

Creativity methods in interaction design

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ABSTRACT

The field of interaction design encompasses a variety of methods for fostering innovation and creativity. In this paper, we present a selection of such methods that scaffold ideation and concept development in the early phases of design. As a conceptual frame for discussing these methods, we introduce four aspects that are particularly salient in the field of interaction design: *tradition and transcendence*, *convergence and divergence*, *degree of structure*, and *sources of inspiration*. We then outline how the methods relate to each of these aspects. The paper contributes to design practitioners by providing an overview of the methods and insights into when and how they may be employed to foster creativity and innovation in the design process; with regards to design research, the main contribution of the paper lies in the establishment and discussion of the four aspects as a frame for analyzing and comparing design methods.

Author Keywords

Interaction design, Methods, Innovation, Creativity

INTRODUCTION

The field of interaction design deals with the development and use of interactive products, systems and services. It is an interventionist discipline in that it aims at transforming the current state of events through the introduction of something novel. Some interaction design projects radically rethink and transform the situation, whereas others incrementally develop existing systems and practices; however, innovation and creativity play a crucial role in most interaction design projects due to this transformative agenda.

In this paper, we present and discuss a series of well-established methods in interaction design intended to foster innovation and creativity in the early stages of a project. To augment the scope of the paper and suggest new paths to follow for future studies in interaction design, we briefly include a preeminent artistic strategy and three additional examples all associated with popular culture. By showing the diversity of cognate, creative strategies, we wish to point to the diffusion between interaction design methods in

its strictest sense and some closer related to mainstream creativity techniques. Overall, the methods we present are all primarily intended to scaffold ideation and development of design concepts, either by developing ideas from scratch, by refining them, or by rethinking them. The methods are: *Future Workshops*, *Interaction Relabeling and Extreme Characters*, *Metaphorical Design*, *Inspiration Card Workshops*, *Fictional Inquiry*, the design concept of the film *The Five Obstructions*, *Provocative Operation*, *Brainstorming*, and *Oblique Strategies*.

As a frame for discussing the methods, we introduce a set of four central aspects for conceptualizing how methods foster innovation in interaction design. Our identification of these aspects is based on literature surveys combined with extensive experience from planning, conducting and analyzing experimental interaction design projects. The four aspects are: *tradition and transcendence*, *convergence and divergence*, *degree of structure*, and *sources of inspiration*.

Our intention is to present an overview of the methods employed in interaction design and to discuss how they may scaffold innovation and creativity. The paper is intended for design practitioners and students wishing to extend their knowledge and repertoire of design methods given that our work can be beneficial in planning and navigating the early stages of projects. Furthermore, the paper is intended for design researchers with regard to the frame we establish for conceptualizing and discussing salient aspects of innovation and creativity in interaction design.

Innovation and creativity may occur throughout an interaction design process, from the initial ideation phase through creative mock-up sessions to iterative refinements based on evaluation of prototypes. In order to clarify the terminology, *creativity* broadly refers to the generation of novel approaches or ideas; *innovation* refers to the application of ideas in a specific context, often in the development of a specific product or service, and as such creativity is a pre-requisite for innovation, although it is not in itself a sufficient condition for it (Amabile et al. 1996). Design processes often entail both creativity and innovation. In this paper, we focus on methods primarily intended to support the initial concept development stages of the design process before the construction of prototypes. Ideas may also emerge in these later stages of the design process and potentially replace the initial concepts, for instance through iterative loops of action and reflection

when shaping products, however, it is beyond the scope of this paper to examine these processes

In our examination of innovation and creativity in methods for concept development, we concentrate on the systemic characteristics and the framing of the methods. We thus do not examine personal and subjective traits like the individual designer's intellect or thinking style etc. These traits influence innovation and creativity, as explored by e.g. Lubart (1994) and Guilford (1967), but we choose here to focus on aspects that designers may influence in their choice of methods when planning and carrying out events to foster creativity and innovation.

As mentioned, this paper is positioned in the field of interaction design research where others before us have developed frameworks providing overviews of interaction design methods. In participatory design, a subfield of interaction design, Kensing and Munk-Madsen (1993) have set up a model that helps decide which methods support productive means of communication in which situation. The model has two dimensions distinguishing in the vertical dimension between abstract knowledge and concrete experience. In the other dimension, they distinguish between three kinds of content: users' present work, new system, and technological options. Based on the model Kensing and Munk-Madsen (1993) apply the model in the mapping of 26 techniques according to the six (two times three) kinds of communication. From a participatory perspective as well, Müller, Wildman and White (1993) have made a brief taxonomy of 22 participatory practices and techniques as a guide for practitioners and organized as a two-dimensional visual space together with a third dimension indicated by graphical notation: 1) point of time in the process, 2) who participates with whom in what, and 3) appropriate group size. The purpose of the overview of techniques is to help practitioners find techniques appropriate for their circumstances.

Recently, Harrison, Back and Tatar (2006) have reported on an experiment where groups of students were exposed to a large array of methods in categories like ideation, evaluation, representation, reflection, and experience design (Ibid p 264). The pedagogical goal of the set up was to provide the students with a setting where they broadly speaking would get insight into a design topic and get confronted with the need to argue for which methods they would use and not use in their own design project. The setup was used for a loosely structured reflection on the students' design projects without the application of any kind of framework for discussing the specific techniques.

These publications are related to our work in this paper in that they systematically examine a series of methods for interaction design. However, in this paper, we focus particularly on innovation and creativity, aspects that are not fully explored in the literature of interaction design.

