Original Paper

Within the Space of Drawing: Lines and the Locus of Creation in Architectural Design

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Abstract

This paper considers the practice of drawing lines in the context of architectural design. The core argument is that drawing lines generates the conditions for creative thought. Moreover, this initial claim is discussed in the context of the creative process in architectural design, as lines play an indispensable role in the locus of creation. First, the so-called "representational paradigm" about hand drawing is critically discussed, leading to the exposition of a new philosophical account regarding drawing. This new position consists of three theses: (I) it regards the drawing surface as a topos *or "space of drawing"; (II) it regards drawings as situated figurations; (III) and it regards lines as processes. Jointly, these three theses form the "performative paradigm", casting each aspect of the drawing process in terms of an unfolding dynamic in which inhabitative imagination and aesthetic sensibility play decisive roles. Lastly, these conclusions are formalized in a design model.*

Keywords

Aesthetics, hand drawing, lines, imagination, creativity, design cognition, architectural design

1. Introduction

The practice of hand drawing is ubiquitous throughout the design disciplines. It is taught around the world as one of the most straightforward techniques of developing ideas, exploring intuitions, prototyping solutions or communicating concepts (Note 1). Seemingly simple and straightforward, the dynamics of hand drawing seem easy to understand. That is, as long as one accepts that drawing is a form of mimetic (i.e. broadly imitative) visual representation, thereby considering it as a representational technique (Note 2). But to accept *that* viewpoint would be unnecessarily reductive, as it has been argued convincingly that hand drawing is not just a form of representation, but that it constitutes a form of thinking in its own right (Note 3). As such, it is an issue that has its home in the

realm of aesthetics. From Kant's Third *Critique* onward, aesthetics has predominantly focused on the notion of the beautiful. However, if we recast it as what Hegel aptly called "the science of sensibility", we see that it encompasses not only the notion of beauty, but the dynamics that characterize artistic practices such as painting, sculpting or drawing in the broad sense. An inkling of this approach is already inherent in Kant, who approached reflection as a type of sensibility-in-practice (Note 4).

Returning to drawing, the statement that drawing is a genuine form of thinking – no matter how intuitively appealing – presents us with paradoxes left and right. If drawing is indeed an autonomous form of thinking, *how* is it so? How does visual and gestural creation guide the process of (creative) thinking, or tap into aspects of that process that no other activity can reach? If aesthetics is concerned with the sensibility inherent in artistic practice, then it must provide an answer, model or tentative theory.

To address this question, I take an indirect route and expand on a very simple claim: that hand drawing of lines is a *form of generating conditions for creative thought.*

To constrain the focus of this paper, I limit the discussion to the *drawing of lines* in architectural design. Creating lines, as architectural theorist Marco Frascari argued, is itself a way of "architectural thinking" (Note 5). Although I'll return to Frascari's statement later on, I'd like to extend his thesis to support an additional claim: not only constitutes the drawing of lines a form of thinking, but correspondingly, lines play indispensable roles in the emergence of the *locus of creation*. In the course of the argument, I'll explain what this claim means.

2. The Representational Paradigm: Three Basic Assumptions About Hand Drawing

To set out the position I criticize, let's introduce three assumptions about hand drawing and lines in architectural design that jointly constitute what I call the *representational paradigm*:

1) The first assumption about drawing is that it occurs on a *neutral plane*. This idea can be traced back to Ancient Greek conceptions of the human mind. The mind was regarded as a *tabula rasa*, or empty plane that would be inscribed by impressions or marks (Note 6). Notice here the close analogy with the development of writing: the mind was conceived as a surface that would acquire its unique shape by external influence, just as the empty sheet of paper is marked with symbols or marks by an author.

    This assumption made it easy to lump drawing and writing together under the heading "the production of traces" (Note 7). In doing so, the act of drawing was silently subsumed under writing (Note 8).

    Writing means permanence: a text can be read in the author's absence, as the marks have a lifespan that exceeds that of the human being. From the very first beginning of architectural drawing during the Renaissance, the material aspect of this permanence claimed center stage: first, a parchment had to be prepared, then a line had to be engraved into it, and this line had to

be filled with specially prepared ink (Note 9). Before the line could achieve its permanence, an entire sequence of material processes was required.

2) The second assumption is that drawings are *imitations* or *copies* of an object or idea that they are supposed to faithfully represent. The idea that the arts are essentially imitative can already be found in Aristotle's *Poetics* (Note 10). Aristotle notices that imitation is a form of learning, and that imitation offers delight or pleasure. We encounter a similar thought in the Platonic corpus of works, which states that the arts focus on imitation (*mimesis*) to achieve visual resemblance (Note 11). In some cases, this is true, as there are drawings that are meant to specify certain features. For instance, technical drawings must closely resemble the objects they depict to be useful at all (Note 12).

Continuing from this assumption, it is but a small step to imagine that a drawing is always a *visual representation* of an absent object that functions as a stand-in. A drawing may be seen as a *copy* of an object. It may also be seen as a *visual representation* of it. The distinction between these two is that a drawing may indeed represent an object (as in still life painting), but that object need not be absent. In the case of designing, the object-to-be is at least partially absent, and so drawing fills in an imaginative rather than a representational gap. This assumption follows from the idea that drawing is imitative. The object that is depicted is absent, or does not even exist yet, but the drawing makes it present in a precise, descriptive and tangible manner (Note 13). This conception of drawing owes much to Leon Battista Alberti's idea that drawing is the process of setting up a descriptive geometry (Note 14). That is, a precise, scale-drawn visual representation of an object that is to be built. Alberti codified drawing in such a way that it became a tool for transmitting ideas between designer and builder. Likewise, the drawing became a tool for "intellectualizing" an idea (Note 15). By geometric representation, otherwise fuzzy ideas became stable objects of inquiry (Note 16). Not only do they acquire a kind of "objectivity" or representational stability, but likewise, they become amenable to a process of control and metric measurement.

The line was in this type of drawing the mark of precision, through scale and metric precision corresponding to a future line or given measure in the real world. However, the lines from which the drawn object is constructed play a vastly different role in the process of creation. Their role in the drawing process is not reducible to merely faithfully representing an object.

3) Third, *drawing* has been subsumed under writing as the production of a kind of script that serves a communicative purpose. This is not to say that drawings never serve to communicate information – the technical drawing comes to mind. Instead, drawing is a noun – it is not a synonym for illustrating or codifying completed, well-formed thoughts. The written text has often been held up as a pinnacle of expressive precision at the expense of the drawing. 20th-century continental and analytic philosophy took quite some time to come to terms with forms of expression that were not syllogistic, propositional or text-based or that had no clear

38

signifier-signified structure (Note 17). The discussion of what constitutes images has developed only recently with image theory and media theory. It should be indicative that we have a philosophy of language, but no philosophy of drawing. Often, when we discuss language, we talk about written language, propositions or well-formed statements (Note 18). This has one important ramification: lines are seen as *passive traces* or *marks of a notation process* that bears a close analogy to writing, although the line itself cannot be treated as a proposition or statement (Note 19). But as poststructuralism and hermeneutics have both shown, text and image alike are very much active (Note 20). Drawing has a dynamic of its own – a regimen of operation that is not reducible to writing, although it is also notational (Note 21).

Concluding, the representational paradigm rests on three assumptions: (1) drawing occurs on a neutral plane; (2) drawings are imitations/and or visual representations of an (absent) object; (3) drawing is a kind of script and therefore lines are passive traces. In the next section, I discuss an alternative to this account.

3. Entering the Space of Drawing: The Performative Paradigm

To rethink drawing in architectural design in a direction that diverges from the representational paradigm, I propose an alternative philosophical account for each of the three initial assumptions introduced in the previous section. In doing so, I provide numerous arguments to rethink basic aspects of the nature of drawing as utilized in architectural design (Note 22). More importantly, these arguments support my claim that drawing lines generates the conditions for creative thought. Put concisely, my claim is that drawing is inherently performative. As such, the account sketched here can be regarded as a *performative paradigm*.

I discuss three countertheses against the representational paradigm (I): the drawing surface is not a neutral plane, but a *topos*; (II) hand drawings are *situated figurations* and not visual imitations; (III) lines are not passive traces, but active processes.

3.1 From Neutral Surface to Inhabited Topos

Consider the conception of a drawing surface as a *neutral plane*. What does it mean to draw a line, or to trace a figure on such a neutral plane? At first sight, it implies a form of notation on a medium for later retrieval. Although this answer is correct, it is also trivial. It tells us nothing about either the nature of the drawn line or the drawing surface. It is as applicable to any form of writing as to drawing. If we wish to know the nature of the drawn line, we have to move beyond functional explanations, and consider the effectiveness of drawing.

