

Art and Complexity
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Drawing, Knowledge, and Intuitive Thinking: Drawing as a Way to Understand and Solve Complex Problems

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A question of interest today, exemplified by the theme of the seminars is how scientists should approach art. I will here suggest that scientists should start drawing, and what I thus want to emphasize is that a scientist has little benefit of meeting with artists compared to what he can reach by learning and practicing *the method of artists*'.

As an architect my profession exists somewhere between science and art, which can mean that architects are neither scientists nor artists, or that they are both. Although most architects are not specialists in either of these two fields, they are possibly what the Norwegian philosopher Arne Kvaløi has named "supermateurs," indicating that they belong to both fields. They are at least not exaggeratedly respectful of either of them, which I believe is important.

Tor Nørretranders has talked about the importance of seeing the complexity of everyday life. I will propose that we look at art, in all its complexity, as an every day phenomenon, since by taking a servile or detached attitude to art it is impossible to learn from it. By describing how an architect works, as a link between the two fields, I will try to show how scientists can learn from, and make better use of the artist's way of thinking.

When I receive a commission I start immediately to produce drawings, projections, and pictures. People often consider drawings as illustrations, the *result* of a mental effort, but what I want to discuss is drawing as a process, including all the drawings of which more than 95% are for my eyes only. I don't start by analyzing the situation, I am not even sure that I read the program thoroughly. I just start to draw, and soon after I have received the commission I have a first sketch on the drawing table. It is not only a part of the building or a detail. It is a solution to the total problem, or an idea about a solution. It does not at all

solve the demands of the program, but the aim is to create a representation of the whole.

From the moment I have this drawing I can start the next phase, which is to examine it. I look at it, view it, but not very carefully. I don't examine how it solves the program; I consider it as a picture. I am not interested in finding faults, only in how to go forward. I think I look for something that has to be changed or developed. Exactly how this works I do not know, but suddenly I am working with the next sketch. When I then observe that one, I get new impulses to change and start new sketches and in this way I go on, until I am satisfied. That does not mean that my job is finished, just that I now have a grasp on it, and do not feel the need to continue any longer.

I have probably established a form of problem hierarchy, and I can go on with the demands of the program and elaborate on details, parts, and new points of view. This is because I have caught the totality in a form of an idea or a structure to which I can relate them. Of course, the details influence the whole, and I have to move between different levels, but all the time in the same manner: Draw, observe, draw, observe, which means much trial and silent, aesthetic evaluation.

I have considered the possibility of creating buildings in a more intellectual or calculating way, by analyzing the problem, dividing it into smaller problems, solving each at a time and then to try to coordinate them. I have doubts about this method however, since its difficulties increase in proportion to the degree of complexity, and to create a building is, in my view, a very complex task. The architect's method has obvious advantages, so I myself continue to draw and have now started to explore the possibility that it might be useful to other professional problem solvers.

The work of an architect includes of course a lot of ordinary analytic thinking, but I will leave it out in this text since I want to focus attention exclusively on the non-analytic or intuitive activity, and specifically the following components.

1. You have to start. This is a naïve comment, but important because it says that you have to be brave, and that you must not listen to the voice that tells you to wait for a better idea.
2. The process will not follow a pattern of hierarchy or casual connection. I myself don't know when I start what will happen next. It is first when I *look* at my sketches I *feel* what to do.
3. The fundamental mental work is to draw and to evaluate *without words*. It is not a logic verbal analysis but an intuitive immediate judgement of problems and possibilities.
4. My solution is not an answer to the given program or question. The program changes and deepens during the process, parallel to the development of the solution. I probably start with an answer, and then try to adjust that answer and the question to each other.
5. I do not stop because I have found *the* solution; I stop because I lose interest or the urge to continue. My interpretation of this phenomenon is that I have unconsciously gained insight to a problem, and formulated it as a solution. The drawing is formulated knowledge.

The main words in this process are *drawing* and *intuition*.

Drawings are indispensable because they more easily, and clearer than words describe an imagined building, but they have other interesting characteristics.

