# Some Notes on the Nature of Game Design

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**ABSTRACT**
The focus of this paper is to have a critical look at the current game design literature through the analytical lenses of the current state of the art in design research. The aim is not to create yet another prescriptive framework for game design but rather an attempt to connect the game design studies to general design studies in a stimulating way.

We first discuss what has been said about design in general, including industrial and graphic design, engineering, architecture, and even software design. We will then continue discussing game design specifically compared to the design in general and point out similarities and especially differences. This leads us to a somewhat obvious claim that doing game design is an activity similar to any other design field but that the form and the content are specific to the game design context. Even though this claim might sound obvious it has some unexpected consequences: firstly, it grounds game design in the large body of existing design research and, secondly, it helps in identifying the crucial activities, forms, contents, and contexts that determine the nature of game design.

We look at six game design books alongside two distinct but mutually supporting models of design in general. Our focus is in understanding game design as a situated activity and to see how this notion is discussed in the game design literature.

**Author Keywords**
Game design research, design research, design situation, game design literature

**INTRODUCTION**
During the relatively short history of design research, there have been two influential theoretical approaches to explaining design as an activity. The view put forth by Herbert A. Simon [29] describes design as being essentially a problem solving process where a rational problem-solver, the designer, searches the space of possible solutions for a satisfactory solution to the given design problem. Simon's theory emphasises the rationality of the design process and aims to reduce the complex nature of designing to a goal-oriented activity where the designer deals with the ill-structured design problems by decomposing them into smaller, better defined subproblems.

The second influential view is by Donald Schön [27] who describes design as a reflective practice where the designer is constantly in conversation with the design situation. Schön [28] characterises design as an act of "seeing-moving-seeing" where the designer uses representations of the design problem to identify elements in the design situation (seeing), experiment with possible solutions (moving) and evaluate the consequences of these moves (seeing). The central idea is the reflective and conversational nature of the process. Instead of starting out with a clear problem definition or goal for the design, the designer constructs the design gradually by experimenting with design moves and thereby gaining "a new understanding of the phenomenon and a change in the situation" [27].

Both views have explicit and implicit takes on what are the design situations and problems the designer encounters during designing. For the sake of this discussion we use the concept design situation to refer to the overall field of tasks, goals, ideas, representations, and what not the designer has at a specific point of doing design. The design situation thus describes the holistic state of a particular design at a particular time. For alternate views on design situation see, for example, Löwgren and Stolterman [21] and Visser [30]. The design situation can, of course, never be comprehensively stated [20]. A design problem, on the other hand, is a designer's internal or external representation of a specific task within the design situation (here we are following Visser [30]). A design solution is, then, a designer's internal or external representation that meets at least partly the requirements of a design problem. Often, if not always, a design solution will become a design problem until the design task is considered finished by the designer. This kind of co-evolution of problems and solutions [15] at least partly explains why design cannot be considered as rigid problem solving. In one sense, the design situation can be also described as the state of the current design problems and solutions and the resources the designer has at his or her disposal to change the situation.

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Describing design activity through the concept of design situation acknowledges the complex network of issues that affect design at any given moment. The design situation is in constant state of change due to a number of factors such as the acts of the designers, changes in the perspectives of the actors involved in the project, changes in the design context such as market state and so on. However, the overall design situation is a theoretical entity. It is virtually impossible for any designer to hold a mental representation of the whole design but instead he or she focuses only on the local design situation, the situation at hand as presented to the designer at a given moment [13, 12, 20]. As the designer always works with the local design situation, we will use the term design situation to denote the local design situation and when applicable, use the term overall design situation to refer to the holistic view of the design situation.

A design problem is something that the designer is confronted with in a specific design situation. A design problem forces the designer to pay attention to certain issues while leaving the other issues in the periphery. This is mainly due the fact that our cognitive capabilities are limited. We humans just cannot properly comprehend complex networks of often even contradictory possibilities. Framing something as a problem limits the possibilities that have to be taken into account, at least for a certain time [12]. After making a decision it is then again possible to consider what the more holistic implications are for the decision.