A first hint of this effectiveness lies in the etymology of the verb "drawing". To draw is to pull a sharp object across a surface, scratching the trajectory that it followed. The pulling activity is important, as it implies the exertion of force, something that we do not usually associate with drawing nowadays. However, history shows that the relation between the drawing instrument and the surface was

multi-dimensional. With modern drawing, the drawing instrument (pencil, marker) largely lost its material connection to the receptive surface. However, from classical antiquity up until the Renaissance, engravings and drawings were largely inseparable. To draw effectively, a parchment had to be prepared, inscribed and filled with specially prepared ink. If anything, the line lost in this type of procedure much of its spontaneity. As we can witness in the drawings of for instance Leonardo da Vinci, sketching remained possible alongside writing (Note 23). But still, even when the material link between line and surface is weakened, the line creates a new situation. Especially during a creative process, the relation between line and depiction grows more complex than one would suspect:

> *I put down something on paper and then react to it. Once I make a line, it becomes a condition: does it look like what I thought? Does it make me want to draw another or shall I erase it? It encourages me to make decisions only I can make. It has instantly become something that already exists and it draws me into the world of its own need to be drawn* (Note 24).

In the quote above, Doug Fitch describes the line as a *condition*: it transforms the surface on which it is drawn. It directly demarcates it in left and right, up and down, in and out, and it may even suggest depth. Through the presence of the line, the surface acquires an orientation. Simultaneously, the line invites further exploration. Even before we consider the line's instrumental value as a vehicle of visual representation, we must consider it as an effective cause. The line *transforms* the surface – it is not merely a passive trace on a passive canvas. Once the line is drawn on the surface, it engages in an interplay with it. The German term *Bildakt* (image act) emphasizes this dynamic character: a line is a visual act rather than a static representation (Note 25). The anthropologist Tim Ingold investigated line patterns that the South Indian *Kōlam* use to ward off demonic presences. These patterns, writes Ingold, are "not made on a surface, but they define it as a geometrical plane." (Note 26) However, in a form of artwork called *kampi*, even this clear distinction between line and surface becomes indistinct. The lines seem to dissolve the surface (Note 27). This simple example illustrates already something of the complex, dynamic relation between *line* and *surface*, or alternatively *figure* and *ground*.
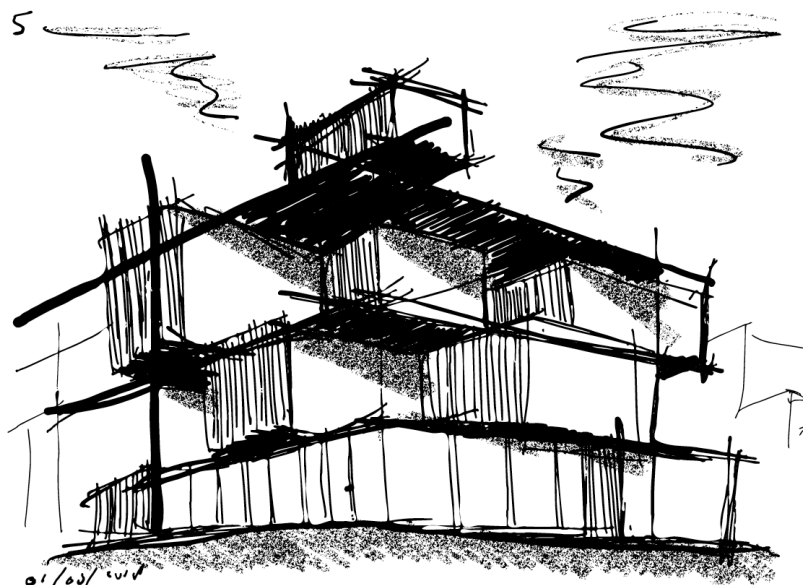
Figure 1. This Sketch Is Expressive rather than Descriptive as Its Lining and Shading Suggests a Depth and Volume That Adds an Additional Dimension to the Surface. Author, 2018.

Similarly, John Berger states that the paper "becomes what we can see through the lines drawn on it; yet it remains itself (Note 28)." All this points to an effectiveness exerted by the drawn line. Drawing a line is not just an inconsequential act but causes various visuospatial effects that are not merely representational. Many of them have little to do with representation but are intended to create sufficient conditions for an idea to appear (Figure 1). In view of this, it makes sense to think of the line as an *event* rather than a symbol, mark or trace.

Fitch mentioned the line as the creation of a *condition*. As image acts, lines actively create conditions that do not just happen to the surface, but that transform the surface into a space. We can quite literally wander in-between the lines in this imaginative space, and "take it in possession" (Note 29). For good reason, Michael Polanyi spoke of "indwelling" in an idea, regarding them as spatial rather than visual or conceptual entities. This inhabiting process allows for imaginative immersion. This is important as architecture is inherently spatial. The fact that drawing takes place on a flat surface or a digital screen does not change this. Paul Emmons took this thought a step further by coining the term "inhabitative imagination" (Note 30). Echoing theories from the Renaissance onwards, the idea is that drawing facilitates the process of mentally inhabiting the building or space that is being designed. As Le Corbusier put it: one must learn to "stroll" with a pencil (Note 31).

As Gaston Bachelard once remarked, *all* thinking is to some degree spatial (Note 32). We order our thoughts in up and down, inside and outside, above and below, before and behind… Thinking is inherently relational and architectonic in the sense that it turns towards systemic relations that have a certain spatial orientation. For this reason, Pallasmaa describes the "architectural image" as an organizing image (Note 33). With "image" he does not just mean a visual representation of a building

41

or a space, but the most basic categorical order that we use to think at all. This categorical order encompasses the distinctions between inside and outside, up and down, horizontality and verticality, static and dynamic, defined and undefined. These relationships are mapped out and staged while one draws. The line as a condition marks the beginning of a thinking-through-creation, utilizing the most basic spatial categories of thinking to inhabit and make sense of an idea (Note 34).

The French writer Michel de Certeau has drawn attention to the anthropological and symbolic languages that are used in this process (Note 35). In the case of anthropological language, the drawing is approached as a space, and one can orient oneself in it. Descriptions like "follow the hallway and turn right at the end to enter the living room" imply a form of perspective-taking that occurs while drawing. Likewise, in Donald Schön's seminal sociological study *The Reflective Practitioner*, this "conversation with the situation" occurs continuously (Note 36). The fact that this situation is conducted through the embodied mind makes it a lived experience rather than dry theorizing. Recent findings have shown how important the relation to the first-person perspective is for architectural design. Drawing an idea from various perspectives involves perspective-taking, aided by embodied movements (Note 37). The process of inhabiting various perspectives brings an idea (or even a world) to life (Figure 2).
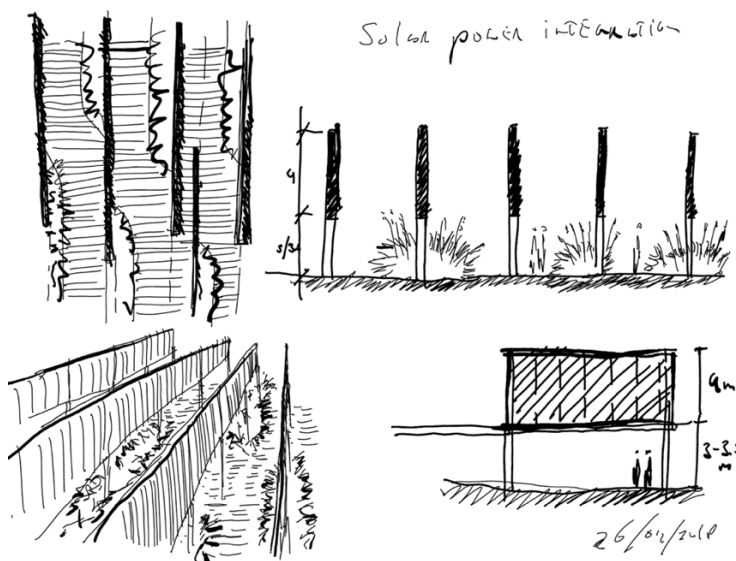
Figure 1. Different Perspectives and Human Figures Allow One to Imaginatively "Inhabit" a Drawing or Idea. Author 2018.

Conversely, symbolic language stabilizes lived meanings. It uses a broadly standardized system to order the plurality of perspectives and notions. For instance, the architectural map is an abstract totality in which the viewpoint is changed from playful, perspectival exploration to systematic abstraction. The map represents a point of view and a level of abstraction that we do not encounter in everyday life.

But while drawing lines, one visually constructs literally a space that is explored and that becomes an active participant in the creative process. The surface is instrumental in achieving this:

> *The architect's drawing surface is not merely a neutral support awaiting the appearance of meaningful marks. Like soils on a site, drawing board materials impact the work. The drawing sheet is an active participant that is already propitious, or, as Chinese calligrapher Li Yang-ping wrote, excellent drawing paper is 'generative'* (sheng-chih) *in that even when unmarked, it is not empty because fine paper is 'endowed with life like fertile soil'. Paper's qualities can inspire the consideration of a particular site's qualities. (Note 38)*

Li Yang-ping draws attention to two aspects that deal with the materiality of the drawing surface. First, the very materiality of the surface is generative by itself.

