

# Designing for Inquisitive Use

Peter Dalsgaard

Center for Advanced Visualization and Interaction,  
Institute of Information and Media Studies, University of Aarhus

Helsingforsgade 14, DK 8200 Aarhus N, Denmark

dalsgaard@cavi.dk

## ABSTRACT

This paper presents the concept of inquisitive use and discusses design considerations for creating experience-oriented interactive systems that inspire inquisitive use. Inquisitive use is based on the pragmatism of John Dewey and defined by the interrelated aspects of experience, inquiry, and conflict. The significance of this perspective for design is explored and discussed through two case-studies of experience-oriented installations. The paper contributes to the expanding discourse on experience design on a theoretical level by exploring one particular facet of interaction, inquisitive use, and on a practical level by discussing implications for design prompted by insights into inquisitive use. These implications are presented as a set of design sensitivities, which provide contextual insights and considerations for ongoing and future design processes.

## Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces – *Theory and Methods, User-Centered Design.*

## General Terms

Design, Human Factors, Theory.

## Keywords

Inquisitive use, User Experience, Interaction Design, Pragmatism, Design Theory.

## 1. INTRODUCTION AND BACKGROUND

The past decade has seen an ever-growing interest in understanding user experience in the field of interactive systems design. This has prompted a number of contributions to the field in which over-all frameworks for understanding experience are presented, as well as ways of operationalizing these understandings in design practice. Although differing perspectives on experience abound, there is a consensus that the topic is highly complex. In this paper, I examine a specific facet of user experience within the field of interactive systems, namely that of *inquisitive use*, and discuss considerations for designing for inquisitive use. The incentive for focusing on a singular aspect is that, in light of the contributions to establish a general

understanding of user experience, this allows for examining in depth one strand of this intricate phenomenon. It further provides room for discussing practical implications for designing systems intended to bring forth certain experiential qualities. The motivation for addressing the specific concept of inquisitive use is to unfold the resourcefulness of users in their interaction with experience-oriented systems and to discuss consequential design considerations.

The structure of the paper is such that, after situating the paper in the broader field of user experience studies, I present a pragmatist perspective on inquisitive use, characterized by the interrelated aspects of *experience*, *inquiry*, and *conflict*. The concept is then explored through the study of two cases. This leads to a discussion of considerations for designing for inquisitive use and notes on future work.

### 1.1 User experience and interactive systems

User experience in interactive systems lends itself to scrutiny from a wide array of perspectives, and there is no consensual definition of the concept. Depending on the definition, the term experience can thus refer to phenomena on various levels, ranging from tacit personal knowledge to societal issues. In [9] Davis argues that, in light of the complexity of the subject, "experiential systems design must be radically interdisciplinary". This entails bringing together insights and methods from disciplines such as engineering and computer science, psychology, and the humanities. Within the interactive systems design community, approaches to understanding user experience include experiments with new technologies as a starting point for exploring experiential qualities (eg. [26][29]), and explorations into what makes for pleasurable products (eg. [30][36][40]). One comprehensive example of the latter is Desmet & Hekkert's "Framework of Product Experience" [17] which explores the interrelations between aesthetic experience, the experience of meaning, and emotional experience in the general frame of product experience. On a higher level of abstraction, another approach is to establish a general theory of experience (eg. [1][9][21][22]). An explicated example of this approach is Forlizzi & Battarbee's "Understanding Experience in Interactive Systems" [21] in which a framework for user experience of interactive systems is established on the basis of a typology of interactions (fluent, cognitive, and expressive) which may yield various types of experiences (continuous experience, particular punctuated experiences, and co-experience). A related approach is to focus on aesthetic aspects of user-system relations and experiences (eg. [2][18][19][37]), as do McCarthy & Wright in "Technology as Experience" [32] in which they establish a framework of four 'threads' of experience (emotional, sensual,

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

*Designing Interactive Systems '08*, February 25–27, 2008, Cape Town, South Africa. Copyright 2008 ACM 1-58113-000-0/00/0004...\$5.00.

compositional, and spatio-temporal) and six practices for making sense of experience (anticipating, connecting, interpreting, reflecting, appropriating, and recounting). A more modest approach is to focus on particular dimensions of experience or aesthetics of interaction, as do for example McCarthy *et al* [33] with regards to the concept of Enchantment, Landin [31] with regards to fragility, and Hummels *et al* [28] with regards to resonance. This paper is positioned within the latter approach by focusing on the specific concept of inquisitive use. Theoretically, the paper is based upon pragmatist philosophy, and as such it shares a kinship with Forlizzi & Battarbee [21], McCarthy & Wright [32], and Petersen *et al* [37]. The latter draws upon the pragmatist aesthetics of Shusterman [41] in order to build a framework for aesthetic interaction that brings to the fore the bodily situated nature and aesthetic potential of everyday experiences.

## 1.2 Conceptualizing users and use

The perspective on inquisitive use presented in this paper posits users as inquisitive and resourceful actors, capable of exploring and experimenting with interactive systems in the course of their experience of them. This perspective is significant because interaction designers' conceptualization of the users of their future systems have extensive implications for both design processes and resulting systems and products, including how to gain knowledge about users and the use domain, the involvement of users in the process, the creation of specifications and requirements, the design of user interfaces as well as underlying structures, and the introduction of the systems and products to users. An introductory disclaimer: The term *user* is contested ground, and may connote a functionalistic perspective on persons interacting with systems. As will become evident, a pragmatist perspective on interaction goes beyond functional aspects; given this disclaimer, I shall however stick to the term *user* in lack of a better denomination at this time.

Methods and techniques based on cognitivist understandings of users (eg. [4] and [35]) initially dominated the field, but these have been challenged from a number of positions, including those mentioned in section 1.1. An important source of inspiration for the concept of inquisitive use presented in this paper is Gedenryd's critique of the cognitivist perspective underlying these methods and techniques [23]. Gedenryd makes the argument that an understanding of the potential of human activity should not be reduced to "the study of human mental imperfection". On the contrary, this potential is characterised by our continuous exploitation of our bodies and our environment in order to complement and enhance our intramental (ie. mental cognitive) capabilities. Competent users will "go out of their way to avoid intramental thinking" [23] by employing what Gedenryd dubs *situating strategies* in which the full range of the situation – users' minds and bodies, co-present humans, physical surroundings etc. - is explored and utilized to affect intended changes in the world. It is in this light that this paper addresses the concept of inquisitive use. The concept is one that encourages conflict, challenge and risk in experience-oriented installations, which in turn will prompt users to adopt inquisitive approaches and actively engage the installations. The rationale for designing for inquisitive use is that this mode of engagement may bring about more fulfilling experiences, a stance discussed here on the basis of pragmatist philosophy.

