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Architectural Drawing: Notation, Reflection, Communication and Presentation

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Abstract

In a time of computer aided design, computer graphics and parametric design tools, the art of architectural drawing is in a state of neglect. But design and drawing are inseparably linked in ways which often go unnoticed. Essentially, it is very difficult, if not impossible, to conceive of a design without being able to visualize it in drawing. Architectural design, in other words, to a large extent happens through drawing. Hence, to neglect drawing skills is to neglect an important capacity to create architectural design.

While the current-day argument for the depreciation of drawing skills is that computers can represent graphic ideas both faster and better than most medium-skilled draftsmen, drawing in design is not only about representing final designs. In fact, several steps involving the capacity to draw lie before the representation of a final design. Not only is drawing skills an important prerequisite for learning about the nature of existing objects and spaces, and thus to build a vocabulary of design. It is also a prerequisite for both reflecting and communicating about design ideas.

In this paper, a taxonomy of notation, reflection, communication and presentation drawing is presented, discussed and exemplified. The focus of the paper is the insights into architecture and design which may be acquired from these different modes of drawing. The paper is theoretical in nature, discussing ideas which have sprung from years of teaching architectural design and architectural drawing. While it is developed from empirical and partly introspective observations of the design process – from analysis over design development to the presentation of final designs – it seeks to corroborate these observations through literature on architectural drawing.

Introduction

Why do architects draw? There are historical, sociological as well as methodological answers to this question. Drawing has been a convention in architecture since Alberti (Carpo 2013, 128-133). Since then, architectural drawing has developed as a language to the extent that it embodies much of the social and cultural practice of architecture (Robbins 1994). On a more mundane level, drawings are easy to produce, reproduce and distribute (whether physically or digitally), as well as to revise and update (Eastman 1975, 46-50).

Although digital models with the advent of BIM are gradually taking over from drawings, from design to construction and subsequent maintenance (Carpo 2013, 128-133; Garcia 2013, 28-35), drawing has established itself as central to architectural practice and is likely to remain for a while (Carpo 2013, 128-133). Out of this privileged position in architecture over the past 500 years, different drawing modes have become established, facilitating the different phases of design development, from understanding the existing built environment to envisaging and ultimately creating new ones.

The four elements of the architectural drawing taxonomy presented in this paper reflect the different components of design exploration. While not necessarily linear in practice, they will be presented in a linear fashion: First, notation drawing is observation and analysis through drawing. Figure drawing, object drawing, and other forms of observational drawing in architectural design are ways to make notations about the existing world. The aim is to analyze and understand aspects of design such as composition, form, spatiality, materiality and detail. Second, reflection drawing – commonly referred to as sketching – is a way of generating new designs through iterative cycles of drawing. While often misunderstood as a way of 'printing' ideas from imagination, reflection drawing is a dialectical process, where ideas are fed from the lines made on paper as much as the lines made on paper are fed from ideas. Third, communication drawing is the capacity to convey, in a quick and draft-like manner, design ideas to others in order to communicate about design ideas. Finally, presentation drawing serves the purpose of presenting a finalized design through different representations such as plan, section, elevation, and perspective and axonometric views.

Arguably, a fifth type of drawing exists in the form of construction drawing. Construction drawings are technical drawings which codify drawing conventions encompassing line widths and types, hatchings, symbols, measures and text,

enabling manufacturers and builders to construct the objects represented in the drawings. However, neither the author, nor the literature have much to say about the insights into architecture and design which may be acquired from construction drawing. This, if of any relevance, therefore has to be left to others.

In practice, the different modes of drawing are not applied in a linear fashion. Rather, they are used interchangeably throughout the design process. While doing early site analyses, first ideas for a design may come up, triggering the need to explore the idea in drawing. Even presentation drawing may be applied long before the end of the process, in order to clarify matters of construction or order, or to clarify structural matters which are crucial to the viability of the design concept. As Will Alsop explains, "there comes a point […], when order in plan is necessary to confront matters such as construction (Edwards 2005, 273-286).

