



# On Imagining in Spatial Design

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## Abstract

Using the imagination during the design process is a critical part of how designers design, using it in the synthesis phase to generate ideas and find creative solutions to a given problem. However, what designers imagine - see in the mind's eye - during the design process is a complex and difficult to articulate phenomenon, which, until recently, has been not been greatly understood or articulated. This early study reports on an education context where exercises were integrated into undergraduate design studies aimed to enhance the imagining process. Outcomes suggest that exercising the imagination in this context assists future designers to become more skilled in design synthesis practices which explore various temporal, existential and physical qualities in future spaces, as well as be able to articulate the seemingly 'mysterious' aspects of the design process.

Keywords: **Imagining, design process, thinking, synthesis, education**



## **Introduction**

Of all the questions we can ask about design, the matter of what goes on inside the designer's head is by far the most difficult and yet the most interesting and vital (Lawson, 1980, p. 94).

Considering the developments in technology over the past three and a half decades, it is somewhat surprising that “what goes on in a designer's head”, or imagining and mental problem solving remains just as mysterious and just as pertinent as it was then. Watching a designer work as they draw lines on a page and rough out small sketches are all clues which help us understand what may be going on in the mind of the architect or designer. However, how they know that space intimately before it is built is not greatly understood and articulated – even by designers themselves.

Until recently, there has been a ‘gap’ in understanding in terms of informed exploration of the thinking that occurs during the design process, and how this is translated into physical outcomes, such as buildings and other spaces. Recent research is beginning to understand what designers see in their mind's eye during the design process, and what they ‘see’ when they draw and design (McAuliffe, 2013). However, even with this knowledge, more importantly, how can these skills be taught to designers? This paper aims to discuss the phenomenon of imagining during the spatial design process and the more recent developments in understanding it. In this context, this paper discusses why such skills are still necessary to teach as an explicit and fundamental component of the design process, and how this has been embedded in an innovative way in creative design education context.

## **Background**

In order to discuss how imagining may be taught as an explicit tool in design education, it is first necessary to define the design process and imagining in that context.

For the purposes of this paper, design process is described as the method undertaken by a designer or design team in generating a proposal related to a building or interior environment. Zeisel (1981, 1984) defined design process as having three elementary design activities: imaging, presenting and testing, and these are undertaken iteratively. Here, potential ideas are presented, most commonly expressed externally through drawings of varying abstraction in order to be ‘tested’ by the designer or used to invite feedback by others. Imaging is an internal process and is described as “forming a general, sometimes fuzzy, mental picture of part of the world” (Zeisel, 1984, p. 6); it is this aspect of the design process that is the focus of this paper.

In design, imaging provides designers “a larger framework within which to fit specific pieces of a problem as they are resolved” (Zeisel, 1981, p. 7). Also described as or in association with Zeisel's model is the term ‘visual thinking’ which Roam (2008) describes as “taking advantage of our innate ability to see—both with our eyes and with our mind's eye— in order to discover ideas that are otherwise invisible, develop those ideas quickly and intuitively, and then share those ideas with other people in a way that they simply *gel*” (Roam, 2008, p. 4).



Studies undertaken by Sommer (1978) of the design process revealed the flexibility and non-material character of images and their ability to allow unusual transformations. Singh (1999) also undertook observational analysis of the architectural design process, identifying that mental imaging plays an important role in the design process and that first, the “flexibility and speed available in mental imaging is far more superior than sketching or modelling...enabling a student to experiment and choose between options at higher rate than sketching or modelling” (Singh, 1999, p. 4).

Mental imaging is also understood to occur when a designer imagines or visualises the possible outcomes or solutions to a design problem using internal pictures (Block, 1981). Here imagery is a cognitive function of the brain, allowing the designer to ‘see’ and manipulate ideas and possible solutions (Block, 1981).

In exploring the process of mental imaging, Athavankar (1997) raises some issues pertinent to design education. Whilst mental imaging differs between industrial design (typically small-scale objects of use) and architecture and interior design (larger-scale spaces which people typically inhabit), Athavankar does raise an important point:

*Design education traditionally has emphasized sketching and its use in creative explorations and is now supporting the use of computers as an alternative representation tool. The education has neglected the development of visualization and imaging abilities, not fully realizing their potentials as well as implications for creative pursuits. There are no conscious attempts to promote the development of imagery and abilities to control images voluntarily and thereby facilitate problem solving. Knowing full well that working on computer workstations makes greater demands on imaging abilities, how effective will future designers be, without the ability to develop virtual models in their mind to support their thinking? (Athavankar, 1997, p. 39).*

Athavankar (1997) is one of few design theorists who specifically address the notion of imagining in designing as its own process, unrelated to sketching or decision making. Folkmann (2010) specifically describes and analyses the process of imagination in design, seeking structural features of the imagination in the dynamic interaction between consciousness and the exterior material work, and how that relates to the design process. He argues that imagining in the design process has received little focus in design theory, despite several studies of significance (Folkmann, 2010, p. 1).