The analogy with soil points towards a process of cultivation or actively working with the substrate. Like Frascari's notion of "sedimentation", the architectural idea requires a slow seeping-in and settling of its various aspects (Note 39).

This growth process requires a physical locus, or "space" in which ideas develop. Again, De Certeau has taken up this theme, describing the space of writing (and drawing) as *un espace propre* or "proper space" (Note 40). The drawing surface provides such a proper, well-defined space. Not coincidentally, there is a direct link here to the idea of a designated, sacred space:

> *Sacred space marks a break in homogeneity of undifferentiated space and provides a spatial orientation through which a world is founded. In the double operation of detaching and reframing, the ground re-appears as the site in its discontinuity. (Note 41)*

Like the architectural image that Pallasmaa alludes to, the drawing surface becomes a carefully differentiated site for thinking and world-building alike (Note 42). Demarcated as a space that differs from its surroundings, the drawing surface acquires its special character. Put differently, we may approach it as a *generative habitat* or cognitive ecosystem. It is a space in which the conditions for world-building, thinking-through-gestures and organized visual experience are nurtured and developed. Above all, it is a space in which ideas are powerfully condensed and concentrated, forcing them to assume a shape (Note 43).

As discussed, from its very inception, drawing involved the material of its surface, but it was only with the rise of descriptive geometry that the surface as neutral plane or projective background appears. The focus shifts towards the precision of the contents that are depicted. In digital drawing, this conception of the background as neutral space is ubiquitous, as the practice of drawing takes place on an empty artboard or modelling space. However, as Peter Cook argues, the surface is anything but passive:

> *Such [visual] indulgence allows the whole surface of the drawing to reach out to the observer, never letting one rest for a second, and somewhat in the manner of an illustrative cartoon feeds in many intriguing and diverting minutiae. (Note 44)*

The surface reaches out and invites one in, never resting but always suggesting something new and fascinating. We might see it like a space or habitat for thought, rather than a flat canvas.

43

Understanding the drawing surface as a *generative habitat* brings us to the second point that Li Yang-ping raises: the drawing surface truly is generative. Perhaps unwittingly, Yang-ping echoes classical Chinese thinking on painting. The idea is that the drawing surface is a space (*topos*) where aspects of ideas can be made to settle and to spring up (Note 45). Especially when sketches are allusive, incomplete, open and generally in a phase of exploration, this dynamic is at work.

The notion resonates with the classical notion of a "figure-ground phenomenon" introduced by early Gestalt psychology (Note 46). However, in this case, we should interpret the analogy that the surface is a "ground" or a "fertile soil" quite literally. The ground is not a static foundation against which a figure appears, but it is the condition of possibility for the figure to appear at all, to stand in a demarcated space and to become an object of inquiry. However, this object hovers in a strange realm that seems imaginal rather than real:

> *It is the process of transforming the actual spatial datum, the canvas or paper surface, into a virtual space, creating the primary illusion of artistic vision. This first reorientation is so important that some painters who have become keenly and consciously aware of it tend to be satisfied with the mere creation of space, regardless of anything further to be created in its virtual dimensions—like Malevich, enamored of the magic squares that, after all, yield space and only space. (Note 47)*

Modern art discovered the space within the canvas and moved consequently away from drawing as a form of pictorial representation. Correspondingly, the artistic – or designerly – gaze is by definition a distortion or semblance. It introduces often viewpoints that do not exist in the real world, but that suggest a kind of spatiality or hidden order. The purely pictorial character of drawing is replaced by an explorative, suggestive hue or tone.

Because the viewpoints are introduced on a canvas or drawing surface, that surface becomes the space of architectural thought and creation. Alberto Peréz-Goméz expands on the hidden complexity residing in this idea: the *topos* is a space in the world of lived experience *and* forms an integral part of our interaction with it (Note 48). However, as Peréz-Goméz argues, architectural creation required the inscription of marks (*grapheíen*) into lived space (*topos*). In order for the inscription to be effective, the place itself must be respected und thoroughly understood. For classical architecture, this meant grasping it in all its complexity. So, the surface becomes a stand-in for the world outside, a place where the interaction between the new and the existing unfolds through architectural meaning. However, we would miss a crucial point if we thought that the inscription is just a passive trace.

3.2 From Traces to Situated Figurations

An idea that is being sketched out is situated within the *topos* of the drawing surface. We move now on from the surface of the drawing to the visual constellation that is realized on it.

The second assumption of the representational paradigm is that drawings are *imitations* or *copies* of an (absent) object or idea that they are supposed to faithfully represent, but which is a misconception:

44

Architectural drawing is a unique locus of active thinking, itself the fertile wellspring of ideas, where a design emerges from within the effort of drawing. It is a common misconception that architectural design drawing merely documents something already fully determined in the mind. (Note 49)

In many cases, although most strikingly visible in architectural drawing, the suggestion can be raised that hand drawing serves not a *representational*, but a *navigational* purpose. The literature on thinking-through-drawing is unambiguous in this regard: the architectural hand drawing serves as a means to explore rather than to illustrate (Note 50).

Instead of being imitations or copies, drawings that emerge in the creative process are best understood as *situated figurations.*

As philosopher Sybille Krämer has developed in detail, the very act of articulating an idea on a surface by visual means imbues it with a new, unique character. The drawing or figure is not just a copy of something that is absent, but acquires its own, unique presence that is synoptic and simultaneous rather than explanatory or analytic. The appearance of an idea *as a figure* opens it up towards our cognition and discursive capacities. Yet, the figure remains a figure, and is not amenable to reductive explanation (Note 51). There is always a representational surplus in it that cannot be grasped conceptually.

Figurations are visual attempts to articulate various aspects of an idea that thereby becomes possible. This process of articulation is anything but linear or predictable, although there are exceptions to this rule. Importantly, the figuration appears gradually and visually through the articulation of lines.

In everyday language, we casually say that we "figure things out" when we are struggling with a problem or a puzzle. When we forcefully make a rhetorical point, we use a "figure of speech". The close etymological link between the figure, the puzzle, and rhetorical strategies tells us a lot about the aim of figuration. By articulating an idea through figurations, we forcibly draw it in the realm of visual and haptic perception. There is a close link between the concept of *Anschauung* (direct perception) and figuration. Direct perception requires visual figures as basis for reasoning. Yet, these figures invite as much questions as they answer.

Still, it might seem paradoxical that an idea becomes only possible by articulating its various aspects. However, in his third *Critique*, Immanuel Kant raised exact the same point with regard to concepts when he discussed the faculty of reflection:

To reflect (to consider), however, is to compare and to hold together given representations either with others or with one's faculty of cognition, in relation to a concept thereby made possible. (Note 52)

What Kant notes about the act of reflection applies even more to drawing. By "drawing things together", that is, by extracting from the space of ideas visual cues and aspects, the idea assumes a kind of possibility (Note 53). Once drawn, notions that appear as situated far apart when considered in isolation display a surprising proximity; conversely, ideas that seemed obviously linked lose their seemingly indisputable connection. Nowhere else has this been demonstrated better than in Schön's

45

seminal study on reflection-in-action and so-called protocol studies of designers at work (Note 54). More recently, Fauconnier and Turner have worked this thought out with regard to "conceptual blending". A new concept emerges as a kind of elastic entity that is enriched, transformed and shaped by introducing and juxtaposing various notions, blending them into a new unity (Note 55).

The possibility of such an entity is visually projected onto the drawing surface. If architectural hand drawings exhibit representational traits, they do so to the degree that the sketching process assists in projecting an idea into the world under the form of a figuration. As discussed, the link between the hand and the mind is fully activated in hand drawing, even to the degree that Le Corbusier claimed that his ideas flowed from his drawing hands to his mind, and not the other way around (Note 56). Such fluid, spontaneous drawing is projective:

> *[T]he drawing is still committed to the project by the idea that promotes it. Drawing in design "associates itself" with drawing in art as a visible representation of the uncertainty of the object of design as an artefact of desire, but only as a "passing" formulation and not as the inevitable finality of design (Note 57).*

