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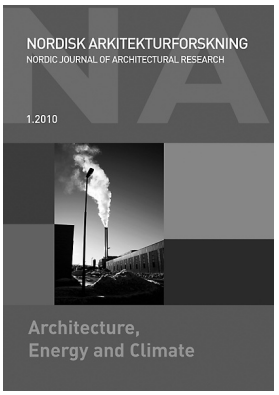

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Architects and the creation of images

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Abstract:

The objective of this article is to discuss the architect's most basic working method—the creating of images—and the untapped, or at least not problematized, potential of knowledge therein. The main question is: What epistemological significance can be claimed for the activity of creating images?
The point of departure is provided by the three questions: Why do we create images? What do we create images of? and What happens when we create images? The answers to these questions are illustrated by pedagogical examples from nine courses in various subjects and reflections emphasizing their relation to the architectural profession.
The answer to the questions is twofold: enhanced ability to explore and develop new insight, and better communication.
The process of sketching proceeds by stops and starts to create visualizations that may require moving beyond the expected. Sketching can exceed mere depiction, and become a way of developing new insight. When architects work to overcome their reluctance it can also be described as letting go of familiar categories.
Architects constantly must communicate with colleagues, prospective clients, and other professionals. Proficient sketching can facilitate those discussions in many ways. Through sketching, architects are able to give shape to ideas still in the process of being thought out. In solving verbal problems by creating images, architects call upon different domains of everyday experience in their quest for solutions.
The conclusion is that drawing is a powerful method for problem solving and communication, which ought to be increase and refined.

Keywords:
Drawing, domains of experience, images, communication, problem solving

1. INTRODUCTION

The objective of this article is to discuss the architect's most basic working method—the creating of images—and the untapped, or at least not problematized, potential of knowledge therein. Architects paint, draw, and sketch in their professional and private lives. For many these activities are an accustomed part of being an architect, while others are never really comfortable doing them. Within the architect's profession, creating images is more often associated with design than with urban or landscape planning, maintenance or architectural research.

Over the past several years, I have noticed that students have become increasingly oriented toward achieve results. They often speak of making quick decisions about an idea, then devoting most of their time depicting it. Their ability to use sketching as a tool for visualizing alternatives appears limited. It is no longer self-evident, for example, that students will bring sketch pads along on field trips. In order to comprehend one's surroundings, we must be capable of observing them in different ways. One excellent and proven way of sharpening observation is through depiction.

Training architectural students to use pencil and paper for sketching and illustration is not just a way of improving skills, but a means of developing knowledge of the world. Architects work within fields that are not only visual, but are a combination of quantifiable factors and perceptual experiences. This statement points out the main question of this article: What epistemological significance can be claimed for the activity of creating images?

Although individual architectural work can be carried out successfully without problematizing the creative process, the creation of images remains an important tool. Working with artistic means in a conscious way, when combined with reflection, affects our relationship to the world around us, the process of knowledge, and our understanding of others and ourselves. In this case the method is of much greater importance than the result. Research conducted in various fields has established that working with images leads to increased self-esteem, enhanced ability to solve problems, and better communication (Dahlman 2004). These are important aspects of an architect's training: by developing the ability to represent the surrounding world, as well as articulate in an image what has not yet been formulated, architects expand their professional capabilities. In accepting the sketch as preceding the thought, just as action may precede purpose, they can arrive at new solutions–which, after all, is the goal of their profession. Sketching not only facilitates depiction, but also enhances conceptualization, releases creativity, and develops understanding on a deeper, more intuitive level, as will be elaborated below.

In the mid-1970s when she was teaching art as a method of problem solving Betty Edwards, then professor of art at California State University, identified three obstacles to understanding: stagnant patterns of conception, the demand of speed, and fear of failure. She argued that by working with images, these obstacles can be eliminated. As a teacher, she noticed that her students did a better job of depicting images that were upside down, than non-inverted ones. She also suspected that words inhibited immediate observation (Edwards 1976, 1979). As support for her reasoning she cited neurologist Roger W. Sperry's research on functions residing in different parts of the human brain. Sperry showed that the brain alternates between two completely differently modes of thinking: a verbal, analytic, sequential mode, and a visual, perceptual mode where time has no importance. Edwards claimed that through the activity of depiction, we can train ourselves to consciously shift between these modes. She developed her own pedagogical method and eventually offered classes in problem solving for managers in the business world. Producing images helped these individuals realize connections they had earlier overlooked. According to Edwards, people complicate their existence by gravitating toward literal judgements and explanations, and in so doing they overlook answers that may be right in front of them, but in a different form (Dahlman 2000).