## 2. INQUISITIVE USE

The concept of inquisitive use has a pragmatist foundation and is primarily based on the work of John Dewey [10]. Pragmatism, a movement consisting of related though not fully congruent theories, was established by Charles Sanders Peirce, William James and later taken up by Dewey (incidentally, the three originators all objected to the label pragmatism). The movement is so labelled due to the assertion that the meaning and "truth" of ideas is to be determined on the basis of their practical implications, a position often referred to as *the primacy of practice*.

In Deweyan pragmatism, the world is characterized by flux and contingency, and the ideas and theories we form are practical instruments for transforming our apprehension of problematic situations into fulfillment by resolving them. This perspective has been influential in the design community and has inspired studies of the reflective design process [1] as well as well as aesthetics of interaction [37]. In this paper, I seek to further examine the implications of adopting a pragmatist perspective in interaction design with the particular focus on user inquiry, engagement, reflection and action in use situations. Deweyan pragmatism presents an interesting frame for reflecting upon these aspects given the primacy of practice which prompts a contextual and processual mode of inquiry into understanding phenomena in the world [11]. It is a perspective deeply concerned with practice as it unfolds, and one that invites to form, test, and transform theory through practice.

The concept of inquisitive use presented in this paper consists of three interrelated aspects: experience, conflict, and inquiry. These were briefly introduced in [7] and are unfolded in greater detail in this paper. Although they are in many ways overlapping, these three aspects are presented separately for the sake of clear presentation. Upon this their convergence in inquisitive use is explicated. The division of inquisitive use into three separate aspects should be construed as a means for comprehensible, linear presentation. It does not imply that they can analyzed in isolation, and their systemic interrelations will become clear in the discussion and application of the design sensitivities.

The concept of inquisitive use may be of of value for the interaction design community on two levels: first, it provides a framework for understanding use of interactive systems; second, it gives rise to *design sensitivities* [5][27] for designing for inquisitive use. I use the term design sensitivities in the sense that they "suggest relevant issues and inspire creative design, rather than imposing rigid rules on the design." [5]. Each aspect is thus first introduced in general, followed by three resultant design sensitivities. The introduction to the aspects will primarily summarize Dewey's concepts, while the design sensitivities can be construed as syntheses of these concepts related to the specific concerns of designers of interactive systems.

The account of pragmatist concepts given in this paper is by no means an exhaustive one (the collected works of Dewey alone are comprised of 37 volumes on issues including education, art, experience, democracy and more [10]), and it may benefit from further expansion and discussion in the future. The specific aspects of experience, inquiry, and conflict are expanded upon due to their relevance for understanding inquisitive use.

## 2.1 Experience

An elucidation of the concept of experience is crucial, since this paper is concerned with inquisitive use within the field of experience-oriented interactive systems. The general usage of the term experience varies, as has been outlined in the previous paragraphs, and I will establish a pragmatist terminology of experience. I shall use the term experience-oriented when I refer to the broader discourse within the field of interaction design.

In Deweyan terminology, there is a clear distinction between *experience* and *having an experience* [14]. Experience is a continuous and ubiquitous aspect of human existence, a flow that binds together all situations we encounter. This continuity implies that “every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after.” [15] Regarding experience-oriented interactive installations, the concept of *having an experience* is often the intended outcome of use. This refers to specific, distinct experiences that are often perceived as problematic or aesthetic. In Deweyan terminology, *Problematic experiences* are those that challenge our pre-formed conceptualization of the world and require inquiry and action if they are to be overcome and transformed. *Aesthetic experiences* arise when past experience and present circumstances converge in a way that creates a sense of meaning and fulfillment. These two types of distinct experiences can be convergent since the process of overcoming a problematic experience can result in an aesthetic experience. A number of recent contributions to the field of interaction design studies have addressed pragmatist understandings of aesthetic experience, including [32] and [37]. Whereas [37] thoroughly discusses aesthetic experiences in their development of what they call *Aesthetic Interaction*, it is equally important to bring into light problematic experiences when considering inquisitive use: First, because it is often problematic experiences that prompt inquiry; second, because problematic and aesthetic experiences are reciprocal in that aesthetic experiences often arise from problematic ones.

For inquisitive use of interactive systems, the pragmatist perspective on experience fosters design sensitivities regarding the following:

### *Experience in practice*

Experience is radically rooted in practice: Users experience the world through acting in it with their minds and bodies, knowledge and understanding arises through active investigation, reflection is in itself a practical activity, and experience unfolds temporally through transactional practice that potentially transforms users and circumstances. To facilitate inquisitive use, interactive systems can support emerging exploration by providing modes of interaction that prompt ongoing user action and cater to both reflective and physical capabilities.

### *Continuous experience*

The continuity of experience prompts designers to consider the integration of their systems not just into the flow of physico-spatial surroundings, but also into the flow of users’ past and future experience. For interactive systems to tie into a user’s experience, they have to present a recognizable link between the past and future in the sense that they resonate with established patterns of thought [28] and indicate that they may lead to an expansion of the capabilities of experiencing the world.