For good reason, the German term for "designing" is *Entwerfen*. Literally, it means to throw something out, to make an idea flow out into the physical world. Once it is thrown out into the world, the projection acquires a peculiar ontological status as an open object (Note 58). No longer is it a fluid notion, but a relatively stable visual entity that appears on a surface. Yet, it is not a physical object or a finalized design.
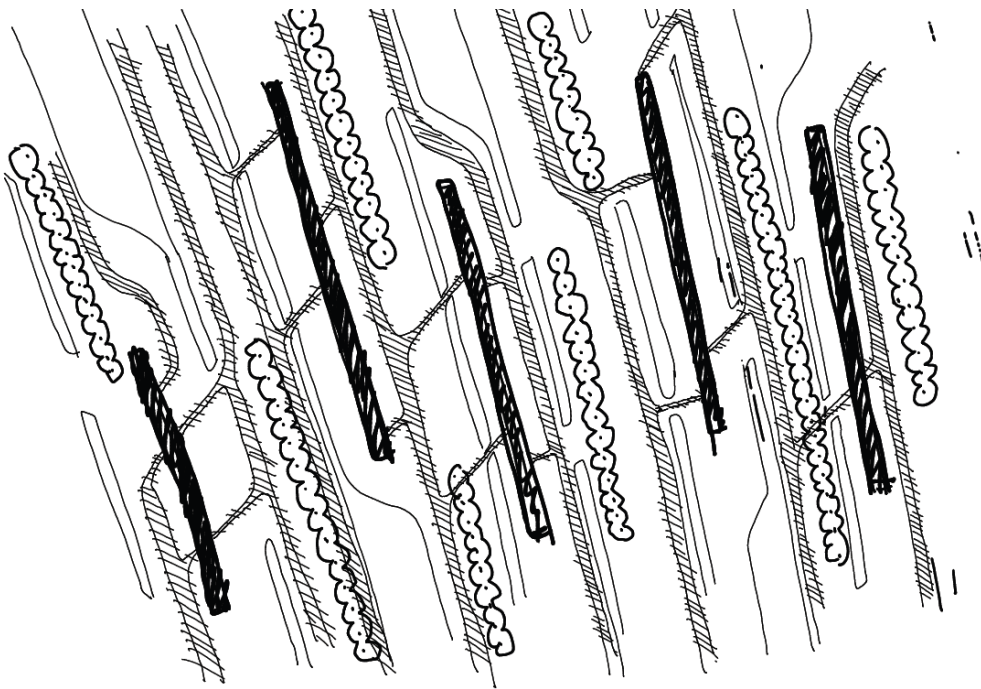

Figure 3. Visual Concepts Like These – even While not Designs – Play Important Cognitive Roles in Developing Design Ideas. Author, 2018.

The Heideggerian concept of *Geworfenheit* (thrownness) can in this context be read as an acute observation about the projective nature of our creative capabilities. We "throw" ideas into the world, mediated and aided by drawing. Although they do not (yet) exist as physical objects in the world, they acquire an ontological existence that causally affects the creative thinking process:

> *Drawing as the possibility of construction of the idea, determines the appearance of the object's form, while representation of the object. Drawing is for design the projectual instrument that enables the visible appearance of the idea (Note 59).*

Through drawing lines, ideas develop in a process of gestation. Initially, an idea may be vague or only rudimentary developed. But instead of being depictions or illustrations of this vague idea, the drawn lines points beyond themselves towards the essential characteristics of what they depict (Figure 3). It should be said that these characteristics are inferred and encountered rather than defined. Lines are articulations, but not yet articulations of something final or even figurative. This leads once again to a paradox: before an idea fully crystallizes, it can only be hinted at in a circumspect, roundabout manner. The "thing" to which it refers cannot be conceptually caught. Indeed, it even requires some openness to drive the creative process (Note 60).
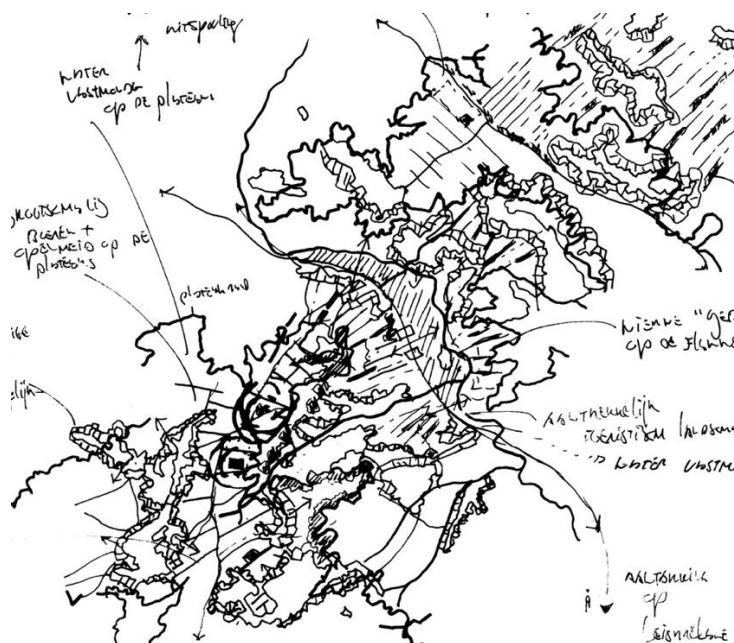
Figure 2. Lines as Pure Expression of Abstract Structures. They Are not Purely Descriptive, nor Are They Completely Accurate. Yet, They Allow for Identifying Relations. Author 2021.

The idea that drawing depicts or duplicates a virtual object that already exists – to some degree finished – in a kind of mental space is quite natural and corresponds to what W.J.T. Mitchell called "naïve realism" about imagery (Note 61). As Michel Foucault put it "the object does not await in limbo to become embodied in a visible and prolix objectivity" (Note 62). It is not as if there is a mental or

virtual repository from which objects or ideas emerge as ready-mades. This point seems obvious, but it is worth remembering, as the often-mythical status of architectural sketches unwittingly conveys the misleading idea that the "mastermind of the creator" knew all along what was going to be designed (Note 63).

More than anything, an idea is drawn into being by producing a series of successive visual artefacts that slowly and jointly articulate its essence (Figure 4). In this process of articulation and exploration, designers familiarize themselves with its structure. We have discussed already how a process of "indwelling" or "taking into possession" is necessary for acquiring a stable grasp on the open object that seems to hover beyond focus.

However, opposite of the *inhabiting pole* of this process, we should also emphasize the *situating pole*. In projecting an idea through figurations, these visual constellations are situated in the world – from where they can be exposed to scrutiny and (collective) discussion. In situating such visual artefacts, their structure, internal coherence, tensions, irresolvable or incommensurable elements is brought before the mind. Tim Ingold cites J. Arthur Thomson, who, in his 1911 *Introduction to Science* wrote:

> *When we work long at a thing and come to know it up and down, in and out, through and through, it becomes in a quite remarkable way translucent. The botanist can see through his tree, see wood and bast…The zoologist can in the same way see through the snail on the thorn, seeing as in a glass model everything in its place, the nerve-centres, the muscles, the stomach, the beating heart, the coursing blood, and the filtering kidney. So the human body becomes translucent to the skilled anatomist…(Note 64)*

Up and down, in and out, through and through…like a navigator, the inquirer traverses the open object, tracing lines through it until its structure is comprehended by grasping the proper place of each element. Thomson's mention of translucency is noteworthy because it is not full transparency that is strived for, but a translucency that suggests depth, overlayering and the juxtaposition of simultaneous elements (Note 65). By positioning the drawn object in a *topos*, it becomes part of a wider environment. Like Kant's notion of reflection, representations and notions are held together in this environment, and gradually settle into meaningful structures.

If we follow the implications of this insight, it means that drawing is a mode of taking action, or "thinking equals knowing equals making" (Note 66). Doing and making are acts of acquiring insight into the constitution of the open object that comes into being on the surface. That the accumulation of insight occurs by making or constructing objects and artefacts is an established fact. As the disciplines of artistic research (Note 67) and design research (Note 68) prove, *making* is an essential strategy for systematizing a body of ideas. To make is to search. It is for good reason that the philosopher Vilém Flusser described the process of getting acquainted with an idea or notion "*ein suchendes begreifen*" (a searching grasping) (Note 69). To familiarize oneself with an idea, one must grasp it through gestures, through imaginative indwelling and through a process of searching it. The *topos* of the drawing is gradually grasped in a genetic process of coming to terms with its figurative appearance.

The so-called "practical turn" in the philosophy of science has shed considerable light on how scientists themselves are involved in constructing and reconstructing ideas in which drawing plays often a constitutive, if underestimated, role (Note 70). Schön conceptualizes a similar process as a reflective conversation in which transactions between designer and designed take place (Note 71).
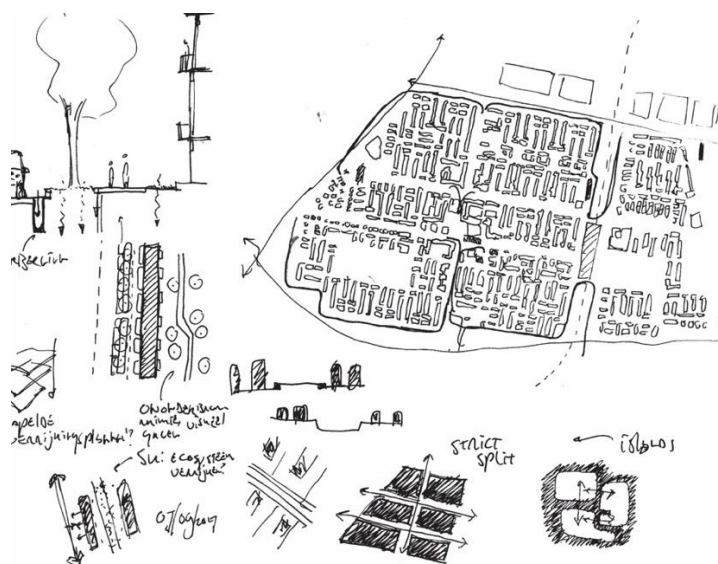
Figure 5. The Entire Area of a Design Project Represented as an Object That Is Visualized at Different Scale Levels and with Different Levels of Precision. Author 2017.