Insight from Drawing
Reading a book does not produce a physical outcome other than the notes which the reader may take while reading. Yet reading is generally considered meaningful because it endows the reader with an experience or insight. Doing calculus does not produce a physical outcome either, other than the calculation sheets used to calculate results. While reading notes and calculation sheets may be of relevance to the person who made them (and occasionally her teacher), they are typically of little interest to others.
With drawing it is different. Drawing always has a physical outcome in the form of a drawing. In fact, that is exactly what constitutes drawing as an activity. For artists and others, the purpose of drawing may be to produce a drawing – as an artifact for others to see. But possibly because of this, and because the physical drawing is always there, it is often overlooked that in architecture and design, the aim of drawing may be similar to that of reading and doing calculus. To produce insights about the drawn object for the person who made the drawing, as much as to produce drawings for others to enjoy.

As such, architectural drawing is a vehicle for understanding, for developing ideas, and to engage in design dialogue, rather than a means to create interesting objects – drawings – in their own right (Edwards 2005, 273-286). Nonetheless, it is often seen as such – either by architects themselves as when they resort to 'pictorial stylism', or by others who may consider architectural drawings as objets d'art (Porter and Dombek 1987, 45).

With reference to Plato, Aristotle, Kant, Peirce and Wittgenstein, Bovelet (2010, 75-84) lays out how drawing has been conceptualized as a specific form of knowledge throughout history. Hence, "[…] drawing comes with its own specific epistemic setting. It seems to be a kind of 'third thing', a sort of 'graphical reasoning' or 'visual thinking'." Drawing, is not a matter of simply representing non-drawn knowledge, as much as of 'producing genuine epistemic objects'. Drawing, in other words, is a way of knowing – or thinking – which cannot simply be replaced by other ways of knowing without knowledge being lost or transformed (ibid.).

Design ideas and the ability to draw are completely intertwined and improve together gradually (Cuff 1980, 5-32). While being a good draftsperson influences imagination – what you are able to imagine is related to what you are able to draw – it is impossible to draw without ideas. This is confirmed by experienced and successful architects who experience empirically that drawing is a way of understanding design problems and that it is absurd to even think that you can design without drawing (Edwards 2005, 273-286). Or, as Norman Foster states, "design is about ordering and this is expressed and explored through drawing" (quoted in ibid., p. 274).

Drawing Categories
In the literature, there is far from consensus as to how the different modes of drawing are named, depending on the authors' geographical and professional provenance. While different authors may frame architectural drawing differently, there is reason to dwell for a moment on the nomenclature of architectural drawing, not only to offer clarification, but also to allow the informed reader to align with her own terminology. In the following, I will therefore list the different names for drawing as used by different authors.

Notational drawings as notations about the existing world is a term shared by Crowe (1986, 5-14), who also refers to the same type of drawings as 'referential drawings', and 'visual notes'. Giving a historical account, he refers to both the sketchbooks of medieval masons, observations of existing architecture made by 18th century students of the Ecole des Beaux-Arts in the form of the Analytique, as well as the sketchbooks of 20th century architects such as Le Corbusier, Louis Kahn and Alvar Aalto.

Edwards (2008) also refers to the notion of the sketchbook in his discussion of the ability to analyze the built environment through notation drawing.

Reflection drawings as a medium for generating new designs are referred to by Crowe as 'process drawings' (1986, 5-14). For this mode of drawing, Belardi, in Nowak's translation (2014), uses the term 'inventive drawing'. Moore (2000, 30-34) refers to reflection drawings as 'conceptual drawings', while Herbert (1988, 26-38) refers to this type of drawings which architectural designers make in the exploratory stages of their work, as 'study drawings'.

Communication drawings as quick sketches used to convey design ideas to others enjoy the interest of both Herbert (1988, 26-38) and Robbins (1994), although neither sees them as a distinct category of drawings. Herbert does not distinguish between communication drawings and reflection drawings, which, to him are all 'study drawings' which "[…] allows a designer to talk to someone else about [a design] with only a brief preface such as 'this is a section through the auditorium'" (Herbert 1988, 26-38, p. 30). Nor does Robbins, who refer to both as 'sketches' or 'doodles' that architects use to develop and communicate ideas in the office (ibid.). Finally, presentation drawings as a means to present finalized designs are referred to by Moore as 'illustrative drawings' and simply as 'conventionalized' drawings by Robbins; a term which to him covers broadly all the working, contract, production and realization drawings which are used for communication outside the architect's office. Herbert notes that presentation drawings, as opposed to the other types or architectural drawings, preserve conventional scale relations and spatial illusion. However, these types of 'measured drawings' as Edwards notes, are increasingly out of favor in architectural education (2005, 273-286) – and practice alike.

