The autotelic experience:
A design approach to user experience (UX)

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Résumé

Si les principes d'utilisabilité guident la conception de solutions de design interactif pour s'assurer que celles-ci soient « utilisables », quels principes guident la conception d'objets interactifs pour s'assurer que l'expérience subjective de l'usager (UX) soit adéquate et mémorable? Que manque-t-il au cadre de l'UX pour expliquer, comprendre, et anticiper en tant que designer une expérience mémorable ('*an experience*'; Dewey, 1934)? La question centrale est issue d'une double problématique : (1) le cadre théorique de l'UX est incomplet, et (2) les processus et capacités des designers ne sont pas considérés et utilisés à leur pleine capacité en conception UX.

Pour répondre à cette question, nous proposons de compléter les modèles de l'UX avec la notion d'expérience autotélique qui appartient principalement à deux cadres théoriques ayant bien cerné l'expérience subjective, soit l'expérience optimale (ou Flow) de Csikszentmihalyi (1988) et l'expérience esthétique selon Schaeffer (2001). L'autotélie est une dimension interne du Flow alors qu'elle couvre toute l'expérience esthétique. L'autotélie est une expérience d'éveil au moment même de l'interaction. Cette prise de conscience est accompagnée d'une imperceptible tension de vouloir faire durer ce moment pour faire durer le plaisir qu'il génère.

Trois études exploratoires ont été faites, s'appuyant sur une analyse faite à partir d'un cadre théorique en trois parties : le Flow, les signes d'activité non verbale (les gestes physiques) et verbale (le discours) ont été évalués pour voir comment ceux-ci s'associent.

Nos résultats tendent à prouver que les processus spatiaux jouent un rôle de premier plan dans l'expérience autotélique et par conséquent dans une UX optimale. De plus, ils suggèrent que les expériences pragmatique et autotélique sont ancrées dans un seul et même contenu, et que leur différence tient au type d'attention que le participant porte sur l'interaction, l'attention ordinaire ou de type autotélique.

Ces résultats nous ont menés à proposer un modèle pour la conception UX. L'élément nouveau, resté jusqu'alors inaperçu, consiste à s'assurer que l'interface (au sens large) appelle une attitude réceptive à l'inattendu, pour qu'une information puisse déclencher les processus spatiaux, offrant une opportunité de passer de l'attention

ordinaire à l'attention autotélique. Le nouveau modèle ouvre la porte à une meilleure valorisation des habiletés et processus du designer au sein de l'équipe multidisciplinaire en conception UX.

Mots-clés : Expérience usager (UX), expérience autotélique, Flow, expérience esthétique, processus visuospatiaux, processus de design.

Summary

If usability guides the formal organisation of interactive systems as it pertains to being usable, useful and efficient, what principle(s) guide(s) the formal organisation of interactive systems when it comes to give form to the subjective dimension of the user experience? This question came from two perceived gaps in our understanding of UX: (1) the UX theoretical framework appears incomplete to this day. Going beyond *experiencing*, what is at play during *an experience*? (2) The process and abilities of designers are not considered and underused in the current theoretical and practical UX framework.

We propose that the autotelic experience could bridge these gaps and be the UX counterpart to usability. The autotelic experience is an internal dimension at the heart of the optimal experience—Flow—(Csikszentmihalyi, 1975) and covering the whole of the aesthetic experience (Schaeffer, 2000). The autotelic experience is a shift in awareness occurring during the interaction. This awareness is accompanied by an imperceptible tension of wanting to make this moment last in order to continue enjoying the pleasure it generates (a circular motivation to stay in the interaction for the sake of the interaction itself) (Schaeffer, 2000). Our results suggest the key to the autotelic experience sits with visuospatial reasoning or more specifically to right hemisphere (RH) activation.

Three exploratory studies were conducted, using a three-part theoretical framework where Flow, signs of nonverbal / spatial activity (physical gestures) and of verbal activity (discourse) were assessed for their various associations.

The main contribution of this research is a model of autotelic experience made of three interlocking elements (high positive pressure, low mental demand and an openness to unexpected events) contextualised by either an active or a receptive engagement on the part of the user. One of the findings is that the pragmatic experience and the autotelic experience (which we have associated to Dewey's *an experience*, 1934), are based on one and the same content, the only difference is the shift in attention on the participant's part.

All the elements of the model are known, but one, to design the experience in a way to keep the user open to the unexpected. This one element supports the occurrence of the shift from ordinary to autotelic attention. The new model opens the door to a better appreciation of designers' skills and processes within multidisciplinary team in UX design.

Keywords: User experience (UX), autotelic experience, Flow, aesthetic experience, visuospatial processes, design process.

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Introduction

> *A carpenter friend and his team once had to work on the roof structure of a 1740s patrimonial building, the Jesuit Mill, near Québec City. For this restoration job, special wood scissors from Japan had been purchased to match the original tools. They had to redo mammoth-size joists and beams (over half a meter diameter and up to 10 meters long) held together through mortise & tenon joints. The wood scissors were as large as 20-25 cm wide with a meter long handle. "We had to work with these scissors... it was amazing; shaving the wood was so precise and easy, every time we'd go like this (he mimed the whole body motion of pushing on a large wood scissor)…long, curled shavings of pinewood would come up. It smelled good; it smelled of wood. We had to pay attention not to overdo it, the shaving motion was so attractive, it was easy to take too much off. There was a guy on the team whose only job was to keep all the scissors razor-shape, so everything worked incredibly well. It was great. Actually, instead of the usual banter, chatter and radio murmurs, we just worked in silence. All of us, the old hands to the new guys, just loved this job".*
> (Rondeau, personal communication, 26 April 2013)

This example illustrates that good user experiences have happen for a long time, the world over. Wood-scissors were designed over centuries of trial and error development and craftsmanship to deliver best performance and efficiency when handled by average size men, while the overall context of use was considered only to make adjustments to the tool. If the space of the workbench, the light, the weight of the tools, the strength it took to work with them were considered in terms of performance and efficiency, they were unlikely to be considered in terms of subjective emotional experience, yet they probably had an unaccounted UX impact, and so may have had the weather, a visit from a neighbour or the noise of the town in the distance; real-life materiality would complete the overall experience often more or less of its own accord. With interactive system (e.g. smart phones, home automation systems, Wii handles, CAD systems or money machines), we do not have the luxury of centuries of experimentations, nor of letting the material context take care of itself. The overall experience needs to consciously be conceived and constructed from scratch, or better, reinvented; consequently we need to understand the user experience in all its details.

A design approach

One impetus for this research came from observing designers on large multidisciplinary teams developing interactive systems, and realising that UX as applied at that time, did not fully integrate their expertise. In these large design teams, knowledge was anchored in applied-science methods, which are different from design methods. But there was more. One particular design ability could have been put to good use in the UX design process, namely the designer's empathy, but was not for lack of scientific recognition. The creative designers' arts and praxis background, and fairly recent research tradition leaves them at a loss of defending the breath of their professional expertise in the face of the applied-science approach to design.

This doctoral thesis looks into UX knowledge and practice from the point of view of UX designers, considering the logic, expertise and creative processes of the creative design tradition. The audience for this research is both design researchers and practitioners. Although it mostly speaks to design researchers, its goal is to address design practice. Researchers will find propositions completing what is known about UX as well as methodology used in the different studies (particularly the use of Relative Deviation, a descriptive statistical method adding more precision to qualitative non-generalisable analyses). Design educators and practitioners will find a new approach to UX affording a larger place to design expertise (section 9.3).

Key design processes and practice

Before engaging in the core issues of this thesis, we will briefly state key characteristics of creative design, since they are the lens through which we looked at UX theory and practice.

Designers are trained to tackle a number of *activities that can be both rational and intuitive, abstract and concrete, analytical and creative* (Dorst, 1997, p.7), yet one of their unique expertises is the mastery of the nonverbal codes of material culture, i.e. they are equipped to read, write and translate complex experiences in the nonverbal language of materiality. We include in the notion of materiality all that addresses the five senses, and

the sense of equilibrium as well as the sense of time (rhythm, pacing, and developing over time) and the sense of space (place, positioning, mapping or developing in space); materiality is not restricted to objects, but includes systems, services and events, real or virtual. Materiality is by no means the central focus of the design practice (see Findeli and Bousbaci, 2005); it is simply the language through which designers actualise their logic and creative process. And it is a nonverbal language.

The second point we want to stress is that we recognize, along with Dorst, Cross (2001) and others, that the creative design process is one of co-evolution, developing and defining the problem-space and solution-space in tandem, adjusting both ends of the design process until a clear and satisfactory pairing comes forth. This is a departure from the problem solving approach described by Simon (1996; 1969) as *"the search for a solution through a vast maze of possibilities (within the problem space)… successful problem solving involves searching the maze selectively and reducing it to manageable solutions"*. This approach has been developed in domains where problem solving involves mainly through deductive and inductive reasoning (such being the case in applied-science design practice), making a strong case for abductive reasoning as the logic of creative design (Dorst, 2011). Furthermore, responding to Simon's "manageable solution", Rittel and Webber (1973) established that ill-defined, or "wicked" problems prompt creative design projects on, and call for unique, innovative solutions (Cross, 2007).

The state of the art

After reviewing a number of UX definitions and four models and frameworks—Hassenzahl's hedonic - pragmatic model (2003), the four threads of experience by McCarthy and Wright (2004), Norman's visceral, behavioural and reflective emotions (2004) and Desmet and Hekkert's framework of product emotions (2007)—we formulated a critical analysis in seven points that can be summarized as follows: (1) The UX definitions give a fragmented view of UX, which suggests information about UX is still missing. (2) UX theory can explain how to conceive interfaces offering users the chance "to experience" something (Dewey's *experiencing*), but not provide users with

what Dewey calls "*an experience*", a unique, memorable experience. (3) Having no clear benchmark for an ideal experience, UX is difficult to assess. (4) Usability is used as the formal principle guiding UX, however usability is dedicated to principles that have proved to limit UX, but practitioners say it works; this made us suspect that there might be formal principles at play that have gone undetected so far. (5) Hedonic motivation is extrinsic and does not account for surprise encounter or for intrinsically motivated experiences; well then, what does? (6) Centering UX solely on emotions, increases reliance on user testing, which in turn empedes on the designer's creative process. (7) Desmet and Hekkert's model of product emotions does not explain how sensory information is processed before it is interpreted as sense making or aesthetic experiences. This leaves out information that could guide designers in crafting the nonverbal aspects of interfaces.

Research questions and hypotheses

The critical literature review was synthesised to two gaps: one concerns the current knowledge about UX, the other the place and contribution of designers to UX: (1) UX knowledge is still incomplete; it does not account for *an experience*, does not provide a benchmark experience, it is rather loose fitting when it comes to explaining the intrinsic motivation. (2) As it stands, UX knowledge falls short of being compatible with the creative process of designers, because of strong reliance on emotions and user testing; the role and contribution of designers to UX is thus being underused and under appreciated. Furthermore, usability is (still) seen as the formal principal guiding UX like it does for extrinsic-goal oriented interactions; which brings us back to the first point: there must be something missing in our knowledge of UX.

These led to a central research question supported by two hypotheses that will hopefully answer most if not all of the concerns raised in the critical analysis. Our research question is:

If usability guides the formal organisation of interactive systems as it pertains to being usable, useful and efficient, what principle(s) guide(s) the formal organisation of

interactive systems when it comes to give form to the subjective dimension of the user experience?

To be able to identify this or these formal principles, we need a user experience that achieves more than being experienced, we need a benchmark experience: Dewey's *an experience*.

Our **first hypothesis** is that the autotelic experience could provide a model for *an experience*. One of the characteristics of the autotelic experience is that it occurs only during the interaction. Schaeffer (2000), discussing it in the context of the aesthetic experience, describes it as a state of heighten awareness or enhanced sensory attention, well beyond ordinary attention. It is induced and sustained by the autotelic attention. The shift from ordinary to autotelic attention is accompanied by the imperceptible tension of wanting to prolong the moment of awareness, to prolong the pleasure it generates, creating the autotelic loop (Schaeffer, 2000). Csikszentmihalyi (1988) refers to the autotelic experience as the heart of the optimal experience or Flow, as it sets off Flow. But it lasts only as long as the interaction, whereas the Flow state can linger on long after. The two descriptions stray from one another in one specific point: for Schaeffer (2000) the precondition for the autotelic experience is a receptive engagement, whereas Csikszentmihalyi (1988) insists that Flow only occurs when "doing something", when actively engaged.

The **second hypothesis** responds to a gap in UX theory, namely how information is received, the cognitive channels are mentioned but not fully searched. Our hypothesis is that the verbal and spatial processes, through which we receive information before making an emotional appraisal, play a more important role in the user's experience than had been previously suggested.

Three studies

Each study is built around real-life autotelic experiences. We proceeded with an exploratory research plan, building from one study to the next. The three studies went as

follows: first, the experience of sitting on an office chair reknown for its ergonomics and style; its goals were to see if the autotelic experience would lend itself to being observed, and what could be learned about it. The second study, which is case study, looks at the experience of visiting an art museum, typically a receptive engagement, in reference to Schaeffer's requirement for the autotelic experience. The third, also a case study investigated the experience of co-designing with two different design tools; it was an active engagement as per Csikszentmihalyi's Flow. The last two studies emphasized respective autotelic frameworks but were analysed with both. We wanted to see how the two frameworks coicided.