Maybe a better term would be a "creative conversation". The theme of conversation is also taken up by the sociologist of science Karin Knorr-Cetina. She states that during research, a researcher adopts sometimes the "perspective of the object" or enters into a direct, so-called "objectual" relation with it (Note 72). The example she uses is of a scientist who – in the absence of a microscope – visualizes a largely magnified version of a protein standing in front of him. This allows him to visualize and understand the reactions of the protein when brought into contact with other chemical compounds (Note 73). Like the drawing, the structure and the behaviour protein is gradually grasped.

The imagined object (a protein in this case) that is in reality invisible is by this move situated before the mind's eye, and thereby brought into focus as a figuration or a open object. Its internal structure can responses can be understood and predictions about its behaviour can be made. It can be understood more thoroughly by visualizing it as a structure. The hand drawing in architecture accomplishes a similar feat: it succeeds in situating a conceptual structure before the mind's eye (Figure 5). However, we should be careful in accepting all premises from the sociology of science. In Knorr-Cetina's example, the scientist uses a visualization technique. However, this has the unintended consequence of pitting content (the protein) against form (its visualization). Already decades earlier, the philosopher Susanne K. Langer cautioned against this division:

An artistic symbol is a much more intricate thing than what we usually think of as a form, because it involves all the relationships of its elements to one another, all similarities and differences of quality, not only geometric or other familiar relations. That is why qualities enter directly into the form itself, not as its contents, but as constitutive elements in it (Note 74).

Unlike the symbolic language that De Certeau invoked, the artistic symbol (and the hand drawing equally so) possesses distinct qualities and depicts not just structural or geometric relations. Likewise, the hand drawing has a tangible, artistic quality of its own and is not merely a geometric representation. The process of visualization discussed by Knorr-Cetina remains descriptive. Unlike the drawing, its use is concerned with structure and rationalization. However, the architectural drawing process is not reducible to a kind of rationalized decision-taking or heuristics. Granted, drawings *may* be used as heuristic instruments, but especially sketches are much more than reasoning instruments. We can see this from the fact the drawn image contains empirical as well as poetic contents.

Put differently, we might describe it as the "locus of tensions" caused by a poetic force that resides in it (Figure 6). Edmund Burke remarked acutely that images in the mind's eye produced a strong emotional response that far surpasses reasoning (Note 75).

Figure 6. Evocative Sketch That Is not Just about the Precise Geometry of an Idea, but That Represent a Vision or Idea. Notice How the Perspective Does not Technically Correct, but still Conveys an Architectural Idea. Author, 2016.

For instance, images of vastness invoke a certain imaginative power that transcends the descriptive capacity of reason. Kevin McLaughlin explored this idea in more detail, describing the poetic force inherent in images:

> *The ability to communicate the feeling of reason transcending cognitive experience also brings with it internally a "withdrawal" of communicability. The language of the poets expresses the capacity and the incapacity to communicate the feeling of the divisive finitude of reason as a force and an unforce. (Note 76)*

Poetic language inhabits a peculiar twilight zone. On one hand, it is intelligible as language and has an impressive force and precision; on the other hand, and like the drawn line, it points ceaselessly beyond itself towards a realm that cannot be described by mere words.

But unlike the word, which has a range of meanings, the drawn line is often pure expression (Note 77). Its meaning is inferred and demonstrated rather than linguistically determined.

McLaughlin invokes the image of the ocean as something that can be viewed in two different ways. On the one hand, we may view the ocean as an object that can be possessed and described to some degree. We can measure its depth, decide to use it for fishery or travel across its surface. On the other hand, the ocean is so large and beyond the direct grasp of our human cognitive abilities that it become the site of myth. It is evoked as dark, threatening, bottomless etc.

According to Kant, the latter type of viewing the ocean lies at the heart of the aesthetic judgement. When our cognitive capacities fail to circumscribe an entity precisely in space and time, our mode of perceiving switches from the "finitude of reason" to the language of the poetic and the sublime. No wonder, then that Burke invokes the idea of "vastness" in his discussion of the sublime. It is the fundamental "openness" of such entities that enables them to transcend our cognitive grasp – the very idea of possession and control vanishes from under our hands. The very fact that the image seems to oscillate between literal and poetic interpretation makes them unsettling but also open, especially in the case of drawing, where new variations and alternatives can quickly be manufactured:

> *For drawing is (…) a great absorber of change, of inconsistency, of variability, of whim, of perverseness, of dogmatism and of waywardness. There is, after all, no such thing as a 'correct' drawing. There is no ultimate obligation of the drawer to perform to a formula (Note 78).*

It is not too far-fetched to apply this insight to drawn images instead of literary images. After all, both types of image operate within the tension that emerges between the empirical and the poetic, or the descriptive and the evocative. How this tension itself emerges has been shown with acuity by Ingold in his study on the anthropological foundation of lines:

> *Whether however a line is real or a ghost – whether, in other words, it is a phenomenon of experience or an apparition – cannot always be unequivocally determined, and I have to confess that the distinction is decidedly problematic. (Note 79)*

The line combines a sense of reality, but also a sense of being-unreal, because it points beyond itself. Like the words in a poem always seem to open up beyond their literal meaning, the drawn line hints at

51

a reality that is suggested and beckoning rather than defined. Unlike the symbol, the drawn line short-circuits the relation between perception and automated response. Seeing a symbol like a red light does not only activate the idea of "stop", but activates an entire behavioral pattern geared at stopping the car.

The symbol is not just a visual marker, but a cue to activate an entire range of affective and cognitive responses (Note 80). This insight about the relation between visual stimulation and bodily response allows us to rethink the nature of the line itself.

3.3 From Lines-as-marks to Lines-as-processes

How intertwined and complex this process of activation is, can be gauged from a passage from *A Thousand Plateaus* by Gilles Deleuze and Felix Guattari. In it, they discuss the nature of lines:

> *Lines of writing conjugate with other lines, life lines, lines of luck or misfortune, lines productive of the variation of the line of writing itself, lines that are between the lines of writing. Perhaps the novella has its own way of giving rise to and combining these lines, which nonetheless belong to everyone and every genre. (Note 81)*

Although this passage can be interpreted in several ways, it seems possible to derive the following from it: artworks organize and align visual and experiential phenomena. They involve concepts, ideas, but equally affects and emotions or oblique allusions. Even the variation inherent in the "line" itself emerges because various other lines meet, diverge and cross. For instance, consider a musical composition in which rhythm, melody and counterpoint form three individual lines that jointly constitute its structure. The line is active in the sense that it structures the *topos* in which it appears. It is an agent of thinking and producing, giving rise to variation and movement, and involving the embodied mind in its motion.

While structural elements cohere into the *formal* structure or geometry of a work, this structure co-extends well into the realm of affect. Deleuze and Guattari even go so far as to say that "figures are never separable from the affectations befalling them (Note 82)." So, geometry is grounded on a primitive "protogeometry" in which we cannot think of figures without also thinking about the effects they exert on us. We can envision the protogeometry as a space of events or occurrences. This space contains all the elements that are expressed in the drawn line.

These expressive qualities of lines invite forms of thinking that are freely hypothetical, yet not directly subjected to any rigorous examination. In the same way that a building can be said to be "dynamic", "swooping" or "sleek", the lines of the drawing evoke sensible qualities that bring associations to mind. However, even as these lines and figures are not depicting anything specific, they encourage the mind to indulge in them. They are saturated with possible meanings that find allusive and oblique expression:

> *(…) the hypothesis emerges as autonomous critical activity, no longer bound by the repetitious cycles of testing and validation to which is it subjected in other fields. Its mere conjecture is rescued from the pejorative, recast as the pleasurable reverie of the thinking mind engaged in nascent speculation. Released from the stranglehold of teleological knowledge production, it is*

52

> *possible to discern specific properties or characteristics within the hypothesis that, in turn, point to certain critical operations at play within the practice of drawing. (Note 83)*

The mere conjecture that takes place during drawing is directly related to its core characteristics: the unfolding play of thoughts and notions occurring in the mind is almost directly transmitted into traces that appear on the surface or *topos*. Still, the drawn line is not yet subjected to the regimen of conceptual thinking or critical argumentation. It is an "open-ended sign" that can still grow and develop in all directions and that may evoke feelings rather than precise, well-formulated considerations. This does not mean that drawing can *never* be evidential. The drawing is not merely a tool for evoking atmospheres or emotive responses. Indeed, the drawing requires a structure that is freely amenable to reasoned thought, if it is to be useful at all. Peter Cook describes it very precisely:

> *For me, there is the delightful experience of carrying out a process that can enhance the primary decisions (of size, position, figure or direction), with such a mobile and extensive addition of evidence. It is as if the first part of the illustration is being illustrated by the second.* (Note 84)

Likewise, the openness of the mind introduces a state of reverie or pleasurable inhabitation or wandering. Indwelling in the drawing is an act – and literally, one draws oneself into it. Layer after layer, new evidence of the usefulness of an idea is compiled, reworked and massaged. Old notions are illuminated in a process of drawing their consequences out.