### *Distinct experience*

Experience-oriented interaction design projects are often intended to bring about interactive installations that can evoke aesthetic experiences. However, designers must recognize the interrelations between problematic and aesthetic experiences. For an experience to be perceived as special and outstanding – as fulfilling aesthetic experiences are – they must necessarily be disparate from habitual ones. This can be the case with instantaneous experiences when elements in a situation suddenly fits together in richly gratifying way. Often, however, what leads to an aesthetic experience is at first a problematic situation that contains elements of conflict and prompt inquisitive action for it to be transformed into a meaningful and gratifying encounter. Interaction designers must thus recognize the potential in perturbing users’ habitual conceptualizations with regards to framing, content, and modes of interaction. The potential of invoking aesthetic experiences for users should prompt designers to explore what may constitute such experiences in the specific domain, and how they may be brought about through the course of interaction

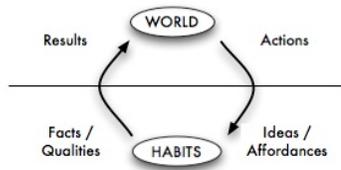
## 2.2 Inquiry<sup>2</sup>

Dewey’s concept of inquiry [16] is closely tied to experience, for we may intentionally seek to create specific experiences for ourselves through inquiry, eg. when one starts learning to play a musical instrument. Inquiry is a particular mode of understanding and engaging phenomena in the world prompted by encounters with problematic situations. *Situation*, in Deweyan terminology, is a systemic concept: “What is designated by the word ‘situation’ is *not* a single object or event or set of events. For we never experience nor form judgments about objects and events in isolation, but only in connection with a contextual whole. This latter is what is called a ‘situation’.” [13]

When habitual action in a given situation does not result in the desired outcome, it is in Deweyan terminology labelled a *problematic situation*. When faced with problematic situations that we wish to resolve, we form simultaneous thought experiments with and articulations to understand what it is that makes the situation problematic. These conceptualizations form the basis for hypothesizing about how we may reconstruct or transform the situation before carrying out physical actions. This process is often one of iteration: we imagine and/or try out a number possible ways of reconstructing the situation, all the while re-evaluating the way the situation talks back to us in our interaction with it. We experience this back-talk as effects that qualitatively change our view of the situation. A problematic situation may be resolved by the transformation of the inquirer, the circumstances, or both (which together make up the situation). An integral component of inquiry is that which Dewey coins *transaction*, the ongoing and transformative interrelations between the experienter and his/her circumstances: the flow of experience incessantly influences the experienter, who in turn transforms with the circumstances in order to pursue certain experiences. For interactive systems design, it is worth noticing that, in Deweyan terms, transaction is distinct from *interaction*, which denotes an encounter in which the experienter and the circumstances are not reciprocally transformed.

---

<sup>2</sup> This section is based primarily on [16].



**Figure 1: Model of inquiry (Translated from [3])**

This process of inquiry is explored in detail in Donald Schön's work on situational back-talk and design as reflexive practice [39], which is heavily inspired by Deweyan pragmatism. For the design of experience-oriented interactive systems, the concept of inquisitive use posits that users may adopt an inquisitive mindset when confronted with problematic situations, and that they are capable of employing situating strategies [23] in order to understand, explore, and transform such situations.

For inquisitive use, the pragmatist perspective on inquiry fosters the following design sensitivities when designing for inquisitive use:

#### *Situated intentionality*

Although some experiences occur without an expressed intent on the side of the experiencer, in the case of experience-oriented interactive systems they primarily arise when experiencers interact with them by their own accord. I use the term *situated intentionality* to denote a directedness towards an object or objective. This directedness, as well as the object or objective, can be more or less well-defined depending on the situation. Eg. in an art museum one may interact with an information kiosk with the specific objective of finding the dating of a certain piece, or one may use it more broadly in the serendipitous hope of learning more about the aspirations of the artist whose works are on display. Designing for inquisitive use implies addressing situated intentionality by exploring users' pre-existing desires to have specific experiences in the setting and by bringing into play elements that pique the interest of users by tapping into their past experiences so that these intentions arise. This arousal of interest and intention is the platform for inquisitive use. Strategies for doing so range from transparent (eg. it is made clear what type of experience to expect) to enigmatic (eg. information is kept hidden to arouse curiosity).

#### *Concurrent action-reflection*

Inquisitive use is a process of testing and transforming conceptualizations about the world by acting in it. Inquisitive use situations should contain both semantic elements of stability and recognition as well as elements of change and uncertainty: The experiencer needs the stable semantic elements as scaffolding for exploring the unfamiliar, lest everything appears in flux. In inquisitive use situations, reflection will occur in action, but it may also be fruitful to design for intermissions (temporally as well as spatially) in which reflection upon the interaction can unfold.

#### *Reciprocal change*

Meaningful experiences instill change in the experiencer through effects that shape future conceptualizations. In inquisitive use situations, the impact of an experience is in part dependent on the change which the experiencer may effect on the system or situation: it is through these transformations that the inquisitive user experiences situational back-talk on her actions that enables

her to evaluate the commensurability between her conceptualizations and the situation. Such transformations can be short-termed or permanent. Strategies for reciprocal change range from expressive systems that allow for short-term alterations (eg. installations such as Laser Tag [25]) over progressively unfolding systems (eg. computer games with advancing levels and narratives) to adaptive, collaborative systems that are deliberately unfinalized by designers and made valuable by users' interaction and input over the course of time (eg. collaborative software such as del.icio.us [39]).

## 2.3 Conflict

In a Deweyan understanding, conflict prompts an inquisitive attitude, drives engagement with situations, and leads to learning:

"Conflict is the gadfly of thought. It stirs us to observation and memory. It instigates to invention. It shocks us out of sheep-like passivity, and sets us at noting and contriving. Not that it always effects this result; but conflict is a sine qua non of reflection and ingenuity." [12]

Conflict as it is commonly understood is a concept laden with negative connotations. This is not the case in a Deweyan perspective, in which it rather denotes tension or unresolvedness in the reciprocal relations between the experiencer and the circumstances. Conflict is a fundamental characteristic of our being in the world, and it is the very existence of conflict and instability that, through human engagement, makes possible experiences of resolution and fulfillment:

"Because the actual world, that in which we live, is a combination of movement and culmination, of breaks and reunions, the experience of a living creature is capable of esthetic quality." [14]

Conflict is not positive and fruitful in all situations, and it may be detrimental to future experience and cut off intended courses if not resolved; however, it is a necessary catalyst for bringing about genuinely new types of experiences through inquiry. In order for a conflict to be perceived as such, there must be something at risk. Conflict is not implicitly something that is thrust upon the experiencer against her will; it may also be something that she intentionally seeks out, eg. in order to expand her horizon, to gain new insights, to be thrilled or moved etc.

Depending on the design domain, conflict may be a more or less preferable property. Eg. in the design of workplace systems, it may be detrimental to the use of the system to incorporate elements of conflict. A major part of research into designing interactive systems may indeed be construed as finding ways to minimize conflict between the experiencer and the system. This is not to say that interaction with workplace systems are bereft of meaningful or aesthetic experiences, merely to point out that designing for functional, habitual use is often the primary objective in the workplace context.