We did detailed investigations of each of the three specific experiences, and as case studies go, each was studied through multiple methods. We used theoretical samplings to enable to explain this phenomenon; the general goal was to understand the particulars of the different autotelic experiences we observed. Working from the ground up, we deduced patterns from the data. After the first study, a three-point assessment framework was arrived at and used for the two subsequent studies: Assessment of the psychological experience through the Flow framework (Csikszentmihalyi, 1988; Massimini and Carli, 1988), assessment of nonverbal modalities (physical gestures) and of verbal modalities (discourse) used by participants (Wickens, 2002; Boles, 2010; Tversky, 2005a; Bowden and Jung-Beeman, 2003). In each study, other frameworks were also used to assess the context forstering these experiences.

Contributions

The autotelic experiences encountered in the three studies yielded a number of findings that add up to two main contributions.

One of the most respected UX model remains Hassenzahl's pragmatic/hedonic model (2004), which defines the two segments of the model according to different motivations: the pragmatic responding to what he calls "do goals", and the hedonic, to "be goals". This suggests that different contents will support different goals. Yet, we found that the autotelic experience stemmed from the exact same content as the task-

related, extrinsically motivated experience. The difference between the task-related and the autotelic experiences is a shift in attention on the part of the user, from goal-oriented, extrinsic (pragmatic) to the autotelic attention; and the pleasure comes from the autotelic attention, and not from alternative contents. In other words, the autotelic experience did not stand side by side with the task-related; it appears to have act as a magnifying factor, 'multiplying' the initial experience once it kicks in. This multiplication of the pragmatic pleasure (e.g. the satisfaction of overcoming a task-related challenge) appears to have occurred through this fresh and heightened attention on the current interaction. In this perspective, the pragmatic and the autotelic find themselves on a continuum, where the autotelic awareness of the current situation takes the experience one octave higher, but still in the same axis.

What appears to trigger the autotelic attention is *how* the content is delivered. And here, the spatial processes have been observed to be active during the autotelic experience, which gives us a clue that nonverbal communication plays a part in this experience.

The second contribution comes from modelling the autotelic experiences we have observed. A first model briefly describes different quality optimal experiences (1. task-related and extrinsic, 2. Autotelic, 3. Innovative).

A second model diagrams the parameters we have observed to be present in autotelic experiences. The some parameters are known: (1) the user's psychological state, as modulated by her/his background, values, perceived ability, stress level, etc; (2) the user's mental workload, as supported by usable interfaces. The third parameter is really what makes a difference between Dewey's '*experiencing*' and '*an experience*', between the current situation and being able to conceive of memorable experiences knowingly: that the user be, even at a low level, in an expectant attitude; that he be open to unpredictable or novel reading of the situation. This openness keeps the spatial processes on idle and ready to jump in, if called for. And one of the ways to keep the spatial reasoning active is to communicate through the nonverbal codes of materiality, which is the designer's expertise.

In short, if we devise of an interface inducing an interaction that engages the user's background and ability at a high enough level, and that this interface provides a low mental workload while keeping the user open to unexpected reading, then in moments of receptive engagement, the user may get an autotelic experience. As designers, what we should aim at is to bring people on the brink of the autotelic shift, from ordinary to autotelic attention.

Since giving form to objects, environments and interfaces of all kinds is part of the central expertise of designers, this new approach to UX could improve their standing in multidisciplinary teams.

Furthermore, the autotelic experience could be taught as part of the designer's basic training; this psychological knowledge could be transferred or translated into a design skill. In order to teach students how to design autotelic experiences, they would have to learn about this experience in its scientific format, (UX models, psychological studies, etc) and, most importantly, in a 'projectable' format, so that designers can integrate this knowledge into their intuitive ways of designing. Both of these formats (the theoretical and the 'projectable') could be taught through studio courses. The translation of the theory behind the autotelic experience into projective design knowledge will rest on two types of learning experiences: (1) Experiencing it for themselves and (2) applying it through personalised analogies.

Part I: The state of the art

Chapter 1: About design

Before reviewing the issues with UX knowledge and UX design in more details, chapter 1 presents design practice through chosen defining elements: Under the act of designing, we mention the projective nature of design and other markers of the search for an epistemology of design, its logic: abductive reasoning to tackle ill-defined problems, with the ensuing creative process of co-evolution. Then we present characteristics of design practice: the importance of innovation, its relationship to materiality, the designer's understated ability of empathy, the use of 'specs' (specifications) in design projects versus acquired skills, and the designer's trained 'intuition'.

Design, as a professional practice, is claimed by two traditions: one is engineering-based taking after applied-sciences; the other is creative with roots to the Bauhaus and the fine arts tradition (Findeli and Bousbaci, 2005). Although they appear to share a common practice, their divergent backgrounds often puts their processes at odds with one another since they frequently come in contact in the course of their work (Cross, 2011). This research addresses design as a creative activity, and unless specified, the words design, designers and *designerly* (Cross, 2001) in these pages refer to the creative design tradition. Furthermore, when we refer to design solutions or design interface, we refer to all possible forms, be they product, service or system. Before going any further, we will briefly state key characteristics of creative design, since they are the lens through which we looked at UX theory and practice. We will present the characteristics of design relevant to this research.

Arching back to the beginnings of architecture, design was long a *practice*, in the sense of praxis, before it became a research discipline (Findeli and Bousbaci, 2005). Since the 1950s, a growing body of knowledge about design and what design could bring to general knowledge has developed (e.g. Simon, 1969; 1996; Cross, 2007; Findeli, 1998; Dilnot, 1998). We subscribe to the view that unlike scientific disciplines that develop from scientific models (natural sciences model or humanities model), design knowledge

will have to find its own model (Dilnot, 1998; Cross, 2007) which needs to be anchored in its praxis (Findeli, 2006; 1998), since so much of its knowledge is actually tacit knowledge carried by its practitioners and teachers (Findeli, 2006).

So design is a practice and a young research discipline in the process of defining itself as something other than art, technology or applied-science, natural or human sciences (Schön, 1983; Cross, 2007). Adding to the difficulty of succinctly defining design, the word 'design' is used both as a noun, relating to the *objects* of design, to form and materiality (as in "this car has a great body design"), and as a verb, "to design", particularly in the Anglo-Saxon world (Findeli and Bousbaci, 2005), relating to the act of designing, of conceiving.

1.1 The act of designing

1.1.1 Design, projection and uncertainty: towards an epistemology of its own

Since the 1950s, a growing body of knowledge about design and about what design could bring to general knowledge has developed, largely anchored in design praxis (e.g. Simon, 1969; 1996; Cross, 2007; Findeli, 1998; Dilnot, 1998). Herbert Simon (1969; 1996) proposed a core competency that design brings to general knowledge: "*The natural sciences are concerned with how things are… Design, on the other hand, is concerned with how things ought to be*." And "*everyone designs who devises courses of action aimed at changing existing situations into preferred ones*." (Simon, 1969; 1996)

Dilnot (1998) states that science 'numbers', humanities 'narrate what is', while design, with its practice-bent, is orientated essentially to possibility; (…) *to think culture (…) in terms of world making rather than world-telling* (Dilnot, 1998). For Dilnot, design's operative questions are '*What if?, Is this perhaps possible?* or '*Why not this?*' instead of science's 'What is that?' Jonas (1996; 2007) talks about the projective nature of design, and sees projection as the distinctive element of design methodology: analysis – projection – synthesis.

1.1.2 Abduction: The logic of design

Deduction and induction are the traditional forms of logical reasoning. Roughly summarised, deduction applies a general rule to a specific case, induction drives a rule from a specific case. Abduction, introduced by Pierce (1998) at the end of the ninetieth century, deduces backwards from an expected resulted, or an aspired and valued outcome (Dorst, 2011) to determine what conditions (objects and scenario) might produce such aspired value. Whereas deduction and induction are forms of logic best applied at explaining how things work, as they (already) exists in the world (Dorst, 2011), abductive logic, with its allowance for insight and open "guesses" (Pierce, 1998) is best suited to create new things and phenomena. Dorst (2010; 2011) distinguishes two forms of abductive reasoning: one where the desired value and a single condition are known; the other where only the desired value is known. This latter form is seen as providing the most innovation potential. The single variable abductive reasoning, or "closed" problem solving, leaves less room to creatively interpret the needs of a desired solution (Dorst, 2010; 2011).

Innovative abductive reasoning can be associated to Rittel and Weber's ill-defined problem (1973), which is often recognized as an essential characteristic of creative design.

1.1.3 Ill-defined problems

Rittel and Webber (1973) pointed to a defining distinction between the applied-sciences and creative design traditions when they stated that creative design problems differ from applied-science problems in that they are "wicked", in the sense that they could not be resolved by a known procedure. They also stated that every solution to *a wicked problem is « a one shot operation » because there is no opportunity to learn by trial and error*; *every wicked problem is essentially unique* (Rittel and Webber, 1973, pp.163-164).

1.1.4 Co-evolution: design's creative process

We recognise the designer's creative process as defined by the co-evolution process. This process develops and defines problem-space and solution-space in tandem, adjusting both until a clear and satisfactory pairing comes forth (Maher et al., 1996; Dorst and Cross,

2001). This is different from any linear and progressive visions of the design process. More recently, Dorst (2010; 2011) has refined this model by explaining it through abductive reasoning (Pierce, 1998; Roozenburg and Eekels, 1995), recognizing abduction as the logic of design. The co-evolution process allows for Schön's reflection in action (1983) as designers move back and forth between the solution and problem spaces (Dorst, 2010; 2011).

1.2 Key characteristics of the creative design practice

We wish to draw attention on four particular aspects of the design practice that will prove relevant to understand the results of this research. These aspects are: the central position of innovation in design; the important yet understated role of empathy in the design process; constraints and demands as embodied in the design brief versus the designer's acquired skills.

1.2.1 Innovation

Since design tackles ill-defined, unique problems, it makes sense that innovation be an important aspect of design (Archer, 1981 in Cross, 2001). Nigel Cross points out that design is more than fulfilment of the client's original design brief, *design is exploratory*.

> *The creative designer interprets the design brief not as specifications for a solution, but as a kind of partial map of unknown territory (as Jones, 1981, suggested), and the designer sets off to explore, to discover something new (…)* (Cross 1999).

Furthermore, sometimes the co-evolution process brings a radically innovative solution engendering a paradigm shift ("innovation de rupture"). Such was the case with the iPhone, Nespresso, Crocs, Google, Swatch and more (Sarrazin, 2012).

1.2.2 The designer's expertise in the nonverbal codes of material culture

From surveying design literature from Vitruvius and Alberti to today, Findeli and Bousbaci (2005) found most of it to be pedagogical or didactic; the early texts right up to

the first Bauhaus (early 1920s) focused on objects and object making. Simon (1969; 1996) famously associated design to the artificial; Dilnot (1998) to the artefactual; Findeli talks about the centrality and subsequent eclipse of the object in the design discourse over time (Findeli and Bousbaci, 2005). We prefer Archer's (1981) and Cross' (2007) pointed description of the designer's expertise in appreciating the *nonverbal codes of material culture,* that positions the designer's relationship to materiality as a linguistic expertise and not as a central purpose. Designers are trained to tackle a number of *activities that can be both rational and intuitive, abstract and concrete, analytical and creative* (Dorst, 1997, p.7), yet one of their unique expertises is the mastery of the nonverbal codes of material culture (Cross, 2007), i.e. they can read, write and translate complex experiences in the nonverbal language of materiality.

In a context of experience design, the designer's relationship to materiality is not the central focus, but it remains its primary or elemental language; *designers are immersed in this material culture, and draw upon it as the primary source of their thinking. Designers have the ability both to 'read 'and 'write' in this culture* (Cross, 2007, p.26). It is a means to an end. The concept of materiality is flexible enough to insert itself in the dialogue that is the creative design process and it is by no means the only expertise designers wield. The notion of materiality addresses the five senses as well as the sense of time (rhythm, pacing, and developing over time) and the sense of space (place, positioning, mapping or developing in space) in the real or virtual world.

1.2.3 Empathy

The literature on design empathy leans two ways: There is a strong current of empathy-design that has come up in HCI. HCI researchers (e.g. Suri, 2001; Mattelmäki and Battarbee, 2002; Wright and McCarthy, 2008; 2010) support an empathic approach to ease the transition from functional experiences to personal and private experiences; to this end, Mattelmäki and Battarbee suggest practicing "empathy probes" (2002). This kind of empathy is proposed as a key to understanding the user experience in the initial phase of problem definition. This technique builds up knowledge of, and compassion for the users ahead of the ideation process.

Empathy is also considered a designer's ability. Designers are trained to consider the needs and desires of the users from an external-observer's perspective, putting themselves in the user's shoe during the design process, through empathy (Zimmerman, Forlizzi, Evenson 2007; see also Cross, 2007). This second type of empathy is associated to the design practice and the ability of the designer to "put oneself in the user's shoes". It is part of the tacit knowledge young designers pick up in the design studio. This designer's empathy is active in the design phase.