Notation Drawing

Notation drawing is about architectural analysis. As such, it is about drawing something which already exists in the physical world. Notation drawing is an important vehicle for observation because you understand what you see on a deep level when you draw it. As opposed to photography, drawing forces you to engage with the subject, rather than simply press the camera shutter (Edwards 2008). Similarly, Crowe describes notation drawing as "[…] active, thoughtful, creative efforts on behalf of the investigator who creates them" (1986, 5-14, p. 10). Or, as Le Corbusier has put it, a camera

'gets in the way of seeing' (quoted in ibid.). An architect himself, Crowe describes the act of notation drawing as a way to dissect an object in order to really understand it; as a sort of design process in reverse. As a form of analytical drawing, in other words, it becomes directly related to understanding (1986, 5-14). Norman Foster, who keeps a sketchbook, argues that sketching helps him reinforce his visual memory. And to some, careful site drawings are beneficial in developing design solutions (Edwards 2005, 273-286). Several architects describe notation drawing as a way of seeing, and use the sketchbook as "a method of recording the site and analyzing its visual characteristics" (ibid., p. 276).

A good notation drawing is not necessarily one which aims at representing the object in photographic detail or 'faithful likeness' (Edwards 2008). Notation drawing may focus on the overall structure and composition of a building. It may try to catch aspects such as light and texture. Or it may depict ornamentation or construction details. As such each notation drawing represents the specific analysis which is carried out. Therefore, notation drawing most often represents a reduction of the observed object with regard to one or more of its intrinsic principles or qualities.

While notation drawing forces you to consider aspects of the studied object such as shape, proportions, rhythm, detail, structure and materiality, it not only teaches you about the specific building, urban space or landscape which is the object of the drawing. Each notation drawing also adds to a growing repertoire of solutions and knowledge about the many aspects of architecture and design which, in turn, nurtures your design capacity. As such, notation drawing is often as much about studying architecture and design in general as it is about studying the specimen.

Reflection Drawing

Reflection drawing is what is often referred to as sketching. It is about drawing something which does not yet exist in the physical world. Reflection drawing is one of the most important processes of design, as it is a verification and moderation process for initial ideas, which are put to test through repeated cycles of drawing. Therefore, this form of 'design-by-drawing' is one of the most common methods for solving design problems (Cuff 1980, 5-32). The first drawings for an architectural project "[…] are arguably the principal graphic instruments of thought in architectural design"

(Herbert 1988, 26-38, p. 26). But while the first drawing captures an idea (which may come from anywhere), more drawings must follow in order to investigate the idea's potential in the context of the design problem (Moore 2000, 30-34). Throughout the process, complexity evolves in successive drawings, leading to the evolution of the design (Crowe 1986, 5-14, p. 10). Reflection drawings are not just records of decisions taken earlier in some already completed process but a medium for the exploration of design ideas (Herbert 1988, 26-38, p. 26). As such, putting the pen to the paper is not merely a 'printing process' of visualizing preconceived ideas. It is as much a 'scanning process' of recording what has just been drawn as a kind of feedback mechanism. Hence, reflection drawing is a thinking device insofar as it is a way of probing our internal world (Belardi 2014). This is what Schön describes as a reflective conversation with the situation:

Because of [the] complexity [of the design process], the designer's moves tend, happily or unhappily, to produce consequences other than those intended. When this happens, the designer may take account of the unintended changes he has made in the situation by forming new appreciations and understandings and by making new moves. He shapes the situation, in accordance with his initial appreciation of it, the situation "talks back," and he responds to the situation's back-talk.
– (Schön 1983, p. 79)