The philosopher Maurice Merleau-Ponty (1908–1961) had another way of describing the narrow frames of reference that limit many people. He used the Müller-Lyer illusion as an example of how an objective, scientific position may be taken as considered superior to immediate sensory experience. In his view the internal relationship of the lines in the illusion is pointless, and can only be raised in an objectified world. Merleau-Ponty argued that within the visual field, opposed ideas displace each other, since objects–in this case the lines–cannot be compared. Each is seen in its own

context, as if the others did not belong to the same universe. He concluded that our perceptions, the primary data of our senses, are always diminished by analysis, and that the objective mode of organizing the world is only one method among others. This is not to minimize the importance of objective science, but to draw attention to the existence of a variety of approaches (Merleau-Ponty 1958).

The scientific and pedagogical problem is, as described above, that architects work within fields that are not only visual, but are a unique combination of quantifiable factors and perceptual experiences. If one asks what epistemological significance can be claimed for the activity of creating images, the answer must be sought by identifying and characterizing such images.

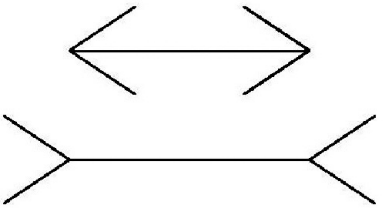

Figure 1:
Müller-Lyer's illusion consists of two parallel lines that terminate in pairs of arrowheads pointing inward and outward. The lines are generally perceived of being different lengths, but when measured prove to be exactly the same. This image is often used to illustrate how unreliable our perceptions are.

2. METHOD

The present article is the outcome of fifteen years of pedagogical experience. It is based on studies conducted through observation and discussions with instructors and participants in the following courses:

Formlära grundkurs inom landskapsarkitektprogrammet vid institutionen för stad och land [Graphic Arts and Design: Basic Course for Landscape Architects], SLU, 1993–2009.

Formlära fördjupning inom landskapsarkitektprogrammet vid institutionen för stad och land [Applied Graphic Arts and Design], SLU 1993–2009.

Formlära för natur- och samhällsvetare [Graphic Arts and Design for Natural and Social Science Students], SLU 1994–2005. (Dahlman 1998, 2000, 2004)

Naturvetenskapligt basår [Preparatory Year for Natural Science Students], UU 2006. (Dahlman and Boman 2006, unpubl.)

Materialkemi [Material Analysis], UU 2006–2007. (Dahlman and Boman 2008a, 2008b)

Bildpedagogik [Art Education], Högskolan i Gävle 2005–2008. (Dahlman 2006)

Learning, Perspectives, and Knowledge, SLU 2007–2008.

Electron Microscopy. PhD preparatory course, UU 2007 (Dahlman and Boman 2008a, 2008b)

Housing Research and Design 2006. Workshop at The Oslo School of Architecture and Design entitled "Between Associative and Argumentative Modes of Thinking".

All of the aforementioned courses were designed and taught systematically, with the exception of the landscape architecture programme. The latter constituted an area of pedagogical freedom, where experiences from other courses could be applied and integrated. The research methodology employed involved practical exercises with image-making and design, observation, oral and written reflections on the above exercises and consideration of the pedagogy itself by participants. Included were interviews with instructors responsible for the vocational subjects. The results were compared with epistemologies in other subject areas. The studies were conducted in fields where working with images is not commonly done, and polished, completed images were not an essential part of the outcome. Thus, the question of what happens when we work with images was scrutinized and rendered more or less transparent, making it possible to attempt an answer. The present paper discusses the results of the projects in relation to the architectural profession.

A point of departure may be provided by the three questions: *Why do we create images? What do we create images of? and What happens when we create images? Some might also add: How are images created?* (although technique in this situation is of minor importance). The reason for focusing on what occurs is that image-making is a process that, when combined with reflection, produces new knowledge. (The term image-making, as used here, includes everything from creating simple sketches to revising drawings and paintings, as well as engaging in three dimensional exercises.)

The answers to the above questions sometimes intersect. In order to avoid repetition, the first two questions are only dealt with briefly and are used as background for the third. Each of the sections below concludes with a reflection emphasizing its relation to the architectural profession.

3. WHY DO WE CREATE IMAGES?

Aside from the joy visual representations bring to many people, one may cite three significant reasons for creating images: 1) to improve the powers of observation, 2) to train the ability to articulate, and 3) to facilitate communication. As far as epistemology is concerned, these three comprise only two categories, since communication can be described as a practical outcome of the ability to articulate, and vice-versa. Even for those who are not architects, being able to observe, articulate, and communicate is fundamental, irrespective of whether one has recourse to creating images. Whether we illustrate something in order to observe, articulate, or communicate, there is always some part of what we are attempting to portray that we are not familiar with. One way of clarifying the difference between observation, articulation, and communication is how we gain access to the object in question. In the case of observation, it is achieved through perception, conceptualization, or memory. Articulation, on the other hand, rests solely on immediate perception, without the need for prior perceptions or preconceptions. When our purpose is to communicate, we may make images to observe or to help us absorb or articulate the object. These sometimes intertwined principles will be illustrated with concrete examples in the following paragraphs. One's approach to depiction also depends on the kind of object and whether it possesses a visual shape or not.