The design situation changes all the time during the design. The same thing happens even more drastically for the design problems and solutions. The problems are decomposed into subproblems, problems become solutions and vice versa, and they can be altogether abandoned, as is the case, for example, when the designer decides to scrap the current solution and start from scratch. The models for design as activity have to take this constant flux into account, otherwise they cannot capture the (sometimes) chaotic and (always) creative nature of design.

In most areas of design - also in game design - the designers often work in multi-disciplinary teams, where there are different kinds of stakeholders involved. In such cases, the subjective nature of design activity transforms the design process into a social process where individual interpretations of the design situation play an important role (see e.g. [9, 11, 2]). Similarly, a common understanding of the situation is important as well [18].

## DESIGN AS A PROCESS AND AS AN ACTIVITY

We provide an overview of two models of design process or design activity: Löwgren and Stolterman's three layer abstraction model and Lawson's model of design activity. These two were chosen because, first, they are complementary to each other and, second, they are compact and convenient models based on thorough analysis of design activities in many different kinds of domains.

### Löwgren and Stolterman

Löwgren and Stolterman [21] first describe the scope of the design process from the initial idea, the vision, through more detailed specifications to the construction of the final artefact. Their model is focused on the intermediate artefacts the designer is working with, be they internal, vague ideas or more concrete sketches, and how the design itself emerges from a complex interplay between these different kinds of representations. They also elaborate on the nature of design thinking and the role of social activity. Here our main interest is on their view on how the design emerges from the vision, through the operative image, to the final specification.

Löwgren and Stolterman's model focuses on the early parts of the process. The process starts when the designer is "thrown into" the design situation and is confronted with the design task itself and the environment where the design takes place. This can happen in several ways from getting detailed requirements from the client to the designer, the designer starting from a vague idea, or even from scratch. In any way Löwgren and Stolterman [21] stress that the design process starts earlier than most methodologies realize; the work starts before there are any formal plans or even requirements for the design task at hand. The design of the design process itself, deciding how the design work is carried out by choosing the focus in the early phases, the amount of innovation and creative work and so on, might be the most important activity of the whole design project [21].

One of the fundamental characteristics of design activity is the "recurrent leaping between details and the whole, or between the concrete and the abstract" [21]. Often the designer has an abstract idea or a strong feeling on what the design is going to be like but is at the same time confronted with making practical and concrete decisions. Löwgren and Stolterman [21] distinguish three different layers of abstraction in early design work: the vision, the operative image, and the specification.

The vision emerges when the designer is confronted with the initial design situation, often as something vague, elusive, and even contradictory in nature. In the case of experienced designers the vision can emerge very early in the process and it can be described as a first organizing principle for the whole design. The emergence of the vision should not be regarded as mostly analytical process, rather it most likely guided by intuition and tacit knowledge of the designer. Often, if not always, it is even impossible to explicitly state how the early vision came to be.

The vision at this stage can take many forms from vague and implicit ideas to rough sketches and ad hoc verbalizations. As the early formation of the vision is contradictory and chaotic in nature there will be several visions operative at the same time, fighting with each other. These conflicting visions are necessary for the designer to be able to assess the design situation at hand from several points of view. As the design thinking is characterized by

constant leaping from one abstraction layer to another the vision can be guided by more detailed and concrete considerations, such as choosing the materials in the case of industrial design. Even though the vision at this stage is vague and even contradictory it will guide the rest of the design process. It is, however, important to note that even though the vision is the first guiding principle for the design thinking it will most likely be modified, shaped, and even replaced during the later stages of the design process.