METHODS TO SCAFFOLD CREATIVITY AND INNOVATION

In this section, we introduce nine methods for scaffolding creativity and innovation. The section is divided into two main parts: first, we present five methods originating from within the field of interaction design; second, we present four methods from art and mainstream culture. We introduce and discuss the latter four since they blur the lines between interaction design in its strictest sense and other related domains. These methods have spawned interest among – or been embraced by – both interaction designers and other creative professionals and, occasionally, even the general public. In order to exemplify this diffusion and potential cross-pollination of methods across domains, we focus in particular on the film *The Five Obstructions* and its use of constraints as a means to stimulate ideation.

Creativity and innovation methods in interaction design

A number of methods have been developed in order to address the specific challenges facing interaction designers. In the following, we outline five such methods. The first two methods, *Future Workshops* and *Interaction Relabeling and Extreme Characters*, are classical examples of creative interaction design methods, whereas the following three, *Metaphorical Design*, *Inspiration Card Workshops* and *Fictional Inquiry*, are methods which have been developed as a part of our work in experimental design research projects.

Future Workshops

Future Workshops is a highly structured process originally suggested by Jungk and Müllert (1987). The method was originally developed to enable citizen groups to have a say in the decision-making processes of public planning (e.g. urban planning), but has been included in many interaction designers' repertoire of techniques, (Kensing 1987). A Future Workshop consists of three phases: 1) the critique phase meant to shed light on a common problematic situation, 2) the fantasy phase where participants generate visions about an ideal future ignoring resource limitations and technical constraints, and 3) the implementation phase where these visions are adapted to the circumstances of reality and where an action plan for implementation is set up. These phases are surrounded by preparation and follow-up phases. The workshop is run by a facilitator responsible for conducting the workshop and ensuring that participants adhere to a set of specific rules such as restricting speaking time to 30 seconds during certain periods of the workshop and not allowing critique during the fantasy phase. Moreover, the use of materials like Post-it®'s and posters is an important element. A Future Workshop typically lasts for a few hours to a full day.

Interaction Relabeling and Extreme Characters

Djajadiningrat, Gaver and Frens (2000) have introduced the notion of Interaction Relabeling and Extreme Characters. These two techniques are meant for use in cases intended to violate usability principles or break away from conventional styles of interaction. In the case of Interaction

Relabeling, the idea is to imagine that the product being designed is like some other product, typically a mechanical device. For instance, when designing a PDA, ideas could emerge from elements of a revolver with mechanical moving parts. The technique is said to work best in groups with mechanical devices at hand for triggering ideas. The core of Extreme Characters is designing for fictional users with exaggerated emotional attitudes. For instance, when designing a PDA, participants could imagine what kind of interaction to design if the user were the pope or a drug dealer.

Metaphorical Design

Madsen (1994) has suggested the systematic use of metaphors as an innovation strategy in digital design. The idea is to understand the domain that is being designed for in terms of a concept from another domain. As an example, by understanding a library as a meeting place, an awareness of new aspects of the role of the library and activities at the library might arise, which in turn can lead to new ideas for potential design solutions. The technique employs a loose structure, starting out from generating metaphors over evaluating metaphors to elaborating the metaphors.

Inspiration Card Workshops

Inspiration cards workshops are collaborative design events involving professional designers and participants with knowledge of the design domain, and in which domain and technology insight are combined to create design concepts. Inspiration Card Workshops are primarily used in the early stages of a design process during which professional designers and their collaborators narrow down potential future designs, (Halskov & Dalsgaard 2006, 2007). The goal of the workshop is to develop design concepts starting from *Technology Cards* and *Domain Cards*. A Technology Card represents either a specific technology or an application of one or more technologies. Domain Cards represent information about the domains for which the concepts are designed. This information may pertain to situations, people, settings, themes, etc. from the domain. The preparation for the workshop mainly involves selecting and generating the cards. Technology Cards, primarily generated by the designers, represent technologies that may directly or indirectly be part of the design concepts. The workshop itself, typically lasting two to three hours, commences with a presentation of the Domain and Technology Cards selected often accompanied with video illustrating the technology in question. The main phase of the workshop consists of the participants collaboratively combining the cards on posters in order to capture design concepts. After the combination and co-creation phase, the participants discuss each poster *in plenum*.

Fictional Inquiry

Fictional Inquiry (Dindler & Iversen 2007) is a collaborative design method in which designers establish a narrative frame for a workshop in order to foster creativity and transgress the workshop participants' understandings and preconceptions of the current situation. In the words of

Dindler & Iversen (2007 p 207), the method entails "[...] bypassing existing socio-cultural structures by creating partially fictional situations, artifacts, and narratives that mediate collaborative design activities." The key aspect of the workshop is thus to use narrative means to overcome fixations on the present and establish a space in which workshop participants are less constrained in imagining possible futures. Dindler and Iversen highlight two ways of employing the technique: *staging* and *evoking*. Staging implies using Fictional Inquiry to solicit insights into current practice by using the narrative frame to make informants articulate implicit assumptions. E.g. the authors used the method in a project to develop an electronic school bag by establishing a narrative frame in which Martians visited planet Earth. In this setup, the authors made primary school pupils explicate taken-for-granted aspects of how they conceived of and used their schoolbag and its contents since they now had to explain it to an alien rather than to a group of grown-ups who the children would expect to know these things. Evoking takes the method a step further and introduces props from the narrative frame in order to involve participants in ideation of future products. E.g. the authors used the method to develop concepts for interactive exhibits at an aquarium by establishing a narrative frame in which the king of the lost city of Atlantis solicited the help of workshop participants in bringing to life what goes on in the depths of the ocean. In this workshop, a series of props fitting into the narrative frame, e.g. seashells and the king's sceptre, was introduced, and workshop participants had to imagine how the artifacts might inform users of life under the sea.

