THESIS
CONSCIOUS DESIGN PRACTICE AS A STRATEGIC TOOL
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CONTENT

1.03 TOOLS TO THINK WITH

The purpose of this chapter is to identify theories outside of the field of design, relevant to the understanding of the empirical findings. I have called these theories 'tools to think with'.[1]

Design activities have been closely connected to both 'creativity' and 'innovation' and I will try to establish the relationship between design, creativity, and innovation as well as describe some of the important creativity theories, which could be valuable as 'tools to think with'. The title of the PhD indicates that there are other ways of working than through the application of conscious methods and processes. The concept of 'tacit knowledge', *"knowledge held in people's bodies and heads—the unarticulated knowledge"[2]* will be discussed to get a better understanding of the different types of knowledge underlying design activities.

CREATIVITY

"Design is an activity associated with creativity and creative fantasy, the spirits of invention and technical innovation. The design process is often seen as sort of act of creation. It is certainly a creative process. However, design does not take place in a vacuum, with a completely free choice of colors, shapes and materials. Each design object is the result of a development process influenced by various, not only artistic, conditions and decisions. Socio-economic, technological, and cultural developments, in particular, along with the historical background and the conditions of production technology, play just as important a role here as ergonomic and ecological demands, economic and political interests, and artistic-experimental aspirations. Dealing with design therefore always entails reflecting on the conditions under which it emerged and visualizing their effect on the product".[3] While creativity is a part of design processes, designing is not necessarily a part of creative process.

CREATIVITY RESEARCH: CPS AND SYNECTICS

The development of design methodology is closely connected to knowledge developed within other fields. Early design theorists took inspiration from many knowledge communities among these, creativity research. Says John Chris Jones: *"[…] I realize that I was thinking, while writing the book* [Design methods, 1970], *of many people outside the design professions, as well as those (such as myself) who were trying to expand designing from within it. […] Many of those outside of design were psychologists and psychologists working in ergonomics. But you could say that they were all working from inside the expanding design process, that was needed".[4]*

Creativity methods were developed after the war, mainly in the US, where a lot of money was freed up to do research on creativity.[5] According to Lotte Darsø creativity research can be divided into two main movements: *"[…] Creative Problem Solving (CPS), also called the "Buffalo School", that had a strong orientation towards tools; and Synectics, a theory developed by Gordon and Prince that focuses on unconscious processes. These are brought forward through fantasy, analogy, metaphors, and intuition or through a climate of acceptance".[6]*

Both movements grew strongly after the war, in the 1940s, 50s and 60s. *"One of the original purposes*

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1   The term is lent from Bente Elkjær, Learning Lab Denmark
2   Dorothy Leonard and Sylvia Sensiper say in the 1998 article "*The complexity of skills and processes needed in the development of today's products and services requires that managers attend to the role of tacit knowledge during innovation. Knowledge held in people's bodies and heads, the unarticulated knowledge, is the very basis of creativity and is not easily captured nor codified*"
3   Bernhard Bürdek, 2005, p. 225
4   John Chris Jones in a conversation with NextD Journal in 2006
5   GK VanPatter in a conversation with John Chris Jones 2006, Nigan Bayazit, 2004
6   Lotte Darsø, 2001

behind the creativity movement was to bring tools to bear that would help humans working in American business organizations unlock their creativity".[7]

As we shall see, the two main lines of thinking within creativity research can still be traced in the approaches to designing today.

CREATIVE PROBLEM SOLVING
CPS originates in the work of Alex Osborn, the father of classical brainstorming. CPS is founded on the belief that creative thinking requires tools like for instance the brainstorm and the affinity diagram. Brainstorming is the listing of all ideas put forth by a group in response to a given problem or question, not allowing ideas to be evaluated or discussed until everyone has run dry. The intent is to tap the human brain's capacity for lateral thinking and free association. Affinity diagrams means to cluster design elements according to intuitive relationships, such as similarity, dependence, proximity, which helps identify connections and reveal innovation opportunities.[8] The CPS approach is built on step-by-step models in a variety of general structures, involving various sets of divergent/convergent steps[6] like 'define problem', 'generate possible solutions' and 'select and implement the best'.