For the design of experience-oriented interactive installations, however, conflict is a critical and somewhat ignored aspect that can be at odds with traditional methods and techniques that strive for ideals of transparency, usability, and user-friendliness. Conflict can exist on multiple levels, eg. it may appear in the interface, in the selection and structuring of content, in the temporal unfolding of interaction etc. Typically, strategies for designing conflict in use situations aim at creating straightforward user interfaces and challenging trials on a content or narrative level (eg. in an arcade driving game). However, designing for

conflict on an interface level (as eg. Dunne [19] has explored) can also make for remarkable use experiences. Integrating the concept of conflict in interactive systems design implies exploring ways of challenging users in ways that may ultimately hinder them in successfully using the systems.

For inquisitive use, the pragmatist perspective on conflict fosters design sensitivities regarding:

#### Challenge

Conflict arises when elements in a situation challenge established patterns of understanding. Hence, designing for inquisitive use entails a process of building up anticipation by facilitating some form of initial sense-making by tying into existing experience. Instilling an initial sense of challenge is thus closely related to situated intentionality. A crucial dimension in establishing meaningful challenges is to balance the difficulty of the challenge to the capability of the experienter. Optimal correspondence between the two leads to an experience described by psychologist Mihaly Csikszentmihalyi as *flow* [6]: “Every action, movement, and thought follows inevitably from the previous one, like playing jazz. Your whole being is involved, and you’re using your skills to the utmost.”[24]. In this sense, flow can be understood as the convergence of conflict and inquiry.

#### Risk

The potential reward for experienters in terms of overcoming a challenge is in part dependant on the perceived level of risk. When the experienter has the sensation that something important is at stake, this can make for more intense and engulfing experiences. For designers, this prompts considerations about how to establish uncertainty of how and if a problematic situation can be resolved. As with challenge, risk has to be balanced between presenting enough risk to make a situation interesting for users to engage in it, though not so much as to make users shy away from it ahead of time. Suspenseful narratives characteristically employ strategies for balancing this by first presenting a status quo, establishing identifiable characters and/or values, and then thrusting these into uncertainty. Well-constructed narratives employ the audience’s identification to up the ante and create tension and doubt. This can be effectful even though the audience may know how conflicts will eventually be resolved. Interactive systems can take this further by putting users in partial control of how a situation unfolds. A typical example of this is to establish a relatively high level of challenge and risk and countering this with the ability to replay situations, as is a common approach in computer game design. However, this strategy must be carefully considered, since replay options ultimately diminish the sense of risk.

#### Resolution

In accord with situated intentionality, inquisitive use is directed towards some form of perceived resolution. The intentions and the perceived resolution may well change over time, as users’ conceptualizations as well as the situation evolve. The user’s sense of what the resolution of a situation may be can be very vague, especially if enigmatic strategies for drawing users in are employed; eg. a crime story has to build the expectation that a mystery will be solved, but must still keep readers guessing until the resolution is presented. Dewey denotes a resolution in which situation and experience fuse in perceived unity as the *consummatory phase* of experience; this is the basis for aesthetic experiences. Such consummation entails a re-adaptation of the

individual with the situation. In Deweyan terms, most experiences are, however, *inchoate*: they provide no sense of closure, they simply stop. This can be the case not just for random everyday encounters, but also for carefully crafted events (eg. “... it was a great movie for the most part, but I was really let down by the cop-out ending”). However, it is inchoate experiences that form the contrasting background for outstanding experiences, for “Where everything is already complete, there is no fulfillment”[14].

## 2.4 Designing for inquisitive use

The converging concepts of experience, inquiry, and conflict form a foundation for understanding inquisitive use which may be represented as in Figure 2: Model of inquisitive use:

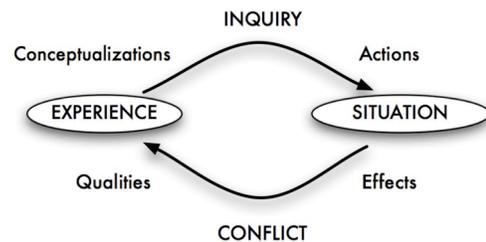


Figure 2: Model of inquisitive use

Inquisitive use is instigated by problematic situations that challenge our conceptualizations. These situations may present themselves without the intent of the user, or she may actively seek them out. Through iterations of inquisitive action and situational back-talk, the user-situation transaction unfolds until resolution occurs, be it in an inchoate or consummatory way.

On this basis, the nine design sensitivities laid out in the previous paragraphs suggest considerations to be taken into account when designing for inquisitive use. The design sensitivities necessarily have a high level of abstraction, in that inquisitive may occur in various forms in a multitude of situations. Awareness of the sensitivities support designers’ reflective practice when carrying out design experiments and moves through what Schön [39] labels *reflection-in-action*, as well as *reflection-on-action* when designers analyze past design moves and outcomes and weigh them against intended future results. In other words, the framework can be used both pro-actively and retrospectively. Together, the conceptual framework and the design sensitivities form a perspective on users as resourceful, inquisitive co-creators of experience.

In order to explore the interrelations between experience, inquiry and conflict, and the implications of employing the design sensitivities in the design process, I will introduce and discuss two case studies of experience-oriented, interactive installations: *Balder’s Funeral Pyre* and *Silence and Whispers*. The author has participated in the design of both installations and thus has insight into the design considerations underlying their development and the specific design decisions made in the development process. Both installations seek to evoke specific moods and ambiances, instill user curiosity, and convey narrative elements. Whereas they are similar with respect to experiential design sensitivities, they however differ radically with regards to participatory and transactional aspects of use: *Balder’s Funeral Pyre* comes off primarily as a contemplative installation, while *Silence and*

Whispers prompts engaged user participation. This invites a discussion of inquiry-related design sensitivities underlying the two installations and the contrasting user experiences they may bring about. The installations should thus be construed as vehicles for discussion rather than prime exemplars of inquisitive use.