Reflection drawing is "[…] a notational system characterized by quickness", which becomes evident in the many mediums such as napkins, train tickets, cigarette boxes and even toilet paper which have been used to jot down down design ideas (Belardi 2014). In reflection drawing, drawing must be up to speed with reflection. "Introspection suggests that the cognitive part of the design activity often goes faster than the drawing does and that an uninterrupted flow of design work is more effective than an interrupted or impeded one." (Herbert 1988, 26-38, p. 32) Speed, in other words, is not so much a matter of getting the work done, as of capturing the ideas that come to one's mind before they fade. There is a lag between our sensory and cognitive apprehension of something we trace – "between what we see and what we know we have seen" (Belardi 2014, p. 23). Hence, if we draw fast, there will be moments when we draw without knowing what we draw, which might well be important to the creative process (ibid.). This might be why some of Michelangelo's freehand sketches appear to have been made quickly, as in an attempt to catch a rapid succession of ideas evolving in his mind. With drawings often left incomplete, the same subject seems to have been investigated from different angles, either physically or conceptually, with each sketch leading to new ideas and new investigations, as vividly described by Cooper (2011, 49-90):
The larger sketch excludes the narrow bay's counterpart to the left precisely because Michelangelo had already drawn the small study of just the central bay in that location on the same sheet. Its purpose, therefore, was that of developing certain ideas that had appeared in only rudimentary form in the small study. These new ideas most likely occurred to Michelangelo while actually drawing the small study, which immediately motivated him to abandon it and develop them further in the larger sketch.
– ibid., p. 60

An important quality of reflecting through drawing lies in the ambiguity of the pencil stroke. Belardi praises the pen as "[…] an indulgent tool that not only permits inaccuracies – if not outright errors – but also allows eraser marks (never definitive) to fade away" (2014, p. 7). Ambiguity may leave aspects unsolved while still indicating the direction in which the design might be going. "Your hand gives you information which is unquantifiable – the result of an impulse that you are expressing to yourself" (ibid., p. 84).

Conversely, using CAD for sketching separates the designer from the object in a 'rubber glove attitude' (Harris 2001, 84-87) because she typically does not have the amount of information which the computer demands. Also, CAD programs frame both the drawing and how we draw, and thus narrow the scope of architectural drawing, as "[t]hey position us within a predetermined idea of space, an array of preprogrammed presets rather than an ambiguous possibility that can be constructed" (Jacob 2017, 76-91).

Communication Drawing
Communication drawing is about conveying design ideas to others. Communication drawing is instantaneous and draft-like, it serves the purpose of supporting verbal or other communication about the design, and is indispensable when explaining or brainstorming about design. When discussing design problems among peers, architects typically explain themselves making extensive use of drawings "[…] serving to direct, order, clarify, and record ideas that come out of the conversation" (Robbins 1994).

But what is communicated is not necessarily thought through before the pen is put to the paper. Again, Schön explains it with precision: "In the medium of the sketch and spatial-action language, [the designer] represents buildings on the site through moves which are also experiments" (Schön 1983, p. 94). The process is exemplified in his memorable account of the architecture student Petra and Quist, her instructor: After a while, Quist places a sheet of tracing paper over Petra's sketches and begins to draw over her drawing. As he draws, he talks. […]

"The verbal and non-verbal dimensions are closely connected. Quist's lines are unclear in their reference except insofar as he says what they mean. His words are obscure insofar as Petra can connect them with the lines of the drawing."
– ibid., p. 80-81

While drawing is an integral part of communication in architectural design (Cuff 1980, 5-32), communication drawing as a form of talking-and-drawing in one, is particularly powerful at the stage of design development. On the one hand, drawing may be very concise if not merely indicative, as it is sustained by verbal explanations. On the other hand, spoken words, which in themselves are notoriously bad for conveying design, may be imbued with meaning from even the most basic sketch.

Communication drawing need not abide by drawing conventions such as plan, section, elevation, perspective, axonometric, etc., but may resort to those idiosyncratic symbols or ways of drawing which are not immediately legible or communicable to others that architects may develop (Robbins 1994; Herbert 1988, 26-38). This is important, not only for matters of expediency – such drawings may be much faster to draw – but also for matters of ambiguity, as they may leave that very important room for interpretation, if not misinterpretation, which may drive the design forward.

Like reflection drawing, communication drawing is open and suggestive and may when mastered, offer insights to all parties in the conversation. The person making the drawing may use it to have a qualified discussion about design development and thus learn from others. And others may learn from the person making the drawing, as this communication format may be considered a "lethal combination of a suggestion and a quick sketch" (Harris 2001, 84-87, p. 84).

Presentation Drawing
Presentation drawing is about showing the final design to the world in an exact an unambiguous manner and which may stand alone without oral support. The classical types of presentation drawings include plan, section and elevation drawings, perspective and/or isometric drawings, as well as diagrams. While an important quality of reflection and communication drawings is their flexibility and ambiguity, presentation drawings must be precise and leave no doubt about the nature of the design which they represent.