3.1. To improve the powers of observation

Observing is not something easily understood or self-evident. Our way of observing varies from situation to situation. It is useful to distinguish between controlling, seeking, and understanding. Controlling signifies checking to see that everything is the way it is supposed to. A quick glance at our watch assures us that we are not too late, although we disregard the exact time. A seeking mode of observing, however, can be characterized as focusing on a specific detail. For example, in a crowd, our attention may be channelled toward seeking out the person we have an appointment with. Finally, to observe in order to understand, we focus our attention on something that is before us. It is in the latter case that drawing is so useful, since it forces us to exclude surrounding impressions. The difference between staring at something and portraying it resides in the level of awareness. It is difficult to transform a solitary visual impression into understanding, since other impressions and thoughts keep intruding. Drawing, however, concentrates the mind on what we are observing, as we use the instrument in our hand to articulate our impressions. When we reflect on the image which this process gives form to, we learn something about the object itself.

The relationship between seeing and depicting has been well-described by the image pedagogue Kimon Nicolaïdes in his introduction to The Natural Way to Draw (1941). There is only one correct way of learning to draw, he declares, which he calls the natural way. It has nothing to do with tricks or technique, nor is it a matter of aesthetics or imagination. For Nicolaïdes drawing is solely a matter of perceiving correctly, by which he means: through physical contact with all of the senses. Rules, in his view, never fulfil a real purpose unless they are related to reality. Someone who has difficulty drawing does not lack ability, he concludes, but understanding. In this sentence, Nicolaïdes captures the paradoxical nature of drawing: we cannot depict what we cannot understand, but it is through drawing that we create understanding, which may be why architects always have been drawing.

Teaching observation through depiction is a classic component of architecture programs and has a strong impact on a student's perception and comprehension of the surrounding world. Not only do students observe in a new way what they have depicted, but they are also able to transfer this fresh understanding into other areas. For example, the shape of a pitcher can be adumbrated with a piece of wire, or evoked by drawing its surroundings. This leads to the insight that questions or problems also can be approached in alternative ways. Through drawing exercises, students begin to realize that there are more ways to observe an object than they first imagined. As their ability to conceptualize grows, they see that they have more options to choose from. Creating a self-portrait

showed participants that they had not observed essential details as carefully as they had thought, leading them to consider whether they had been as inattentive to other things. In the end they learned how easy it is to take what is comfortable for granted, how difficult it is to ignore what we think we know, and that it can be quite troublesome to re-evaluate preconceived notions.

Figure 2:
The shape of a pitcher adumbrated with a piece of wire and a drawing of its surroundings.

3.2. To train the ability to articulate

By articulation we mean an activity whereby a concept that has not yet been visually expressed is given a certain form. For an architect, the most obvious articulating activity is sketching the solution to a spatial problem, and in so doing growing closer to the reality with which he is engaged.

In all of the courses included in this study, participants practiced depicting non-visual concepts. Some of these were emotions, such as anger and calm. Others were general concepts, such as attention and creativity, or concepts specific to their chosen field of study, such as reciprocal space or sustainable development. The power of these exercises lay in their ability to elicit images, whatever their nature, and at the same time increase understanding of the abstract concept presented. The resulting images formed the basis for group discussion. By being exposed to the uniqueness of each image participants came away convinced of how differently we perceive the world.

3.3. To facilitate communication

Communication signifies the ability to share thoughts with others and being able to engage in self-reflection. To reflect upon what one knows and how one knows it requires a spoken or written language. Andy Clark, professor of philosophy and cognitive science at the University of Sussex, proposes that when a thought becomes a word, it becomes an object that we can observe and reflect upon. He argues that while we are creating something, we are in a state of not thinking about what we are doing, but when a result appears we treat that result as an object. In then reflecting upon the object, our understanding grows. Clark holds that a common language is necessary because it helps us communicate ideas while serving as a tool for developing our own notions. He points to the common conception that words emerge from our thoughts, and that we first think what we wish to say or write, and then carry it out. However, Clark believes that the reverse takes place: thoughts are produced through language (Clark 1997, 193-219). There are similarities between Clark´s view of reflection and the process of creating images: while we are creating images, we are in a state of not thinking about what we are doing, but when a result, a drawing, appears we treat that result as an object. In then reflecting upon the drawing, our understanding grows.