The following CPS model is based on Arthur VanGundy's description from 1981[9]

1 Mess finding: Sensitize yourself for issues that need to be tackled.
- *Divergent* techniques include 'Wouldn't It Be Nice If...' (WIBNI) and 'Wouldn't It Be Awful If...' (WIBAI) and brainstorming to identify desirable outcomes, and obstacles to be overcome
- *Convergent* techniques include the identification of hotspots expressed as a list of IWWMs ('In What Ways Might...'), and selection in terms of ownership criteria and outlook criteria

2 Data finding: Gather information about the problem.
- *Divergent* techniques include Five Ws and H (Who, Why, What, When, Where and How) and listing of wants, sources and data: List all your information 'wants' as a series of question; for each, list possible sources of answers; then follow these up and for each source, list what you found
- *Convergent* techniques again include: identifying hotspots, Mind-mapping to sort and classify the information gathered; and also restating the problem in the light of your richer understanding of it.
- 3 Problem finding: convert a fuzzy statement of the problem into a broad statement more suitable for idea finding.
- *Divergent* techniques include asking 'Why?' etc.—the repeatable questions and Five W's
- *Convergent* techniques include Highlighting again, reformulation of problem-statements to meet the criteria that they contain only one problem and no criteria, and selection of the most promising statement (but NB that the mental 'stretching' that the activity gives to the participants can be as important as the actual statement chosen).

4 Idea Finding: generate as many ideas as possible
- *Divergence* using any of a very wide range of idea-generating techniques. The general rules of Classic Brainstorming (such as deferring judgment) are likely to under-pin all of these
- *Convergence* can again involve hotspots or mind-mapping, the combining of different ideas, and the short-listing of the most promising handful, perhaps with some thought for the more obvious evaluation criteria, but not over-restrictively.

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[7]   GK VanPatter in a conversation with John Chris Jones 2006
[8]   IDEO Method Cards, 2003
[9]   Arthur B. VanGundy, 1981, *Techniques of Structured Problem Solving*

5 Solution finding:
- *Divergence*: generate and select obvious evaluation criteria (using an expansion / contraction cycle) and develop (which may include combining) the short-listed ideas from Idea Finding as much as you can in the light of these criteria
- *Convergence*: opt for the best of these improved ideas (e.g. using Comparison tables).

6 Acceptance finding: How can the suggestion you have just selected be made up to standard and put into practice?
- *Divergence:* Shun negativity, and continue to apply deferred judgment—problems are exposed to be solved, not to dishearten progress
- *Convergence:* Action plans are better developed in small groups of 2 – 3 rather than in a large group (unless you particularly want commitment by the whole group). Particularly for 'people' problems it is often worth developing several alternative action plans. Possible techniques include – Five Ws, Implementation Checklists, Consensus Mapping, Potential-Problem Analysis (PPA)

Van Gundy has divided the creative process into a discrete number of stages, which are subdivided into steps of diverging and converging. There is a striking resemblance between Van Gundy's process description and that of Humantific, as we shall see later. Also, the methods described, for instance "Affinity programs", "Five Ws" and "brainstorming" are all part of the IDEO toolbox. We will return to this later in the comparison.

The CPS approach can be used as a training program and has a very extensive track record linked particularly with the Centre for Studies in Creativity of the State University College at Buffalo, New York, the Buffalo Creative problem Solving Group, and with the Centre for Creative Learning in Sarasota, Florida.[10]

"SYNECTICS"
The Synectics movement started with experiments in 1940s focusing on an operational description of the creative process itself.[11] The term "Synectics" is derived from the Greek expression "synecticos". "Syn" means to bring together and "ectos" stands for "diversity". As a whole it says something like: "bringing different things into unified connection". The focus was to develop operational (conscious) ways of accessing the unconscious—and the work was based on three main hypotheses:

(i)   Creative efficiency in people can be markedly increased if they understand the psychological process by which they operate; [interestingly, this has been adopted as a tool in the Humantific approach to designing]
(ii)   In creative process the emotional component is more important that the intellectual, the irrational more important than the rational;
(iii)   It is these emotional, irrational elements which can and must be understood in order to increase the probability of success in a problem-solving situation

Synectics define creative process as *"[…] the mental activity in problem stating, problem solving situations where artistic or technical inventions are the result",*[12] pointing to the importance of understanding the problem before moving into problem solving. The process involves 'making the strange familiar' and

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[10]   Prominent theorists within the CPS movement are Sidney Parnes, who formulated the theory together with Osborn, Isaksen and Treffinger (1985), Isaksen, Dorval and Treffinger (1994 and 1998).
[11]   William J. J. Gordon, 1960, *Synectics,* p. 15
[12]   William J. J. Gordon, 1960, p. 33-37

'making the familiar strange'; the first is an analytical phase, where the main objective is to understand and feel at home in the problem. The main objective of the second phase is to achieve a new look at the "familiar world", to distort, invert or transpose the everyday ways of looking and responding.[12] Says Gordon about making the strange familiar: *"In any problem-stating, problem solving situation, the first responsibility of individuals involved is to understand the problem. This is essentially an analytical phase where the ramifications and the fundamentals of the problem must be plumbed." Making the familiar strange: To make the familiar strange is to distort, invert, or transpose the everyday ways of looking and responding which render the world a secure and familiar place. This pursuit of strangeness […] is the conscious attempt to achieve a new look at the same world, people, ideas, feelings, and things".*[12]

'Making the familiar strange' is achieved by tapping into the unconscious and in the 1950s the Synectics group found that 'play' and 'irrelevance' were necessary for successful inventive effort. 'Irrelevance' understood as attitudes, information and observations, which from a common-sense point of view, do not seem relevant to the problem under consideration and 'play' as the ability to sustain a childlike willingness to suspend adult disbelief,[13] words like 'play' and 'irrelevance' are operationally meaningless, and in 1958-59 attention was turned to a further study of the mechanisms, which would help making the familiar strange. The result came in the form of 4 operational mechanisms, which are to be regarded as specific and reproducible mental processes:

'Personal Analogy':   Personal identification with the elements leads to new perspectives

'Direct Analogy':   Making actual comparisons of parallel facts, for instance in nature

Symbolic Analogy: Using aesthetics, for instance poetry, for association and inspiration

Fantasy Analogy: Using the fulfillment of a wish—the wildest desire and fantasy—for inspiration

INTUITION OR RATIONALITY

To sum up the characteristics of the two movements within creativity research, the early CPS movement was focusing on the development of rational tools and step-by-step processes whereas Synectics worked with the development of a conscious approach to tapping into unconscious potential, which was seen as pivotal to creative process. Both thought of creative processes as starting with identification of the real problem before moving on to problem solving. One of the major differences in the two approaches is described by John Chris Jones in an interview in 2006: *"[…] the two movements […] were quite separate […] the ones who put rationality first drove away intuition—and the ones who put intuition first drove away rationality".* Jones continues by arguing that there was no bridging of the gulf between them and that *"[…] the real difficulty, in design or in any creative activity, is how to integrate these ways of thoughts".*[4]

As we shall see, present day design consultancies are making use of several of the approaches in both movements. At e-Types, designers like to gain inspiration for projects by watching movies, going to art galleries, looking into books to scan for inspiring visual elements—which would fall in the Synectics category of symbolic analogy. The IDEO '60 minutes brainstorming', 'Affinity diagram' and 'Five W's' are methods parallel to those of CPS just as the dividing of process into discrete steps. The Humantific creative problem solving preference tool can be seen as answer to the Synectics hypothesis that *"Creative efficiency in people can be markedly increased if they understand the psychological process by which they operate".* We will return to Synectics and CPS when discussing the design processes and process documentations of the 4 consultancies.