1.2.4 'Specs' versus the designer's tool box

Before launching into the design phase of a project, a design brief with a list of "specs" (specifications) is established. These are the specific requirements that must be met by the design solution. For example, some specs may concern functionalities or the visual identity, the technical requirement for infrastructure, and so on. Specs are unique to each project. The "specs" are obviously different from the designer's acquired skills, but they share the fact that they both shape the project's outcome. The designer's skills, acquired through practice, are part of their "tool box".

In the process of seeking to legitimise itself as a scholarly discipline and in order to be better suited to face the complexity of the design project, design has integrate knowledge from a variety of scientific disciplines. The issue here is that the difference in disciplinary culture has landed most of the new knowledge in the spec lists (along with the client's requirements) and not in the designer's intuitive toolbox. This is a subtle shift, for which we have found no reference in scholarly papers, but it has had an impact on the design curriculum: the complexity of interactive projects has warranted teaching design students the science of systemic and basic project management in order to make sure every requirement is addressed.

1.2.5 Trained 'intuition'

The last element we wish to draw attention to is the designer's educated abilities. We wish to talk about the fact that a lot of knowledge is transferred during the designer's education through studio classes, where tacit learning is passed on from experts

(professors and professionals) to novice, repeated and expanded often enough that their use becomes 'second nature', 'intuitive'. And over the course of this training, the young designer will also develop her/his sensibility. This is the standard path leading to design practice (Goldschmidt, Hochman and Dafni, 2010; Kvan, 2001). Their training is so ingrained that often, when asked to justify a design decision, practitioners will brush it off on intuition (Kolko, 2010).

Since so much of the material available to design research comes from the practice where intuition is often invoked colloquially or scientifically, we feel it is important to understand what is involved in intuitive thinking. The problem with intuition, as Kahneman (2003) relates, is the fact that intuition has been equally proven to result from high skill than poor reasoning.

> *In the examples discussed so far, intuition was associated with poor performance, but intuitive thinking can also be powerful and accurate. High skill is acquired by prolonged practice, and the performance of skills is rapid and effortless. The proverbial master chess player who walks past a game and declares "white mates in three" without slowing is performing intuitively (…), as is the experienced nurse who detects subtle signs of impending heart failure (…). The distinction between intuition and reasoning has recently been a topic of considerable interest to psychologists (…). There is substantial agreement on the characteristics that distinguish the two types of cognitive processes, (…)[intuition is] fast, automatic, effortless, associative, and often emotionally charged; they are also governed by habit, and are therefore difficult to control or modify. The operations of [reasoning] are slower, serial, effortful, and deliberately controlled; they are also relatively flexible and potentially rule-governed.*

	Perception ***Intuition***	***Reasoning***
Process	*Fast*	*Slow*
	Parallel	*Serial*
	Automatic	*Control*
	Effortless	*Effortful*
	Associative	*Rule-governed*
	Slow-learning	*Flexible*
	Emotional	*Neutral*

Kahneman, 2003, p.1451

(Kahneman, 2003, p.1450-51)

1.3 Summary

The elements of design mentioned in this chapter draw a picture of the design practice, starting with abductive reasoning as the logic of design (Dorst, 2011). Abductive inferences make possible the act of projecting into a possible solution (Dilnot, 1998), which is the heart of designing (Jonas 1996), innovating in the face of unique problems (Rittel and Webber, 1973); innovation may sometimes be so radical as to create a paradigm shift for a particular product (Sarrazin, 2012). The designer's abilities are engaged holistically in the projective act of design. Designers are trained to fluently express the nonverbal codes of materiality (Cross, 2007), as they are to put themselves in the user's shoes, exercising designer's empathy (Zimmerman, Forlizzi, Evenson, 2007). Once they have mastered the required abilities of their specific practice, designers use these abilities fast, automatically, effortlessly, and with personally charged sensibility (Kahneman, 2003). This leaves mental resources to put on the project's specific requirements (specs), which need the kind of conscious, laborious attention that reasoning provides (Kahneman, 2003), as they proceed through the co-evolution of the problem and solution spaces (Dorst and Cross, 2001).

Chapter 2: Usability and User Experience

Chapter 2 presents a review of the historical context that gave rise to the notion of user experience (UX), the concept of usability and the limits of usability. Then, it reviews the state of UX knowledge looking for either definitions or frameworks explaining what users experience. First, we review a number of well-cited UX definitions; we then review two frameworks of product emotion and two UX models, the hedonic /pragmatic model, felt-life and the four threads of experience. The critical review reveals seven gaps in UX knowledge. The chapter ends with our articulation of two core problems and our central research question.

To understand the issues with UX research and practice, it is useful to review the short history behind UX. In this chapter, we will go over the inception of the principle of usability up to the time when the HCI community agreed usability had reached its limit to insure a fulfilling overall experience. This review does not cover all of HCI history neither does it dive into ergonomic principles taxonomy nor in design guidelines, seeking instead the most fundamental understanding of what is experienced by people in UX definitions and frameworks (i.e. how do these define the "experience" in UX).

2.1 Brief review of user concerns and usability

2.1.1 Users' accessibility to personal computers (PC)

The relationship between users and computers evolved in phases, from accessibility, to usability and to the integration of emotions. From the end of the Second World War up to the mid-70s, as the computer was being developed, the challenge was to give the scientific users access to the computational power of this new machine. The need to develop computer interface adapted to the abilities of the general public emerged in the late 70s with the advent of microprocessors and the PC. The initial considerations concerning human factors were about software psychology (Schneiderman, 1980). At that time, at the IBM labs, Lewis and Reiman (1993) were seeking principles correlating the

interface with the task (task-centred user interfaces). This was while computer scientists from the Xerox P.A.R.C. were developing the graphical user interfaces (GUI) with its desktop metaphor and two click mouse (Smith, 1982; 1985), and Apple Computers produced the Lisa (1983) and the Macintosh (1984) with their innovative desktop interface (Williams, 1983; 1984 *as cited in* Myers, 1996). At that time, Norman (1983a; 1983b) was looking for a general design principle for human-machine interfaces. "*If the field of Human Factors in Computer Systems is to be a success it must develop design principles that are useful, principles that apply across a wide range of technologies*" (Ibid., p.1). These early studies weighted the worth of menus versus coded commands, size of displays versus response time, considering the benefice of clearer instruction (heavier interface) against slower processing. At IBM labs, Gould and Lewis (1985) focused on the "cognitive, behavioural, anthropometric as well as attitudinal" characteristics of the user. They recommended three design principles, early focus on users and tasks, empirical assessments and iterative design. The mid-eighties were a time of rapid evolution of the comprehension of the user's needs; these studies led to and crystallized around the concept of usability (Gould and Lewis 1985; Norman, 1988).

2.1.2 Usability

Nielsen (1993) defines usability through five variables: learnability (how easy is it for users to accomplish basic tasks the first time), efficiency (once learned, how quickly can users perform tasks), memorability (when users return to the design, how easily can they re-establish proficiency), errors (how many, how severe, and how easily can they recover from these errors), satisfaction (how pleasant is it to use the design). Usability is paired with *utility* (concerned with the pertinence of an interface) as the two components of the notion of *usefulness* (Davis, 1989), which supports interface adoption.

Within the umbrella of usability, the concept of affordance was developed (Schneiderman, 1982; 1998): *An affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used* (Norman, 1988, p.11). This implies that interfaces should support (encourage) direct manipulation as opposed to predefined by task procedure. It opens the door to higher

user engagement with the interface, where they can construct they environment instead of merely being guided through it.

In 1998, usability is elevated into an industrial standard by the ISO norm ISO 9241-11 (Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs)—Part 11: Guidance on Usability) and ISO-TR 16982: 2002 (Ergonomics of human-system interaction methods Usability-Supporting human-centred design). These ISO standards define usability as "*the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use*." The ISO standards refer to human- or User-Centred Design (UCD), which is a user-interface design process that focuses on usability goals, user characteristics, environment, tasks, and workflow. UCD follows a series of well-defined methods and techniques for analysis, design, and evaluation (WAI, 2004). It is strongly associated to usability as its methodology of choice.

2.1.2 Critique of usability

To this date, usability remains the dominant paradigm to understand the relationship between the individual and technology in interaction design. Usability holds to a vision of the interactive system as a tool, the human subject as a user, orchestrating a mechanics of goals and tasks. In the 90s, overzealous usability researchers have interpreted the principle of efficiency and performance as a deterministic rule to interface design. An extreme example would be Fitts' law (MacKenzie, 1992), a mathematical model, which dictated what should be the time required to move from one point to another by pointing with a finger or mouse, focusing on a limited variable over the general interaction.

Another kind of extreme interpretation of usability can be found in the practice with sets of rules claiming to deliver a common sense approach to usability; a personal favourite is Krug's (2005) *Don't Make Me Think, a* how-to guide to Website usability where the basic principles are turned into simple rules such as *don't make users think*, *design pages for scanning, not reading, users like mindless choices, write as little as possible*, and to top the list: *user testing, done simply enough, is the cure for all your site's ills*. Krug's book

exemplifies the kind of rigidity that the principles of usability acquired in the practice over time. It underscores the idea that the design of an interactive system should not engage users in any reflection, leaving the verbal content be the only source of information. The issue in turning a principle into a set of rules is the acquired rigidity, the loss of interpretative ability limiting the range of experiences that can be developed; Nielsen, considered a 'usability guru', has been critisied for such rigidity (Macdonald, 2001). Excesses aside, designers still turn to usability to regulate functional interactions (Law et al., 2009).

Beside the burden of design rules and the strong bias toward work-related efficiency that practitioners complained about (e.g. Macdonald, 2001), a significant critique raised against usability is that at best it produces well-orchestrated interactions, but it does not give clues as to how an interaction could be elevated to an outstanding experience (Robert, 2008; Robert and Lesage, 2011). *Usability is one of those things that are first understood in the negative. By that I mean, it is often easier to know when something isn't usable than when it is* (Heller, 2008). For decades, the HCI community acted as if it had equated system quality to the absence of problems (e.g., errors, user frustration). Robert (2008) and Schaffer (2009) make a parallel between this critique and the two-factor model of job satisfaction by the American psychologist Frederick Herzberg, sometimes called the Motivator-Hygiene model (Hackman and Oldham, 1976). Herzberg investigated the factors that were responsible for the satisfaction at work of employees from different organizations. He discovered that they could be classified in two categories: hygiene factors and motivators. Hygiene (which include working conditions, company policies, relations with peers and superiors) does not produce noteworthy satisfaction, but will cause dissatisfaction when not met. Motivators (which include achievement, recognition, work itself, responsibility, and advancement) encourage people's performance and satisfaction. Robert (2008) and Shaffer (2009) associate usability to a hygiene factor, leaving the question open as to what could act as a motivator. Motivators have the real power to create positive UX. And at this point, no principle has been identified as a UX 'motivator'.

2.1.3 Beyond usability

The mid-1990s saw the development of Internet with a significant wave of new technological systems that supported non work-related activities; usability having allowed all walks of users and uses to access the computer, the computer found its way into home and leisures. It thus became apparent that the strict application of usability principles was not enough to fashion interactions that offered complex and fulfilling experiences. Alben (1996) asked the question that was on many HCI practitioners' mind: *how does effective interaction design provide people with a successful and satisfying experience?*

When computers migrated from the office to the home and on to different interactive systems, our interactions with them diversified, our relationship to technology became more complex (McCarthy and Wright, 2004). This led the HCI community to broaden its focus from the prescriptive nature of usability to the larger user experience. The initial interpretation of usability principles kept a number of experiences out of reach, such as any ad hoc experimentation in our relationship with the interface, for instance looking around or experiencing discomfort, surprises, or stress (McCarthy and Wright, 2004). HCI researchers and practitioners readily accepted the notion of UX (Law, et al., 2007; Hassenzahl and Tractinsky, 2006) because they have become well aware of the limitations of the traditional usability framework (Shackel, 1990; Green and Jordan, 2002). By the end of the 90s, in reaction to the limits of usability and in search for fulfilling experiences, a large field of research had developed to better understand the subjective aspects of the user experience. Since usability stood for work-related performance, initial studies focused on leisure-related emotions, such as pleasure (Jordan, 2000), joy (Draper, 1999), enchantment (McCarthy, et al., 2006), fun (Monk and Frohlich, 1999; Blythe, et al., 2004), and play (Gaver and Martin, 2000). Several other studies have addressed the importance of beauty and aesthetic experience (e.g. Tractinsky, 2000; Hassenzahl, 2004; McCarthy and Wright, 2004). In time, these were assimilated to emotional response, and seen as the key to understanding the UX (Desmet and Hekkert, 2002; Norman, 2004).

2.2 Defining UX

In 2007, twenty-two HCI researchers met at a workshop to construct of a coherent UX manifesto, to establish fundamental principles and common reference model for future work on UX (Law, et al., 2007). Up to that point there had been no common consensus over a clear UX definition. UX seems to be one of those easily understood phenomena that are hard to clearly define because it involves so many variables. In lieu of a consensual definition, there were a number of frequently cited ones in chronological order:

> *All the aspects of how people use an interactive product: the way it feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves their purposes, and how well it fits into the entire context in which they are using it* (Alben 1996).