The next abstraction layer, the operative image, consists of making the first explicit representation of the vision. As in the vision, there are many kinds of representations the designer can be working with from early overall sketches of the whole design situations, such as rough architecture models in software engineering, to detailed sketches of a specific design situation such as decorative details of a window sill in architecture. The main point in the operative image is that it has an explicit form allowing the designer (and other stakeholders if need be) to visualize, simulate, and manipulate a specific design situation. Through the operative image the vision, or parts of the vision, are made concrete allowing more detailed and thorough evaluation of the design situation. The process, however, is still far from straightforward. The sketches and other representations define an option, a possibility, for the design decisions. The operative image is thus a tool for making the vision and the design situation more concrete and understandable. It is again worth noting that the designer is in constant conversation with the design situation and is constantly leaping between abstraction layers.

A sufficiently detailed operative image can act as the specification, which instructs how to construct the final artefact. Even at this stage the design work is not finished yet. During the construction process new kinds of design situations emerge, as there is no clear division between design and construction stages.

The abstraction layers are a way to think about the design as an activity. As Löwgren and Stolterman note several times, the design work does not follow a linear path from the vision through the operative image to the specification but all three abstraction layers form a constant, dynamic dialectical process. The vision shapes the operative image and the specification and is in turn shaped by them. The designer moves back and forth between the layers during the design activity.

### Lawson

Lawson's [20] model of design activities offers a complementary view to the one described above. Lawson's model focuses on categorizing different kinds of activities which are inherent in design thinking. While Löwgren and Stolterman's [21] abstraction layers describe the implicit and explicit ways of formulating the design thinking Lawson provides insights into what the designers are doing, what kinds of decisions they have to make, and what kinds of thinking they go through the design process.

#### *Formulating*

The group of activities that Lawson calls "formulating" essentially consists of the activities involved when a designer observes and assesses the design situation. Some prominent research theorists see the designer's ability to formulate the design situation as the elemental ability in terms of designer expertise [8, 14, 20]. Lawson makes a distinction between identifying and framing.

Framing is a key concept in Schön's theory. As noted by a number of commentators (see for example [20, 12]) Schön himself never fully gave a clear definition of a frame, but the concept has caught on. He speaks of framing of the design situation as being "a setting of some problems to be solved" [27]. The designer frames the situation in such a way that there is a problem which can be attempted to be solved with an experimental design move. Schön sees framing as a subjective act, governed by the designer's own "likings, preferences, values, norms, and meanings" [26].

What Lawson means by "identifying" is partly contained in Schön's act of framing. The designer needs to identify the elements within the design situation and be able to understand their qualities and how they relate to each other. Lawson does not mean the simple task of singling out the components within the design situation. Instead he speaks of the designer using specialised domain-knowledge and already making judgements on the composition of the elements. In fact, Lawson [19] describes identifying as being kin to the way chess players recognize board situations allowing them to respond to the situation with a suitable gambit. Instead of analysing the situation, expert chess players perceive situations in the broad context of massive number of precedents and gambits used in the history of chess allowing them to quickly understand the future possibilities of the situation.

Lawson [20] underlines the usefulness of framing as a tool for controlling the complexity of the design situation by allowing the designer to focus on a select number of issues while temporarily suspending others.

#### *Representing*

The designer works with and works through representations of the design situations. The representations can be on different abstraction layers [21], can take many different forms from almost illegible scribbles on a napkin to functional software prototypes, and they can even be as evanescent as thinking out aloud. Some claim that the representation does not even have to be external but that the designer can make an implicit cognitive representation of the design situation [30]. Lawson, however, is discussing external representations. According to Lawson the designer makes sense of the design situations by making representations; the designer is in a conversation with them [26]. Lawson states that the designer is almost always working with multiple representations as they are used in shaping the design situation, and they provide a way to make possible design choices more concrete. It is

conceivable that the designer can entirely work without external representations but this seems to be very rare. The representations can be on any of Löwgren and Stolterman's [21] three abstraction layers but that the forms of representation can differ significantly from layer to layer.