In the courses referred to, working with images has also been used as a method of looking at shifting perspectives and group processes. An example is when students from 17 different countries made a painting each showing the meaning of sustainability. By painting a concept that all the participants were familiar with, discussions could probe deeper into understanding, and similarities and differences in perception be made clearer. Since images consisting of previously unformulated knowledge or verbalized perceptions form a common basis for discussion, participants interact with greater equality. Reticent individuals are given the same opportunity to speak as those who are usually more assertive.

3.4. Why do architects create images?

Architects create images in order to observe the physical environment, articulate their ideas, and communicate. When an architect makes a quick sketch of a marketplace, a landscape, or a detail, it is because something intriguing impels her or him to wish to remember or understand it. At the drafting table, an architect makes sketches in search of solutions to complex problems, giving visual expression to abstract concepts. Such sketches constitute the foundation for reflection and communication, with oneself or others. Architects also showcase their ideas at presentations with original documents. This creative process also includes a destructive part. Architects are not only heading towards a specific goal, but are always ready to give it all up in order to continue to a new step in a totally new direction.

4. WHAT DO WE CREATE IMAGES OF?

If we suspend our criticism of the results, most of us are able to portray something we have in front of us. Most people can also manage to depict something from memory. As in a case of a drawing of something physically present, similarities to the original object can also be detected in pictures based solely on recollection.

Figure 3:
Portrait of a chair.

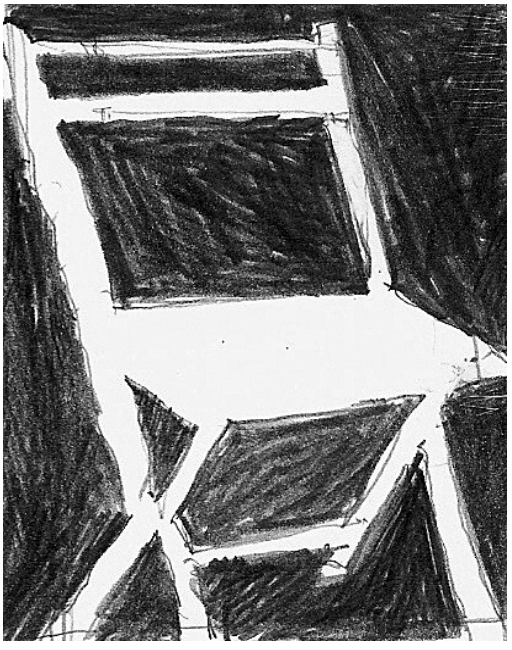

Figure 4:
Portrait of the surroundings of the same chair

In addition to depicting objects that are either present or remembered, we can also, with very little guidance, create images that have no visual referent (i.e. images of concepts we have no visual preconception of.) In art, we can experience an image as something more than what is depicted on the surface. Most people feel a discomforting chill when standing before Edward Munch's Skriet (The Scream). What Munch has achieved is the portrayal of something that does not have a determinate physical shape, but which still can be communicated through an image. This is however an example of when the result of a creative process has turned into an emblem and become part of the historical collection of ready formulas.

In the following, an object is considered based on its form (defining appearance) and name (verbal label). One alternative, objects with no name and no shape, will not be discussed here since such an object is not perceived in a conscious way. This category is, however, essential for our ability to understand and to make conclusions.

4.1. Objects with name and form

Any concrete object, such as a cup, a chair, or a landscape, can be depicted directly or through recollection. The object, or an image of it, can generally be recognized when seen.

4.2. Objects with shapes but no names

The shape circumscribed by a chair's legs, the underside of the seat, and the floor has a defined form, but we have no name for its exact shape, or for such configuration as the

background or surroundings of a still-life, or a skyline where it meets the edge of a forest. Drawing these shapes requires thorough observation, since we cannot conceive of what they look like beforehand.

4.3. Objects with names but no shapes

This category of concepts can be exemplified in different ways, such as: a) through symbols that are conventionally agreed upon within a certain context. A heart, for example, often symbolizes the word love; b) through examples, that is, by depicting a situation associated with, or correlated to, the concept being portrayed. An example might be an image of the beloved in order to portray love; c) through direct articulation, where an image presents the concept in a shape that did not exist prior to the image being made. These concepts are also referred to as abstractions and they are visually inaccessible. By creating such images, we give the concept an articulated form that can help us develop greater insight.