Standard presentation drawings represent a limitation to the scope of interpretation of a drawing. As such, they give back only what they allow as a matter of convention (Cuff 1980, 5-32). But for this very reason, all presumptions and generalizations about the design are put to test in presentation drawings. Geometry, proportions, scale and relations re-enter the stage. As with notation drawing, measures and relations, which were hidden in the reflection and communication drawings surface and may cause new iterations of reflection, if assumptions from reflection and notation drawings turn out not to hold true. Hence, the precision of the presentation drawing may add new layers of understanding to the designed object. Although presentation drawing today, for all good reasons is mainly carried out using graphic, CAD, and rendering software, there is a lot to learn from manual presentation drawing, particularly for the design novice. Rather than simply copying and pasting doors and windows across a facade, manual presentation drawing forces you to consider rhythm, distance, proportions and position for all elements, in order to get a satisfactory result. Detail drawings may reveal tectonic aspects of the design which were not evident in the sketch, such as how parts and materials come together and how different design components are constructed. Similarly, structural relations between plan and section may only become apparent once drawn manually and to scale. This is most likely why several experienced architects value the lost discipline of drawing 'measured drawings', which focuses on construction rather than appearance (Edwards 2005, 273-286).

Discussion
Over the past couple of decades, the demise of hand-drawing in architecture has been lamented by some and cherished by others. While the lack of drawing skills in young architects have been pitied by older generations, the virtues

of drawing have been deemed nostalgic and irrelevant by generations brought up in the age of CAD. Yet, these discourses tend to share a common focus on drawings as artifacts and objects of design representation. Only rarely are drawing as an act rather than an object, and drawing as a vehicle for insights into architectural design the topics of discussion. Judging from current-day architectural representation, it is clear that the importance of drawing has diminished. Aesthetic preferences aside, there is no reason to lament that per se. And truly, new technologies such as building information modeling and parametric design have added new qualities and possibilities to architectural design. But if we do not recognize architectural drawing as a vehicle for architectural insight, we may risk to throw out the baby with the bath water.

It is important to note, that even if the argument of this paper is that drawing is an essential skill throughout the design process, it doesn't mean that other tools may not also be of value. It simply means that the tools are complementary rather than interchangeable. It is also not new, that drawing is not the only relevant design tool. Long before CAD, physical scale models, prototypes, collages, film and many other forms of visual media were – and still are – relevant and important ways of visualizing architectural design.

It is equally important to note, that even if the qualities of drafting as we know it – pencil and paper – may to this day be unique in offering the kind of immediacy, expediency, ambiguity, portability and communicability which are important qualities of drawing as a vehicle for architectural insight, it does not mean that new technologies may not at some point be able to offer the same qualities. Tablets with styluses in combination with drawing software may be examples thereof, even if a nylon stylus tip against a glass surface may offer a tactility which is different from pen and paper.

Conclusion

The four modes of architectural drawing presented in this paper offer complimentary ways of gaining insight into architectural design. Notation drawing is a way of acquiring a deep understanding of the physical world through architectural analysis. As such, it is radically different from photography, which does not necessarily involve the same level of active observation. Notation drawing not only provides insight into the specimen, but adds to an accumulating body of general architectural knowledge.

Reflection drawing, as a form of reflection-in-action, offers a unique medium for design reflection, due to its quickness and ambiguity. The iterative process of sketching and the dual nature of the drawing as informed and informing of design ideas makes reflection drawing ideal for the kind of insight into architectural design necessary to develop new designs. Communication drawing offers a medium for understanding through explaining due to the closely integrated act of drawing while talking. Just as one of the most effective ways to learn is to teach, communicating about your design through communication drawing may not only make your design ideas clear to others, but may also reveal new aspects of the design to yourself. And finally, presentation drawing, while hardly a manual discipline in architectural practice anymore, may offer important insights into relational, proportional, tectonic and structural aspects of a design, particularly to the design novice. Despite the advent of computational technology, which adds new and relevant tools for the architectural design process, architectural drawing in these different modes, must therefore be considered indispensable for gaining a wide array of relevant insights into different aspects of architectural design.

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