Creativity and innovation methods in art and popular culture

As shown, Fictional Inquiry is strongly based on a distinct narrative framework, which typically includes various props to evoke and nourish ideation during a design process whose inviting simplicity renders it especially useful for non-specialists such as families and children etc. In that sense, Fictional Inquiry's immediate appropriability contributes to strengthening the link between research-based creativity methods and popular culture in general. By employing a fictionalized space, this particular method bears resemblance to certain workflows from the realm of art, which also rely on what could tentatively be called constrained fabulation. As a vanguard for later creative *modi operandi*, a number of innovative artistic techniques have over time come to be understood as avant-garde techniques. Most notably the techniques of Surrealism have proved inspiring for new generations of artists and creative professionals. An initial example is *Cadavre exquis* (ca. 1920) based on the party game *Conséquences*; a classic, popular parlor game in which each participant writes a sentence on a piece of paper, conceals the words by folding the paper and passes it on to the next player and so forth. As the game progresses, a unique narrative unfolds whose incoherence and (anticipated) absurdity is eventually read

aloud to the amusement of the entire party. The Surrealists, not least the French author André Breton, refined this game to facilitate the creation of curious pictorial agglomerates that given their crude complexity and compositional diversity would be hard to imagine could ever be the result of a single individual's creative act.

The point we wish to make by mentioning these few examples from art and popular culture is in short that what characterizes many of these techniques is their apparent reliance on delimitation and constrained fabulation, which we consider in line with workflows displayed in certain creativity methods developed within the field of interaction design. To bring such design-related methods more up to date to shed light on the methodological field of convergence between interaction design and creativity methods in general, i.e. in popular culture, we find it appropriate to study the film *The Five Obstructions* (2003).

The Five Obstructions

In 1967, Danish poet and film director Jørgen Leth's short film *The Perfect Human* (in Danish: *Det perfekte menneske*), was released to critical acclaim. In addition to its b/w idiom, the film spawned much interest among peers because of the innovative way Leth had conceptualized the creative process. To stimulate ideation and promote artistic originality, Leth had set up aesthetic constraints to restrict and thus frame his space of action during the orchestration and execution of the film. He named these steps 'spilleregler' in Danish, which may best be translated to 'rules of the game'.

Three decades later, another lauded Danish film director, Lars von Trier, conceived a cunning homage to Leth whose oeuvre and clear-cut poetics von Trier had studied closely. The homage was designed as a provocative, artistic challenge in which Leth was asked to recreate his 1967 classic five times. Besides being five minutes long, each remake had to adhere to a set of rules, an artistic 'self-chastisement', spontaneously contrived by von Trier. The project was released as an experimental documentary called *The Five Obstructions* (in Danish: *De fem benspænd*) in 2003, which has caused interest among scholars and creative practitioners in other fields of popular culture due to its - at first glance - wide, uncomplicated applicability and ability to inspire by 'demystifying' artistic creativity.

In *The Five Obstructions*, von Trier states that it is Leth who has opened his mind to viewing filmmaking as a rule-governed, experimental practice aiming to test certain hypotheses (Hjort 2008: 21). Whereas Leth usually speaks of the paradoxically liberating power of *constraints*, von Trier strongly emphasizes the game or duel character of the film and the imposed rules as *obstructions* or '*benspænd*' in Danish; an expression borrowed from football meaning to forcefully and illicitly try to trip a competitor on the pitch. Self-imposition of constraints as a taut, artistic strategy to encourage creativity, however, is not an unfamiliar object of analysis in aesthetic academia. One example is French

writer Georges Perec, who as a member of the influential avant-garde cluster known as the Oulipo group, consisting of artists and mathematicians, in 1969 wrote the constraint-based, lipogrammatic novel *La Disparition* (literally 'The Disappearance' published in English as *A Void*) without using the letter 'e' (Perec 1969). In that perspective, the design of *The Five Obstructions*' creative context is rooted in a well-established artistic tradition. Another point to be made here is the fact that the employment of obstacles can also be found within game studies. Such similarities aside, what really makes the film stand out is its dialogical, game- or competition-like design concept with Leth and Trier engaging in an artistic duel of sly inventiveness (Ponech 2008). The film's unique design concept can be analyzed aesthetically with reference to previous, cognate artistic strategies, however, it is the film concept's reliance on a collaborative workflow, its (suspenseful) dynamics of both establishing, imposing and overcoming obstructions which makes it relevant for research into creativity methods in interaction design. More precisely, the reason for this is the fact that interaction design is not a clearly demarcated field as it incorporates a multitude of sources of inspiration, not just in terms of themes, content and structure, but also with respect to its diffusion into popular culture. By bringing *The Five Obstructions* into play, we wish to encourage further methodological cross-pollination to augment the scope of perspectives for creativity methods in interaction design.

Provocative Operation

As *The Five Obstructions* can be seen as a duel between two master directors, it could be argued that the film's overall, constraint-based design concept ultimately is rooted in somewhat elitist or film buff-like soil within popular culture. However, studying the specific obstructions reveals some interesting characteristics. One such is the legible diversity of the obstructions themselves, which suggests resemblances to other popularized types of interruptive creativity methods. The freely enforced imperativeness of the obstructions as a means to incite innovative solutions appears in a slightly different version in Edward de Bono's concept '*po*', an acronym for 'provocative operation' (among others). *Po* is a part of de Bono's multitude of lateral thinking techniques and aims at stimulating cognitive, forward movement by formulating discursive provocations in the form of statements, which eventually might lead to an innovative idea. *Po*, then, is closely associated with de Bono's *six thinking hats*, a system of conceptual tools to strengthen and nurture various thinking processes (1993). Though his practice-oriented techniques have been a commercial success and have been widely embraced in popular cultural practice, from hobby inventors to homespun philosophers and part-time artists, their scientific substance and legitimacy have been criticized (Sternberg & Lubart 1999).