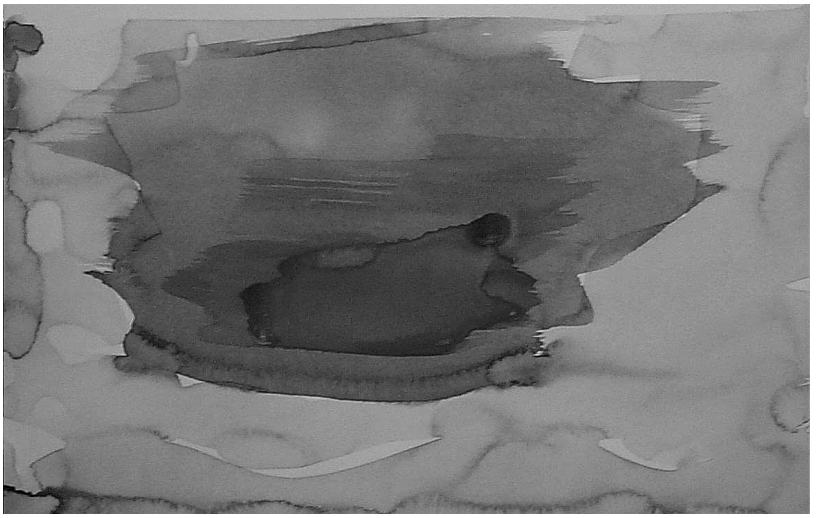

Figure 5:
Picture made by a veterinary student showing "responsibility" for the coming professional life. The student was surprised by the heavy red cloud but realised that he was concerned by the pressure he expected.

4.4. What do architects depict?

Architects routinely depict objects from all of the above categories. During field trips, they draw visual forms that may or may not have names. In the sketching process, new solutions are articulated through images, some of which have no previously known shape.

5. WHAT HAPPENS WHEN WE CREATE IMAGES?

In order to understand what it means to create an image, we may consider it against the background of the description of developing knowledge offered by Don Norman, currently professor of cognitive science at Northwestern University. According to Norman, when we are exposed to new impressions, we try to understand their significance by striving to identify patterns that coincide with something already familiar to us. As long as the process is ongoing (in this case, the creation of images), we are seeking something. When the patterns fit and become stable, we have a thought. This happens, Norman finds, quickly and automatically on an unconscious level. Therefore, we are only aware of the end result, not how we arrived at it. He argues that our thoughts and mental activities do not work neatly, rationally, or logically, as many have tended to believe. Instead, various ideas and unrelated thoughts are synthesized through creative leaps, insights, and connections. Norman concludes that much of our knowledge is unavailable to consciousness, and that we primarily uncover it through our actions (Norman 2000). The creation of images is such an action.

In studies designed to interpret the outcomes of the courses listed earlier through the application of theories of knowledge from philosophy, pedagogy, and cognitive science, I have been led to conclude that there are three main reasons why knowledge increases when one works with images:

- different domains of experience are brought together
- resistance to challenging familiar explanations ceases
- ability to conceptualize increases (Dahlman 2004, 2007b)

However, these three factors are not mutually exclusive and may often overlap. They are also not directly related to categorizations of why and what we draw.

5.1. Bringing different domains of experience together

Domains of experience can be described as different ways of remembering various experiences. For example, memories may be visual, tactile, kinetic, or verbal. The phrase "domains of experience" itself is, among others, used by George Lakoff and Mark Johnson to characterize how metaphors work In that context, it usually indicates two conflicting linguistic dictums brought together to create a new understanding. If one considers a statement such as "Life is a play", we realize that it is not true in a literal sense. But combining our experiences of "life" with our experiences of "a play" creates a broader understanding of what life might be. In this example we invoke categories of experiences in an attempt to comprehend something although accessing these categories is not always a conscious act. (Lakoff and Johnson 1984)

Fundamental to integrating different domains of experience is our need for an understandable, cohesive reality. If what we experience is not rendered comprehensible through the application of familiar patterns and explanations, we reluctantly try others. A determining factor in this situation is the ability to see beyond what is before us at a given moment as well as our willingness to rely on incomplete clues to facilitate comprehension. The development of knowledge is based on the capability to make sense of our present reality, that is, both the familiar and the absent, unarticulated component.

To portray concepts that have no clearly defined visual shape requires bringing together different domains of experience. As in the case of a metaphor attempting to do so requires a verbal transforming into an image. Assigning students the task of depicting the concept "attention" in the form of a watercolour causes the same consternation as presented by the paradoxical statement "Life is a play". When rationally incompatible domains of experience are forced together, new understanding may emerge by recourse to the making of images. Learning something in this case may be a movement between different domains of experience – a process in which one is compelled at some point to return to the verbal domain for reflection.

A single phenomenon can be conceptualized alternatively, as though we had parallel modes of intelligence. One is recruited through formal tools of thought, and the other through unarticulated skills as presented by for instance philosopher Michael Polanyi (Polanyi 1962). The process triggered by making images can be expressed as an attempt to articulate an ineffable reality that cannot be attained through formal tools of thought.

In order to understand what happens when we create an image of a non-visual concept, we must first make clear what we mean when we speak of articulating or creating an object. Metaphor may once come to our aid. According to philosophers Donald Davidson and Paul Ricoeur, there are no pre-existing guidelines for formulating a metaphor, since a metaphor is constituted by a creative act that is not based on a verbal set of rules (Davidson 1979). It can be described as the union of two contradictory (or rationally incompatible) concepts to form a new whole. Only then can one comprehend the full range of a metaphor (Ricoeur 1979). Once again, as different domains of experience are brought together, comprehension increases. To modify a saying of Pascal's (he spoke of the heart), "The mind has its reasons that reason doesn't know".