### 3. DISCUSSION: INQUISITIVE USE EXPLORED THROUGH TWO DESIGN CASES

The discussion of inquisitive use in the two cases is structured as follows: the two installations are presented; then the concept of inquisitive use is discussed in each case in relation to the practical circumstances of the cases (eg. setting, involved stakeholders, time constraints etc) and the *intentions* and *values* underlying the design processes, and finally the elements of inquisitive use in the two cases is compared. Regarding intentions, I refer to the purposes of creating the installations in terms of function and use, while values refer to the experiential qualities embedded in and evoked by the installations, (see Dalsgaard & Halkov [8]). The practical circumstances, intentions and values are brought into play since they form the foundation for discussing the design sensitivities in practice.

#### 3.1 Case presentation: Balder's Funeral Pyre

Balder's Funeral Pyre is a custom-made interactive installation at 7<sup>th</sup> Heaven, a center for children's literature. It was created at the Center for Advanced Visualization and Interaction (CAVI), University of Aarhus, with the participation of the author. The *intentions* underlying the installation is to arouse children's interest in literature by introducing them to Norse mythology without retelling the stories from this universe word by word. This approach to knowledge mediation aims at encouraging children to read and explore stories from this universe themselves after visiting the center.

In Norse mythology, the death of the god Balder marks a crucial narrative turning-point: Balder is slain by his own brother through the treachery of the deceitful Loki. Upon his death, Balder's body is placed upon a ship that is ignited and set off to sea. These events spell the beginning of the end of the mythological world, culminating in an apocalyptic battle, Ragnarok, which lays waste to the heavens and the earth.



Figure 3: Visitors experience Balder's Funeral Pyre

The Balder's Funeral Pyre installation appears to visitors as a narrow, 7 meter long corridor in which one of the sides is rear projection of fire (see Figure 4 for a diagrammatic overview). The fire is visualized by mixing video feeds of fire with a particle

generation system. This imagery is coupled with pressure sensors in the floor which enables visitors to interact with the fire. When no one is in the corridor, the flames simmer near the floor, but when someone enters the corridor, a fire shoots up at their location. As the visitor proceeds down the corridor, the growing fire appears to envelop them. The software controlling the interaction has built-in delays in order to minimize the visitors' awareness that they are in direct control of the fire. The installation is one of many in the 7<sup>th</sup> Heaven Norse mythology exhibition, and visitors typically encounter it halfway through their visit. Thematically, the story of Balder's funeral can also be conceived as the middle of an unfolding narrative, before which the stable Norse universe is presented, and after which Ragnarok occurs.

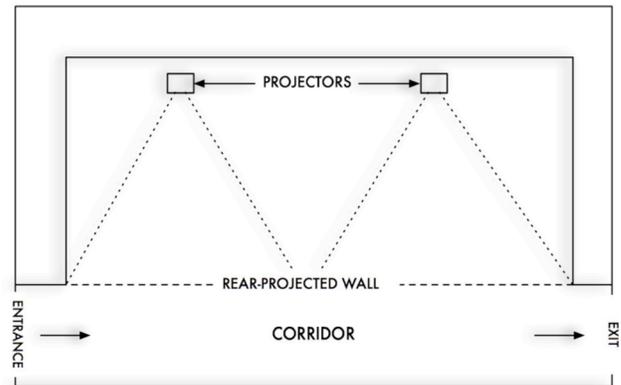


Figure 4: Diagram of Balder's Funeral Pyre

#### 3.2 Case presentation: Silence and Whispers

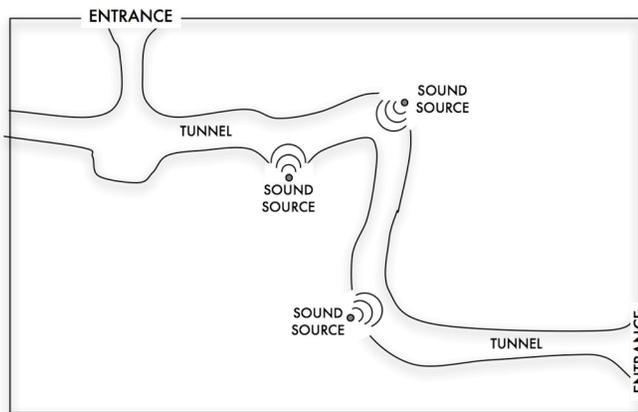
Silence and Whispers is a conceptual mixed reality installation created in 2006 as a cross-disciplinary collaboration between four interaction design researchers, including the author. Silence and Whispers was developed and located on Suomenlinna, a series of islands in the Helsinki harbour entrance. Suomenlinna served as a naval fortress and 1748 until the end of World War I, and simultaneously the islands housed detention camps. Today, there is a close-knit community of inhabitant on the islands that also serve one of the most popular public recreative area in Finland. Furthermore, Suomenlinna hosts an open prison facility whose inmates carry out maintenance and restoration work on historic monuments and sites.

The primary *intention* underlying the design of Silence and Whispers is to collect and convey stories that reflect this multi-layered cultural history. Near King's Gate on the southern island of Gustavssvärd, faint whispers stem from a shadowy cave. When visitors step inside the cave, they hear audio fragments of ominous stories and folklore from Suomenlinna. These stories, collected from resident islanders and visitors with strong relations to Suomenlinna, tell of events and myths not presented in official historic documentation. In addition to the audio fragments, stories and rumours are written in chalk on the cave walls (see Figure 6 for a diagrammatic overview). Some of the written fragments retell the same stories as the audio snippets.



**Figure 5: Visitors explore *Silence and Whispers***

The further visitors move into the darkness of the cave, the more disturbing the stories. In order to view the gloomiest stories, visitors can light matches to reveal them in short glimpses. Pieces of chalk are left in the cave, and visitors can write down their own stories. In this way, the installation evolves and expands over time as old stories are erased or washed away and new ones are added to the cave walls.



**Figure 6: Diagram of *Silence and Whispers***

In the following, I will discuss how the interrelations between experience, inquiry, and conflict in inquisitive use were explored in the design of Balder's Funeral Pyre and Silence and Whispers.