Brainstorming

One of the most well known tools to encourage creativity and generate possible solutions in problem solving is

former advertising manager Alex F. Osborn's group-based method *Brainstorming* (Osborn 1953). Though his method with its four ground rules has been applied in many different business contexts, its proper efficiency in ideation processes has been questioned (Rickards 1999). This critique, however, does not alter the fact that Brainstorming has been popularized and diffused to an extent where it has now become a standard term in everyday speech, both as a noun and as a verb, as a way to express the forced practice of idea generation, even if these more casual modes of appropriation are not entirely in thread with Osborn's original technique.

Oblique Strategies

While *The Five Obstructions* arguably shares characteristics with artifacts pertaining to what is traditionally regarded as highbrow culture, there are other examples of artistic creativity methods that have flowed from a provenance in the avant-garde into the motley confluence of popular culture. A well-known example of this is the random input-based *Oblique Strategies* (with the subtitle: 'over one hundred worthwhile dilemmas'), which is a deck of cards expressing various imperatives and cryptic comments to offer a way out of blind alleys during creative processes. Originally conceptualized and published by innovative music producer Brian Eno and artist Peter Schmidt in 1975, the *Oblique Strategies* has now been employed by a number of artists, including British big-selling band Coldplay to mention a recent, well-known example. Furthermore, the *Oblique Strategies* concept has even become available as an app for the Apple iPhone, facilitating injections of creative spontaneity into everyday life. This development emphasizes the diffusion and popularization of creativity methods embraced by the general public through the artifacts of commercialized popular culture, which blur the lines between interaction design methods in its strictest sense and closely related techniques from other realms of popular cultural production.

STRUCTURING ASPECTS OF THE METHODS

The abovementioned methods are heterogeneous, both in relation to their form, content and typical context of use. In order to focus our treatise of these methods in relation to interaction design, we will in the following discuss the methods on the basis of four aspects that are particularly salient within this field, namely *tradition and transcendence*, *convergence and divergence*, *degree of structure*, and *sources of inspiration*. As stated initially, we have selected these particular aspects because they represent systemic dimensions and characteristics that designers can identify and to some extent influence when they plan and carry out events in the design process. For instance, a designer may identify the need for a stronger rooting in tradition in a process sprawling with diverse ideas and thus employ methods aiming at tradition and convergence. In order to unfold the four aspects, we will discuss each of the nine methods in relation to them. We have summarized these discussions in Figure 1, which

offers an overview of the nine methods as seen through the lens of the four aspects.

Some of the entries of the table are more unequivocal than others. For instance, Inspiration Card Workshops have sources of inspiration as an essential element, whereas Future Workshops make no inherent use of sources of inspiration. However, in the case of several of the methods, the characteristics of the methods with respect to each of the four aspects depend on the concrete implementation of the methods. For instance, Metaphorical Design may be more or less transcending depending on the choice of source domain. Likewise, introducing a diverse set of sources of inspiration as part of an Inspiration Card Workshop may support divergence, there is also the option of introducing a narrower set of sources of inspiration to enable a convergent process. To complicate the picture even more, certain aspects of a method may feature one characteristic whereas another element of the method may have a quite different quality. For instance, Inspiration Card Workshops are highly structured in terms of the sequence of phases (introduction of sources of inspiration, main ideation activity, and presentation of design concepts), whereas the main ideation phase itself is intentionally very loosely structured with only few rules. Likewise, the fantasy phase of a Future Workshop is intended to support divergent thinking, whereas participants enter a mode of convergent thinking during the implementation phase.

The methods are not in all cases directly comparable since their nature varies greatly. Methods which only take a few minutes to employ, e.g. *Oblique Strategies*, obviously have a very different structure than methods requiring several hours, e.g. Future Workshops. The table is thus not meant as a strict categorization of the methods, but rather as tool for supporting reflection on the methods and the way they are applied in design processes.

Tradition and transcendence

In the Scandinavian systems design tradition, the balance between tradition and transcendence (Ehn 1988) is seen as one of the key challenges in design. When designing for a workplace context, the axiom suggests to take current workers' qualifications, work organization, and work activities as points of departure. The perspective on innovation indicated by the term *transcendence* suggests that design is rooted in the tradition of current practice.

The notion of the tool perspective in the Scandinavian tradition reflects the concern for tradition in digital design and emphasizes the importance of grounding design in the development of human's current skills. By applying a tool perspective, the new computer system becomes a metaphor for the devices previously used by the profession. But metaphors may also be used as a vehicle for generating new perspectives. As an example, when understanding a library as a meeting place, the focal point becomes conversations between people about books and subjects related to books rather than managing lending (Madsen 1994). Like