> *UX is the overall experience a user, customer, or audience member has with a product, service, or event. It encompasses function and flow, as well as the understanding compiled through all of the senses, over time, and on both physical and cognitive levels. The boundaries of an experience can be expansive and include the sensorial, the symbolic, the temporal, and the meaningful* (Shedroff, 2001).

> *Every aspect of the user's interaction with a product, service, or company that make up the user's perceptions of the whole* (UPA, 2006).

> *A consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.) the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.)* (Hassenzahl and Tractinsky, 2006).

> *"User experience" encompasses all aspects of the end-user's interaction with the company, its services, and its products. The first requirement for an exemplary user experience is to meet the exact needs of the customer, without fuss or bother. Next comes simplicity and elegance that produce products that are a joy to own, a joy to use. True user experience goes far beyond giving customers what they say they want, or providing checklist features. In order to achieve high-quality user experience in a company's offerings there must be a seamless merging of the services of multiple disciplines, including engineering, marketing, graphical and industrial design, and interface design* (Nielsen-Norman Group).

> *The value derived from interaction(s) [or anticipated interaction(s)] with a product or service and the supporting cast in the context of use (e.g., time, location, and user disposition)* (Sward and MacArthur, 2007).
>
> UX is *"a person's perceptions and responses that result from the use or anticipated use of a product, system or service"* (ISO 9241-210, 2010).

Echoing the definitions in this list, a survey of 275 UX researchers and practitioners by Law and colleagues (2007), only 27 of which were designers, tells us that they see UX as *dynamic, context-dependent, and subjective, stemming from a broad range of potential benefits users may derive from a product. (…) UX is seen as something new, which must be a part of the HCI domain and be grounded in UCD practices* (Law et al., 2009 p.722), in other words, on the principles of usability. Furthermore, the respondents associate UX, a person's internal state, to needs and motivation. Some respondents insist that the timeframe should cover the past, present, and future, from pre-sale perception to post-sale customer support. They also felt that UX should be investigated during and after use, even long after the interaction since the industry is typically interested in the long-term user experience.

These definitions give a portrait of UX as a field still transiting from a great reliance on usability to a new understanding of what exactly is the subjective dimension of the user experience, understood so far as reflective activity involving past experiences and current psychological states.

2.2.1 A fragmented view

Looking at these definitions, we note that authors from the same discipline produce similar definitions: Alben (1996) and Shedroff (2001) are both designers and designers-thinkers; they emphasize the sensory, perceptual dimension of UX. Being rooted in the design practice, they were among the first to initiate the turn toward UX. The usability experts, both researchers and practitioners (Nielsen-Norman Group, 2012; UPA—Usability Professionals' Association, 2006) focus on the wider business context, seeing UX as an extended version of usability ranging from personal pleasure to business interests. The ISO norm ISO 9241-210 (2010) and social scientists (Hassenzahl and

Tratinsky, 2006; Hekkert, 2006) define UX through the affects resulting from an interaction, stressing its multidimensional nature (Robert and Lesage, 2011).

If we choose to see these as complementary, the variety of viewpoints creates a kaleidoscopic view of UX making it difficult to evaluate if UX is well understood. Considering these definitions gives the impression of a practice with no unified vision of its object, but instead an additive approach leading something of a layered cake model. Here UX practice is a multidimensional phenomenon where different disciplines cater to different "layers": the designers to the sensory/perceptual; usability experts to the pragmatic/functional; and cognitive psychologists informing the team about the subtleties of internal states.

This hardly constitutes a coherent vision of what is UX. This additive view may be workable in practice, but on a theoretical level, it harbours some gaps. For instance, in a vision where the subjective dimension is conceived as an added layer after the functional (ruled by usability), its implies one of two things: either UX is a result of new content added to interfaces, content whose format obeys usability principles; *or* there is some aspects of the form of the interface that, unknown to current UX practitioners and researchers, accidentally triggers positive subjective experiences.

In short, the definitions are evidence that usability still holds a central position in the new field of UX. Different disciplines focus on different aspects of UX. These may guide the UX practice, turning it into a layered endeavour, but their collected views do not amount to a coherent whole; significant shortcomings are making the fragmented vision of UX untenable. This, to us, suggests that information about UX is still missing before a coherent understanding can be stated.

2.3 UX models and frameworks for product emotions

Going beyond definitions, some authors have developed functional models for UX, while others have looked closely at the mechanisms underlying emotions. Folizzi (2015) groups the various approaches in three general categories: product-centred, user-centred and

interaction-centred frameworks to which she adds a fourth development, the experience over-time. The product-centred frameworks (Alben, 1996; Jääsko and Mattelmäki, 2003; Forlizzi, 2007) focus on information in support of design practice (evaluation check-lists, lists of criteria) and as such they do not directly help define what constitutes UX as much as they guide designers in how to achieve it. Consequently these will not be reviewed here. They are of less interest to this review as they guide design practice.

The user-centred frameworks inform us on user behaviour, goals and motivations. In the following section we will review two of the most cited Norman's (2004) visceral, behavioural and reflective emotions and Desmet and Hekkert's (2007) framework of product emotions.

We will also review two widely referred UX models that belong in the interaction-centred frameworks: Hassenzahl's hedonic - pragmatic model (2003) and the four threads of experience by McCarthy and Wright (2004). Interaction-centred frameworks look at how products mediate between designers' intentions and users' experience. This category has attracted much research from many disciplines (Forlizzi and Ford, 2000; Battarbee, 2004; Overbeeke and Wensween, 2003; Hassenzahl, 2007). Subsequently, some of these authors have expanded their research in looking at how experience develops over time (Karapanos, Zimmerman, Forlizzi, and Martens, 2009; von Wilamowitz-Moellenborff, Hassenzahl and Platz, 2006). These have found that the positive experience is supported by different qualities in the initial and later phases of a prolonged experience. We do acknowledge these works but will abstain from reviewing them at this point since they focus of the experience triggers. Likewise, we acknowledge research done on persuasive technology (Fogg, 2002) and symbiosis (Brangier et al., 2010), which focus on the relationship between humans and technology. We are specifically interested in frameworks that define the human experience; the latter two are one step further, looking at the modulated relationship between humans and technology and as such are of less interest to us at this point.

2.3.1 The visceral, behavioural and reflective emotions

Norman (2004) provided the HCI community with a way to understand how emotions work. He grounds his three-tier model on the appraisal theory of emotions (Roseman and Smith, 2001; Desmet and Hekkert, 2002), mainly saying that emotions result from an evaluation. According to Norman (2004), users appraise products at three levels: visceral, behavioural, and reflective. *Visceral design refers primarily to that initial impact, to its appearance. Behavioural design is about look and feel—the total experience of using a product. And reflection is about one's thoughts afterwards, how it makes one feel, the image it portrays, the message it tells others about the owner's taste* (Norman, 2006) (Figure 1).

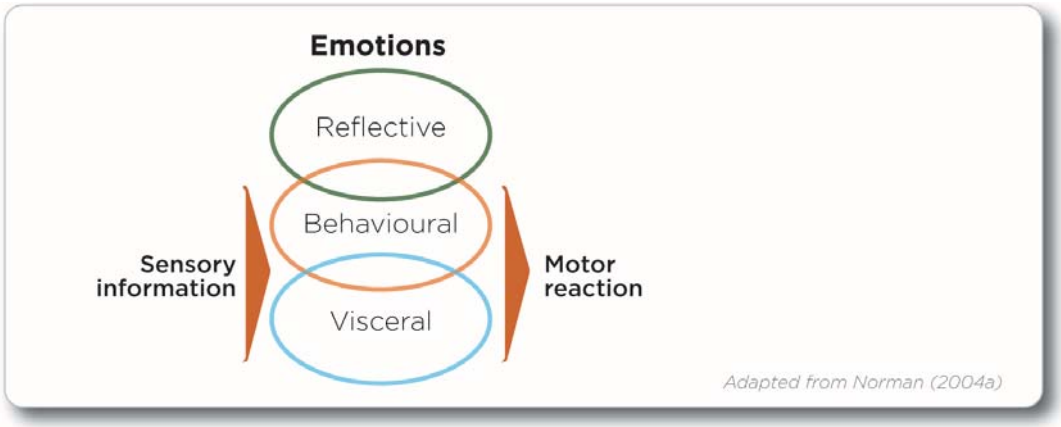

Figure 1. Diagram for Norman's 3-tier model of emotional appraisal

The visceral level comes from rapid judgments (such as good or bad, safe or dangerous) and sends signals to the motor system and to the brain. Norman considers it the start of affective processing. The behavioural level controls the user's actions, how he uses the product, fully exploits its functionalities, plays, shows it to friends and colleagues, upgrades it, etc. Norman appears to consider the time of the interaction as strictly behavioural. The reflective level watches over, reflects upon, aiming at influencing the behavioural level. Based on information coming from the other levels and on one's knowledge, experience, culture, and, or values, the reflections about the product will be positive, neutral, or negative. The reflective assessment may happen in action or after the

interaction, bringing different kinds of emotional responses. For instance, after a major effort, one might feel proud or shaken, or feel more competent (Figure 1). The reflective has some measure of control over the behavioural level, by watching over, reflecting upon and trying to influence the behaviour.

2.3.1.1 The challenge with relying on emotions

As is the case with the models and frameworks previously presented, the HCI community has identified the emotions as being at the crux of the subjective dimension of the user experience (e.g. Hassenzahl, 2010, p.3 "*it is beyond question that emotion is at the centre of experience*"). We found ourselves questioning the idea that emotions were central to the experience, since they result from an appraisal of the interaction. Couldn't they be considered a marker, or a sign that something has already happen? Holding emotions at the centre of the experience, and therefore at the centre of the UX design process, raises issues for designers because emotions result from an appraisal (Norman, 2004). Emotions are difficult to integrate to the design process because of the projective nature of the design activity. Specifically, to know if a design solution elicits a particular emotion requires user testing, which in turn demands that the design solution be prototyped (i.e. once a first design is been done). This retrospective testing strips the designers from their ability to work through projection and abductive inference, enforcing instead after-the-fact design decisions. Strong reliance on user testing shifts critical design-decisions to user-feedback, potentially displacing the design process.

2.3.2 Framework of product experience

Smith and Kirby (2001) see emotions as coherent systems, organised and functional. Their purpose is to establish our position in our environment by attracting to us some things and pushing away others. Desmet and Hekkert (2007) support the notion that the emotions act as a subjective motor driving people to action. They have brought to the HCI community a theoretical framework of how emotions come about, reporting on research done in the psychology of emotions for the last century (Bradley and Lang, 1994; Wundt, 1907; as cited in Desmet and Hekkert, 2007). Desmet and Hekkert (2007)

distinguish *three components or levels of product experience: aesthetic pleasure, attribution of meaning, and emotional response* (Figure 2).

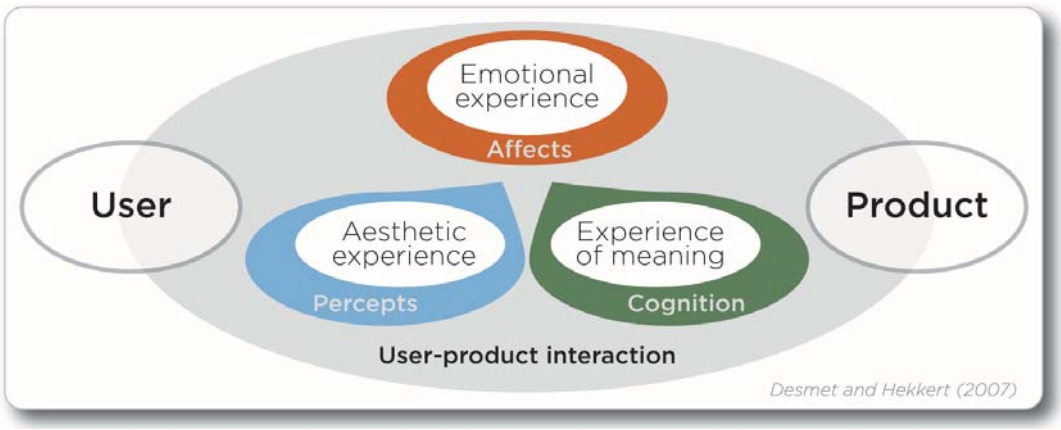

Figure 2. Desmet and Hekkert's framework for product experience

Hekkert explains that the process underlying an emotional response to products can most accurately be described by an appraisal model. (…) an emotion is elicited by an evaluation (appraisal) of an event or situation (…) It is interpretation of the event or situation, rather than the event itself, which causes the emotion. (Hekkert, 2006, p.160)

In this framework, information reaches the person through the senses and, or the cognitive processes and triggers an emotional response. In other words, all the information exchanged in an interaction is funnelled into perceptual information (some leading to aesthetic experience) and cognitive processes (leading to sense making), the aesthetic experience and meaning are appraised, eliciting an emotion.

2.3.2.1 Aesthetic experience and meaning creation: a first step

The appraisal of the sense-making and aesthetic experiences is the bridge between the outside world and an emotional response (Figure 2, Desmet and Hekkert, 2007). These two experiences are the building blocks of emotions. With this framework, the design team is one step closer to be able to produce artefacts designed for emotional response and therefore for more complete UX. As it stands, the framework for product experience guides the design team by identifying 'what' is needed to trigger an emotion (a mixture of

cognitive and aesthetic content), but it gives no indication as to 'how' this content is received to craft more precisely the desired affect.

