

How Many Times Is Enough? Rationalizing Program and Optimizing Performance Through [Repeated] Human-Building Interaction

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Performance in architecture today supersedes the simple characterization of “devising a set of practical solutions to a set of largely practical problems” (Kolarevic, 2004), to now place emphasis on what the building does across numerous dimensions -- notably how it affects and how it transforms -- based on quantifiable, qualifiable and intangibilities of the architectural ‘object’. On the other side, we question how buildings are interpreted, which is contingent on the idea of interactivity – the interaction between buildings and their users, or the container and the contained. In this discourse, however, too much emphasis has been placed on the purely spatial aspects of experiencing architecture at the expense of other understandings – one of which is, vitally, the concept of time.

The goal of this paper, therefore, is to explore how (the frequency of) human-building interaction can constitute the basis for decisions surrounding programming and design optimization. This research, considering space + time in concert, deploys meta-analysis of literature, coupled with case studies and logical argumentation, to shape a provocation and proposition.

Keywords: performance, architecture, time, space, systems-thinking

PROLOGUE

Performance today seems omnipresent in our lexicon. To a degree, traditionally, the origins of architecture began with the pursuit of performance; namely the understanding of human movement, shelter provision and user experience, to determine function and space as suitable solutions. As we consider space and time in our exploration of human-building interactivity, we argue that such relationships transcend immediate experiences of space through deliberate actions, to then consider the frequency of such interactions. How and when do we know what we do not know? *How many interactions* prove sufficient? *How many encounters* qualify the user to render ‘valuable’ information as to the beauty, commodity, and efficacy of space. Kunawong (2019) opines that ‘time’ designs along with the architect, and that while it is subjective, it is a critical architectural dimension embedded in all the phases from design to occupancy. Extending from this notion, we question the point, in the life of a building, where it elicits the emotions/meaning/perspective that truly matter? Does newness render more potent feedback? Does patina, or the rust of time, matter more? Over time, does perception change? If emphasis is placed on the issue of time above space, what limitations around place assessment (and attachment) can be overcome? What, if

any, are the appropriate intersections of the interaction and movement of people within the space? And where is the moment (or window) when space that is experienced can effectively guide design decisions? The cumulation of answers from the questions above constitute the basis for understanding and satisfying our key question: *if the user's interaction with the building were to be centralized in the creation of a design with optimized performance, what qualifies as sufficient experience, in terms of frequency of interactions?*

Our conclusions are hypothetical; the authors contend that there is an ever-growing awareness around performance (both detailed and writ-large) as key architectural design paradigm – one concerned with the results of the generated effects/impacts of the architecture on both people and the environment, and one we maintain must also evoke and involve time within the equation. We wonder however, if these effects/impacts on people, and their environments, are permanent or temporal? In our pursuit of a greater grasp of such relationships and connections, we anticipate an increased adoption of the synergistic combination of performance and time as a priority in the conception and construction of buildings and cities alike, and a reduction of the extent of our 'objective' architectural knowledge thereby, centering the reality of the lived encounter.

This paper, through the study of the role of experience (user perception) and the multi-dimensional nature of time seeks to examine the value and presence of time within equations for architecture's conception and construction, that is, in determining building perception, programming, production, and use.

INTRODUCTION

"The hardest way to improve perceived performance is to improve real performance."

– James Dyson (n.d)

The generic definition of architectural design, *"the design or plan of a building"* (Benge, 2017), implies that for thousands of years before recorded history, architecture has existed. "Someone somewhere at some time likely dreamed up plans for a structure and built it from mud, brush or whatever was readily available" (Benge, 2017, para. 1). However, the first *known* attempt at architectural design is chronicled to have been undertaken by Imhotep, the first *identified* architect, who was credited with designing the first Egyptian pyramid complex, around 2600BC (Benge, 2017). According to historians, Egyptian pyramids were not just extraordinary displays of advanced science and engineering precision, but evidence of architectural design (McKinney, 2020). Although, this was at a time (and for several decades following), when architecture was about a singular by-product - the structure because the measurement of architectural design success was *solely* the building. Buildings were considered more of an engineering feat than design. This is evident in the allusion of the title 'architect' to individuals who were categorically engineers but undertook architectural tasks. In 80-70BC, Vitruvius Pollio, who is perhaps the next most recognizable early known 'architect', was an engineer (and builder), and like Imhotep, did in no way conform to our contemporary perception of architects or the practice of architecture.