With regard to the creation of images, when portraying a concrete object, such as a hand, we attend to a familiar shape of a present reality. Portraying non-visual phenomena (the concept "awareness", for example) is a way of appropriating part of an absent and as yet unarticulated reality.

In the first case, portraying concrete objects, the ability to observe and understand one's surroundings enhances. When an inexperienced person tries to portray a concrete object, the image often turns out to be a stereotypical confirmation of something already known. If that person is trained to carefully scrutinize the same object, he or she learns something new about it. The conception of "fingers", for example, is deepened and leads to the realization that fingers can appear in many different shapes. In order to understand how a specific hand looks, an artist must be guided by reality.

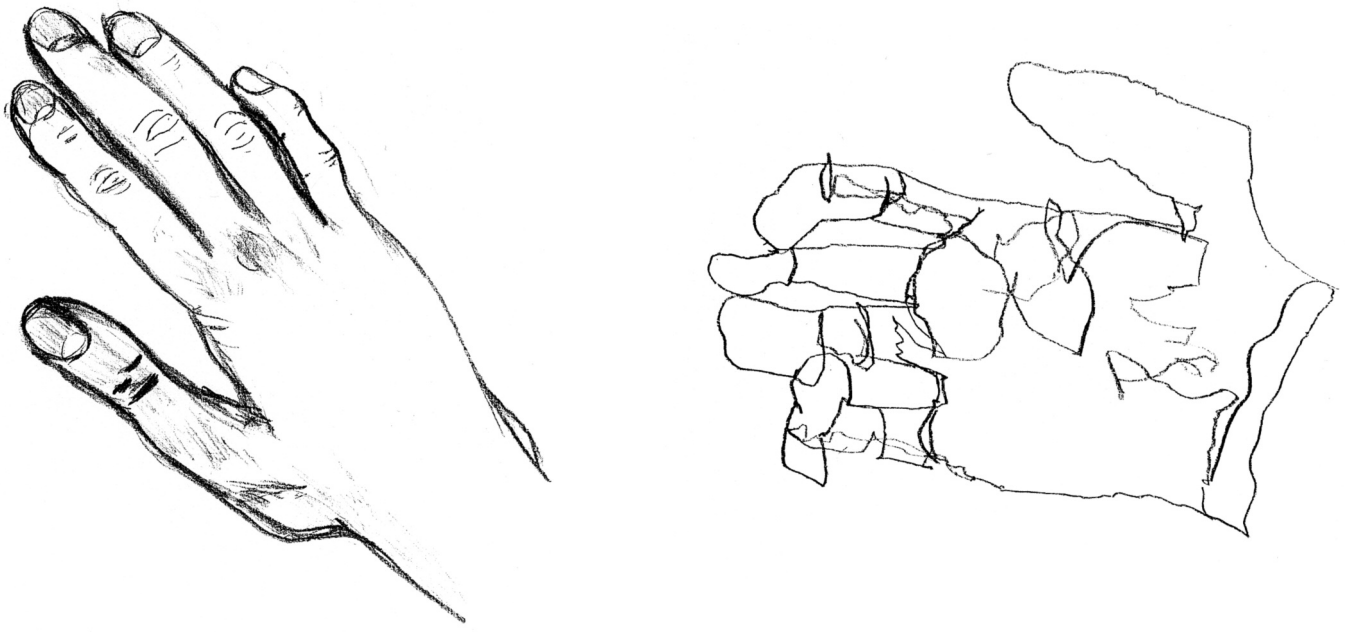

Figure 6:
Stereotypical portray of a hand and a carefully scrutinized one.

In the latter case, portraying non-visual phenomena, the completed image shows the original concept "awareness" in shapes drawn from a domain of experience other than the verbal. Necessity causes us to fall back on our own resources to solve the problem and the result is very personal. The image does not repeat the concept's shape (since it has none in itself); the content cannot be completely decoded; and the understanding that emerges from creating the image differs from that reached by logical deduction.