### 3.3 Discussion of Balder's Funeral Pyre

During the initial concept development phases of Balder's Funeral Pyre, we (the designers at CAVI) in collaboration with 7<sup>th</sup> Heaven formulated three core experiential values to be evoked by the installation: It was to interactively engage visitors and *convey a solemn mood, nurture deliberate slowness and provide room for reflection*. These values emerged during joint design sessions, including initial brainstorming sessions and inspiration card workshops [34]. In terms of experiential design sensitivities, these values were addressed in a way that emphasizes the interaction between users and installation seen as a situated whole: By providing room, both physically (by making a large space for moving/standing still) and mentally (by placing the installation in a isolated section of the exhibition flow), and through a deliberate slowness in the interface (regarding the built-in delays) the installation aims to convey the sombre weight of Balder's story

and invites visitors to stop and reflect upon it. Hopefully, this will lead visitors to revisit the story later and continue the experience of Norse mythology in reading. The installation thus addresses experience in practice by combining physical exploration (through movement in the corridor) with sense-making (in recognizing the installation as a visual interpretation of Balder's story) with the aim of bringing forth a *distinct experience* that ties into the *continuous experience* of visitors, both in light of the other exhibits in the center and visitors' previous and subsequent reading and understanding of Norse mythology.

These sensitivities turned into practical implications for design primarily vis-a-vis aspects of *conflict*. We aimed for a simplicity in the visual expression, opting for a dark display with fiery imagery, supplemented by audio tracks of crackling fire mixed with sounds of creaking wood and waves crashing onto a ship. A more complex visualization, with dissolving imagery from Norse mythology, was discussed and discarded, since it would not leave enough room for reflection. Several prototypes were tested with children as subjects. Among these was a version that was initially more popular than the one we eventually settled on. The popular version had drastic fiery explosions that responded instantly to children's movements and interaction: This encouraged playful interaction from the children who would run down the corridor, playing and hooting; this version was recognizable to the children as something out of a computer game or an action movie, according to their responses. Thus, opting for a quieter and ultimately more demanding version that only revealed itself through a longer duration of engagement and inquiry (which interaction-wise was done by introducing delays and visualizing slowly emerging fires around users) turned out to pose more of a *challenge* to the children, in that they experienced it as something new, somewhat frightening and definitely extraordinary. The decision to implement this version however meant that not all children would experience the same things – some were too frightened and hurried through the corridor, others were too impatient and moved along before the installation revealed itself to them, making for *inchoate experiences*. The children who remained in the installation long enough to watch events unfold, however, were for the most part very affected by it and experienced it as a *consummatory resolution* to their exhibition visit thus far.



**Figure 7: Design discussions around Balder's Funeral Pyre**

With regards to inquiry-oriented design sensitivities, Balder's Funeral Pyre plays into *the situated intentionality* via a strategy of intrigue: visitors are intended to make the connection between the

fairly abstract installation and the story of Balder, which they most likely know. The interactive emergence of the fire plays into *concurrent action-reflection*, paradoxically by encouraging slowness or stillness once activated. The installation exhibits reciprocal change to a very limited degree, by rewarding calm modes of use with scripted responses.

### 3.4 Discussion of Silence and Whispers

The Silence and Whispers installation was developed much more rapidly than Balder's Funeral Pyre since it was primarily intended as a design experiment rather than a finished product, and the use of interactive elements in the installation is restricted to playing back pre-recorded audio narratives. Given more time, the plan is to present visitors with ways of verbally narrating their own stories as parts of ongoing audio collections to be played back in the caves, possibly edited by installation curators.

The primary values underlying the design process was to *instill an explorative mood, promote narrative sense-making coupled with physical movement*, and to prompt *simultaneous story exploration and -telling*. These values were all coupled to giving a richer sense of the multitude of situated narratives tied to the specific location of Suomenlinna. Some of these are over-arching shared narratives, eg. the official history of the island, some are collective but tacit, eg. the fact that a prison camp presently exists on the island, and some are personal, eg. residents' scary stories from their childhood.

Silence and Whispers presents visitors with snippets of narratives, both audively and visually, that have stereotypical traits. Eg. an audio track would tell of the silhouette of a strange man that lurks around the island, scaring children, and written in chalk is a snippet of a story about a girl who fell down the rocks outside of the cave. Although these were real events from Suomenlinna, we deliberately cut them to a level of generalizability so as to couple visitors' *experience in practice* through physical exploration (ie. moving through the caves) with a mental state of *inquiry* by inviting them to "fill out the blanks" in the narratives by connecting them to their own previous experiences and preconceptions. These design moves reflect experiential design sensitivities in which a balance is intended between the *continuous experience* of visitors (ie. general knowledge of the stereotypical traits and narratives, and potentially personal experience with certain of these stereotypes) and the *distinct experiences*, potentially aesthetic, situated in the specific setting of the Suomenlinna underground.

These deliberate omissions and fragmentations also posed visitors with a manner of *conflict*, in that the narratives were not necessarily resolved, but rather called upon the visitors to engage in *inquiry* to find out how they might conclude, either by finding other fragments and snippets by navigating the caves and the soundscape, or by making them up themselves. Thus visitors are immediately *challenged* to engage in the inquiry into the installation if they want to find out more. This challenge is closely coupled design considerations regarding *situated intentionality*: in that the setup is aimed at piquing and arousing the curiosity of visitors and make them want engage in the emerging narrative space.



Figure 8: Stories written in chalk in *Silence and Whispers* cave

The installation was primarily intended for an adult audience, but even so many users found it more frightening than Balder's Funeral Pyre due to the fact that it was situated in caves that for a large part were completely dark, save for a few flickering candle lights illuminating select narrative fragments. To many visitors, this was clearly an element of *risk*; in some cases the it proved too much of a risk in that it made visitors abandon the installation. The users who ran the risk engaged in phases of *concurrent action-reflection* by moving about the cave tunnels to piece together the narrative snippets. This was however only possible to a certain extent due to the intentionally fractured character of the narratives; some of them were deliberately left incomplete. One potential *resolution* is for visitors to piece together a coherent narrative; another resolution is for visitors themselves to fill out the blanks in the narratives; this was a common strategy, and in some cases a necessary one due to the unfinalized narrative snippets. Both of these resolutions are laden with the potential of evoking experiences of fulfilment and consummation. On the other hand, there was also the clear risk of inchoate experiences, in that some visitors would not complete the storylines. The installation, both in its prototypical and intended complete form, support *reciprocal change* in user-system transactions. Visitors hopefully form different conceptualizations of Suomenlinna, and potentially of their own past experience, that expand their future experiences on the island. At the same time, they can leave behind traces and snippets themselves. We (the designers) do not conceive of the installation as a finished product, rather we view it as an experiment that will on the one hand elicit more stories about Suomenlinna, on the other hand provide empirical data about how an auditive and physical narrative space frames visitors' behaviour, experiences and desires to express narratives themselves.