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[13]   William J.J. Gordon, 1960, p. 29-30

ENDURING COMPLEXITY

In 1976 Mihaly Csikszentmihalyi carried out a study among groups of artists trying to pin point what distinguishes successful artists from not so successful artists. What he found was that the successful artists were able to endure 'not-knowing' and being in a space of complexity and ambiguity longer than the other group, who would make decisions at a much earlier stage. The successful artists were able to wait for crystallization to happen and a new level of consciousness.[14]
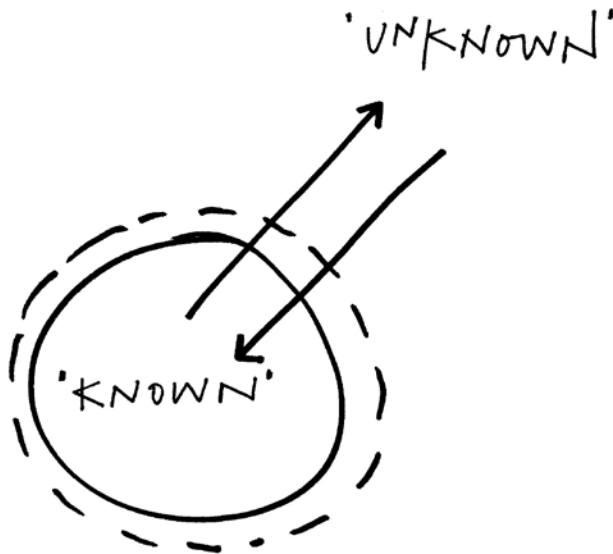
Model 1.8. The model illustrates the idea that one must move into the 'unknown' to create something new to the world. If one stays out there—it remains fantasy. One must return and ad new insights to the known world to be creative. SAKFriis 2004

Jeff Mauzy and Richard Harriman describe the reaching into the unknown as *"reaching barehanded through the dark, [it] is often frightening".*[15] If frightened sufficiently, they argue, most people will return to the safe grounds of the well known. Curiosity is the driving force. *"Curiosity engages the unknown. Curiosity increases uncertainty and an attendant element of fear. In moments of fear, curiosity becomes hard to sustain. And yet without curiosity's advance into the sometimes fearful unknown, people avoid the experience from which they might gain new insight".*[15] They refer to studies by psychology professor Teresa Amabile when they use the concepts of 'intrinsic' and 'extrinsic' motivation arguing that the intrinsic motivation, what is personally meaningful, is a much stronger engine than extrinsic motivation, for example a raise or tight deadlines. Mauzy and Harriman conclude, *"The more the intrinsic motivation, the better the creative result".*[16]

INNOVATION

Creativity and innovation are two distinct concepts with different meanings. Creativity is the generation of novel and appropriate ideas. Innovation, as defined by Mauzy and Harriman, implement those ideas

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[14] Mihaly Csikszentmihalyi and Jacob Warren Getzels, 1976, *The Creative Vision*
[15] Jeff Mauzy and Richard Harriman, 2002, *Creativity Inc. Building an Inventive Organization*, p. 20
[16] Mauzy and Harriman, 2002, p. 16

and thereby changes the order of things in the world. *"Creativity is about breaking down prior assumptions and making new connections for new ideas. Innovation means taking new ideas and turning them into corporate and marketable reality".*[17] According to psychologist Lotte Darsø, PhD, the differences between creativity and innovation can be summed up as follows:

- *Creativity is a process—innovation is a result*
- *Creativity Is not primarily aimed at economic gain—innovation is*
- *Creativity is evaluated by the creator—innovation is evaluated by the recipients.*[18]

As already discussed in the chapter 'Strategic design', 'innovation' is often used interchangeably with 'strategic design', focusing on the development of new business models, services, products, experiences and events. Both innovation and strategic design tends to be judged by its result—but as we shall see in the findings, there is a shift towards also seeing innovation and innovation capacity as process and transformation. Says Bettina von Stamm *"As innovation is a frame of mind, for innovation to happen generally requires a shift in attitudes and behaviors".*[19]