Analogies and precedents in the form of other related designs or products are a strong form of representation as they can communicate important aspects of the design situation. Lawson [19] points out that precedents can act as anchors to design knowledge of very complex design characteristics. Lawson provides an example where the architects of a design office used the word "belvedere" to denote "a whole series of devices for organising space vertically in order to afford dramatic views that helped building users to build mental maps of their surroundings" [19]. According to Lawson [19], it appears that in addition to communicating design knowledge, experienced designers use precedents also to organise and understand the characteristics of design representations and situations. This is further supported by an experiment by Ball and Christensen [3] in which they linked analogies and mental simulations to uncertainty resolving mechanisms.

*Moving*

According to Lawson [20] designers are solution oriented and work by "generating ideas about the whole or partial solutions". Sometimes these ideas are abandoned during the process and sometimes the ideas become part of the design situation and generate new kinds of design problems. One of the designer's activities is thus to create these solutions and Lawson uses the term 'moving' to describe these activities. A design 'move' can create a whole new solution to a particular situation or they can alter and shape existing ones. Lawson distinguishes between interpretive and developmental moves. The interpretive moves are based on the reflection on the current (implicit and explicit) representations of the design situation and they might be entirely novel or derived from existing ideas. In the developmental moves an idea is developed further and clarified, usually with some kind of a representation. Goel [17] refers to these two types of moves as 'lateral' and 'vertical'.

Lawson notes that designers often develop early solutions to a design problem before even understanding the problem. He claims that this is often done through a concept of primary generators introduced by Jane Darke [10]. According to Lawson [20], the primary generator is basically a simple handle to the design situation that narrows down the complexity of the problem and presents some aspect of the problem that is seen as central by the designer. The concept is very close to the vision abstraction layer of Löwgren and Stolterman [20]. Primary generators can be beneficial by allowing the designer to focus on a limited number of inter-related solution candidates and therefore can improve creativity of the designer.

As described by Schön [27], elemental design moves often take the form of surprises as the designer makes exploratory moves that allow her to see the design situation in a new way. Cross [7] uses the concept of creative leaps to describe a similar situation, where a novel or creative solution candidate suddenly emerges while working on the design situation. Both Schön and Cross note that although surprising, these moves are really the result of a gradual process. Cross calls this being "more akin to bridging than leaping the chasm between the problem and the solution" [7].

*Bringing problems and solutions together*

We have already discussed the difficulty of viewing design as a problem solving activity and that it is often difficult to discern the problem from a solution. In some cases the problem may be clear and that it is possible to move from the problem to a solution in a rational path but sometimes the problem itself emerges from generation of possible solutions and that it is not necessarily clear in which order the problems and solutions appear. Lawson states, in parallel with our earlier discussion, that "[…] problem and solution are better seen as two aspects of a description of the design situation rather than separate entities" [20].

*Evaluation*

Designers are making implicit subjective evaluations all the way through the design process. They generate alternative solutions and have to decide which of them to take further and which to leave out. Most of these evaluations happen intuitively during design thinking concerning particular design situations but the designer has to also be able to make judgements concerning the overall design situation. Lawson distinguishes between subjective evaluations ("does this feel right? ") and objective ones ranging from mental simulations to user testings. Doing right kinds of evaluations at the right time is crucial for design ability, although Lawson notes that being good at evaluations does not necessarily coincide with doing good design moves.

*Reflecting*

Interpreting Schön's idea of the 'reflective practitioner' Lawson discusses 'reflection in action' and 'reflection on action'. Reflection in action is covered by Lawson's formulation, moving, and evaluation activities since the designer is continually thinking about the current design situation. Reflection on action is a higher level activity where the designer is monitoring the process, not the design itself. The designer is taking a step back and looking at the design process asking questions such as "are the relevant issues taken care of? ", "which activities (formulating, moving etc.), if any, have been neglected? ", and "am I doing this the right way? ". Lawson stresses that the skill of reflecting on action at the right time and asking the right questions might be one of the most important skills the designer can have. Another aspect of reflecting is that the designer looks outside the current project and reflects on what kind of an effect this particular project has for the

designer's wider work. In other words, the designer thinks about his or her own understanding of design as an activity. This also includes collecting precedents and references from relevant domains. An architect might collect blueprints and take photos of buildings for reference material and game designers usually play a lot of different kinds of games. The references do not have to be in the same domain; the game designer might also collect same kinds of references as the architect.