1. One that is often mentioned is that a picture constitutes a whole. This means that you can quite easily detect different mistakes like undesired consequences or impossible connections.
2. Another characteristic is that a picture can never be the result of a calculation, or be the correct answer to a given question. What it can be is a commentary on a problem, a *spontaneous and subjective commentary*.
3. A picture can not be the final solution to a problem but a possible solution.
4. Its aim is not *the* truth, but it can be true.
5. A drawing can not be judged or criticized only logically. The judgement passed must be subjective, which means that it has to be based on values existing on a level where words do not reach. I believe that pictures and drawings appeal to deep human knowledge and experiences.

Drawing can be a way to get in contact with silent or wordless knowledge connected to experience and a profound value system, and thus start a mental process capable of handling complex problems without a definite solution. In other words, drawing uses another kind of thinking than the logical/verbal. It uses *visual/intuitive* thinking.

Intuition, in my words, is a mental system that tells us how to act. It is older than analytic and causal thinking, and I believe that early man was, as animals are, directed by intuition. I know that some people are suspicious of intuition, but I claim that we make many decisions daily with its help. We dress, buy appropriate food and choose the bicycle instead of the car on a sunny day. It would be a waste of resources to make more use of our intellectual capacity in these situations.

Even very important decisions are based on intuition, and that to a higher degree than most people want to believe. A managing director must trust his intuition when he makes important decisions. If he constantly needs more facts he is of no use. When we choose a partner for the rest of our lives we very seldom try to analyze our situation, and draw conclusions, we prefer to believe in our intuition. Intuition is not a whimsical impulse. It is a message from our deepest well of knowledge.

I argue that we have two modes of thinking; one logical/verbal, which I dare call the scientist's way, and one intuitive/wordless, which I consequently call the artist's way. I consider that we all use both, but that we do not pay the artist's way enough respect, even though we are all too respectful to art.

So in my opinion we do not exploit the capacity of the intuitive way of thinking, and consequently mismanage our own resources. I do not say that we should *always* rely on intuition, but that intuitive thinking can help us to understand and solve complex problems. Design theory tells us that it is not possible to solve a design task with only intellectual thinking, and I believe that many problems can be understood as design tasks.

There are of course more methods to reach, develop, and exploit one's intuitive thinking than by making drawings, and many people have probably discovered their own, but still I will point out some advantages of the one I practice.

1. To create a mental vision or picture is a common way for most people to understand words. Especially abstract notions.
2. All of us have practiced drawing for many years when we were children. Drawing was once a natural way for us to examine, understand, and describe.
3. We can all use it as soon as we stop setting up rules and principles for what the pictures *should* look like.
4. Drawing is a way to see and understand because you have to observe carefully and from different positions. Drawing forces you to observe.
5. Drawing is the only method to develop intuitive thinking, that I know, which is traditionally taught at a university level. In my department, as in all architectural departments we teach the sketch method.

The sketch method is continuously trained in the projects, but the basic skills are taught in drawing-, painting-, and sculpture-courses. The aims of these courses are that the student shall

1. learn not to be ashamed of their drawings. This is very important and can take a long time.
2. discover that their pictures show something that they did not know they had seen.
3. discover that their drawings contain knowledge that they did not already know.
4. discover the links between their inner images and their pictures.
5. discover the links between prejudgments and creative thinking.

What I have tried to describe and discuss is one method to develop and use one's intuitive thinking, and my question is if this method can be useful to other professions than architects. In order to test this, our department with Ylva Dahlman as teacher in charge, has been offering courses in drawing to students in other disciplines; veterinarians, agronomists, engineers. We very clearly declare that our aim is not to make artists of them, and not to teach them techniques, but to help them to understand their own subjects in a richer way. After four years the courses seem, according to the evaluation, to be successful for many students, and I therefore believe that they could be useful even for scientists who want to develop their visual, intuitive thinking. My hope is that they, as the students, shall discover that drawing is a good way to comprehend and solve complex problems.