### 3.5 Comparing inquisitive use in the two cases

When comparing two installations with regards to inquisitive use, it is clear that Balder's Funeral Pyre only invites inquisitive use to a quite limited extent: It arouses the interest of users and rewards a specific type of behaviour with a pre-defined response that fits nicely into the flow of the over-all Norse mythology exhibition. However, it may be more accurate to describe it as contemplative installation that seeks to craft a certain type of user behaviour, namely one in which the visitor exhibits a stillness of movement, hopefully instilled by the solemn mood and leading to reflection upon the story of Balder. The aspects of inquisitive use that are only present in the system in limited measure are principally those of challenge and reciprocal change: challenge in the sense that there is in fact only a very limited degree to which you are

challenged, once you have overcome the first hurdle of understanding the interaction, there is not much left to do in terms of inquiry (although the contemplative aspects may reward repeated use); reciprocal change is even less present, in the sense that the system always responds in the same manner, and although design moves like the in-built delays are made to blur this, the only possible change over time occurs in the visitor's conceptualizations, i.e. no transaction occurs. This is not to say that the installation is not well-designed: it is an interesting example of an interactive system that may evoke distinct, potentially aesthetic experiences in the specific context, and which may act as a catalyst for instilling in users an inquisitive attitude towards further exploring Norse mythology, either in the rest of the 7<sup>th</sup> Heaven center or in other contexts.

Silence and Whispers represents a better example of inquisitive use, since, in optimal situations, it ties into existing experience, evokes distinct experience, connects to practice, prompts reciprocal change, challenges the user and presents elements of conflict and risk, and allows for resolutions through resourceful and engaged use. Compared to Balder's Funeral Pyre, the main difference is the space left open for the user to explore and affect. There is a potential for establishing a longer-lasting experience of flow, and for reciprocal change in the user's option of "feeding into the system" her own conceptualizations, thus affecting both her own experiences of consummation and future users' perception of the installation. With regards to the resolution of the experience in Balder's Funeral Pyre compared to Silence and Whispers, a key point with regards to inquisitive use is that there is a close relation between the commitment and engagement users invest in inquisitive use of a system, in spite of challenges and risks, and the feelings of fulfillment and potentially aesthetic experiences that visitors may achieve through use. So even though aesthetic experiences are inherently individual phenomena that arise from the confluence of personal experience with a lived situation, designers can actively pursue strategies bringing these about (such as the those suggested by the design sensitivities in this paper) by developing systems that offer up the potential for inquisitive use.

Inquisitive use, however, can be a 'hard sell' in design collaborations. Because of the elements of conflict, challenge and risk, stakeholders in design projects are often reluctant to adopt strategies of inquisitive use. Case in point is 7<sup>th</sup> Heaven and Balder's Funeral Pyre, in which 7<sup>th</sup> Heaven opted for a very understandable inclusive strategy with regards to visitors: As many children as possible should be able to experience the stories of Norse mythology, and this means imposing limits on how challenging the installation may be. A major hurdle for inquisitive use thus lies in the very early stages of the design process in which these founding principles for the project are determined. In the case of Silence and Whispers, it was much easier to experiment straightforwardly with aspects of inquisitive use because it was first and foremost an experimental design research project.

#### 4. SUMMARY AND FUTURE WORK

This paper has presented the concept of inquisitive use on the basis of Deweyan pragmatism. Furthermore, design sensitivities for designing for inquisitive use have been presented and discussed to demonstrate how the concept may form a productive approach in interaction design practice.

Inquisitive use represents a stance towards interaction design that encourages designers to regard users as resourceful co-creators of experience in the use interactive systems, capable of finding ways of making sense of installations that are not self-evident in their structure, presentation, or operation. A key point of the paper is to highlight the importance of conflict in designing for remarkable use experiences, for conflict is a key component in inquisitive use, and a sine qua non of aesthetic experiences. The concept of inquisitive use is not thought to replace traditional conceptualizations of the use of interactive systems; it is rather a critical attempt to challenge views on use that do not take into account the potential resourcefulness of users and their ability to employ situating strategies for experiencing and inquiring, nor their aesthetic aspirations.

Inquisitive use denotes a systemic understanding of the reciprocal relationship between experiencer and circumstances in a situation. This is intrinsic to understanding the way that inquisitive users co-create experiences, and it mirrors Dewey's understanding of the *work of art* (as opposed to the static *art product*) as a reciprocal relationship between an expressive artist and an appreciator who actively assimilates the art product: "The work takes place when a human being cooperates with the product so that the outcome is an experience that is enjoyed because of its liberating and ordered properties." [14]

The framework for inquisitive use has been developed concurrently with the practice of designing the two installations *Balder's Funeral Pyre* and *Silence and Whispers*. This cross-fertilization of design theory and design practice has been beneficial in allowing for the framework to be subjected to practice-based scrutiny all the while directing the design of the installations towards inquisitive use; on a critical note, this also implies that the installations can be conceived as cases constructed to support the theoretical concept of inquisitive use. However, this point of criticism is countered by the fact that both installations have been developed in cross-disciplinary design teams governed by various perspectives and interests.

It is the plan to further explore and expand the pragmatist perspective presented here, both through application of the framework in design practice, and through analyses of other types of interactive systems than the installations presented in this paper. As a specific expansion proposal, the inquisitive use framework laid forward here is predominantly concerned with individual interaction; an expansion of the framework to embrace collective interaction and experience will be a sound next step. Given the pivotal role of conflict in inquisitive use, it will also be interesting to examine how studies of narrativity may inform the framework. On a more concrete level, it will be interesting to employ the design sensitivities more pro-actively in early stages of design processes and examine if they translate into specific recommendations and guidelines in particular design domains.

#### 5. Acknowledgements

Many thanks to Louise Aagaard, Maiken Fogtmann, and Jacob Kreutzfeldt for a great time working on Silence and Whispers, and to Maria Hellström and Ilpo Koskinen for framing and giving valuable feedback on the design experiment.

Also many thanks to my colleagues at CAVI who took part in the creation of Balder's Funeral Pyre, and especially to Professor Kim Halskov with whom I have previously written about the project. Balder's Funeral Pyre is part of a project funded by It-korridoren (j.nr. 63499).