	Tradition/ Transcendence	Convergence/ Divergence	Degree of structure	Sources of inspiration
Future Workshops	Some phases address tradition, others transcendence	Initial divergence, then moves towards convergence	Highly structured in general but with free phases	No inherent sources of inspiration
Int. Relabeling/ Ext. Characters	Highly transcendent on the basis of metaphorical domain	Encourages divergent thinking in shaping products	Moderately structured	One or few sources of inspiration, but a very important element
Metaphorical Design	Transcendent on the basis of metaphorical domain	Can converge loosely coupled concepts, but can also create divergent set of alternatives	Moderately structured	Few sources of inspiration, but highly important element of the technique
Inspiration Card Workshops	Varying levels of transcendence depending on selection of cards	Many sources of inspiration open design space, followed by a move towards convergence in concept development	Loosely structured ideation, structure originates from selection of cards	Many sources of inspiration, highly important for the technique
Fictional Inquiry	Introduces transcendent narrative into traditional domain	Aims at converging ideation and concept development	Strongly structured through use of narrative frame	One coherent inspirational narrative frame
The Five Obstructions	Intentionally challenges traditional form and structure of product	Initially employs constraints to open up opportunity space; subsequently uses constraints to structure concepts	Highly structured frame; individual obstructions vary in structure	From none to few, depending on the specific obstruction
Provocative Operation	Stimulates transcendence through discursive provocation	Forces divergence in specific events	Loosely structured	None
Brainstorming	Tendency towards tradition due to lack of transcending elements	Strongly divergent	Very loosely structured	None
Oblique Strategies	Transcendent through introduction of random commentary into traditional workflow	Divergent	Very loosely structured	One or few

Figure 1: A overview of the nine methods as seen through the lens of the four aspects.

metaphorical design, Interaction Relabeling is very much a transcendence-oriented design method. The introduction of new kinds of technologies and materials via Technology cards is a key component of Inspiration Card Workshops, whereas Domain cards are meant to ground the generation of design ideas in the domain being designed for.

Future Workshops is a design method whose two first phases correspond to a focus on tradition and transcendence, respectively. In the critique phase, the participants have the opportunity to raise their voice about problematic situations, flaws, and critical issues related to current work practice, whereas attendees in the fantasy phase have the opportunity to formulate their vision about an ideal future without considering availability of resources, technical constraints or other kinds of limitations.

The Fictional Inquiry and Provocative Operation methods are explicitly aimed at transcending fixations on the present. It is a participatory design method in which designers involve users who are to some extent familiar with the domain that the design process is intended to transform. Given the participants' familiarity with the domain as well as their implicit taken-for-granted assumptions about it, the method represents an attempt to overcome these preconceptions while at the same time keeping the design process from becoming too disjoint from practice, since it does involve participants from the domain.

Following the terminology proposed by Ehn (1988), *The Five Obstructions* intentionally challenges the easy and the

obvious during the ideation process. A precondition for this approach in the film is the fact that von Trier has carefully studied Leth's creative bag of tricks, which allows him to be extremely precise, almost cynical, when establishing constraints for his competitor. As a creativity method, *The Five Obstructions* purposely pinpoints, takes on and breaks conventional borders and traditions of the design context, which shows this method's ability to trigger transcendence.

By initiating a varied set of discursive provocations causing the participant to react and respond spontaneously, Provocative Operation seeks to stimulate transcendence. A similar target is found in the Oblique Strategies due to this method's overt reliance on aleatory input. By introducing random commentary in the form of imperatives into the traditional, creative workflow, this approach is distinctly transcending in its scope. Brainstorming, on the other hand, is more inclined toward tradition, simply because this method involves no proper transcending elements other than the pre-reflective, unuttered limitations residing in the participants' cognitive constitution.

Convergence and divergence

Innovative processes often oscillate between phases in which participants broaden their horizon, gain new insights and find novel avenues to pursue, and phases in which participants explore in depth one or few particular aspects on this horizon of options.

In design processes, we label the horizon of options and potential choices for the designers *the design space*

(Dalsgaard, Halskov & Nielsen 2008; Dalsgaard, Halskov & Nielsen 2009). The design space varies greatly across projects, depending on the frame and scope of the project, the kind of stakeholders involved, etc. In many innovative design projects, the design space is very broad indeed, comprising a large number of concerns that the design team needs to overview and manage. Throughout the design process, the design space expands and contracts as designers move towards the final product; these fluctuations are described by Löwgren & Stolterman (2004) as phases of *divergence* and *convergence* (ibid pp 29-30). Divergence refers to the process of expanding or opening up the design space, of identifying new options and alternatives beyond the immediate design space. Convergence refers to the process of narrowing down the list of potential options, on zooming in or focusing on particularly salient aspects of the design process. These notions mirror Guilford's (1967) identification of convergent and divergent thinking as general problem solving strategies.

Some design methods are well suited for expanding the design space, e.g. Brainstorming and Inspiration Card Workshops. Such methods are often employed very early in the design process. Other methods, e.g. Fictional Inquiry, are decidedly convergent and intended to provide focus and a move from a large set of options towards a coherent set of product concepts. Such methods are often implemented later in the process, as designers seek out the most fitting solution to design problems and dilemmas, although there are exceptions to this general course of progress. For instance, after much work, designers may find that they are stuck and need to radically rethink their project, in which case methods such as Interaction Relabeling and Extreme Characters are useful for fostering divergent thinking. In many design projects, both types of methods are used, in that designers often need to explore both the global properties of the entire project and the local, specific aspects of a particular concept. For instance, designers may initially set up an Inspiration Card Workshop in order to generate a wide spectrum of ideas in the early divergent phase. After evaluating the ideas resulting from the workshop, the designers may set up a more constrained narrative frame for a Fictional Inquiry workshop in which the framing and objectives of the workshop can lead to a more focused development of ideas.

In the case of *The Five Obstructions*, the use of constraints, or as von Trier calls them, obstructions, is primarily meant to stimulate convergence. However, this is carried out in a radical fashion to be extremely limiting, almost venomous, to Leth's creative aptitude. To take an example: When von Trier sets the frame rate to 12 fps (frames per second) in the Cuba instalment, the first obstruction, Leth is completely taken aback, muttering it will end up a 'spastic' film. Still, he manages to approach the demand with an open mind, which allows him to use the obstruction as a vehicle of divergence. By embracing constraints to unlock opportunity space and subsequently employ the constraints to structure

emerging concepts, *The Five Obstructions* demonstrates the fruitfulness of sustaining a dynamic relationship between divergent and convergent avenues and actions in a creative process aiming at attaining an innovative design concept.