In line with Schön, Lawson also sees design as being governed by the designer's subjective system of values. What Lawson calls the guiding principles, are basically a set of subjective values and priorities evolved over the years, that guide the designers in their work. Although quite similar to Schön's appreciative system [26], Lawson's view on the notion is more precise and expressed better in terms of design activity. To Lawson, the guiding principles are the expression of the designer's approach to design and often recognisable in the designer's work.

## GAME DESIGN LITERATURE

### Overview

We analysed six game design books looking at how they corresponded to the theories of the general design research, with a specific focus on the models presented in the previous section. The six books in question are:

- Björk, Staffan and Jussi Holopainen (2004) Patterns in Game Design [5]
- Fullerton, Tracy; Christopher Swain & Steven Hoffman (2004) Game Design Workshop: Designing, Prototyping, and Playtesting Games [16]
- Rollings, Andrew and Ernest Adams (2003) Andrew Rollings and Ernest Adams on Game Design [22]
- Rouse, Richard III (2001) Game Design: Theory and Practice [23]
- Salen, Katie and Eric Zimmerman (2003) Rules of Play: Game Design Fundamentals [24]
- Schell, Jesse (2008) The Art of Game Design [25]

Our selection of the game design books is by no means comprehensive, but we feel that it represents the diversity of the game design literature to a sufficient detail. We are also aware that one of the authors of this article is also an author of the Patterns in Game Design. The book was not selected due to self-promotion, but because we felt it presented an interesting and a rather distinct view on game design that should be taken into account.

Almost all books about game design describe at least in some way how the design as activity is split into different stages or phases. Some of these descriptions are stage models where the design moves through distinct stages linearly from one stage to another. Common such stages are, for example, initial idea, concepting, designing, prototyping, implementing, and playtesting. See, for example, Rollings and Adams [1], Rouse [23], Bateman and Boon [4] for other kinds of stage models. The stage models do have their advantages as they can be used to describe different kinds of actions and competencies the designers (and other developers) have to have in different stages. Other authors suggest that the stage model itself is too rigid and promote iterative game design (see for example [24, 6, 16]) where the design emerges through rapid evolution and iteration of concrete prototypes ranging from simple paper ones to complex, and almost finished, software implementations. Even in the case of iterative process models the stages within one iteration are clear: design, test, and analyze.

It seems that the process models described in the game design literature are, in the end, regarding the design activity itself as monolithic; the designer might do something else with the current design situation, such as testing it with real players, but in the end it is the design stage where the magic happens. In both stage and iterative models the design as a process is first decomposed into different stages, but, in the end, one of the stages is called somewhat recursively "design". What seems to be missing is to, first, accommodate for the fact that design takes place throughout the whole development cycle and, second, to be still able to analyse and discuss different types of actions and activities of the design in a meaningful way.

The notion of understanding game design as evolving design situation is implicitly evident in a number of books. By understanding design as a process and the artefact as a system where changes affect the whole system, it is safe to say that Salen's and Zimmerman's view on design activity is situated. The same implicit support for situated design can also be seen in Fullerton's insistence on testing the whole game after making minute changes [16] and in Björk and Holopainen's decision of not viewing their game design patterns as means of mechanical problem solving due to the effects of single patterns affecting so many different aspects of gameplay [5].

### Content

The view that game design is a second order problem where the designer can only indirectly affect the players' experience is embraced in a number of books [5, 24, 25]. Although typical to other disciplines of design as well, especially those related to entertainment in general, this problem of design goal being outside the reach of the designer is particularly characteristic of game design. As pointed out by Schell [25], a game design is unique in the amount of freedom given to the player, this leading to complexity of the artefact that is really difficult to control. The designer works by designing the formal system of game rules, but the experience and the meaning that players

create is dependent also on the larger social and cultural contexts [24].