Once engaging with the drawing, we find that certain ideas or notions are "springing up" and "settling". As Frascari emphasized, architectural ideas settle gradually, thereby "sedimenting" themselves. The French philosopher and sinologist François Jullien provides an alternative conception of this notion. Visual representations that are open and seemingly unfinished are necessarily not determined completely. Not every element in them is finished, unambiguous or clearly demarcated. As such, the representation remains "at work".

Because it is in an active, working state, it invites new readings and stimulates thinking. As Jullien argues, new elements "spring up" out of the drawing. Those elements that "settle" are determined for the time being:

> *[T]his fundamental fact–that the determination (any determination) grasps what is settled and not the springing up; that the definition is situated downstream rather than upstream, in a state of flatness that is sterile and not fecund. (Note 85)*

Observing someone drawing with intent shows how much concentration flows into it. One could pleasurably loose oneself in the activity. The psychologist Mihalyi Csikszentmihalyi recognized his pleasurable indwelling in his seminal study on "flow states" (Note 86). Flow states are "autotelic" – that is, they become ends-in-themselves. They invite full involvement, play and immersion. They also provide a cognitive entrance into the subject matter, as they *fuse* action and awareness, joining both capacities to reach moments of insight (Note 87). Drawing is the quintessential flow state – one must bodily enact intentions and ideas in fluid lines, accurate gestures and expressive traces. All this requires aesthetic sensibility, involvement and acumen.
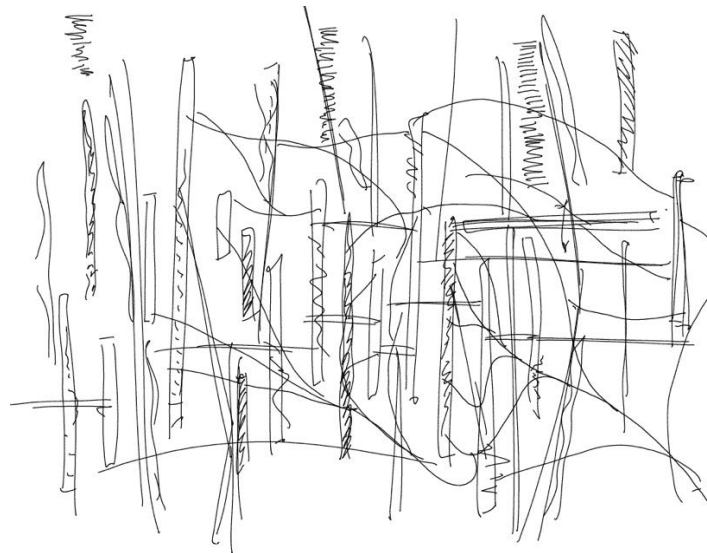
Figure 7. Purely Abstract Overlapping Structures in a Sketch Study. The Lines Are Non-figurative, yet They Are Expressive and Evocative. Author, 2019.

One of the advantages of this dynamic fusion is that it becomes easier to focus one's energy towards the external world, thereby aiding a deep involvement with the surrounding environment and highlighting the capacity to "see" new possibilities (Figure 7). Indeed, as David Bohm has argued in his work on creativity, the capacity to perceive the new into the existing order of things is what underlies creativity as such – the novelty that is produced lies not only in making new objects or plans, but in conceptualizing relationships that were "hidden in plain sight". For designers, this is a very familiar thought: the designed object is not realized yet but has to be "drawn out". Some of its desired properties are (dimly) known and are projected on a real-life context. In designing, the "ideal" is overlayed on the "real" and treated as a viable or fascinating possibility (Note 88).

A way of expanding on these thoughts is that lines are *processes* rather than marks or symbols. Drawn lines suggest not just movements; they *are* movements. They are so in a double sense.

First, we require bodily gestures to draw lines, whether this concerns lines in manual or digital space. The body must enact the line before it becomes visible. The tip of the pen traces the movement on a surface, which, as we have seen, is a *topos*. Such gestures are not part of our daily repertoire of motions. They fall in a different category than doing the dishes, driving a car or dusting the bookcase. They are "invented" for a very specific case and a very specific situation. Such "invented" gestures are unique, as they respond to a particular context in a particular manner (Note 89).

These line-as-processes are deliberately enacted, and change therefore not only the surface, but the drawer as well. The "subject of design" acquires a level of mimetic awareness by tracing out the precise contours of an idea (Note 90). Enacting the line leaves a trace in the memory as well as on the paper (Note 91).

Second, lines *invite* movement. The eyes tend to actively follow the lines and stimulate embodied movement (Note 92). A line that seems dynamic is not just a visual mark with swooping characteristics; it is the invitation towards pursuit:

> *Architectural lines are material, spatial, cultural and temporal occurrences of refined multi-sensorial and emotional understandings of architecture. Architectural lines create a* graphesis*, a course of actions based on factures by which architects actualize future and past architecture into representations.*
>
> *Architectural drawings must not be understood as visualizations of buildings, but as essential architectural factures. (Note 93)*

Frascari uses the term "facture" (It.: *fattura*), meaning "to make" or "to do". Rather than being illustrations or depictions, architectural drawings are embodiment of the "events that gave rise to them" (Note 94). Each line is an event that occurs in real-time and that has to be bodily traced out in the real world. Such lines are gesturally acted out into the world, and it is not far-fetched to view lines and drawings as actors in the creative process. Indeed, the term "active image" is entirely appropriate. The drawing acts and is acted upon.

Like the graph or statistic, the line exerts a certain fascination, as it promises the possibility of "drawing together" otherwise disparate observations into a single gesture. As Latour relates, observers working in laboratories noticed the obsession of scientists with visual representation (Note 95). The neatness of the graph or curve allows scientists to extract particular insights from a messy mass of data, aligning them in visual structures that are cognitively accessible and convincing. The graph or the plotted function is the essentialisation of complex phenomena that occur in the real world. This is why statistical curves have such a rhetoric potential: they condense otherwise disparate phenomena and events in a single visual gesture that seems stripped from anything superfluous.

A similar process unfolds in hand drawings in architectural design. As visuals, they exert a certain rhetorical force, even to the degree that hand drawings of great architects acquire an often-mythical status, but equally to the degree that the drawing surface becomes a site to explore. The single drawn line unites disparate aspects of an architectural idea:

> *The fruitful vagueness ruling architectural graphesis comes from the ambiguity embodied in the Latin spell:* nullo dies sine linea*, where linea (line), an heuristic device, must be understood as a line of writing, as a line in a drawing or as the pulling of a line on a construction site, but not as linearity. (Note 96)*

The line is a movement but is not always linear. It is a projection, a meandering search, a demarcation or condition. The line as a heuristic device serves the function of searching and navigating. Lines can be used to navigate a space of possibilities or to articulate a developing idea that seems only barely accessible. We should not couch this process just in terms of decision theory. The so-called "first generation of designer researchers" did so, but they overlooked the autonomy of the drawn line (Note 97). Beyond its heuristic function, the line has a poetic and expressive power of its own.

The expressive power of lines stems from the fact that we catch the mind in movement when we draw. In almost no other activity is the link between mind and hand so short and its feedback so direct (Note 98). However critical we may be about regarding drawings as traces one aspect of this conception is very useful: the trace left behind by the drawing hand represents most faithfully a developing idea, expressed in a non-linguistic mode. As discussed, drawings are intensely active. They are not just illustrations of works but are *themselves* works (Note 99). They continue to play a cognitive role long after the drawer has finished working on them. All this points to the conjunction of thinking and drawing. Frascari speaks of a "a sapient working together of writing, drawing, and construction lines (Note 100)." As we can freely switch between visual, textual, gestural, haptic and verbal modes of expression, the drawing becomes an indispensable site of articulation.

Articulation, like sedimentation, is a gradual process. It requires time and the possibility of settling for one expression or the other. Pallasmaa has in this regard spoken of the "hesitancy of drawing." Not every line is self-certain, swooping or even useful. The processes of transmitting thoughts to paper, and of exploring thoughts through drawing requires a delay, an action of "understanding-as" (Note 101). Every time a line is drawn, it can be understood *as* something to which it points, however imperfectly and indirectly.