The above dynamics between convergence and divergence is less pronounced in the three additional, more mainstream examples. Provocative Operation forces divergence into specifically delimited situations by impeding certain ways of proceeding. This method, then, is intended to open up the process by generating divergent, occasionally giddy ideas, as a way toward a useful solution to an articulated problem. The quantitative aspect of structured ideation is even clearer in Brainstorming, whose main goal is getting lots of new ideas via a strongly divergent approach. Oblique Strategies also relies on divergence, but typically within a predefined framework; in the 1970s, this would often be the recording of a song or an album. As the creative initiatives fostered by this approach usually must comply with pre-given material such as key, tempo, pitch, and tuning in a recording session, the element of convergence, literally speaking, plays a crucial role in the outset of the creative process.

Degree of structure

Two opposing adages in terms of creativity are on the one hand that creativity originates from random flashes of inspiration, and on the other hand that creativity is "99% perspiration and 1% inspiration". In interaction design, we find *unstructured methods* that reflect the first position, implying a low level of structure and control over the creative process, *highly structured methods* representative of the second position, and of course a number of *methods in between* these bi-polar opposites.

By structure, we refer here to the ways in which rules determine the setup and progression of the methods. Not all methods are easily labeled by these parameters, since some imply a structured setup and unstructured execution, e.g. Inspiration Card Workshops demand careful planning and selection of cards, but then present few rules in the ideation phase. In comparison, Fictional Inquiry is a more structured approach in terms of both preparation and execution, since it relies on the development of a coherent narrative frame and sets up specific goals for workshop participants within that frame; if participants stray too far from these goals, the designers have designated roles letting them intervene and steer events in the intended direction. At the other end of the spectrum, we find loosely structured venues like Oblique Strategies and Provocative Operation.

It is hard to establish general guidelines for when designers should opt for either structured or unstructured methods. However, one aspect to consider is how experienced the designer or design team is. Löwgren & Stolterman (2004) describe two key benefits of design methods as 1) "their potential to help designers organize their work temporally" (ibid p 99), and 2) that methods are "bearers of history and collectors of competence" (ibid p 99). As such, structured methods may be preferable for less experienced designers

striving for control and guidelines in their work, whereas more experienced designers may possess competencies to help them navigate more unstructured processes. With regard to involving external participants in these processes, as is commonplace in the Scandinavian systems design tradition (Bansler 1989), in our experience, unstructured methods may be daunting and therefore work best when used by participants who have experience in creative work. E.g. the Fictional Inquiry method determines a specific narrative and institutes a fictional contract legitimizing statements and behavior beyond the participants' normal practice. Another consideration is the fact that in collaborative design projects, structured approaches can be beneficial, not just in terms of scaffolding creativity, but also because it renders the process transparent and open to discussion. E.g. in a Future Workshop, all participants get to voice their opinion and influence the outcome.

However, unstructured methods can imply less obvious, but very real, aspects of control. Setting the frames of a relatively unstructured process can be a form of control, e.g. Inspiration Card Workshops are ostensibly unstructured in that all cards can be combined in whichever way participants deem interesting, but the very process of selecting the cards beforehand gives the workshop organizers great control in framing the open discussions. Determining the structure of a method is thus a way of taking control, but in a less obvious form.

In terms of structure during the creative process, *The Five Obstructions* relies on its agents' ability to navigate in field of action marked by freedom and constraint, which may also be conceived as levels of structure. While von Trier typically enjoys an intentionally 'defocused', yet extremely controlled, structure to provoke his cast to 'fuck up' to reveal something humanly honest and authentic, Leth sees this agenda as utterly romanticized. He, on the other hand, prefers to 'set a trap for reality' and patiently wait for the surprising moment, the magic, to occur. Despite their differing artistic sensibilities, Leth and von Trier recognize the need for a strong structure for the unstructured and unexpected to appear during a creative process. Within this frame, subsequent obstructions can vary greatly in strength.

In Osborn's original work (1953), he states four basic rules in Brainstorming as a method, all aiming at breaking down barriers for creativity generation. The rules comprise a focus on quantity, withholding criticism, openness towards unusual ideas and an alertness with regard to combining and refining ideas. Apart from these guidelines, the core of Brainstorming consists of breeding many new ideas, which entails setting a very low degree of structural frame. Provocative Operation is only a bit more structured as this method tries to strike a balance between a strong openness toward new ideas and the need for a continuous, conceptual propulsion in order to reach a goal or solve a problem. Given its essential reliance on random input, Oblique Strategies is very loosely structured by definition. For the

method to be fruitful, the participants must commit to obeying the rules. This element of normativity constitutes the structure of Oblique Strategies as a creativity method.

Sources of inspiration

According to Lubart (1994), knowledge is one of the important components of creativity. In this section, we address one particular kind of knowledge, namely experience from previous situations and its role in creativity in general. A concern for sources of inspiration is supported by the design theory of Schön (1983) who has argued that the designer *sees* the situation as something already present in his repertoire of paradigm cases or prototypes. In the same design tradition, Lanzara (1983) has investigated the role of frames and metaphors as resources in design.

In the domain of knitwear, Eckert and Stacey (2000) have investigated how previous design and other objects and images play a role as a source of inspiration in a design process (Ibid, p. 524), and they distinguish between the various, specific roles of sources of inspiration in design, like for instance initiating a design process and reusing existing components. Also in the domain of knitwear design, Petre, Sharp, and Johnson (2006) have identified a set of main categories of inspiration, e.g. other garments, works of art and natural phenomena. Kelly and Littman (2001) have reported how designers at IDEO in a systematic way collect gadgets and materials to store them in a file cabinet for later use as sources of inspiration in subsequent design projects.