The problem of the second order design is particularly evident when viewed in terms of the model of designing by Löwgren and Stolterman [21]. The higher the abstraction level the designer is on, the more difficult it is for the designer to anticipate the successfulness of the artefact. As the game design process starts out with a vague and unformed vision, the designer's tacit knowledge and understanding of the subject matter plays a critical role in forming the vision into an operative image. In terms of Lawson's [20] model of designing, the designer's ability of formulating the design situations is pivotal in game design. This notion is also clearly underlined in the game design literature. Knowing and understanding the structures and principles that can be used to constructing great experiences for the players is seen as the key ability for the game designer.

Almost all of the books provided a conceptual framework to support the designer in shaping the elements and the relations between them in a design situation. The frameworks varied in their scope of application and level of abstraction. In Fullerton et al. [16] the designer formulates the design situation through a generalised structural model of gameplay consisting of formal game elements, dramatic elements and system dynamics. Schell [25] approaches the question through a higher-level model of mechanics, story, aesthetics and technology. Rollings and Adams [22] look at design elements especially in terms of game genres and the elements typically present in them. Salen and Zimmerman [24] provide an organised and systematic view on the elements of game design through their concept of game design schemas, which are grouped into formal, experiental and cultural schemas. Rouse III [23] also provides a framework of design elements, but with an inclination towards evaluating design situations.

As a rather extreme approach, Björk and Holopainen [5] introduce a collection of nearly 300 interrelated game design patterns each describing a distinct design aspect analysed from existing games. In addition to allowing the designer formulate the design situation, they are interesting in relation to our notion of design situation. With the relations between the patterns narrowing down the design space but also showing the rationale between situation changes, game design patterns could be said to support the formulation of an evolving design situation.

The usefulness of asking questions throughout the design process in order to better formulate the situation and to make sure that all the necessary elements are included is expressly promoted in a number of the books [22, 23, 25, 16]. Apart from this conversational view on design, framing as a design tool is advocated only in two of the books. Salen and Zimmerman [24] divide their broader schemas into a number of subschemas, each providing a limited perspective on an aspect of game design. Similarly, Schell [25] introduces a collection of 100 lenses each consisting of a number of questions on unique perspectives on game design. Individual schemas present a lot more broader view than an individual lens, however, the lenses as a whole cover more fully the design process than schemas. The schemas are more clearly provided as ways for controlling the complexity of the situation whereas lenses also act as creativity tools by attempting to maximise the number of frames available to the designer.

#### Design as an activity

Representation touches the issue of formulating intimately. If formulating the design situations is an act where the designer identifies the relevant elements in the situation, then representation is the medium through which the designer does the identification. It is interesting how issues related to creating and using representations are discussed in the game design literature. Although this is partly explained by the emphasis on gameplay design in a majority of the books [22, 23, 16], it would appear that the designers mostly work through prototypes and textual descriptions. Schell [25] comments also on using illustrations as tools of prototyping and all of the books contain screenshots and concept art from games, but discussion on the various forms of representations is very limited. This leads to a somewhat perplexing notion, that even though games are seen as complex and diverse mediums, apart from actually building the game, they are best described by text and playing simple prototypes.

In line with Löwgren and Stolterman [21], the detail of representation is tied to the stage the process is currently on. During the early stages of design, the use of minimalistic paper prototypes is strongly promoted [24, 25, 16] and there are explicit instructions on keeping the textual [25, 23, 22, 16] description brief as well.

It seems obvious at least from the interviews of the designers included in the books we reviewed, that game designers also rely heavily on precedents when describing and communicating design situations. This was also evident in the way existing games were used in the books as examples of game elements. In particular, game design patterns [5] make heavy use of precedents by each pattern providing at least one concrete reference to a game that implements the said game design pattern. However, basically none of the books studied the issue in depth or gave guidance to the reader how to use references to games as means of communicating the design. It is as if the use of precedents is seen so natural to the designer, that there is no need to actually discuss it.