The idea of architecture eventually becoming a concept dedicated to more than *just* physical structure; about space, the ambiance of the structure, social impacts, aesthetics, and performance/performativity among other things, came much later. The latter, performativity, which is central to this paper, originated around the mid-1900s (Nevlyutov, 2017). Performativity is not rooted in any architectural tradition, but according to John L. Austin, the individual known for pioneering the idea, is founded in linguistics (Austin cited in Nevlyutov, 2017). In the words of Nevlyutov (2017, pp. 9), performativity refers to "expressions that do not simply describe reality but assert it and create what they talk about being self-referential" (pp. 9). Rather than traditional models of design, performativity opened the door to utilizing a different lens to analyze both "existing and potential realities and acknowledged the specific realness of activities" (pp. 9), which lay beyond the grasp of the established models resulting in more familiar philosophical systems such as phenomenology. Like Bergson (1998), Nevlyutov (2017) debates the dependence on the products of intellect compared to those obtained from perception. They ground this on their studies that support the tendency of intellect to fabricate, as against intuition, which is based on ridding oneself of the rigidity of intelligence and allowing observation and experience to lead.

Applying intellect or allowing intuition to lead are the two fundamental classes in understanding architecture. While intellect has historically been the predominant means of understanding and interpreting architecture, perceiving/observing/experiencing architecture reveals that there was much left undiscovered in terms of designing and assessing the performance of design. The divide between understanding architecture in either of these ways is multi-faceted; (i) Judson (2012) speaks to the observation of architecture from an exclusively spatial viewpoint as an objective one, which is based on the recognition of traditional representation techniques so that architecture becomes an encounter appreciable only to reason and unchanging even to experience. On the other hand, is the shift from architecture's reliance on space, which "erodes understanding it as a singular, stable object... but more as a moment of a transient nature that does not construct a permanent edifice of meaning; rather a condition, requiring the individual's personalized interaction with the building" (pp. iv). (ii) Nevlyutov's (2017) reference to the multi-faceted nature of understanding architecture is likened to the attention to exteriority versus introspectivity. To him, it is an understanding of design from outside the boundary of time versus observations from *within* time – in some form, allowing the design to 'become', (iii) Takatsu & Ando (2013) refer to the two ways as spatial perception and temporal perception respectively, where with the former, the individual is dominated by a pattern/process mode of recognition, and the latter is associated with the "body, human life, the mind and individuality... and creation based on personality" (Takatsu & Ando, pp. 34). This temporal perception is known to be hugely influenced by scales of time. Somewhat similar to Takatsu & Ando's (2013) opinion is that provided by Letherbarrow (2004), which captures the estimation of the authors, and perhaps is the most facile of all the distinctions. Letherbarrow (2004) emphasizes that both of these classes start viewing the building as an object; he then describes what Nevlyutov (2017) and Takatsu & Ando (2013) define as 'attention to the exteriority' and 'spatial perception', as a "result of technical conditionality... the technical and productive, and the other, an assertion of aesthetic expectations... the contextual and projective" (pp. 6). However, how he defers, is in his claim that dispels the relevance of this categorization, whether it be about technology/usefulness or aesthetics. He argues that architecture should not be about what the building *is* but what it *does*, that is, how it performs. This performance, the authors argue, is derived from human-building interaction, which we hypothesize should be the foundation for programmatic decisions in architectural design. Letherbarrow (2004) alludes to this indeterminacy, when he states that performativity is *the* only way capable of revealing the existence behind any architecture.

One reason why Letherbarrows' studies are remarkable is because where other researchers/experts mention the time element superficially, he grounds his, within it. This is critical because performative architecture is incomplete without the influence of the concept of time. Time does not only impact how we experience architecture, but the value we attach to it... because "what is more important is not the human labour invested in the creation of things, but the duration of external factors and impacts" (Nevlyutov referencing Letherbarrow, 2017, pp. 10), in an occurrence known as "weathering". As architecture ages, time brings with it internal and external layers of "enrichment" (Zumthor, 1999, pp. 24), which are the marks obtained from the endless updating and renovation and wear of the building, as well as the action of the weather. Over time, alongside the changes to the building are the changes to the impression on/of the user, where depending on the level of enrichment, the physical traces of what the space resembled can be erased and forgotten. At times such as this, the aesthetics and style become less important and the memories associated with the space take precedent; and the users of the space become the historical tools that bear witness to what the space/design/building sincerely represented (Zumthor, 1999).

While the aim of the authors is not to discount the represented meaning of architecture via the use of traditional elements or the creativity and creative act associated with it, we seek to close the distance between the (essentially two) ways architecture is understood, and to disrupt the idea that all of architectural design can be resolved by the designer.