## 6. REFERENCES

- [1] Alben, L. 2004. *Quality of Experience: Defining the Criteria for Effective Interaction Design*. Interactions 3.3 May+June 1996, 11 Computing, 2004.
- [2] Bertelsen, O.W. and Pold, S. *Criticism as an approach to interface aesthetics*. Proceedings NordiCHI 2004, pp. 23–32.
- [3] Brinkmann, S. (2006). *John Dewey*. Hans Reitzels Forlag.
- [4] Card, S.K.; Thomas, T.P. & Newell, A. 1983. *The Psychology of Human-Computer Interaction*. London: Lawrence Erlbaum Associates.
- [5] Ciolfi, L. 2004. *Situating "Place" in Interaction Design: Enhancing the User Experience in Interactive Environments*. Dept. of Computer Science and Information Systems, University of Limerick, Ireland.
- [6] Csikszentmihalyi, Mihaly 1990. *Flow: The Psychology of Optimal Experience*. New York: Harper and Row.
- [7] Dalsgaard, P. 2007: *Designing for inquisitive users: A pragmatist perspective on users in experience-oriented interaction design*. Proceedings of Nordes 2007, Stockholm, Sweden.
- [8] Dalsgaard, P. & Halskov, K. 2006. *Real Life Experiences with Experience Design*. NordiCHI 2006, Oslo, Norway.
- [9] Davis, M. 2003, *Theoretical Foundations for Experiential Systems Design*. ETP'03, Berkeley, California.
- [10] Dewey, J. 1882-1953. *The Collected Works of John Dewey* (Ed Boydston, J. A) Southern Illinois University Press.
- [11] Dewey, J. 1910. *How We Think*. Dover Publications, Mineola, NY.
- [12] Dewey, J. 1922. *Morals are human*. In *Human Nature and Conduct: An Introduction to Social Psychology*. New York: Modern Library: 295-302.
- [13] Dewey, J. 1925. *Experience and Nature*. Open Court Publishing.
- [14] Dewey, J., 1934. *Art as Experience*. Perigee Books.
- [15] Dewey, J., 1938, *Experience and Education*. Simon & Schuster, New York
- [16] Dewey, J. 1938. *Logic: The Theory of Inquiry*. Holt, Rinehart and Winston, New York.
- [17] Desmet, P.M.A., & Hekkert, P. 2007. *Framework of product experience*. International Journal of Design, 1(1), 13-23.
- [18] Dunne, A. & Raby, F. 2001. *Design Noir: The Secret Life of Electronic Objects*. Berkhauser, Berlin, Germany.
- [19] Dunne, A. 1999. *Hertzian tales*. Royal College of Art Computer Related Design Research, London.
- [20] Field, Richard (no date available) *John Dewey*. Internet Encyclopedia of Philosophy: <http://www.iep.utm.edu/d/dewey.htm>
- [21] Forlizzi, J. & Battarbee, K. 2004. *Understanding Experience in Interactive Systems*. Proceedings DIS 2004, ACM 261-268.
- [22] Forlizzi, J. & Ford, S. 2000. *The Building Blocks of Experience: An Early Framework for Interaction Designers*. In Proceedings DIS 2000, ACM 419-423.
- [23] Gedenryd, H. 1998. *How Designers Work – Making Sense of Authentic Cognitive Activities*. PhD Dissertation, University of Lund, Sweden.
- [24] Geirland, J. 1996. *Go With The Flow*. Wired magazine, September, Issue 4.09.
- [25] Graffiti Research Lab 2006: *Laser Tag*. Documented on [http://graffitiresearchlab.com/?page\\_id=76](http://graffitiresearchlab.com/?page_id=76).
- [26] Hallnäs, L. and Redström, J. 2002. *From use to presence. On the expressions and aesthetics of everyday computational things*. In ACM Transactions on Computer-Human Interaction 9(2) (2002) 106–124.
- [27] Hornecker, E. *A Design Theme for Tangible Interaction: Embodied Facilitation*. ECSCW'05, Paris, France, Springer
- [28] Hummels, C., Ross, P. & Overbeeke, K. 2003. *In Search of Resonant Human Computer Interaction: Building and Testing Aesthetic Installations*. Rauterberg, M. et al (eds) Interact'03.
- [29] Ishii, H. and Ullmer, B. 1997. *Tangible bits: towards seamless interfaces between people, bits and atoms*. In Proceedings CHI 1997.
- [30] Jordan, P.W. 2000. *Designing Pleasurable Products: An Introduction to the New Human Factors*. Taylor and Francis, London, England.
- [31] Landin, H. 2005. *Fragile and magical: materiality of computational technology as design material*. Critical Computing 2005, Aarhus, Denmark.
- [32] McCarthy, J. Wright, P. 2004. *Technology as Experience*. MIT Press.
- [33] McCarthy, J., Wright, P.C. Wallace, J., and Dearden, A. 2005. *The experience of enchantment in human-computer interaction*. Personal and Ubiquitous Computing. Vol 10.6 pp. 369-378.
- [34] Madsen, K. H. & Dalsgaard, P. 2006. *Inspiration Card Workshops*. Proceedings DIS 2006.
- [35] Miller, G. A. 1956. *The magical number seven, plus or minus two: Some limits on our capacity for processing information*. Psychological Review 63, pp.81–97.
- [36] Norman, D. 2004. *Emotional design: why we love (or hate) everyday things*. Basic Books, New York, NY.
- [37] Petersen, M.G., Iversen, O.S., Krogh, P. and Ludvigsen, M. 2004. *Aesthetic interaction*. Proceedings DIS 2004, pp. 269-276.
- [38] Rogers, Y. 2006. *Moving on from Weiser's Vision of Calm Computing: Engaging UbiComp Experiences*. In Dourish, P. & Friday, A. (eds.) Proceedings Ubicomp 2006.
- [39] Schachter, J. 2003. *Del.icio.us*, <http://del.icio.us>
- [40] Schön D. 1983. *The Reflective Practitioner*. MIT Press, Cambridge, MA.
- [41] Shedroff, N. 2002. *Experience Design*. New Riders Publishing.
- [42] Shusterman, R. 1992. *Pragmatist Aesthetics*. Living Beauty, Rethinking Art. Blackwell.