Creating design solutions is central to design and this view is clearly reflected in the game design literature as well. However, as was discussed earlier about game design being regarded as monolithic, there is something similar here as well. There is tendency towards equaling solution generation to brainstorming game ideas, which are then gradually revised into game designs through an iterative

process [23, 25, 24, 16]. This view is somewhat problematic because it hides the intricacies of solution generation under the heading of brainstorming thus making it harder to understand and talk about the mechanisms behind it. It also suggests that solutions are only created at the initial stages of the process thus further blurring the idea that design takes place throughout the whole development cycle.

### Designer

Apart from Schell [25] who saw the designer in a broader role, the books that made explicit comments on the role of the designer [22, 23, 16], clearly defined game designer as the designer of gameplay. In view of situated design, the limitation to only designing gameplay is clearly a constraint on the designer as it fails to acknowledge the numerous aspects that affect the design situation.

In a way, the books themselves are examples of reflection-on-action. Although the authors probably aim for objectivity, each is still an account of the author's understanding of game design and reflect what Lawson [20] describes as the guiding principles of the designers. This is also acknowledged in all books [5, 22, 23, 24, 25, 16]. The notion that one can become a designer mainly through practice is evident in most of the books [16, 24, 25, 23, 22]. Although the idea of reflection-on-action as a tool of monitoring the process and the design activity itself is implicitly present in basically all of the books we reviewed, it is not explicitly touched upon by any except for Schell [25] who promotes this through some of his lenses.

The various forms of objective evaluation were somewhat thoroughly discussed in the literature. Especially Fullerton et al. [16] and Schell [25], but also others [23, 22, 24], discuss the importance of playtesting as means for evaluating the design constructs. As for subjective evaluation, those that touched the subject, all agreed that it was up to the "gut feeling" of the designer [25, 23, 16].

Regarding the social nature of the design process, only Fullerton et al. [16] and Schell discuss the [25] the issue, but quite briefly. Fullerton et al. [16] mostly describe the different roles of people involved in a game design team, giving quite little attention to group dynamics or team communication. Schell goes on to more depth, but even then it is more about the forms of communication, how to get along in a team, than it is about transfer of knowledge or negotiating common understanding of the design situation.

## CONCLUSIONS

Judging from the selection of the game design literature we analysed, game design is heavily governed by the object of the design, games. Although this may seem like an overly obvious statement, it carries with itself the connotation that the activity called design, is left to too little attention. Whereas the books concentrate on teaching the reader the principles and elements of game design, at the same time they leave aspects of design activity such as representing, moving and reflecting to little consideration. Naturally, it is critically important for the designer to build up knowledge of the multitude of elements that can be used to construct games, yet in our view, it is equally important to know about the activity itself as well. At the moment, it is not discussed as explicitly as it could be.

The disposition to describing game design through stage models or iterative spirals leads to a rather abstract view on design where the various forms of activity involved in design are lumped together without properly addressing their distinctive characteristics. This is also notable in the manner the books look at solution generation

We argue that game design should be studied through models such as Lawson's that address the various kinds of activities inherent in design thinking. In our view, this will not only allow for a better understanding of game design, but also open up new possibilities of improving the methodologies of game design.

Secondly, we suggest that game design should be addressed as a situated phenomenon acknowledging the very complex network of issues affecting it. At the moment, the picture painted by game design literature overly emphasises the design of gameplay. Although Schell [25] discusses at length also other factors such as other stakeholders and the design context in the design process, in general they are still viewed more in connection with the process instead of the design activity itself.