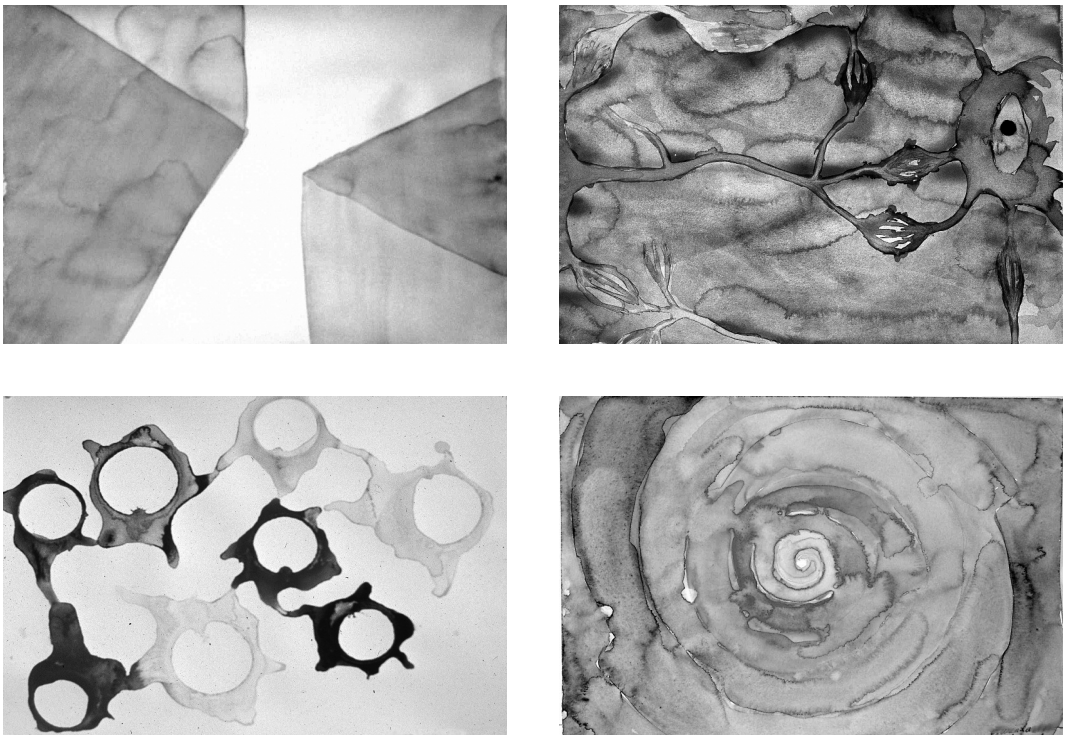

Figure 7:
Four pictures showing "awareness".

5.2. Reluctance to challenging familiar explanations ceases

Unifying different domains of experience occurs when we struggle to give expression to something unclear that lies outside the realm of our experience. When we encounter something that contradicts or is incompatible with our previous experience, an uneasiness is created that we try to avoid by modifying the earlier conception. Charles Peirce has among others described that thinking is prompted by the irritation that causes doubt, and is overcome only when we reach a conviction (Peirce 1983). Learning may also depend on our ability to put faith in inconclusive clues, as suggested earlier. Michael Polanyi has described a similar process, arguing that this is a necessary skill for solving problems. Vague clues may point the way to as yet unarticulated knowledge. To access the intelligence's inchoate resources one must first demolish the obstacles presented by familiar borders (Polanyi 1963). This process is analogous to the way architects leave solutions to find new and better ones.

5.3. Ability to conceptualize increases

In portraying concrete entities, the understanding of the object and the number of expressive alternatives increases. This can also be considered an enhancement of our ability to conceptualize. The philosopher Peter Gärdenfors at Lund University has described the significance of this. He sees imagination as supplying models of how to read reality in a new way, arguing that if one cultivates such an ability, it becomes easier for a person to choose and plan (Gärdenfors 2000). We keep developing our imaginative capacity throughout our lives. Creating images is one technique that let us practice this.

The concrete world can be expressed as the foundation for creating a comprehensible hypothetical model of a larger sphere in which what exists and what is conjectured are contained. Our imagination is a guide for experimental activities that gradually transform the existing present into the desired future. The results that appear are used to confirm and further probe this guiding conception. There is a clear parallel to the sketching process here. Our conceptions lead us in fumbling, experimental attempts to come to grips with the unseen. The response to the assignment takes shape and, finally, a solution is chosen that best agrees with what the individual wanted to accomplish.

5.4. What happens when architects create images?

As we now have seen the significance of drawing has a lot in common with various epistemological statements. Architects create images in order to 1) explore and recollect reality, 2) solve complex problems, and 3) present their conceptions. They depict environments and details, intuitively sketch out solutions, and strive to produce clear and convincing representations of yet-to-be constructed objects. Training as illustrators makes architects more proficient in their work, giving them the ability to shift focus between the whole and its component parts, change perspective, show flexibility in taking a client's best interests into account, and be able to develop something new based on often conflicting requirements. In the process of drawing, an architect's ability to observe and understand the surrounding world is improved while simultaneously a repertoire of ideas for future projects is amassed.

Architects constantly work to overcome their reluctance experience in letting go of familiar categories. The process of sketching proceeds by stops and starts to create visualizations that may require moving beyond the expected. Sketching can exceed mere depiction, and become a way of developing new insight.