METHODOLOGY + RESOLUTIONS

"What is the finish line of designing in architecture?" - Maitai Kunawong (2019)

The goal of this paper is to explore how human-building interaction can constitute the basis for decisions surrounding programming and design optimization. Via review of literature, comparative case study, and logical argumentation, the authors attempt to formulate, build and exercise an idea. The necessity of forming and proffering this idea is founded on the notion identified by Gianni Vattimo, that philosophical groundings cannot produce absolute principle and therefore, certainties around architectural design require “a more pluralistic conception of truth” (Judson, 2011, pp. 2). This helps us to begin to answer the questions we believe are fundamental to satisfying the goal of this present paper.

From whom do we obtain the information/knowledge required to design based on human-building interaction? Whose human-building interaction is most valuable - architect or user?

Italian philosopher, Gianni Vattimo (1988), and Martin Heidegger (1996) argued the need for a multiplicity of similarity in thought to establish a design principle, but on what side is this pluralism vital? Going by Vattimo’s (1988) theory of *weak thought*, he suggests that it is impossible for the architect to hold an autonomous conceptual jurisdiction in such a dynamic world, where individual engagements are “rhythmic, fleeting and unpredictable” (pp. 1). *Still*, one may argue that the transference of design elements across generations of architects, and its continued application and implementation, within design could represent a testament to its functionality. Nonetheless, [and in consonance with our previous studies (Daniels-Akunekwe & Sinclair, 2018; 2019; 2020; 2021)] is the rigor in centering public perception; the manner in which users perceive and utilize design should always take precedence in establishing that which constitutes a design principle. In our 2019 paper, we establish that in certain architectural design scenarios, there is a disparity between the elements the architect considers necessary to those the users believe are critical for the enjoyment of the architecture. Where the architect anticipates, based on their own experiences, that they can replicate and elicit similar emotions from/in the user’s experience, in a kind of reverse engineering (Daniels-Akunekwe & Sinclair, 2019), Pallasmaa states that architectural design is most successful when it is derived from public scrutiny and “strongly rooted in the collective consciousness of the public” (1996; 2018). Studies conducted as far back as the 90s up until the present, continue to point to the user/public as the more appropriate source of design decisions; one reason being that although the continued application of certain elements/principles across designs could imply pertinence, it could also result in bias towards said element and the elimination of the need for the continued appraisal of its utility. Heidegger (1996) emphasizes the ‘purity’ of the perspective of the user, who perceives “without any presuppositions – unencumbered by any pre-given idealistic or realistic views” (quoted in Daniels-Akunekwe & Sinclair, 2019).

Judson (2011) highlights the possibility of constructing a contemporary central reference point comprising heterogeneous experiences. Without the daunting task of aggregating a universally acceptable system of principles, within communities, current architects can build a new system – one where design principles are not based on what was, that which has long since been established, but can adopt a new theoretical grounding that has been subject of scrutiny. Architects should no longer design and afterwards commence the undertaking of convincing users to agree to or recognize the value in it, rather designs should be borne out of user preference so that future architects can reference the present to determine the accepted design elements/principles. In much the same way architects currently have an idea of building programming based on historical and preceding designs; present day architects can initiate a novel compendium of elements/principles that constitute a foundation for more applicable and preferred design.

*Does time impact human-building interaction or does the user experience space the same way every time? if user experience changes, is it attributable to the encounters they have had; either the infrequency of visitations or would user experiences *still* change irrespective of the successive encounters/engagements of the space? How many interactions prove sufficient, that is, qualify the user to render ‘valuable’ information as to the beauty, commodity, and efficacy of space?*

Time impacts architecture: once the architecture is complete, *time* assumes responsibility as the next designer and works on the building for the remainder of its life span – “adding another layer on the building” (Kunawong, 2019, pp. 4). Comparable to the architect, time influences the user while it manipulates the architecture. As time manipulates the building and its elements, it also impacts the interaction people have with the space, such that the experience and “the experiential time can no longer maintain linearity” (Judson, 2011, pp. 4). Based on Judson’s (2011) study, there is neither a single time when the user derives the same perception from an experience nor is there a universal perception across multiple users “instead there are multiple ways to experience a space through time”, and the knowledge of these ways “makes it possible to construct a unifying experience” (ibid.) that could form the platform for design. While user experience is subject to change whether or not engagements with the space are infrequent or otherwise, frequent engagement of space alters perception due to the familiarity that is birthed by constant interaction and movement but is capable of illuminating to the user what works and what does not. One dimension that this was most manifest, was in relation to aesthetics. In the Canadian study referenced in Ng’s writing (2020), results showed that the frequency of exposure to architecture desensitized the participants. Over time, aesthetically pleasant architecture ceased to elicit as much awe and wonder, while the more historic buildings, which were initially thought to be unpalatable/vexatious became less unattractive. Although frequent engagement can expose the user to multiple perceptions concerning the design and realization of viability or otherwise of the design elements, experience time could require considerable lengthening to identify or build a perception of elements overlooked during previous engagements.