Liddament (2000) argues that not only is it impossible to know what is going on in the inner space of consciousness with regard to imaging and picturing in connection with design (“what goes on in the designer’s head”), the very notion of a particular essence of creative imagination is problematic. For him, ‘imaging’ and ‘imagery’ is “not something intangible which takes place in a mysterious ‘medium’” (for example, in the mind), but instead “imaging is a doing” that “alludes to the thinkable, and this means: to the do-able” (Liddament, 2000, p. 604).



## Mental models, simulation and imagining

In design and architecture, mental simulation has been anecdotally described as an activity of utmost importance. One such example is where Tafel (1979) describes how Frank Lloyd Wright in 1928 developed the concept for Fallingwater, an iconic architectural residential building in Pennsylvania. The building was commissioned by Edgar Kaufmann, who kept in contact via telephone with Wright to enquire how the design was progressing. For almost one and a half years, Wright's response was simply that the plans were proceeding well, although unbeknownst to the client, no drawings were yet undertaken. One day, Kaufmann called and proclaimed that he was en route; two hours and twenty minutes away. It was only at that point that Wright began sketching plans for Fallingwater; first and second floor plans, with sections, elevations and details. All were drawn up almost true to final form, apparently developed fully in Wright's head prior to producing external representations. It was later that Wright described his design process in the following manner:

*Conceive the building in the imagination, not on paper but the mind, thoroughly – before touching paper...Let it live there – gradually taking more definite form before committing it to the drafting board. When the thing lives for you – start to plan it with tools. Not before. To draw during conception or sketch, as we say, experimenting with practical adjustments to scale is well enough if the conception is clear enough to be firmly held...But if the original concept is lost as the drawing proceeds, throw all away and begin afresh. (Wright, 1928)*

This reflection suggests that design concept development is able to be carried out by using only mental simulation and imagery first, and that the concept perhaps should not be committed to external representations (paper or prototype) prior to a process of consolidation.

More recent studies into this aspect of design process have revealed that, contrary to previous research, imagining in the spatial design process is multi-faceted, can be articulated, and is not a mysterious process, as previously understood (McAuliffe, 2013). In fact, for experienced designers, imagining can be such an immersive process, it can replicate a sense of presence, where an individual experiences a subjective feeling of 'being' and 'acting' in a virtual environment (Slater, Usoh & Steed, 1994). In her research, she argues that a 'virtual environment' can include an imagined place in the mind's eye, not only a digitally-mediated environment.

In the many types of presence (digitally and non-digitally mediated), the non-mediated *literary presence* is most closely aligned with imagining in the spatial design process. Literary presence is a phenomenon experienced when reading a particularly immersive narrative where an individual can be led to believe that they are somewhere they are not, or in the presence of people and objects that do not actually exist (Lombard and Ditton, 1997).

McAuliffe (2013) proposes that in imagining, if the individual utilises certain strategies such as those described as contributing to flow (Csikszentmihalyi, 2004), then presence can, and does,



occur. Flow occurs when an activity includes elements of novelty and discovery and an autotelic, effortless, and highly focused state of consciousness is experienced. Csikszentmihalyi (2004) defined flow as having nine essential elements:

1. *Clear goals:* an individual always know what needs to be accomplished next;
2. *Immediate feedback:* actions produce immediate feedback to signal how well an individual is doing;
3. *Balance between challenges and skills:* abilities are well matched to opportunities for action;
4. *Action and awareness merged:* concentration is focused on the action;
5. *Distractions excluded from consciousness:* as a result of intense concentration, the individual is aware only of what is immediately relevant to the task at hand;
6. *Little concern for failure:* clarity in what needs to be done; skills are matched appropriately with challenges and fear of failure does not exist;
7. *Self-consciousness disappears:* involvement absorbs one with the project at hand;
8. *Sense of time becomes distorted:* perception of how much time has passed depends on enjoyment of the task; and
9. *Activity becomes autotelic:* the task or activity has an end or purpose in itself and is worth doing for an individual's own sake.
- 10.