Yet, discipline and exercise are required to draw well and to imbue lines with an affective force that makes them truly come alive, thereby igniting their generative potential. In classical Chinese philosophy, the characteristic that renders drawings effective is known as "*shi*", and plays a major role in aesthetic cognition:

> *[I]t is* shi *that "gives life" and that makes the slightest dot or stroke vibrate, as if we were reliving the moment of its execution. Shi always enhances what would be mere empty representation without it, for* shi *gives depth to a representation and exceeds its concrete limitations by revealing within the actualized static form, a dimension of perpetual, soaring flight. (Note 102)*

The art of sketching centers around evolving from one property of the drawing to the other – to freely navigate the new, diaphanous space that emerges between the elements. Jullien identifies a "divergence that is provoked" within the work. Each new line extends the play of forces and the architectural design process in its entirety.
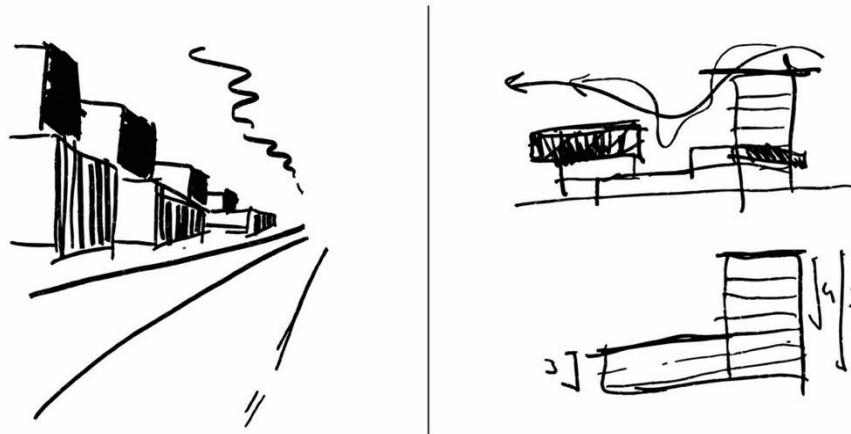
Figure 8. Two Quick "Form and Flow" Studies. Even with These Rudimentary Sketches, the Contrast between Flows and Massive Building Volumes Becomes Tangible. Author, 2019.

This explains why some architectural sketches have such an expressive and creative appeal: their unfinishedness keeps them effective. They exert tangible generative effects, allowing the designer to organically explore the ideas they suggest (Figure 8). The more one finishes and refines, the more the drawing becomes settled, losing the critical edge of its generative power (Note 103). Its incompleteness causes its efficacy:

> *In revealing to us the power of incompletion (or by revealing that plenitude is not completion), the sketch makes us feel the infinite richness of the indefinite, or the fecundity of the beyond and of possibility – in short, what we ordinarily understand as the powers of the virtual. (Note 104)*

The "indefinite" is the operative realm of creation – the domain of (visual) suggestion and springing-up as opposed to the domain of settling down and defining. Openness and unconstrained expressivity are integral parts of its visual appearance. While the representational paradigm views drawings as the endpoint in a determinative process, Jullien emphasizes the fact that "availability" or "space for development" is the most effective asset that the drawing possesses (Note 105). Once a drawer realizes how much can still be changed, and how many possibilities are still waiting to be worked out, can the creative process unfold and open up again.

4. Conclusion: The Locus of Creation Explored

Summarizing, lines are processes that are conjoined in situated figurations. In turn, these figurations appear within a *topos*, or space of architectural creation. Criticizing the representational paradigm, the alterative account I sketched out in the previous section *animates* every element of the drawing, from the lines to the figure and the surface. Instead of being representational, the alternative paradigm I

described is *performative*. It ascribes an active and animated character to the drawing and the practices involved in it.

To adopt this dynamic perspective is important, as it allows us to conceptualize the locus of creation in architectural design in a different manner. There is not enough space here to explore all aspects in-depth, but we can start by paying attention to two characteristics:

First, the locus of creation is not located "in the head". Nor is completely contained in the representational contents of a drawing. That which is depicted in an image always points beyond itself and opens up towards the non-conceptual and the allusive. The locus of creation is not some originary point where an initial idea comes from but is contained in the process of creation itself. Unless it is witnessed, it cannot be found, pointed at or defined in clear terms.
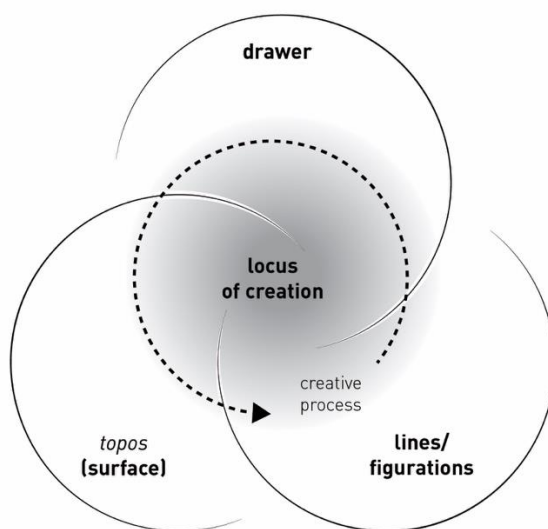
Figure 9. Model of Drawing Practices and the Locus of Creation. The Creative Process Unites Drawer, Lines and Figurations in the Context of a *topos*. Author 2024.

One must catch the creative process "in motion" to understand where the locus of creation resides. Correspondingly, it is misleading to focus too much on the "master sketch" that acquires a mythic status. Instead, we would acquire a much more accurate view of the creative process if we investigate the developing relations between the drawer, the drawn, the surface and the resulting thinking process.

It cannot be emphasized enough that the drawing surface is a *topos*, while lines are processes. Keeping these two points in mind enables us to fully appreciate the inherent performative character of drawing, as opposed to its representational counterpart.

The person drawing the line is changed by the practice of drawing, as the body remembers the structures that are gesturally enacted on the surface. While the idea might be intellectually approached

58

through the capacity for deliberative reasoning, the entire body is materially involved with the drawing to actualize it in the world. The drawer, the drawn and the space of drawing form an aggregate, a locus of creation that can only be observed "in action." In this sense, the aesthetics or "the science of sensibility" is first and foremost a practice of observing the emerging relations between drawer, *topos* and lines/figuration in action within the context of a creative process (Figure 9). By paying attention, the inherent richness of the drawing opens up and allows for inhabitative imagination and expansion.

Second, the idea of a locus implies a locality, a focal point. So, we should inquire where the "locus of creation" is actually located. Put concisely, it resides in the effective juxtaposition of its contributing elements. In the moment that thinking processes, drawn lines, embodied gestures, the spatiality of the surface and perceptual experiences come together, all elements for true creativity are brought together in a single point in space and time. The fact that the drawn line possesses a certain permanence but is not yet completely "settled" turns it into a visual instrument that is perpetually effective. It can be revisited again and again yet allows also for further definition and determination. Previously, I described the drawing as a "locus of tensions" – the incomplete and the defined, the vague and the precise, the technical and the poetic all exist side by side. Often these elements resist closure but they spur the process of creation. The tension inherent in the drawing is often the result of incongruities between the elements that are present in it – strictly logically speaking, there seems little reason to juxtapose them. By concentrating these elements in the space of a single drawing, new perceptual experiences suggest themselves, emerging into the cognitive foreground once an idea is revisited again and again. The effectiveness of the drawing keeps it "at work."

No matter how active and dynamic the drawing is, it is only so in relation to a perceptive and creative subject who is open to what it suggests. The very space of the drawing exerts its own character and creates a place for thinking through its elements. Its inherent orientation is organized by the most basic categorial system of our thinking, and as such resonates with it.

Concluding, by adopting a dynamic view of the practice of drawing lines, we can grasp (in the context of architectural creation) how inherently relational, embodied, gesturally anchored, navigational and spatially oriented the drawn lines are. Moreover, we can see how they play out within the productive tensions of openness and determination, poetic force, aesthetic sensibility and reasoned argument. But above all, we can grasp how in situating even the first line onto a surface, we fully enter the "space of drawing" itself.

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61

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Notes

Note 1. See for a critical overview: Purcell and Gero 1998

Note 2. See for a discussion of the role of mimetics in architectural sketching: Paans 2024a

Note 3. See Hoffmann 2020 for sketching as design thinking. See also Geer 2011: 45; Pallasmaa 2015: 92

Note 4. Paans 2023

Note 5. Frascari 2009

Note 6. The idea is discussed in Aristotle's *De Anima,* referring back to Plato's *Timaeus*.

Note 7. The idea is inherent in Jacques Derrida's concept of *différance* (Derrida 1982). See Derrida 1982; See Krämer, Kogge and Grube 2016 for a range of discussions around this topic.

Note 8. Flusser (2004) also discusses the link between writing and drawing. But in this case, Flusser conceives text as line-based thinking, and drawing as surface-based thinking. Flusser's account of the surface, however, bears close resemblance to the idea of the plane as a *topos*.

Note 9. Frascari 2017: 29; Emmons 2019: 102

Note 10. Barnes 1984: 2318

Note 11. See for instance the work of French philosopher Philippe Lacoue-Labarthe on the subtle difference between *mimesis* and *imitation*. Often, the two terms are held to deal with replication, but Lacoue-Labarthe disputes this claim, arguing that they are in fact rather different.