TACIT KNOWLEDGE

The concept of tacit knowledge and the question of whether it can be made explicit is in itself relevant to the present study where the focus is on the individual and shared languages used to describe design methods and processes—and the possibility that conscious knowledge might actually enable designers to move to another level of design practice. 'Tacit knowledge' has already been discussed in relation to the different modes of knowledge conversion in relation to the research methodology (see the chapter 'Research Methodology'). Here, we will take a brief look at tacit knowledge in relation to the activity of designing; according to John Heskett the design discipline is in great need of creating coded knowledge: *"At one end of the spectrum are the highly subjective processes based on individual insight and experience. These can be difficult to explain and quantify. Particularly in corporate contexts dominated by the numerical methodologies of finance and marketing, with their apparent ability to demonstrate 'facts', it is easy for such approaches to be underestimated.*

There is a welcome recognition in economic and business theory, however, that in many disciplines the kind of knowledge based on experience and insight—tacit knowledge—can be a vital repository of enormous potential. Much design is indeed of this kind, although this does not mean an ability to design should be limited to the tacit dimension. There is a vital need to extend alternative forms of knowledge in design that can be structured and communicated—in other words, coded knowledge. Most practical disciplines, such as architecture and engineering, have a body of basic knowledge and theory about what the practice is and does that can serve as a platform, a starting point, for any student or interested layman. The absence of a similar basis in design is one of the greatest problems it faces. Emphasizing tacit knowledge means that many design students are expected to reinvent the wheel, acquiring knowledge in an unstructured manner through learning-by-doing. In effect, more rational methods of enquiry and working are considered irrelevant. Tacit, subjective approaches may be appropriate for small-scale projects—for example, where the emphasis is on differentiating form. In contrast with large-scale projects involving questions of technology and the organization of interactions on many levels, personal intuition is unlikely to be capable of handling all necessary aspects. In such projects, rational, structured methodologies can ensure the full dimensions of projects are understood as a platform for creative solutions on the level of detailed execution".[20]

Codified knowledge, as a term, does not appear to have a single seminal source. In general, it means the use of a written language or symbols to encode the knowledge of one or more persons into a

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[17] Mauzy and Harriman, 2002, p. 6
[18] Lotte Darsø, 2001, *Innovation in the Making*, p. 159
[19] Bettina von Stamm, 2004, article in *Design Matters nr. 8*
[20] John Heskett, 2002, *Toothpicks and Logos*, pp. 71-72

material matrix that subsequently—distant in time and space—may be decoded and assimilated as tacit knowledge by another. This is inline with Nonaka and Takeutchi's understanding of tacit knowledge as knowledge awaiting "translation" or "conversion" into explicit knowledge.

Heskett's argument is close to those of Christopher Alexander, John Chris Jones, Bruce Archer, Bernhard Bürdek, and many other design theorists, who believe that design projects have become way too complex to handle intuitively and from experience alone—and that explicit methods and processes must be put to use to support sense making activities and collaboration.[21]

John Chris Jones says about the method collection that he put together in 1970: *"[It] is an attempt to make public the hitherto private thinking of designers; to externalize the design process. In some cases this is done in words, sometimes in mathematical symbols, and nearly always with a diagram representing parts of the design problem and the relations between them. Clearly, the underlying aim is to make designing more manageable, particularly at the systems level. A major advantage of bringing design into the open is that other people, such as users, can see what is going on and contribute to it with information and insights that are outside the designer's knowledge an experience".*[22] In other words, making methodologies explicit enables collaboration, it enables bringing users onboard the process—important in the face of increased complexity where one person alone can't possess all the knowledge necessary to solve the problem.

In 1964 Christopher Alexander argues there is a rise in the complexity of the projects designers are grappling with. Designers can't rely on intuition alone; if doing so, they will only repeat their own internal forms and perceptions and not realize the complexity of the problem facing them. They might in fact deliver a solution to the wrong problem and thus leave the real problem unsolved. Alexander proposes a method to get things "out of the designer's head" onto paper by visualizing the different aspects of a problem through diagrams.