In Desmet and Hekkert's framework, the physical human interface is made of the senses, but this does not account for how the senses receive the formal information. This framework as well as Norman's model for emotions all focused on content—on what is communicated, on sense making; as a designer, we also need to know how form is received cognitively, and therefore influences the experience.

2.3.3 The hedonic / pragmatic model

Hassenzahl (2003) proposes a model based on the dichotomy of hedonic and pragmatic properties (Figure 3). Hassenzahl's (2003) pragmatic/ hedonic model of UX sets up two different yet concurrent dimensions to the experience, fulfilling two different sets of goals, "do-goals" and "be-goals".

> *The hedonic/pragmatic model of UX assumes that people perceive interactive products along two different dimensions. Pragmatics refers to the product's perceived ability to support the achievement of "do-goals", such as "making a telephone call", "finding a book in an online bookstore", "setting-up a webpage". In contrast, hedonics refers to the product's perceived ability to support the achievement of "be-goals", such as "being competent", "being related to others", "being special".* (Hassenzahl, 2007, p.10)

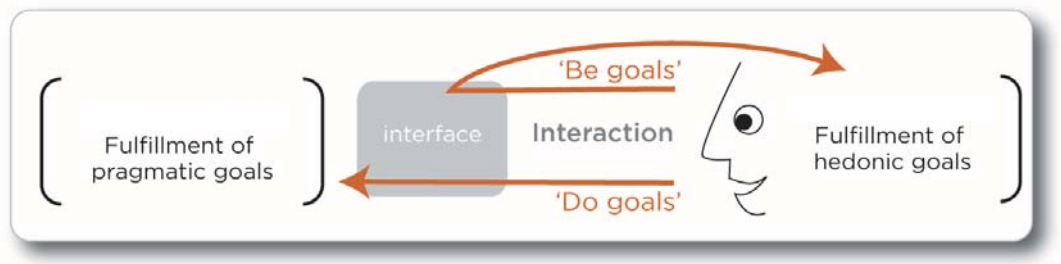

Figure 3. Our interpretation of Hassenzahl's pragmatic / hedonic model

This model offers a very "actionable" understanding of UX, where the interface is built according to two kinds of user's needs: the pragmatic/extrinsic needs and hedonic/intrinsic needs. Hedonics focus on what the self has to gain from getting involved with a given product, covering general human needs beyond the instrumental

such as need for novelty and change, personal growth, self-expression and/or relatedness (for lists of general human needs see Ryan and Deci, 2000; Schwartz and Blisky, 1987; Sheldon Elliot, Kim and Kaiser, 2001; as cited in Hassenzahl, 2007). The author identifies three general drivers of hedonics: stimulation (e.g. novelty, change and personal growth), identification (e.g. identity, branding, relatedness), evocation (e.g. memories, symbols), but there can be more.

The hedonic / pragmatic model has been readily accepted by the HCI community. According to this model, UX is to be understood through twin sets of goals, needs and motivations. With both pragmatic and hedonic dimensions defined in terms of extrinsic motivation, the formal organisation of the designed solution is likely to follow UCD principles because they are designed to deliver on motivation, goals and needs.

2.3.3.1 Questioning the notion of hedonic motivation

Accoding to the pragmatic / hedonic model, both types of goals are likely to be extrinsic, meaning that a user would engage in an interaction for what can be gained from that interaction whether the rewards are hedonic or pragmatic. This model does not address intrinsically rewarding interactions; these may occur, but the model provides guidance for extrinsically hedonic/pragmatic rewards. This leaves a gap to explain the surprise/unexpected intrinsically motivated experience. Here is a commonplace experience to illustrate our concern: Susan stops for a quick lunch in a restaurant, and orders the chicken dish (a safe bet for an unfamiliar place). Turns out she is completely taken by how good it is. Charmed, she makes a note to come back. From this scenario we can consider two very different experiences, one where Susan appraises her experience as it occurs (the first visit) and one loaded with expectations and projections (the following visit), both potentially hedonic. Yet from Susan's point of view, these are different experiences.

Although both visits bring hedonic rewards, their respective motivation and goals are clearly not the same. The issue we find is that hedonic motivations, as it can relate to extrinsic or intrinsic rewards, it not really helpful to differentiate between *experiencing* and "*an experience*". The only certainty is that the rewards are hedonic. This points to a gap in

our knowledge of what may have triggered the first intrincally hedonic experience. Obviously, this gap has not proved insurmountable for designers, but knowing why an experience became intrinsically rewarding may hold a clue into what turns a good experience into a memorable one.

2.3.4 Felt life and the four threads of experience

From their ethnographic studies of human experience with technology, McCarthy and Wright (2004) propose a shift in understanding technology from something we *use* to something we *live* with. This readily displaces the mechanics of goals and motivation as the only way to understand technology. In *Technology as Experience*, these authors criticise models that reduce the human subjects to users or consumers metaphors because potentially rich concepts risk being dwarfed by the driving business interests from goals and motivations directly to implications, methods and features. This shortcut leaves little regards for opportunistic use of technology. McCarthy and Wright (2004) conceive UX around "people", capturing the breadth of the human experience, which highlights the importance of affective aspects (*felt life*) and the importance of person-to-person relationships around and through technology. They depict the experience as whole, contextualised and "felt", seeing the experience with technology actually in its larger setting, as opposed to strictly studying the interaction. They subscribe to a holistic and relational definition of experience where experience is an irreducible whole, constituted by the relationship between object and subject as illustrated in their example:

> *A father comes home from work. As he rushes into the hall, he keys in the password to disable his house alarm. His daughter comes in behind him. He needs to get the dinner prepared, so he switches on the computer in the study for his daughter and sets up her favourite game for her. Once she is settled in, he goes to the kitchen, prepares the food, places it in the oven. He listens to his phone messages while doing this. Eventually he sets the temperature and timer and sets the food to cook. As he passes down the hallway to the sitting room, he pops his head in the study. His daughter asks him to play with her. "Back in two minutes love." In the sitting room he programs the TV to record a drama that he and his wife want to watch later. Now he is heading for the study to play his daughter's computer game with her.* (McCarthy and Wright, 2004, p.2)

Drawing from the pragmatist's take on experience from philosophers like Bahktin (1990) and Dewey (1925; 1934) and from their own phenomenological analysis of different situations, Wright and McCarthy formulate a theoretical framework resting on aesthetic engagement, situated creativity, centres of value, and sense making. Furthermore, bringing their analysis of the pragmatist's notion of experience to the design team, they identify four threads of experience, "*four ways of talking about technology that heighten sensibility to people's experience of it*" (McCarthy and Wright, 2004; p.80): the sensual, the emotional, the compositional (understanding the parts, the whole and their relationship), and the spatio-temporal.

The diagram (Figure 4) shows the psychological drivers and formal principles. The elements on the inside and outer ring are interrelated (e.g. aesthetic engagement and the sensual, compositional and spatio-temporal) thus they must be considered holistically by the design team.

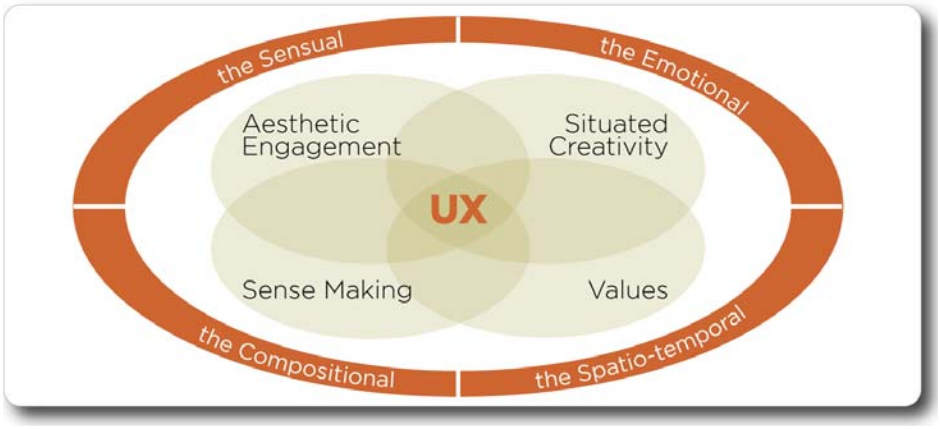

Figure 4. Our interpretation of the four threads of experience model. Inside: the four psychological drivers; outer ring: channels engaging people's sensitivity.

Wright and McCarthy's analysis of where technology actually sits in the human experience grounds the subjective aspects as much in the sensory as in the volitional (goals, motivations and needs), with the formal aspects of UX (space / time, organisation and sensory information) falling in the realm of expertise of designers.

2.3.4.1 Dewey's two notions of experience: "experiencing" and "an experience"

McCarthy and Wright (2004) as well as Forlizzi and Battarbee (2004) have introduced the HCI community to Dewey's (1925; 1934) theories of experience. In its wake, most of the HCI community (see Law, et al., 2009) see experience as a holistic phenomenon. They may also recognise the difference between *an experience* and *experiencing* (Hassenzahl, 2010). "*This was quite an experience!*" is an emphatic and colloquial reference to *an experience* underscoring the awareness on the part of the speaker that something was going on (Robert and Lesage, 2011). In *Art as Experience*, Dewey (1934) expands on *an experience,* stating a difference with the act of *experiencing*, previously defined in *Experience and Nature* (Dewey, 1925). For him, *an experience* has "*its own beginning and end. For life is no uniform, uninterrupted march or Flow, it is a thing of histories, each with its own plot, its own inception and movement toward its close*" (1934, p.37). On the other hand, Dewey (1925) sees "experience" as occurring all the time, "*it includes what men do and suffer, what they strive for, love, believe and endure, and also how men act and are acted upon, the ways in which they do and suffer, desire and enjoy, see, believe, imagine, in short the process of experiencing*" (1925, p.8). Although this description seems to anchor the experience in the subject's sense of being in action (internally lived or externally enacted), Dewey specifies that experience *"recognizes in its primary integrity no division between act and material, subject and object, but contains them both in an unanalyzed totality"* (1925, p.8). In short, for Dewey, experiencing happens all the time and is a holistic phenomenon, whereas *an experience* has a unity of its-own with a beginning, middle and end.

To fully grasp one's experience with an interactive product, service or system, we have to understand what is at work when users are both *experiencing* and having *an experience*. But the most cited models and frameworks, reviewed here, although they appear to account for all the building blocs of great UX, do not explain what makes *an experience* but rather seem to describe the continuous act of *experiencing*. *Experiencing* is the entry-level, appropriate subjective experience, while *an experience* is the differentiator; *an experience* stands out, is memorable.

This raised the question: is there a factor or a combination of factors that could be responsible for steadily triggering *an experience*? This convinced us to focus on the moment of the interaction itself to look for a dynamic combination of factors that provoke the kind of experience that strikes one's attention.

2.3.4.2 Lack of benchmark

As already stated, early studies in the field of UX sought to go beyond the functional by latching on its opposite, the leisurely. Fun, joy, beauty, enchantment, pleasure, play were initially proposed. These studies opened the door to the integration of emotional response as a central element of UX. We recognize this as an important step toward defining UX, but such a definition remains extremely broad falling short of defining what a remarkable UX could be.

From not having identified what makes a remarkable experience, it follows that there is a lack of benchmark. The models and frameworks presented in this chapter explain how users are *experiencing*, but not what a most memorable UX could be made of; there is no benchmark experience nor are there elements specifically associated to UX. This is an issue because it makes assessing UX difficult.

A comprehensive UX model or framework would have a rationale for both 'what kind of content should be produced' (which Desmet and Hekkert's has) and a more precise description of the channels people receive information through (which is suggested by McCarthy and Wright, but not explained). This way, designers, using their expertise in the nonverbal codes of materiality, could address (tickle, call upon, strike, or awaken) purposefully the cognitive and aesthetic senses. In spite of the lack of comprehensive models, practitioners succeed in eliciting specific reaction out of trial and errors, and abundant user testing.

The benefits of such theoretical framework would be two-folds. First, with two levels of information (the 'what' and the 'how', or content and form), the designers would have more latitude to articulate a given experience. Secondly, but most importantly, by addressing known nonverbal channel they would be handling 'projectable' information,

i.e. the kind that designers could integrate into their design process as they envision potential solution, projecting with some clarity both the designed interface and its effect on user. Such a legitimate theoretical model would alleviate some of the reliance on early user testing.

2.4 Gaps in UX knowledge

From this review of the UX definitions, models and frameworks, we identified a number of gaps in the knowledge about UX, gathered and summarised in six points below.

(1) The UX definitions were partial and non-cumulative giving out a fractioned, kaleidoscopic vision of UX, which does not amount to a coherent vision; therefore it suggests that information about UX is still missing.

(2) In reference to Dewey's distinction between *an experience* and *experiencing* (1934), the UX theory appears to understand what is involved in *experiencing*, but not what is involved in *an experience,* i.e. a memorable, emarkable experience. We figure *an experience* must have to do with being aware of the experience as it unfolds, but little else is known about it.