We, therefore, question what qualifies as ‘frequent,’ how many of these interactions sufficiently qualifies the user to opine on the functionality of the programming of the space. Our logical argument is this: based on a 1993 study conducted by Ericsson et al., the researchers found that for an individual’s opinion on an issue to have significance, it should have been gained by devoting a minimum of 10,000 hours in its study and practice or active engagement. The idea gained prominence and formed the grounding for new studies where he revises the result to indicate that while that amount of time may qualify an individual to proffer a weighted opinion, more time would be required for an opinion to be considered valuable and masterful enough as it relates to principles around craft – which architecture is, among many things. In 2016, Ericsson & Pool stated that, rather than 10,000 hours, 20,000-25,000 hours around/within the object of study would be required. While Babauta (2011) acknowledges Ericsson’s study, he argues that proffering masterful opinions regarding anything necessitates between 6 and 10 years. “There is no one who is great at anything who hasn’t been engaged with the object of interest for at least 6 years” (Babauta, 2011, para. 7). To this, Ericsson & Pool respond with the idea of *deliberate practice*; they suggest that sometimes, should there be skepticism regarding the extent of time (hours), the role of deliberate practice could supersede. The idea of deliberate practice speaks to the high concentration of activity or involvement of the individual with the object of interest in order to develop knowledge about it (Ericsson & Pool, 2016). In one of our previous studies [on pro-poor housing design (Daniels-Akunekwe & Sinclair, 2018)], where we utilize user perception towards designing social housing, while we do not set a fixed minimum number of years, we require the following criteria from intending participants: the user must “(I) have witnessed the construction of and subsequent abandonment/dilapidation of the social housing development, (II) have been of an age that allowed them to be aware of the situation with the development from inception through till abandonment, (III) have been of an age that allowed them to form an opinion about the situation with the development and its impact on the neighbourhood, (IV) currently be able to communicate clear and detailed accounts of their experiences during the period of the occurrence, (V) genuine interest in the phenomenon (and desiring better design), and (VI) have good grasp of the study’s investigation, information that is to be collected, and objectives.

Is newness a more compelling influence on user perception (and appreciation of a space) than patina/rust? At what point in the life of a building is it able to elicit the emotions/meaning/perspective that truly matter? Do we really begin to gain genuine opinions of architecture after the excitement of newness has lapsed? If emphasis is placed on the issue of time more so than space, what limitations around place assessment (and attachment) can be overcome?

Ng (2020) and Kunawong's (2019) studies' approach and explore the issue of newness versus rust/age in diverse ways. Ng's (2020) case study reference was conducted with 236 participants and utilized a conventional photographic medium where images from journals and books were selected and transferred to slides, which were then projected for viewing in small groups of up to ten participants per time. All the architecture selected had to follow certain criteria along two classes: modern/modern-styled buildings and older/old-styled buildings. Although over the years, several semantic differential scales including: friendliness, aesthetic appeal, organization, coherence, character, clarity, repulsion, and elegance, have been identified and employed, Ng highlighted only three scales (the first three listed) based on their consistent utilization across other like-themed experiments. Because "results of studies showed general agreement between verbal and non-verbal approaches" (pp. 4), Ng retained the use of the verbal scale for ease of application. Participants returned to view these images as much as eleven times (to address the aspect of frequency) in a random order, to view and give their perception of three old and three modern buildings from multiple, full-scale views. The results revealed the following: (I) the new/modern-styled architecture(al designs) were more positively evaluated for their aesthetics, than the old buildings even though research indicated that this preference showed no relationship with the age of the building (as all the images collected were of well-maintained buildings), (II) old/historic-styled buildings were organized, and less complicated, while modern designs/architecture were thought to be chaotic and complex; the latter was fraught with too many different kinds of design elements compared to the older buildings, which were simpler, easier to appreciate and navigate, and overall, having a more cohesive and harmonious design and (III) in terms of friendliness (appeal), none was found to be significantly higher evaluated than the other. However, it was noted that participants mentioned that they would generally prefer familiar, predictive architectural designs over the more recent modern-style designs, which may initially arouse excitement by its novelty, but ultimately, evoke contrary emotions (due to the fast peaking of the appeal stimuli) (Ng, 2020, pp. 6-7).