Conscious use of sources of inspiration plays a prominent role in several of the methods: Inspiration Card Workshops, Metaphorical Design, Interaction Relabeling and Extreme Characters and Oblique Strategies. whereas Future Workshops, Fictional Inquiry, Provocative Operations, and Brainstorming do not incorporate sources of inspiration as a driving force in innovation.

The pool of approaches discussed in this paper varies with respect to the number of sources of inspiration brought into play. Oblique Strategies, Interaction Relabeling as well as Metaphorical Design deploy only a single or a few sources of inspiration. Likewise, both the staging and evocation phases of Fictional Inquiry workshops introduce a limited number of props to set the mood and evoke ideation. As part of the Inspiration Card method, generally ten to fifteen sources of inspiration are introduced.

Bringing unorthodox examples into play in the design process seems to be particularly relevant in several of the methods. Interaction Relabeling revolves around having a large distance between the domain being designed for and the domain serving as inspiration, which is also the case for Metaphorical Design, though it is argued to have at least one bridging concept between the two domains. The Inspiration Card method includes inspiration from both close and remote sources of inspiration. Future Workshops in its original form does not use sources of inspiration, but

Kensing and Madsen (1991) has suggested introducing metaphors to stimulate innovation in the fantasy phase. In its basic form, Fictional Inquiry does not apply sources of inspiration.

Besides relying on refined, well-proven artistic strategies as a recurrent source of ideas and unequivocally taking charge of the creative process itself, both von Trier and Leth see cooperation as an integral part of their workflow. Especially Leth puts a lot faith in his long-time crew (Hjort 2008b: 143). In brief, this means that the importance of sources of inspiration varies greatly in *The Five Obstructions* with key elements being filmhistory, aesthetic sensibilities and, not least, confidence in competent, collaborative input.

Overall, Provocative Operation, Brainstorming and Oblique Strategies are less anchored in clearly traceable, articulated sources of inspiration, but this does not render them less complex. By consensual definition, creative processes rely on partakers' experiences, impressions, preferences, ideas etc., but in these particular three methods, such and similar elements are highly confluent and thus difficult to single out to track-and-trace. Brainstorming stands out by lacking sources of inspiration as clear-cut variables. Provocative Operation and Oblique Strategies, however, both apply forced inspiration in a decidedly provocative and allusive manner as a vehicle of divergence. This means that the element of concrete inspiration is there, in Oblique Strategies even in tangible form be it paper or on-screen, but in a radically aphoristic, diffuse way. To add to this complexity, Oblique Strategies also purposely turns its own inspirational potential upside down, as it were, as many cards simply contain plain imperatives, i.e. 'what to do's.'

CONCLUSION AND FUTURE WORK

In this paper, we have presented a series of methods intended to foster creativity and innovation in interaction design processes. Some of these methods, e.g. Inspiration Card Workshops and Fictional Inquiry, are native to the field of interaction design; other methods, especially *The Five Obstructions* and Oblique Strategies, exemplify a more mainstream applicability and have been imported to display the field of convergence between interaction design and creativity techniques in the broader sense. By including these and cognate methods from popular cultural practices and focusing on the similarities while at the same time acknowledging the obvious singularities, we hope to be able to contribute to and further point toward new paths for research in ideation and creativity methods within the field of interaction design. Based on our experiences of working with these methods in interaction design for several years, as well as through surveys of related academic work, we have outlined four pivotal aspects or tensions distinguishing common characteristics of interaction design processes. These aspects concern characteristics that the designer can to a certain degree anticipate and control when analyzing and planning the design process. In this respect, the explication of the four aspects can serve both as a platform

for reflection upon the current state of a project and, in combination with the method overview, scaffold future action on the basis of this analysis. For instance, through reflection upon the progress of a project, the designer may come to the conclusion that the current design concept is too rooted in ill-functioning elements of the existing practice, in which case it could be prudent to employ divergent and transcending methods for moving the project into a more fruitful direction.

In addition to these well-established methods in interaction design, we have also brought into play methods from the arts and popular culture that we stipulate can inspire and expand traditional approaches to interaction design. Most notably, *The Five Obstructions* offers a valuable insight into the self-imposed structure and freely constrained methodology of a particular type of ruled-governed creative process conducted by two expert exponents. By articulating the anatomy of Leth and von Trier's working methods, the film contributes to leveraging the understanding of a possible cross-disciplinary potential inherent in these processes. By focusing on what we consider four particularly important, common aspects of interaction design processes, our slightly uncustomary inclusion of an analysis of *The Five Obstructions* and three popularized, mainstream methods sheds light on interaction design studies' methodological self-understanding. This, we hope, might help pave the way for future transfusions and expansions to improve the conceptual framework relevant in hands-on configurations and subsequent analyses of interaction design processes.

The palpable benefits of looking to the arts for inspiration has encouraged us to pursue this line of inquiry in our future work to strengthen, modify and refine methods of creativity in interaction design. In addition to this work concerning the import of methods from other realms of creative practice, another topic for future studies is to further examine the four aspects and their interrelations. We consider this paper to be a first attempt at conceptualizing core aspects of creativity and innovation in design methods, all the while acknowledging that this pertinent topic is by no means exhausted by our work so far.

ACKNOWLEDGEMENTS

This research has been support by the Danish Council for Strategic Research, grant 09-063245 (Digital Urban Living).