(3) Not having identified what makes a remarkable experience (*an experience*), it follows that there is a lack of benchmark to assess UX.

(4) Practitioners say they rely on usability to guide the formal organisation of UX interfaces. This suggests one of two scenario: either UX is usability with extra content responding to its set of goals and motivations, or UX's formal principles have gone undetected so far.

(5) The notion of hedonic motivation does not clearly address intrinsically motivated experience; it is too "loose-fitting". There is a gap in our knowledge at that point. Knowing why an unsuspected experience becomes intrinsically rewarding may hold a clue into what turns a good experience into a memorable one.

(6) Without questioning the importance of emotions, holding them at the centre of the UX design process raises issues for designers because emotions result from an appraisal (Norman, 2004; Desmet and Hekkert, 2002). Relying on emotions implies relying on user testing (to confirm these appraisals). A strong reliance on user testing has the potential of stripping designers from their creative process, i.e. their ability to work through projection and abductive inference, enforcing instead after-the-fact design decisions.

(7) Knowing that there are two types of appraisals: an aesthetic experience or a meaning building experience, both leading to an emotional appraisal, does bring us closer to the actual interface design. Yet, Desmet and Hekkert's (2007) framework is still once removed from the sensible contact to the interface. As designers, we would like to know what kind of information has transited through what kind of channels before it was processed into an aesthetic or meaning-building experience. We suspect there is a gap in our understanding between the interface and the appraisal of the interface. As said previously, the language of designers is the nonverbal code of materiality, therefore, we would like to better understand how and where the sensible (nonverbal) information transits before it is invested with verbal sense making. The nonverbal communication may be a very short relay, verbal encoding occurring very quickly, but to dismiss it might make us miss out on information that could guide designers when crafting this nonverbal, qualitative communication.

Once put together, the shortcomings listed above add up to two problem-issues, gaps in the general knowledge about UX and gaps in the designerly knowledge about UX:

- **UX knowledge is still incomplete**; we noted that UX definitions, models and frameworks did not explain what is at play during *an experience*, nor gave a clear explanation of what drives a person to pursue the experience, specifically an unexpected positive experience.

- As it stands, **UX knowledge falls short of being compatible with the creative process of designers**[1]**.** Although one of the outcomes of UX research to date is that greater importance has been granted to the experiential dimension of the interaction, it has been generally explained in terms of motivations, extrinsic motivations for the most part. This has left the assessment process unchanged (heavily reliant on post-conception user-testing), therefore still refraining or bypassing the creative design process. Furthermore, we question what seems a counter-intuitive guideline, specifically that designers should expect outstanding UX to come from implementing the rules of usability, even though usability was devised to guide the conception of extrinsic-goal-based interactions and that much criticism had been voiced about its limits.

2.5 Research questions

Consequently, we came up with a main question, supported by two hypotheses, each responding to gaps in the general and design UX knowledge.

- If usability guides the design of interactive systems in regard to being usable, useful and efficient, what principle(s) guide(s) the design of interactive systems when it comes to giving form to the subjective dimension of the user experience?

Underlying this question is a sense that there is something missing in the reviewed UX models and frameworks. To answer the main question we have to gain a better understanding of (1) what constitutes *an experience* and (2) how we encounter information. First, we hypothesise that, going beyond a general UX (*experiencing*), if the parameters defining Dewey's *an experience* were known, we could identify the principle(s) behind a memorable UX. Secondly, since designers shape materiality, knowing how or

[1] The process of designers from the creative tradition

through what path *an experience* is materially received, or 'encountered', would point to design principles that could support this path.

2.6 Summary

After a brief historical review of usability, its strengths and limitations, we have reviewed what UX has proposed to further respond to user subjective needs. We looked at a number of often-cited UX definitions, models and frameworks. We underscored seven notable gaps in UX knowledge: (1) The UX definitions give a fragmented view of UX, which suggests information about UX is still missing. (2) UX theory can explain how to conceive interfaces offering users the chance "to experience" something (Dewey's experiencing), but not provide users with what Dewey calls "an experience", a unique, memorable experience. (3) Having no clear benchmark for an experience, UX is difficult to assess. (4) Usability is used as the formal principle guiding UX, however usability is dedicated to principles that have proved to limit UX, but practitioners say it works; this makes us suspect that there might be formal principles at play that have gone undetected so far. (5) Hedonic motivation does not account for intrinsically motivated experience; (6) Centering UX solely on emotions increases reliance on user testing, which in turn impedes on the designer's creative process. (7) Desmet and Hekkert's model of product emotions does not explain how sensory information is processed before it is interpreted as sense making or aesthetic experiences. This leaves out information that could guide designers in crafting the nonverbal aspects of interfaces.

These gaps have led to a main research question and two sub-questions. The main question is: If usability guides the design of interactive systems in regard to being usable, useful and efficient, what principle(s) guide(s) the design of interactive systems when it comes to giving form to the subjective dimension of the user experience? The two underlying questions are: What constitutes an experience? How do we encounter information?

Chapter 3: Other experiences and their autotelic dimension

In our search to understand what an experience could be, we review three well-studied human experiences recognized as autotelic: the experience of play or more specifically the autotelic dimension of play, the optimal experience (or Flow) and the aesthetic experience, with an overview of what these tell us about the autotelic quality. This chapter closes with our theoretical proposal of the autotelic experience as applied to UX.

In this chapter, we present different highly desirable human experiences that are strongly invested in the moment of interaction: two associated to a type of activity (play and aesthetic appreciation), one describing a psychological experience that can be had in any activity (the optimal experience). As it turns out, the experience of play, the optimal experience and the aesthetic experience share a common dynamic quality: they are all autotelic, i.e. when any of these experiences is good, people engage in it for its own sake without care for external rewards.

Looking to dictionaries to introduce this concept, the adjective 'autotelic' comes from the Greek words auto, 'self', and telos, 'end', 'purpose', 'goal', 'which is complete in itself' as used by Aristotle, Hegel and Marx (Merriam-Webster, 2013; Le Robert, 1995; Wikipedia, 2014). It refers to that which is its own goal and does not exist to serve a functional, moral or didactic purpose (Encyclopaedia Britannica, 2013). The notion of autotelism was first used in the late 19th century, questioning the purpose of art, based on Kant's "purposeful purposelessness" of art, reacting to industrial age utilitarian social philosophy; similar to the "art for art's sake" doctrine. Proponents of New Criticism (e.g. Dickie and Beardsley) later adopted it in the 1920s (Encyclopaedia Britannica, 2013).

This little-known notion born of 19th century aestheticism is akin to the "greatest common devisor" to the play, optimal and aesthetic experiences, as it relates to intrinsic motivation. The autotelic experience, which has not been the central object of much research[2], is attractive to us because it is a relatively narrow quality, which allows us to be pointed in our explorations of what it can offer UX.

3.1 The autotelic dimension of play

> *Forget about placement, a score, elegance as an end in its own right. Forget about a model of good play to motivate practice. Here's all the motivation you'd ever want: get that action again, those last few bricks left and that eerie lobbing interim as the ball floats about so you never know when it'll hit and you don't dare try placing a shot because you're more than happy just to hold on with your eyes glued to the ball.* (Sudnow, 1979; as cited in Salen and Zimmerman, 2006, p.3)

In this quote, David Sudnow vividly illustrates what keeps him playing: the strong, tip-of-the-moment experience. The experience of play is notoriously autotelic (Huizinga, 1950; Csikszentmihalyi, 1975; Sutton-Smith, 1997; Salen and Zimmerman, 2004). It is generally assumed that players engage in play for the sake of playing. Yet a number of game-design authors question the assumption that all play is by essence autotelic. Their questioning sheds light on the nature and limits of this notion.

Salen and Zimmerman (2004) suggest that the intrinsic / extrinsic divide between what is in the game world and what is out of it, is not as clear in real-life as it might appear in theory. Once in the game's *magic circle*,

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[2] A scholarly search engine quotes 1070 English language publications to carry the notion of "autotelic experience", 910 of them as a quality associated to Csikszentmihalyi's Flow, and none of the 910 publications have has central research object the autotelic experience. As will be explained in the next sections, Flow is a broader phenomenon than its autotelic core, therefore studying Flow does not equal to studying its autotelic component. 165 publications mention this notion without talking about Flow: in education literature (quality of self-motivation in learning), and in sports and game literature with one paper actually dedicated to the autotelic experience of play (Schmid, 2009), presented in the next section. The autotelic quality, without being associated to Flow, is cited in 4410 publications, the most cited of which is a sociology of play paper from 1960 cited 66 times. [Google scholar. online, retrieved 12-2014]

> *the victories and losses, the triumphs and failures a player experiences (…) has no bearing on anything outside of the game. (…)(w)e know, of course, that there are many ways [in which] winning or losing games can impact players: affecting their lifestyles, their sense of self (…). There are certainly extrinsic ways that winning a game matters. At the same time, every game implicitly asserts the premise that the value of the game is intrinsic, that the game is self-contained* (Salen and Zimmerman, 2004, p.331-332).

As part of his inquiries on the philosophy of sports, Schmid (2009) looks closely at the autotelic nature of play. Schmid notes that this autotelic quality can be defined in at least three different ways, according to different authors: it can describe *"activities which are ends in themselves" (Suits, 1988), activities which are "intrinsically valued, not instrumentally desired" (Feezell, 2004), and an "activity voluntarily pursued for predominantly intrinsic reasons" (Meier, 1988)* (cited in Schmid, 2009, p.3).

In other words, according to these authors, the autotelic quality rests possibly on either or all of three sources: because the activity is an end in itself, because it is intrinsically valued and / or because people come into it driven by hedonic motivations. The first one, *quality of an activity as an end in itself* (Suits, 1988), states the dictionary's definition without explanations. The last one, an activity determined by the player's hedonic attitude when getting involved (Meier, 1988), echoes the hedonic motivation of the Hassenzahl's model, which, as previously mentioned, needs more definition.

Play as autotelic because the act of playing is intrinsically valued (Feezell, 2004) sets the intrinsic focus on the activity. Feezell appears to want to make a distinction from an intrinsic motivation that would be "internal" to the player, a motivation based on the player's will or whim or perceived pleasure, to clearly set it in the act of playing, in the interaction. Thus, in the intrinsically valued activity, the autotelic experience is a dynamic and relational phenomenon, linking a person to an interaction. The intrinsic quality here is expressed at the level of the activity; the impetus is to stay in action.

Otherwise, a lot of the game design literature has apparently adopted Csikszentmihalyi's (1988) concept of Flow to explain the best play experience (e.g. Salen and Zimmerman, 2004; Hsu and Lu, 2004; Ermi and Mäyrä, 2007).

3.2 The optimal experience

> *"When I start on a climb, it is as if my memory input has been cut off. All I can remember is the last thirty seconds, and all I can think ahead is the next five minutes"* (Csikszentmihalyi, 1975, p.40).

> *"The mystique of rock climbing is climbing; you get to the top of a rock glad it's over but really wish it would go forever. The justification of climbing is climbing, like the justification of poetry is writing; you don't conquer anything except things in yourself ... The act of writing justifies poetry. Climbing is the same: recognizing that you are a Flow. The purpose of the Flow is to keep on Flowing, not looking for a peak or utopia but staying in the Flow. It is not a moving up but a continuous Flowing; you move up only to keep the Flow going. There is no possible reason for climbing except the climbing itself; it is a self-communication"* (Ibid, p.47).

These testimonies give a sense of being overtaken and "filled to the brim" by what is going on. If the first quote illustrates the quality of being immersed in the present with no care for any distant future, the second testimony strongly illustrates that this activity is done for its own sake, and not for any ulterior rewards. Csikszentmihalyi (1975) collected these testimonies about rock climbing for his doctoral research on the optimal experience.

Before describing the optimal experience, we feel it is important to underscore the importance Csikszentmihalyi (1988) attaches to the conscious self and its need to perpetuate itself. According to Csikszentmihalyi, seeking to be in consciousness as we take action in the world is the key to the strongest possible experience, the optimal experience.

Csikszentmihalyi explains that consciousness probably evolved out of the need to strike a balance between the often-conflicting genetic programming (survival needs) and cultural imperatives (social needs) as the individual was called to act. Consciousness is composed of three functional subsystems: *attention*, which takes notice of information available and is the medium that makes events occur in consciousness—also thought of as energy, psychic energy; *awareness*, which interprets the information, and whose most important processes are *thought or cognition, feeling or emotion, and conation or volition, and memory, which stores information (Hilgard, 1980; Broadbent 1958, Pope and Singer 1978,* as cited in Csikszentmihalyi 1988, pp.17, 19). At a certain point in the development of

consciousness, the individual realized his or her powers to direct attention, think, feel, will, and remember. At that point a new agency, the *self,* developed within awareness. And as with all organisms, once the self became established in consciousness, its main evolutionary purpose was to ensure its own survival, to affirm itself; in short, the ultimate purpose of consciousness is to *be conscious*. Therefore, seeking optimal experiences is a fundamental drive of our conscious self in its need for affirmation. Csikszentmihalyi states that when we step beyond motivations based on pleasure (genetic drives), power and participation (two drives based on social programming), we open consciousness to experience new opportunities that lead to evolution in consciousness (1988). In this perspective, the specific emotions gained in reaching the optimal experience (e.g. pleasure, playfulness, joy, or even appreciation for beauty) could be thought of by-products of the quest to be exercising heighten awareness.