6. CONCLUSION

In this article we have considered the activity of creating images and the knowledge produced by working with them. Through sketching, architects are able to give shape to ideas still in the process of being thought out. In solving verbal problems through creating images, they call upon different domains of everyday experience in their quest for solutions. As a window of the mind, sketching can overcome the reluctance to abandon the familiar and venture into the unknown.

Architects constantly must communicate with colleagues, prospective clients, and other professionals, such as structural engineers, contractors, and inspectors. Proficient sketching can facilitate those discussions in many ways. The process of depiction, in which action precedes meaning, where nothing is final and everything can be edited, conceptions of the future may be advanced by intuitive, non-rational methods and choices. Here many alternatives are better than few and architects attain a level of freedom without which they cannot thrive. The ability to think sometimes requires the ability to relinquish thinking. This can be elevated to an art form in the traditional practice of an architect. Giving the imagination free reign to build images in which the architect can dwell for a while remains at the heart of architectural creativity.

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LITERATURE

CLARK, A. 1997. *Being There: Putting Brain, Body, and World Together Again*. London: MIT Press.

DAHLMAN, Y. 1998. *Bildtänkandets pedagogik* [The Pedagogy of Pictorial Thinking] Pedagogiskt utvecklingsarbete, SLU. Uppsala.

———. 2000. *Bildtänkandets pedagogik 2 – intervju med Betty Edwards* [The Pedagogy of Pictorial Thinking 2: Interview with Betty Edwards] Pedagogiskt utvecklingsarbete, SLU. Uppsala.

———. 2004. *Kunskap genom bilder: En studie i hur studenter inom natur- och samhällsvetenskapliga utbildningar fördjupar sin ämnesförståelse genom arbete med bilder* [Knowledge through pictures: A study of how pictorial practice affects understanding in the field of study for students of natural and social science]. PhD diss, Acta Universitatis agriculturae Sueciae. Agraria, 448, SLU Sveriges lantbruksuniversitet.

———. 2007a. Den konstnärliga och kreativa processen i vetenskapens tjänst [Artistic and creative processes in the service of science]. *Bild i skola: konst/media/design* 78; 10–13 Lärarförbundet.

———. 2007b. Towards a theory that links experience in the arts with the acquisition of knowledge. *International Journal of Art Design Education* 26(3)274.

DAHLMAN, Y., AND BOMAN, M. 2008a. Ökad kunskap i kemi genom arbete med bilder [Deepened understanding in chemistry through drawing]. Paper presented at NU conferece in Kalmar, Sweden.

———. 2009. Associative learning through art activities. In: M. Gupta-Bhowon, S. Jhaumeer-Laulloo, H. Li Kam Wah, P. Ramasami, (eds) *Chemistry Education in the ICT Age*. Dordrecht Heidelberg London New York: Springer.

DAVIDSON, D. 1979. What metaphors mean. In: S. Sacks (ed.), *On Metaphor*. Chicago: University of Chicago Press, 29–45

DEWEY, J. 1907. The control of ideas by facts. *Journal of Philosophy, Psychology, and Scientific Methods* 4(8)197–203.

EDWARDS, B. 1976. An experiment in perceptual skills in drawing. PhD diss. University of California at Los Angeles.

———. 1979. *Drawing on the Right Side of the Brain*. Los Angeles: Putnam.

EISNER, E.W. 1998. Does experience in the arts boost academic achievement? *Journal of Art and Design Education* 17(1) 51–60.

GÄRDENFORS, P. 2000. *Hur homo blev sapiens.* [How Homo Became Sapiens: On The Evolution of Thought]. Nora: Nya Doxa.

JAMES, W. 1916. *Pragmatism*. Stockholm: Bonniers Förlag.

JOHNSON, M. 1987. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press.

JOHNSON, M., AND LAKOFF, G. 1980. *Metaphors We Live By*. Chicago: University of Chicago Press.

MERLEAU-PONTY, M. 1958/2006. *Phenomenology of Perception*. London and New York: Routledge.

NICOLAÏDES, K. 1941. *The Natural Way to Draw*. Boston: Houghton Mifflin.

NORMAN, D. 2000 *The Design of Everyday Things*. London: MIT Press.

PEIRCE, C. 1983. Hur våra idéer kan göras klara. [How to Make Our Ideas Clear] In: K. Marc-Wogau (ed), *Filosofin genom tiderna, Vol 3*. Stockholm: Bonniers Förlag, 252–269.

POLANYI, M. 1963/1983. *The Tacit Dimension*. Glouchester, MA: Peter Smith.

RICOEUR, P. 1979. The metaphorical process as cognition, imagination, and feeling. In: S. Sacks (ed.), *On Metaphor*. Chicago: University of Chicago Press, 141–157