In McAuliffe's (2013) large scale study, it was revealed that the three forms of complex but distinctly different forms of imagining in the design process consist of; [con]textual, visual (pictorial and spatial), and aesthetic imagining. The latter is particularly significant in the design process as it demonstrates embodied consciousness and enables designers to form poetic assemblages early in the design process before external visual representation is necessary. These three types of imagining are represented as the *Spatial Design Imagining (SDI) Model*, which describes that experienced designers demonstrate the following features in imagining:

- Synthesis
- Orientation to the future demanding conjecture and simulation
- Simulation that involves imagined transportation to, immersion in, contextual engagement and intervention with the modelled environment (McAuliffe, 2013).

Overall, imagining effectively supports designers at a macro, highly abstract, synthesising level in the initial stages of designing and is directly beneficial in assisting in creating a satisfactory solution for a design problem.

### **Imagining in the Design Process**

The impetus for explicitly teaching imagining in design began with a desire to better understand how to enhance student learning in and about design, increase attention and provide the opportunity for students to articulate and share their cognitive process. How do students best 'create' mental representations of the spaces they are creating for others, and moreover, how do they articulate those spaces in verbal, textual and visual representations? Informing this were observations and concerns about the initial stages of designing and how much was developed 'in the student's mind' (the imagining process) before it was externalised by the student. Despite



attempts to assist students in development of drawing and visualisation skills so as to represent and expose their thinking and imagining, there was an inherent reluctance, even resistance, by the students to discuss this process with their tutor or peers. If the student cannot articulate their design 'envisioning' to the tutor, there can be little or no shared understanding of the process or the end solution, which in turn makes it challenging for the design educator to provide appropriate feedback.

### **The context**

After in-depth research and investigation into how the educator might address the above issues, imagining exercises were developed to be taught as explicit exercises to design students. Considering how fundamental imagining is to design, it is often surprising to those outside the design field to learn that the development and honing of these skills in spatial design education is considered tacit, rather than made explicit. Thus the aim of "building" imagining exercises into design education may assist students to better learn how to design, and thus be able to articulate the seemingly 'mysterious' parts of the design process.

Alternative ways to foster imagining and a deep engagement with the design process was essential for students to really "connect" in the synthesis stages of design, so using McAuliffe's (2013) research and SDI Model as a goal for students to achieve long-term, several fundamental exercises were developed. These were formulated with the concept of imagination as the core activity, and if they were to be successful, had to be perceived as relevant and engaging as well as useful in developing student's imagining processes.

The next stage was to experiment with various methods, and after several trials, eight exercises were developed, with the following criteria:

1. No exercise could be longer than seven minutes (long enough to hold attention, but short enough to reduce the potential for disengagement);
2. All exercises must be varied, and must explore different elements in design, from abstract to real space;
3. All must be carried out via drawing and/or text;
4. All exercises were to be carried out in silence to avoid distraction;
5. All exercises were delivered so the students were to listen or think, but not watch any media; and
6. None were to require students' use of electronic devices.

For each exercise, the lecturer would manage the delivery of the exercise, and the students were to place their laptops and other electronic devices out of sight. Whilst the exercise was underway, the students were to draw what they felt was represented in the provided media. The eight exercises are described below.

Imagining music: The first exercise was for the students to listen to classical music, which was



chosen because there are no lyrics to suggest images or scenes. The third movement from Saint Saens' piano concerto number two was the given piece, and students were to draw what they felt it represented. A lyrical and fast moving work, the students often illustrated landscape or other such 'outdoor' scenes. This activity was deliberately sent as an 'open', where the students could depict whatever images came to mind.

Imagining audio: The second activity was to listen to a small clip from an audiobook, Frances Hodgson Burnett's *Secret Garden*. The scene was where Mary, the main character in the book explored the mansion where she lived, where there are many interior spaces described. The students were especially absorbed during this exercise, and depicted colours, textures and materials, with many drawing perspective sketches to represent interior space. As this activity was designed for students to begin considering interior elements, it was successful in achieving those aims.

Imagining text: The third exercise was aimed to inspire students in considering both interior and exterior space, and the transition between those spaces. For this, they were to mentally visualise a letter of the alphabet, then imagine it scaled up to be the size of a two story house. They could draw this as a whole space in plan view, side views, perspective views, and interior or exterior views. This activity was designed to enhance spatial conceptualisation, and was, overall, successful.