REFERENCES

1. Amabile, T.M., R. Conti, H. Coon, et al. Assessing the work environment for creativity. *Academy of Management Review*, 39(5), 1996, 1154–1184
2. Bansler, J. System Development Research in Scandinavia, *Scandinavian Journal of Information Systems*, vol 1. August 1989, 3-20.
3. Dalsgaard, P., Halskov, K. and Nielsen, R. Towards a design space explorer for media facades, in *OZCHI '08*. ACM, New York, USA 2008, 219-226.

4. Dalsgaard, P., Halskov, K. & Nielsen, R. Maps for design reflection. *Artifact*, 2(3-4), 2009, 176-189.
5. de Bono, E. *Serious Creativity: Using the Power of Lateral Thinking to Create New Ideas*, Harper-Business/HarperCollins, New York, 1993.
6. Dindler, C. & Iversen, O.S. Fictional Inquiry – design collaboration in a shared narrative space. *Journal of Co-Design*, 3, 4, December 2007, 213–234.
7. Djajaningrat, J.P., Gaver, W.W. & Frens, J.W. Interaction Relabelling and Extreme Characters: Methods for Exploring Aesthetic Interaction, in *Proceedings of DIS 2000*, Brooklyn, New York, 2000, ACM Press, 66-71).
8. Eckert, C., and Stacey, M. Sources of inspiration: A language of design. *Design Studies* 21, (5) (9), 2000, 523-38.
9. Ehn, P. *Work-oriented Design of Computer Artifacts*. Arbeitslivscentrum, Stockholm, Sweden, 1988.
10. Guilford, J.P. *The Nature of Human Intelligence*. McGraw-Hill, New York, 1967
11. Halskov, K. & Nielsen, R. Virtual video prototyping. *Human-Computer Interaction Journal*, 21, 2006, 199-233.
12. Halskov, K. & Dalsgård, P. Inspiration Card Workshops. *Proceedings of DIS 2006*, 2006, 2-11.
13. Halskov, K., Dalsgård, P. The Emergence of Ideas: The interplay between sources of inspiration and emerging design concepts. *Journal of CoDesign*, 3 (4), 2007, 185–211.
14. Harrison, S., Back, M. and Tatar, D. “It’s Just a Method!” A Pedagogical Experiment in Interdisciplinary Design. *Proceedings of DIS 2006*, 2006, 261-270.
15. Hjort, M. (2008). Style and Creativity in The Five Obstructions. In M. Hjort (ed): *Dekalog1 – On The Five Obstructions*. Wallflower Press, London, 2008, 15-37.
16. Hjort, M. (2008a). Preface. In M. Hjort (ed): *Dekalog1 – On The Five Obstructions*. Wallflower Press, London, 2008, xiii-xviii.
17. Hjort, M. (2008b). The Dekalog Interview: Jørgen Leth. In M. Hjort (ed): *Dekalog1 – On The Five Obstructions*. Wallflower Press, London, 2008, 141-147.
18. Jungk, R. & Müllert, N. *Future Workshops: How to create desirable futures*. Institute for Social Inventions, London, 1987.
19. Kelley, T., & Littman. *The art of innovation: Lessons in creativity from IDEO, america's leading design firm* (1st ed. ed.). Currency/Doubleday, New York, 2001.
20. Madsen, K.H. A Guide to Metaphorical Design. *The Communications of the ACM*, 37(12), 1994, 57-62.
21. Kensing, F. Generation of Visions in Systems Development. In P. Docherty et al.(eds.): *Systems Design for Human and Productivity—Participation and Beyond*, North-Holland Publishing Company, Amsterdam, 1987, 285-301.
22. Kensing, F. & Madsen, K.H. Generating Visions: Future Workshops and Metaphors. In Greenbaum, J. & Kyng, M.: *Design at Work*, Lawrence Earlbaum, 1991, 155-168.
23. Kensing, F. and Munk-Madsen, A.PD: structure in the toolbox. *Communications of the ACM* 36, (6), 1993, 78-85.
24. Lanzara, G. F. The design process: Frames, metaphors and games. In U. Briefs, C. Ciborra & L. Schneider (eds.): *Systems design for, with and by the user*. North-Holland Publishing Company, Amsterdam, 1983, 29-40.
25. Lubart, T.I. Creativity. In: Sternberg, R.J. (ed.): *Thinking and problem solving*. Academic Press, San Diego, CA, 1994, 289-332.
26. Löwgren, J. & Stolterman, E. *Thoughtful Interaction Design*, MIT Press, 2004.
27. Müller, M., Wildman, D. and White, E. A Taxonomy of PD Practices: A brief Practitioner’s Guide. *Communications of the ACM* 36, (4), 1993, 26-27.
28. Osborn, A.F. *Applied Imagination* (rev. ed.), New York, Scriber’s, 1953,
29. Pereg. G. *La Disparition*. Les Éditions Denoël, Paris, 1969.
30. Petre, M., Sharp, H., and Johnson, J. Complexity through combination: An account of knitwear design. *Design Studies*, 27 (2), 2006, 183-222.
31. Ponech, T. Work and Play: The 5-0 Game. In M. Hjort (ed.): *Dekalog1 – On The Five Obstructions*. Wallflower Press, London, 2008, 76-94.
32. Rickards, T. Brainstorming. In: M. Runco, and Pritzker, S. (eds.), *Encyclopedia of Creativity*, Academic Press, San Diego, Vol 1, 1999, 219-228.
33. Schön, D. *The Reflective Practitioner*. Basic Books, New York, 1983.
34. Sternberg, R.J. and Lubart, T.I. The Concept of Creativity: Prospects and Paradigms, In: Sternberg (ed.), R.J.: *Handbook of Creativity*, Cambridge University Press, Cambridge, 1999, 3-15.