## REFERENCES


1. Ernest Adams and Andrew Rollings. *Fundamentals of Game Design*. Prentice Hall, first edition, 2006.
2. Petra Badke-Schaub and Eckart Frankenberger. Design representations in critical situations of product development. In Gabriela Goldschmidt and William Porter, editors, *Design Representation*, pages 105–126. Springer, London, 2004.
3. Linden J. Ball and Bo T. Christensen. Analogical reasoning and mental simulation in design: two strategies linked to uncertainty resolution. *Design Studies*, 30(2):169–186, 2009.
4. Chris Bateman and Richard Boon. *21st Century Game Design*. Charles River Media, first edition, 2005.
5. Staffan Björk and Jussi Holopainen. *Patterns in Game Design*. Game development series. Charles River Media, Hingham (Mass.), 2005.
6. Mark Cerny and Michael John. Game development myth vs. method. *Game Developer Magazine*, (June), 2002.
7. Nigel Cross. Descriptive models of creative design: application to an example. *Design Studies*, 18(4):427–440, 1997.
8. Nigel Cross. Expertise in design: an overview. *Design Studies*, 25(5):427–441, 2004.

9. Nigel Cross and Anita Clayburn-Cross. Observations of teamwork and social processes in design. In Nigel Cross, Henri Christiaans, and Kees Dorst, editors, *Analysing Design Activity*, pages 291–318. John Wiley & Sons, Chichester, 1996.

10. Jane Darke. The primary generator and the design process. *Design Studies*, 1(1):36–44, 1979.

11. Andy Dong. The latent semantic approach to studying design team communication. *Design Studies*, 26(5):445–461, 2005.

12. Kees Dorst. On the problem of design problems - problem solving and design expertise. *Journal of Design Research*, 4(2), 2004.

13. Kees Dorst. Design problems and design paradoxes. *Design Issues*, 22(3):4–17, 2006.

14. Kees Dorst. Design research: a revolution-waiting-to-happen. *Design Studies*, 29(1):4–11, 2008.

15. Kees Dorst and Nigel Cross. Creativity in the design process: co-evolution of problem-solution. *Design Studies*, 22(5):425–437, 2001.

16. Tracy Fullerton, Christopher Swain, and Steven Hoffman. *Game Design Workshop: Designing, Prototyping, and Playtesting Games*. CMP Books, San Francisco (Calif.), 2004.

17. Vinod Goel. *Sketches of Thought*. The MIT Press, 1995.

18. Jonathan H.G. Hey, Caneel K. Joyce, and Sara L. Beckman. Framing innovation: negotiating shared frames during early design phases. *Journal of Design Research*, 6:79–99, 2007.

19. Bryan Lawson. Schemata, gambits and precedent: some factors in design expertise. *Design Studies*, 25(5):443–457, 2004.

20. Bryan Lawson. *How Designers Think: The Design Process Demystified*. Architectural Press, fourth edition, 2005.

21. Jonas Löwgren and Erik Stolterman. *Thoughtful Interaction Design: A Design Perspective on Information Technology*. The MIT Press, 2007.

22. Andrew Rollings and Ernest Adams. *Andrew Rollings and Ernest Adams on Game Design*. NRG. New Riders, Indianapolis (Ind.), 2003.

23. Richard Rouse. *Game Design: Theory and Practice (2nd Edition)*. Wordware Publishing, Inc., second edition, 2001.

24. Katie Salen and Eric Zimmerman. *Rules of Play Game Design Fundamentals*. MIT Press, Cambridge, Mass, 2004.

25. Jesse Schell. *The Art of Game Design: A book of lenses*. Morgan Kaufmann, 2008.

26. Donald A. Schön. Problems, frames and perspectives on designing. *Design Studies*, 5(3):132–136, 1984.

27. Donald A. Schön. *The Reflective Practitioner: How Professionals Think In Action*. Basic Books, first edition, 1984.

28. Donald A. Schön. Designing as reflective conversation with the materials of a design situation. *Research in Engineering Design*, 3(3):131–147, 1992.

29. Herbert A. Simon. *The Sciences of the Artificial - 3rd Edition*. The MIT Press, third edition, 1996.

30. Willemien Visser. *The Cognitive Artefacts of Designing*. CRC Press, first edition, 2006.