Mental looking: In attempting to move students' imagining in exploring viewpoints and memory, students were to close their eyes for approximately two minutes and visualise looking through a window to an interior space, then draw it. They were then to repeat the same exercise, except the context was looking out through a doorway. The students described being very absorbed in the task, and a sense of "other world-ness" was reported.

Imagining mapping: In taking imagining to a more abstract level, the fifth exercise required students to "visually map" a context in three different ways: spatial – where they were in their classroom on campus; temporal – a map of time relevant to where they may be in the semester, the day, the year, etc; and conceptual – a map of concepts such as their learning process, a book chapter, etc. This was a particularly challenging exercise, and in retrospect, would be better suited for depiction of one type of map only.

Flow of thought or memories: In keeping with the concept of abstraction, whilst considering space and place, this activity was designed to be more connected personally to each student. The students were to draw a flow of thoughts as they flowed into the mind, or draw a memory of childhood. This could be represented abstractly or representatively. Of all exercises, this was the most successful so far in that the students reported the highest levels of engagement and absorption.

Imagining colour: An exercise designed for students to 'represent colour' without using coloured media (such as paint or pencils, etc.), this was a more fast-paced exercise where students were to



listen to the lecturer narrate a short chapter of Italo Calvino's *Invisible Cities*, a story about imaginative dreaming and to draw elements that depicted colour. This was successful in that students were able to follow the story, but it was perhaps a little too fast paced with too many scenes within the chapter. Students became a little stressed at the number of scenes they felt they had to draw; as such the outcomes of this activity were very similar to the mapping exercise in that the task was too complex even though high levels of concentration were reported.

Mental experiences in space: Taking a scene from Alexander et al's *A Pattern Language*, the lecturer narrated one chapter of the book depicting a flow of experiences in interior spaces, while the students were to draw them. This final exercise was aimed at asking students to represent experiences from a sequence of spaces. This was a highly successful exercise that engaged students to a significant level. Overall, the students reported that they were extremely highly absorbed in the tasks.

### **Discussion and Conclusion**

Early feedback from the students, as well as observation from the teaching staff over the course of the semester revealed that positive change was occurring in the classroom. The exercises were held weekly, and by week six (of the thirteen week semester) gradual results were revealed. Firstly, student engagement during the design exercises improved, with more students displaying more creativity and design exploration than in previous design units. Secondly, students were more verbal in explaining their synthesis with tutors and peers, allowing for a more open transparent design process. Finally, students reported that the imagining exercises helped them develop focussing and concentration skills, thus allowing the mental formation of images to develop and flow more easily. One comment from a student was that *"these activities somehow make me more creative, and the ideas seem to flow more easily and often. I've really noticed the difference now I've started using them"* and another student stating that *"I actually take the time to do one of these exercises before I start my design and it seems to help me focus –they are surprisingly useful!"*

In all, the imagining exercises appeared to give students a deeper awareness and understanding of the various mental skills designers require for intuitive thinking, whilst at the same time, allowing them to engage in the process of production and representation through imagining and drawing. This process also allowed them to structure their imaginative thinking and communicate ideas on paper. Another important aspect of this was that developing a deep sense of awareness and consciousness on a cognitive level assists students to empathise with the end user of the design; a fundamental aspect of thinking like a designer.

The imagining process was aimed to extend from daydreaming and fantasising through to abductive and speculative thinking, which is what experienced designers inherently do in the design process. Through these exercises, the students were able to generate mental models that represent imagined environments that are multidimensional. In so doing, they become more skilled in design synthesis practices which explore affective, existential and temporal qualities as well as physical qualities in 'future' spaces. Overall, early outcomes of this early study reveal that



imagining effectively supports students in learning design synthesis, and that, if explicitly integrated into design studies, may assist them in growing more confident at articulating their internal cognitive processes and images.

To a large extent, imagining in the design process has remained uncharted territory. Perpetuating this is the belief that design ability stems from creative talent – it is mysterious and inaccessible; something that many practitioners exploit for various reasons in their relationship with clients. However, as Polaine (2011) points out: “We have sold what we do as magic at the cost of hiding our processes, and when we hide our processes we can no longer articulate them, teach them or give them the value they deserve” (Polaine, 2011, p. 44). The experiment undertaken above – although in early stages – may be a first step in removing the “mysteriousness” in this process and thus enable students in developing core skills as designers with “future-focussed” abilities.

Future studies in this area may involve a wider participant pool internationally as well as nationally, and potential development of implementation strategies by spatial design educators to apply, evaluate and extend imagining (and thus the SDI model’s) value in spatial design education.

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