It is apparent that the entirety of the users' experiences of engaging with the architecture is important to creating/developing the appropriate principles, *still*, it is important to note that Ng's (2020) case study mentioned that initial perceptions changed with the frequency of engagements therefore, even though the perceptions changed and contributed towards the final results, it does not render the initial perceptions irrelevant. Every perception from the first encounter is necessary. Perhaps, for future research, studies can be conducted to understand how the initial perception can be maintained.

Kunawong's (2019) study takes a different approach; it investigates user perception and materiality at the architectural design/space scale through a physical case study. For its singular study, Kunawong considers John Deere Headquarters (aka the Rusty Palace) in Moline, Illinois, where the first record of weathered material (steel) was used for architectural applications. The lens that Kunawong (2019) adopts is one that seeks to distort the concept of time and how it influences perception. She is of the opinion that if the weathering of the materials utilized in a space/architectural design over time, can alter the perception of the user because of the observation of negative change to that material, then perhaps, the use of the same material in its weathered form at the inception of design/construction, can deceive the user into maintaining their perception, and desisting from deeming the material in its weathered state as negative. With regards to rust specifically, Kunawong states that the material continues to weather in a manner that changes its coating, "from orange-brown, to reddish orange-brown, until it becomes darker-purple patina" (pp. 4) such that rather than it represents evidence of the passage of time, it could be perceived as a "living finish that continues to evolve" (pp. 4). Mohsen & Letherbarrow (1993) previously discussed this idea, that "finishing ends construction, weathering constructs finishes". The result of this could be that this weathering/wear of materials would be viewed as "just another constructive layer added on architecture." and thus, be able to create a timelessness in architecture (Kunawong, 2019, pp. 5). In our society, where visuality is a huge bias on human perception, addressing elements such as this is critical to ensuring that a space continues to hold the same value and meaning to the user. This is in alignment with where he mentions that, not only was the user solely responsible for programming, but aesthetics was also selected/used based on "senses, feelings, and perception" (Plato, 2010).

Newness is conceivably a huge influence on user perception in two dimensions: one, in the ability of older buildings to become less attractive to us, and two, the possibility for subsequent engagements with a space, to impact how much deference we have for it after precursor encounters morph into regular/repeated visitations.

What, if any, are the appropriate intersections of the interaction and movement of people within the space? And where is the moment (or window) when space that is experienced can effectively guide design decisions?

Unreservedly, the appropriate intersections lie between consistency of use/engagement and meaningful/deliberate interface with the space. Without connectedness, consistent interactions, and personalization of the space, it is difficult to obtain meaningful experiences sufficient to form the bases for the opinions necessary to guide program rationalization and performance optimization. The focus on the user must remain at the center of all enquiries. Based on the studies referenced, precisely isolating the moment/window of the user's interaction with space that provides the most suitable suggestions for architectural design, is impracticable. Furthermore, a singular isolated situation is unable to provide rigorous enough information to constitute a point of reference/guideline.

CONCLUSION

“One of the great beauties of architecture is that each time, it is like life starting all over again.” – Renzo Piano

The present paper, through exploration and provocation, interrogated the value and presence of time within equations for architecture's conception and construction. By no means, do the authors imply a removal of the architect from design decisions but, rather and critically, advocate for the reduction of the extent that our 'objective' architectural knowledge, which could be illusionary, be involved, so as not to diminish or dissipate the reality of the lived encounter. Our experiences of space and place, and the accompanying emotions, matter, and should carry as much weight as more empirical, scientific, and substantive means of assembling and assessing design. Many times, our orthographic drawings – our trimming of space to drawings and renders – can morph into an enemy of imagination, and our familiar repetition of program arrangement, drives us to degrade/discount the possibility of chance encounters and immersive experiences. The result of a reliance on the overly rationale dimensions of the profession & industry are, all too often abstract spaces and vacant engagement – an antithesis of what the user expects and deserves. The users expect spaces and places that are not merely piloted by logic and defined by know-how, but equally by the visual poetry along with all the other sensorial qualities of the built environment that favor life and preference living. Quality of Life (QoL) is complex and can be elusive. That said, the architect's greatest aspiration must be to craft meaningful, potent, beautiful, and memorable milieu. Perhaps, rationalization must not stem solely from expertise but from familiarization. Any formulae for design should embrace the pragmatic and the poetic. The negative consequences of imbalance and indifference, to such ends, proves far too consequential.

The study of the role of experience (user perception) and the multi-dimensional nature of time on determining building perception, programming, production, and use.

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