Note 12. We find a variation on this thought in the idea that designers draw to *communicate* their ideas. This claim is partially true, and it is easy to pinpoint drawings that serve a communicative purpose. Such drawings may be final renderings of a project or plans that depict a plan. However, these drawings are only made when an idea has been worked out in a process of designing.

Note 13. Pombo and Magalhães 2006

Note 14. Pallasmaa, 2009: 29; Paans, Pasel and Ehlen 2019

Note 15. Paans, Pasel and Ehlen 2019

Note 16. Goldschmidt 1991; Ammon 2016; Van Den Berghe, 2013; Paans and Pasel 2018

Note 17. Some of this tension is implicit in Goodman's account worked out in *Languages of Art* (Goodman 1968). See Paans and Pasel 2018 for a discussion of this theme.

Note 18. Partially, this influence can be traced back to the philosophical roots of early analytic philosophy and the after-effects of John Austin's 1962 book *How to do Things with Words.*

Note 19. Cross 1982; See Whyte and Ewenstein 2010 for a more recent account; See also Krämer 2015 for a philosophical exploration of this topic.

Note 20. Gadamer 2013: 108–109; Derrida 1982; Yaneva (2009) embeds the idea of activity within the framework of Bruno Latour's Actor-Network-Theory (ANT), whereby artefact and social conditions become players in an integral network of conscious actors, materials and processes.

Note 21. Paans and Pasel 2018

Note 22. I follow Frascari's (2009) distinction between (a) hand sketches meant to work an idea out and (b) construction drawing or executive drawings that communicate the specifics of an idea. Renderings of a finished project also fall in this category. A slightly different distinction is made by Graves 1977, when he draws the distinction between early explorative sketches, descriptive sketches and technical drawings. There is certainly more to be said about the creative value of even executive drawings, but that is a topic outside the scope of this paper. For a discussion of such drawings see: Ursprung 2016.

Note 23. See Güss, Ahmed and Dörner 2021 for an overview of da Vinci's drawings in relation to his creative process their generative potential.

Note 24. Fitch 2011: 147; Dernie 2013

Note 25. See for an exposition of this concept: Bredekamp 2015

Note 26. Ingold 2007: 57

Note 27. Ingold 2007: 57; Ingold cites Paul Klee, who makes a similar point in his notebooks.

Note 28. Berger 2000: 124

Note 29. Polanyi 2010: 18; Zumthor 2014; Pallasmaa 2009: 109–110

Note 30. Emmons 2019: 41; Emmons 2007

Note 31. Emmons 2019: 41, 113

Note 32. Bachelard 1994: 212

Note 33. Pallasmaa 2011: 121-122

Note 34. We should also note here that the embodiment of the drawer is of enormous importance. A drawing is always related to our sense of inhabiting spaces. As such, every drawing is by necessity perspectivist: it is made by an author who inhabits necessarily a first-person viewpoint. See: Tversky and Martin Hard 2009 for a discussion around this topic.

Note 35. De Certeau 1988: 118-120; Paans and Pasel 2020; See also Cook 2014: 30

Note 36. Schön 1987

Note 37. See Mittelberg, Schmitz and Groninger 2017 for an elaborate discussion of this theme.

Note 38. Emmons 35; citing Li Yang-ping, *The Nine Generative Fa,* or *Chiu sheng-fa*, as quoted in John Hay, Surface and the Chinese Painter; The Discovery of Surface. Hay's article appeared in: *Archives of Asian Art* 38 (1985): 95-123, here p. 98.

Note 39. Frascari 2009

Note 40. De Certeau 1988: 134-135; See Paans and Pasel 2018 for a discussion of De Certeau's approach of this topic.

Note 41. Emmons 2019: 35

Note 42. Note here the close similarity to the symbolic act of tracing the first line for a city, divining the space in which a city is to be built or even the on-site drawing of a Medieval cathedral. See for a detailed account: Luce 2009. See for a cognitive science perspective on organizing space: Tversky 2010.

Note 43. Dutch architect Herman Hertzberger is known to have said that he liked to condense his sketching on A3 format paper. Apparently, the spatial constraint imposed by the paper format concentrates the thinking process.

Note 44. Cook 2014: 163

Note 45. Jullien 2016: 49

Note 46. Koffka 1936; Maas 2019

Note 47. Langer 1953: 80

Note 48. Peréz-Goméz 2016: 154-155

Note 49. Emmons 2019: 1

Note 50. See: Paans and Pasel 2018, 2020; Have and Van Den Toren 2012; McGuirk 2008; See Schütze, Sachse and Römer 2003 for an empirical study.

Note 51. See Krämer 2009; 2016 for a detailed discussion around this topic.

Note 52. Kant 2002: 15 (CPJFI 20: 211).

Note 53. Latour 1990

Note 54. See Schön 1987, 1992; Goldschmidt 1991; Palmboom 2020; Mittelberg, Schmitz and Groninger 2017

Note 55. Fauconnier and Turner 2002; See also Taura and Nagai 2013

Note 56. See the account by Emmons 2017: 100

Note 57. Pombo and Magalhães 2006: 3

Note 58. Paans 2021

Note 59. Pombo and Magalhães 2006: 3

Note 60. See Paans 2022; Pombo and Magalhães 2006: 7

Note 61. Mitchell 1984: 508–509

Note 62. Foucault 2002: 49

Note 63. See Graves 1977 for a discussion of the role of the first sketches; See Charitonidou 2022 for a discussion of Frank Lloyd Wright's hand sketches.

Note 64. Ingold 2007: 61; Thomson 1911: 27-28

Note 65. Paans 2024b

Note 66. Betsky and Eeuwens 2008: 143-176

Note 67. See for instance Haarmann 2019

Note 68. See Michel 2005 for an overview. See Hasenhütl 2009 and Ammon 2016 for an overview of knowledge accumulation in drawing. A detailed account of how drawing and thinking interact is presented in a case study by Vangrunderbeek 2018.

Note 69. Flusser 1994: 60

Note 70. Knorr-Cetina 2006

Note 71. Schön 1992: 4

Note 72. Knorr-Cetina 2006: 174

Note 73. Knorr-Cetina 2006: 179

Note 74. Langer 1953: 51

Note 75. Burke 2015: 49–50

Note 76. McLaughlin 2014: xiii

Note 77. That is, of course, as long as the line is not part of what C. S. Peirce would call a symbol. A symbol might be a horizontal line to symbolize a floor, or a curvy line symbolizing a wave.

Note 78. Cook 2014: 228-229

Note 79. Ingold 2007: 50

Note 80. Bohm 2004: 76–124 for a wide-ranging discussion of this topic.

Note 81. Deleuze and Guattari 1987: 192

Note 82. Deleuze and Guattari 1987: 212

Note 83. Cocker 2017: 98; See Suwa and Tversky 2003 for a discussion of semantic saturation and Hasenhütl 2010 for a discussion of the role of hypotheses in architectural design. Cook (2014: 169) uses terminology that is closely related to the idea of "settling" and "springing-up": as he states the

68

following: "[W]e must respect the person who, having reached a state of clarification, sees the need to overlay another objective or criterion, and so the progress of the work is like a mist forming and clearing – and then forming again. The act of drawing, and particularly free-moving 'scribbled' drawing, enables this."

Note 84. Cook 2014: 172

Note 85. Jullien 2016: 49; See List 2009 for a concise discussion of this topic. List describes it as *"nichtfestgelegtheit"* or, not-being-finally-defined.

Note 86. Csikszentmihalyi 2008

Note 87. Csikszentmihalyi 2013: 101-102

Note 88. Nelson and Stoltermann 2014: 31

Note 89. Kang and Tversky 2016

Note 90. Paans 2024a; Sheets-Johnston 2013: 24; Goldin-Meadow 2010: 665

Note 91. Ingold 2013: 162

Note 92. See Langer 1953: 64-65 for a discussion on this topic. Langer points to the fact that "[m]ovement and lines are intimately related in conception, as also lines and growth. (…) A person "writing in air" makes letters appear to our imagination, invisible lines that grow before us though our eyes see only his moving hand."

Note 93. Frascari 2009: 203

Note 94. Frascari 2009: 203

Note 95. Latour 1990

Note 96. Frascari 2009: 202

Note 97. This term is commonly used for design researchers working during the 1960s and 1970s. Seminal figures are Herbert Simon, Allen Newelll, Horst Rittel and Charles Eastman.

Note 98. Van Den Berghe 2013

Note 99. Ingold 2007: 164

Note 100. Frascari 2009: 210

Note 101. Gadamer 2013: 83

Note 102. Jullien 1999: 78

Note 103. Jullien 2012: 69-70; Cook (2014: 88) is critical of such an account. To my mind, he is right insofar that not every sketch is equally generative, and not any finished drawing refuses to exert tangible effects. Moreover, there is certainly much to be said about the relations between sketches and for instance technical drawings that exceeds the scope of this paper.

Note 104. Jullien 2012: 61

Note 105. Jullien 2012: 69-70