The author refers to this focus on consciousness as an autotelic motivation, because its goal is primarily the experience itself, rather than any future reward or advantage it may bring. Csikszentmihalyi (1988) gives the example of artists who choose to paint even thought they do not seem to enjoy the finished painting, often getting no financial rewards from it; likewise for rock climbers and chess players.

In Csikszentmihalyi's research (1975; Csikszentmihalyi and Robinson 1990), people from all walks of life have described how it feels to be doing something worth doing for its own sake, a state he has called Flow, after his participants' recurrent use of that word (1975) to describe the state of optimal experience. *"This unanimity suggests that bringing order in consciousness produces a very specific experiential state, so desirable that one wishes to replicate it as often as possible*" (1988, p.29) (see rock climbers' quotes in the opening of this section).

Flow is attained when attention and awareness are fully engaged in an activity with high involvement, pulling in all of one's attention--psychic resources to the point where action and awareness merge; the experience is lived as holistic, and time falls out of awareness. The author stresses that *the universal precondition for Flow is that a person perceives there is something for him or her to do* (Csikszentmihalyi 1988, p.30), and that he

or she feel they are capable of doing it, in other words that there is a balance between one's perceived challenges and perceived skills[3]. Csikszentmihalyi's Flow describes an *active* experience (our emphasis again); the parameters he identifies for Flow are aimed at action and active stance: clear goals, direct and immediate feedback, high degree of concentration and focus, and above-average challenges met by corresponding skills. Once Flow state is engaged, the subject experiences some sense of control over the outcome of the activity, a "distorted" sense of time, a temporary loss of self-consciousness, and a merging of action and awareness, meaning that one's thinking and actions are in complete synchrony (as exemplified by the two rock climber's testimonies above).

Beside the Flow experience, the relationship between perceived skills and challenges when uneven, will give rise to other possible psychological states. Massimini and Carli (1988) have characterized them as akin to worry, anxiety, arousal, control, boredom, relaxation, and apathy (Figure 5).

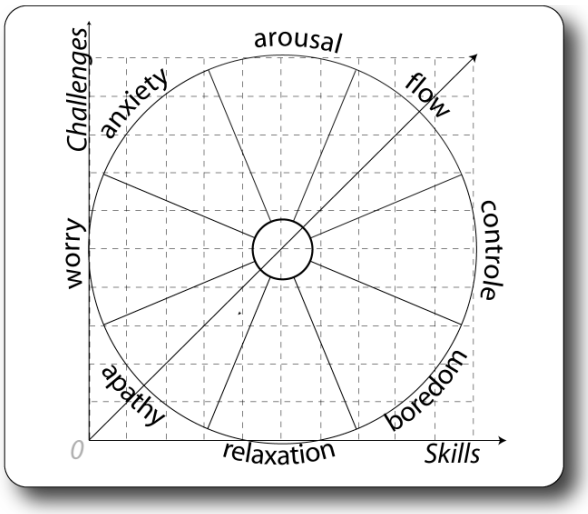

Figure 5. Flow wheel inspired from Massimini and Carli's suggestion of 8 types of psychological states

[3] Interestingly, Csikszentmihalyi does not contextualise the concepts of challenge and skills within motivation theory, nor does he readily associate those to task completion. Instead he focuses on the real-time user *perception* of the challenge and skills. This way the Flow experience underscores the intrinsic dimension of the experience while possibly inserting itself inside an extrinsically motivated experience.

3.3 The aesthetic experience

Aesthetic theory and philosophy of art, with roots going back to Aristotle, have developed a rich discourse on the aesthetic experience aligned with the thinking and knowledge of their days. Beardsley (1969), an author from the New Criticism movement in art theory, defined the aesthetic experience as marked by three qualities: unity, complexity and intensity. According to him, a person is having an aesthetic experience if and only if most of his or her mental activity is *unified* and enlivened by the connection to the form and qualities of an object presented in the sensible world or envisioned through imagination.

Going one step further in the scrutiny of the aesthetic experience, analytic aesthetics, a philosophical current of the end of the twentieth century, links it to the person's cognitive reception, away from the art object's specific qualities (Talon-Hugon, 2005). Its characteristics are unity, coherence and a completeness of thoughts much greater than in ordinary experience. Here, the aesthetic experience can occur in response to mundane objects or situations, as it can to art objects, as long as these objects or situations are encountered through the sensible world. Analytic aesthetics differenciates between everyday attention and aesthetic attention. In the former, attention is paid to objects based on use or planned use (Talon-Hugon, 2005): they are means to an end, signs of a potential action. In a state of aesthetic attention, however, we see things not as a means but as an end in itself. Aesthetic attention is nothing other than ordinary attention (visual activity of the common perception, not especially reflective), which undergoes a transformation (Schaeffer, 2000). According to Schaeffer, at a given moment, sensitive information strikes the person's awareness and triggers aesthetic attention. This attention is a discriminating attention, it is heighten beyond ordinary attention; it distinctly appreciates the world (it reads it, sees it, touches it, smells it, listens carefully) and it finds pleasure in itself. The discerning attention brings a heighten awareness. This sudden awareness is accompanied by the imperceptible tension of wanting to prolong this moment of awakening to prolong the pleasure it generates. He cites three of Stendhal's tender musical enchantments as he awakens to the sounds of life

around a plaza fountain in early nineteenth century. Schaeffer chose this example to show three of the characteristics of the aesthetic experience: the inseparable tie between personal experience and sensory (aesthetic) experience; the fact that the narrator, here Stendhal, saw an aesthetic experience in occurrences that were not staged as in art but part of everyday life; and that beauty was indeed "in the eye of the beholder", i.e. that aesthetic appreciation is a cognitive activity and not a property of an object or event. We chose to share Schaeffer's example because all the occurrences described by Stendhal are experienced receptively, and all these are free of extrinsic motivation. This receptive stance is a key characteristic of the aesthetic experience.

The aesthetic attention is autotelic, in that its goal is to keep the awareness of the attention going, it runs in a loop driven by the pleasure it generates. Schaeffer (2000) stresses that *what distinguishes aesthetic experience from other experiences is that although it realises itself through a mental activity based on our cognitive link to the world like other experiences, it is unique in that it holds the cognitive conduct as a source of pleasure of its own* (translated from p.28), which is the definition of the autotelic experience. Referencing Desmet and Hekkert's framework for product emotions (2007), here the source of the pleasure is the real-time process of processing the aesthetic information.

Schaeffer rises against the common view whereby aesthetic experience is a passive version of the artistic experience. He makes a distinction between the two, as they call for different mental processes, with their own resources. Put simply, Schaeffer sees the *representational activity of creating* and *the mental activity of paying attention* as irreducible to one another. In art making, the artist alternatively goes from the mental representations needed in the act of art making (an operative conduct), to the cognitive discrimination/distinction called for in aesthetic attention as the artist steps back to appreciate the progress of the artwork (Schaeffer 2000, p.43-44). The aesthetic experience is associated to the receptive, yet cognitively active moments.

Schaeffer identifies seven characteristics. (1) The notion of pleasure is central. (2) Although pleasure is central, it may run parallel to other emotions experienced simultaneously (he gives the example of the Japanese poet Sei Shōnagon who wrote about

experiencing bliss at the rain, even though the rain itself had a sad feeling about it). He recognizes two subtle levels of awareness: one's own general feeling (Shōnagon's bliss) and the specific response to the situation at hand (the sadness of the rain). Here the aesthetic experience has induced the ability to be aware of one's feelings as different from one's reaction to the world. (3) There is an inseparable link between aesthetic emotions and personal history (akin to Desmet and Hekkert's framework). (4) An experience is completely subjective. (5) There is no opposition between art objects and everyday objects; it is the subject's attitude that determines the experience. (6) Everyday life is a never-ending source of aesthetic moments. Aesthetic attention is in fact part of our day-to-day repertoire of experience. (7) While in aesthetic attention, heighten visual or sensory attention stretches, prolongs the experience (as if to delay coming out of it).

Schaeffer further describes the mental nature of the aesthetic experience. First, the aesthetic experience is a *representational activity*, in the sense that it is always "about" something; it is bouncing off of an object, which is its referent. Second, in the cognitive relationship we entertain with the world while having an aesthetic experience, we *let the world act upon us* as we are trying to identify, understand or interprete the current action, i.e. as we are trying to form a clear representation. This contrasts with an instrumental relationship, where we attempt to bent the world to our desires (in aesthetic conduct we adjust our mental representations to the world). We are being receptive to the world. Third, the unique and irreducible feature of the aesthetic conduct is not its cognitive relationship to the world (common to instrumental or evaluative conducts) but its goal: that the interaction be, in itself, the source of pleasure (its autotelic quality). Fourth, the pleasure comes from the representational activity aimed at the object that anchored the aesthetic experience; the pleasure does not come from the object itself. And lastly, the aesthetic conduct is *interested*, it is laden with value, anchored in the 'network of our desirs'. This last point echoes the emotional appraisal that occurs at the end of the process of taking in information perceived as aesthetic.

3.4 Overview of the autotelic quality

A number of characteristics come forth from this review making the autotelic experience different from a regular functional or pragmatic experience.

3.4.1 Intrinsically valued interaction

In all three experiences, autotelic motivation is born out of the interaction itself, where a person enjoys an activity for its own sake, distinct from the reward she/he derives from having done the activity. The literature on autotelic play specifically identifies that the activity of playing is *intrinsically valued*, as opposed to being instrumental to a purpose outside of the activity (Feezell, 2004), placing the focus of "intrinsicality" on the activity.

Schaeffer (2000) makes a precise phenomenological description of the autotelic motivation in the aesthetic experience as loop-like, going from the heighten awareness sparked by the cognitive conduct stimulated by the artefact, on the face of the pleasure it generates, running in a loop fuelled by the pleasure it generates. We prefer referring to this view of the autotelic motivation with its loop-like action between two different agents, rather than referring to intrinsic motivation. Schaeffer's description of a dynamic process between awareness and cognitive information gleaned from the material world is more fertile from a design research perspective, which aims at bridging UX knowledge and designers' expertise. Leaning on Feezell (2004) and Schaeffer (2000), we propose that in an autotelic experience, the interaction is intrinsically valued, not just the pleasure it secures.

3.4.2 Heighten awareness

In *The art of seeing*, Csikszentmihalyi and Robinson (1990) addressed the aesthetic experience and, like Flow, finds it to be defined by heighten awareness. In Flow, people claim to give their total awareness to the activity at hand; as with the aesthetic experience, Talon-Hugon (2005) and Schaeffer (2000) distinguish between ordinary attention and aesthetic attention, describing the later as acute, with senses fully awaken.

3.4.3 Receptive posture

Yet, Flow and aesthetic experience significantly diverge in their active and receptive posture. The precondition for Flow is that there be something to do (Csikszentmihalyi, 1988), whereas the aesthetic experience is defined as markedly receptive (Schaeffer, 2000). The difference may lie in how close to the interaction each author stands: Csikszentmihalyi (1988) reports on the whole experience as assessed in retrospective, seeing Flow as holistic; looking at the act of art making, Schaeffer (2000) distinguishes between active and receptive moments within a continuous session. His phenomenological analysis of art making reveals that awakening awareness occurs through heighten attention, or aesthetic attention. Csikszentmihalyi says about attention that it *is the medium that makes events occur in consciousness, it is useful to think of it as "psychic energy"* (Kahneman 1973; Csikszentmihalyi 1978; Hoffman, Nelson and Houck 1983, as cited in Csikszentmihalyi 1988, p.19). Thus, it would appear that either experience gives a determining role to attention, which implies that how we receive information may be determining for these heighten experiences. This brings a new emphasis to the "receptive" posture in the user behaviour.

3.4.4 Hedonic rewards, autotelic motivation

The literature on the Flow and aesthetic experiences also address the concept of pleasure and motivation. Optimal experiences are motivated by the quest for the self to actualise itself by being fully “conscious” (Csikszentmihalyi, 1988). Here, the pleasurable reward is a sign and a by-product of a “successful” optimal experience, not its primary motivation (Csikszentmihalyi, 1975). Therefore defining non-pragmatic experiences as hedonic is potentially missing the mark. Pleasure may be a sign of the Flow experience, but focusing only on pleasure leaving out the importance of being fully conscious is misunderstanding the concept of Flow. This distinction between the source of the positive experience (being conscious) and its reward (pleasure) may seem rhetorical, but it is significant because *being conscious* and *experiencing pleasure* are delivered by different design strategies.

The aesthetic experience, as explained by Schaeffer (2000), is a dynamic system made of four elements (*italicised*) interacting together: *sensitive information* strikes the

person's awareness and triggers *aesthetic attention*, which in turn sets off an *autotelic motivation* (i.e. a desire to prolong the moment of awareness of the active cognitive process; this runs in a loop driven by the pleasure of being aware of this cognitive process) (Schaeffer, 2000). Here again, the pleasure and the awareness are so closely associated as to be inseparable. And again, in this loop-like dynamic between wanting to remain in the awareness and the pleasure it gives, the rewards are clearly hedonic, and the motivation autotelic.