THIN-SLICING

Malcom Gladwell reflects in his book "Blink" on the ability to 'know' something without knowing why. He particularly relates it to the expert's ability to know or have a hunch without being able to explain right away and labels the phenomena "thin-slicing".[23] *The term thin-slicing was coined by psychologists (led by people like Robert Rosenthal and Nalina Ambady) who were interested in the human tendency to draw conclusions about situations and people based on very "thin slices" of experience. So how long do I have to know you before I decide what kind of person I think you are? How much "information" do I have to gather before I make a prediction about whether you are, say, straight or gay, or friendly or unfriendly, or honest or dishonest? The gist of much of the thin-slicing work is that we don't take very long to jump to those conclusions and, surprisingly, we're pretty good at those snap judgments. Much better than we would ever have imagined".*

Gladwell argues that a snap judgment made very quickly can actually be far more effective than one made deliberately and cautiously. The 'adaptive unconscious', very different from the unconscious of Freud and Jung, is thought of as a gigantic computer that quickly and quietly processes a lot of the data we need in order to keep functioning as human beings. Gladwell allows that the 'computer' is fallible—but for a specific and consistent set of reasons.

Designers can 'know' something without going through the motions of actually gathering information or analyzing a situation consciously. An art historian instantly knows a sculpture is fake just like the graphic designer knows something is off in a letterhead and needs to be changed.

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[21] Jones, 1970, Archer, 1965, and Bürdek, 1991
[22] John Chris Jones, 1970, *Design Methods*
[23] Malcom Gladwell, 2005, *Blink. The Power of Thinking without Thinking*

According to among others Nonaka and Takeutchi, Heskett, Alexander, Jones, and Gladwell, we can know something without knowing *how* we know it. This implicit expertise is both a strength in many types of designing—as well as a hindrance in others, for instance in relation to transferring skills, or to the coordination of action in a team consisting of people with many different types of talents and backgrounds. While it seems necessary for designers to build explicit types of process knowledge to cope with new, more complex challenges and work forms, it seems equally important to investigate and acknowledge the role of intuition and learning-through-doing in certain types of design work, and in parts of different design processes.

We will look closer at the difference between implicit and explicit process knowledge in the 4 case studies.

SUMMARY
The purpose of this chapter has been to identify theories outside of the field of design, relevant to the understanding of the empirical findings, what I am referring to as 'tools to think with'.

The development of design methodology is **closely connected to knowledge developed within other fields.** Early design theorists took inspiration from many knowledge communities, among these, creativity research. According to Lotte Darsø **creativity theory** can be divided into **two main movements**, the Creative Problem Solving School (CPS) and Synectics, a theory developed by Gordon and Prince. The early CPS movement was focusing on the development of rational tools and step-by-step processes whereas Synectics worked with the development of a conscious approach to tapping into unconscious potential, which was seen as pivotal to creative process.

While often used interchangeably, **'creativity' and 'innovation' are two distinct concepts** with different meanings. Creativity is the generation of novel and appropriate ideas. Innovation, as defined by Mauzy and Harriman, implement those ideas and thereby changes the order of things in the world. *"Creativity is about breaking down prior assumptions and making new connections for new ideas. Innovation means taking new ideas and turning them into corporate and marketable reality"*.[17] As already discussed in the chapter '**Strategic design', 'innovation' is often used interchangeably** with 'strategic design', focusing on the development of new business models, services, products, experiences and events. Both innovation and strategic design tends to be judged by its result—but as we shall see in the findings, there is a shift towards also seeing innovation and innovation capacity as process and transformation.

The concept of **tacit knowledge** and the question of whether it can be made explicit is in itself relevant to the present study where the focus is on the individual and shared languages used to describe design methods and processes—and the possibility that conscious knowledge might actually enable designers to move to another level of design practice. Alexander, Jones, and Heskett believe there is a need to **extend alternative forms of knowledge in design** that can be structured and communicated arguing that designers can't rely on intuition alone.

Intuitive and implicit expertise is both a strength in many types of designing—as well as a hindrance in others, for instance in relation to transferring skills, or to the coordination of action in a team consisting of people with many different types of talents and backgrounds. While it seems necessary for designers to build **explicit types of process knowledge** to cope with new, more complex challenges and work forms, it seems equally important to investigate and acknowledge **the role of intuition and learning-through-doing** in certain types of the design work, possible in certain parts of design processes.