Furthermore, hedonic motivation can be acted upon now or later, indiscriminately; autotelic motivation, on the other hand, is always in-the-moment, as a micro-motivation with an extremely short, almost immediate, projection in time. This very short projection is probably why the autotelic quality has been overlooked and is little known. To illustrate the difference between standard and autotelic motivation, lets consider John, an avid mountain biker. As he plans an outing, assessing different hills, remembering different trails, he is driven by hedonic motivation, i.e. the prospect of biking for good fun. Once on the trail, fully immersed in the moment, with not a thought to anything else but to ride his bike at brake-neck speed, feeling the excitement, the fear, the noise, the pain, and the pride of making his way down the hill with a modicum of control and elegance, John is driven by autotelic motivation.

3.5 The autotelic experience

From this review of the literature, the autotelic experience appears to be an appropriate model to understand the core of *an experience*, with its real-time, heighten awareness. From the play, aesthetic and optimal experiences, we are able to make several inferences about the nature of the autotelic experience as it could apply to UX[4].

[4] We have left out for now the parameters more directly related to active, extrinsic goals (clear and immediate feedback, clear goals, balance of challenge and skills) since we are here concerned with the subjective experience. These may impose themselves back into our model of the autotelic experience after further testing and observations.

1. The interaction is intrinsically valued (Feezell, 2004; Schmid, 2009).

2. It only happens in real-time (during the interaction) (Schaeffer, 2000).

3. It relies on being actively receptive (Schaeffer, 2000).

4. It is active only when in direct contact with sensory information, i.e. the material world in the widest sense (Schaeffer, 2000).

5. The processing of sensory or perceptual information is accompanied by cognitive processes making sense of the interaction in the light of personal history and values (Schaeffer, 2000).

6. It is driven by autotelic motivation; it delivers hedonic rewards.

7. It heightens the awareness well beyond ordinary attention (Schaeffer, 2000; Csikszentmihalyi, 1988).

8. While in this state of heighten awareness, amplified sensory attention appears to stretch or slow down the experience. The shift from ordinary attention to autotelic attention is accompanied by the imperceptible tension of wanting to prolong the moment of awareness, as if to delay coming out of it, prolonging the pleasure it generates (the autotelic loop) (Schaeffer, 2000).

9. There is a merging of action and awareness, with corresponding loss of sense of time and loss of self-consciousness (Csikszentmihalyi, 1988).

3.5.1 The autotelic experience versus Flow, play and aesthetic experiences

The autotelic experience thus described borrows from Flow, play and aesthetic experiences. It could be seen as their greatest common divisor, this analogy stressing that the autotelic experience is probably a tightly circumscribed experience at the heart of these wider, more complex experiences. Unlike the play and aesthetic experiences that refer to specific activities, the autotelic experience, like the Flow, can be associated to any activity. Csikszentmihalyi (1988) tells us that people experience Flow as a holistic, strong

and powerful psychological state. In comparison, the autotelic experience is a subset of Flow, a way of naming and highlighting a facet of the Flow experience, specifically its in-the-moment-quality, one could say the *nucleus* of the Flow experience. People can be aware of experiencing Flow, but not so much the autotelic episode at the heart of Flow; the autotelic experience is an inner phenomenon of Flow.

We insist on focusing on the autotelic experience as opposed to Flow for three reasons. Firstly, Flow was identified forty years ago and theoretically described in terms of challenge and skills. These are closely related to performance, and since this research is concerned with the subjective UX, we wished to distance ourselves from an approach related to the functional or pragmatic (i.e. extrinsically motivated) experience.

Secondly, Flow being an overwhelming psychological state, it often lasts far beyond the autotelic episode, yet Dewey's *an experience* demands that we stay focused on the moment of interaction. And lastly, building from a lesser-known concept, the autotelic quality, allows us to leave behind unnecessary baggage that Flow has gathered over the years. Interestingly, Csikszentmihalyi (1975) explains why he chose not to refer to "*this peculiar dynamic state—the holistic sensation that people feel when they act with total involvement*" as the autotelic experience but rather call it Flow from that point on. "*Flow is what we have been calling "the autotelic experience." (…) In calling an experience "autotelic," we implicitly assume that it has no external goals or external rewards; such an assumption is not necessary for Flow*" (1975, p. 36). He goes on to say that the holistic nature of Flow is ill served by the term autotelic. This confirms our choice in focussing on the specific autotelic dynamic, seeing it as embedded in a larger, holistic albeit more complex phenomenon with potentially multiple motivation levels.

Moreover, our review of the play and aesthetic experiences has brought to the fore aspects to the autotelic quality that were not emphasized in Csikszentmihalyi's description of Flow and that are pertinent to UX. Consequently, the autotelic experience thus described is our hypothesis for what is at play in *an experience*, with its emphasis on the role of the material world and sensory information.

3.6 Summary

Chapter 3 looked at play, Flow and aesthetics experiences. These revolve around a heighten awareness of the moment of the interaction; they also all call upon the autotelic experience to explain their intrinsic nature. Reviewing these experiences led us to hypothesize that the autotelic experience would be a good model for 'an experience'. Its characteristics are: the interaction is intrinsically valued (Feezell, 2004; Schmid, 2009). It happens in real-time, when in direct contact with sensory information, when in receptive engagement (Schaeffer, 2000). It draws on personal history and values (Schaeffer, 2000). It is driven by autotelic motivation; it delivers hedonic rewards. It heightens the awareness well beyond ordinary attention (Schaeffer, 2000; Csikszentmihalyi, 1988). The heighten awareness appears to slow down the experience and it is accompanied by the imperceptible tension of wanting to prolong the moment of awareness, to prolong the pleasure it generates (the autotelic loop) (Schaeffer, 2000). There is a merging of action and awareness, with corresponding lost of sense of time and lost of self-consciousness (Csikszentmihalyi, 1988).

Chapter 4:
Verbal and spatial cognitive processes

Chapter 4 looks at how we receive information. It makes a quick review of visuospatial reasoning in psychology (Tversky, 2005a) and cognitive neuroscience (Bowden and Jung-Beeman, 2003). Then it presents a model from cognitive psychology, the multiple resources theory from Wickens (2002) and colleagues (Boles, 2010) that describes how humans receive information. This model addresses how we receive specific auditory and visual 'input' and manual and vocal 'output', as well as recent scholarship on gestural 'output.' The chapter ends with a presentation of the right hemisphere (RH) coarse semantic coding theory and its impact on reading material culture.

4.1 How is meaning assigned?

In his book "*Adieu à l'esthétique*", Schaeffer (2000) debunks the philosophical constructs around the aesthetic experience (dating back to the Greeks and up to Kant's view of Aesthetics) and instead, roots this experience in the cognitive processes of encountering the world. He turns to the work of Daniel Dennett (1993), philosopher and cognitive scientist interested in evolutionary biology, for an explanation of how aesthetic experience came to be a non-pragmatic cognitive activity.

Looking into biology, Dennett describes the simplest form of cognitive activity, a reaction to direct sensory information supported by a short-term memory (erased once the reaction is done); no knowledge of spatially structured environment is needed. A leap in evolution later, organisms were able (a) to extract information from a distant source and (b) to break the bond between receiving information and reacting. For humans, hearing, smell and sight allowed us to gleen distant information, which allowed us to develop the ability to anticipate (be aware of time). This ability allowed us to delay a reaction once information is received. So, instead of reacting, one can take note of the new information, known as an *orienting response* (Dennet, 1993, chapiter 7) and update

one's assessment of the situation (Is it a threat? Is it the promise of good things to come?). The aesthetic attention would be an *orienting response* detached from a pragmatic outcome, but practiced for its own sake, i.e. sensory information taken in and considered on its own terms (What is this? What does it mean?).

The aesthetic attention lets the world act upon us as we adjust our mental representation to it, as we toy with possible representations, possible meanings. This begs the question: How is information received? How is it encoded? How is meaning assigned?

As designers, we need to know. Designers are experts at interpreting the nonverbal codes of materiality; and the difference between a good and a memorable UX could lie in *how* one receives and processes the interaction. Therefore, we need to better understand how sensory (nonverbal) information transits before it is invested with meaning and emotional appraisal.

4.2 Linguistic and visuospatial encoding

We have considered the research of two groups of authors who have studied encoding mechanisms: Cognitive psychologists (Wickens, 2002; Boles, 2002; 2010; Hostetter and Alibali, 2008; Tversky, 2005; 2005a) address verbal and visuospatial reasoning, refer to verbal and spatial processes as they are stimulated by input and output modalities; and cognitive neurologists (Beeman et al., 1994; Chiarello et al., 1990; M. E. Faust and Gernsbacher, 1996; Beeman and Chiarello, 1998; Bowden and Jung-Beeman, 2003; Beeman, 2005) have developed a theory of language comprehension where linguistic information is encoded trough a different process according to how clear or diffuse its meaning is. Clear meaning is encoded by the dominant hemisphere, generally the left hemisphere (LH), diffuse meaning is coarsely encoded through distant associations by the non-dominant hemisphere, generally the right hemisphere (RH). Cognitive psychology and neurology being independent disciplines, they do not explain encoding in the same way; but either shed interesting lights on the results of our three studies.

4.2.1 How information reaches and leaves the verbal and spatial processing codes

Wickens (2002) has articulated mental processes in a model he uses to explain multitasking (Figure 6). Leaning on a cybernetic analogy, cognitive psychology studies how humans exchange information. It is often called upon in engineering design research because it attempts to shed light on theoretical mental structures (Baddeley, 1992) active in the relationship between the material world, design's playing field, and our physical actions.

Furthermore, what was strictly a theoretical model in the years before the development of neurosciences, is now gaining *neurophysiological plausibility* in the sense that Wickens' model has parallels in brain anatomy: "*a well established line of research associates the processing of spatial and verbal material respectively with the right and left cerebral hemispheres of most individuals (Just et al., 2001; Just, Carpenter and Miyaki, 2003)* (Wickens, 2008, p.451)."

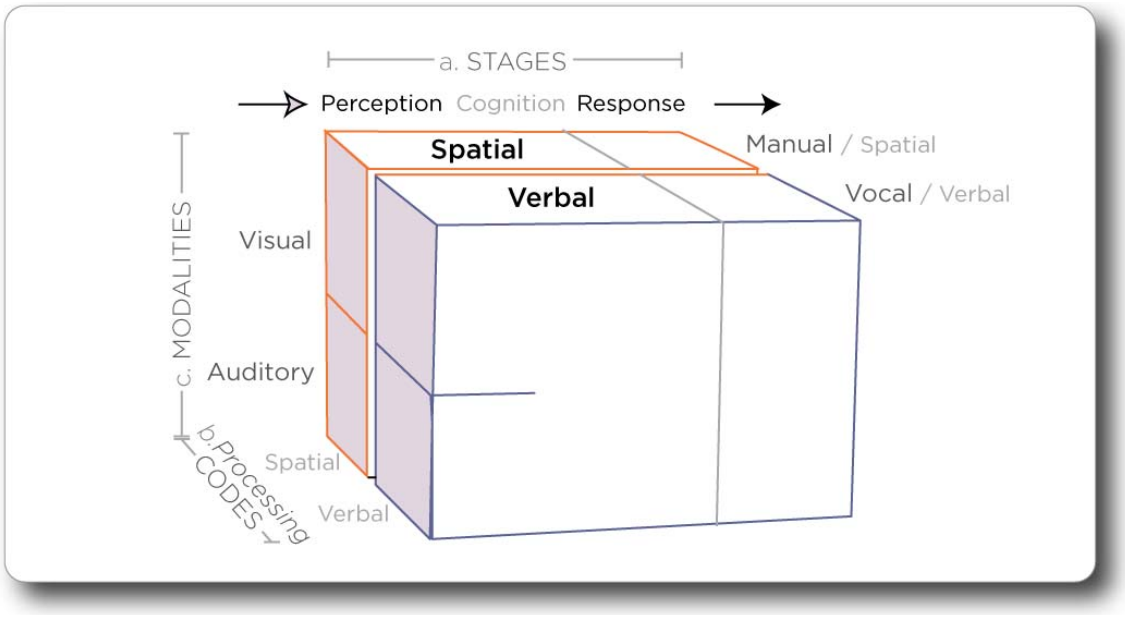

Figure 6. Diagram of Wickens' multiple resources model showing only 3 dimensions: the processing stages, codes and modalities, reproduced from Wickens (2002, p.163)

In his multiple resource theory (MRT), Wickens distinguishes three distinct and dichotomous dimensions (Figure 6), all associated to distinct physiological mechanisms: (a) the **stages** of processing (perception-cognition and response), (b) the **processing codes** (spatial and verbal codes; this dichotomy carries through all stages) and (c) the **modalities** (auditory – visual perception (inputs); nested within perception alone, the shaded face of the cube; and manual and vocal responses at the other end (outputs)).

This research is interested in how information is encountered by the verbal or spatial processing code, i.e. through linguistic or visuospatial reasoning. Although thinking is often expressed in language, it does not occur through language; Tversky (2005) states that *it occurs through the action of neurons reacting to linguistic and imagistic information*. Both linguistic and imagistic reasoning can be characterised as elements and relations, *a crucial difference is that for imagistic representations, meanings can be carried by resemblance of elements and spatial proximity among them* (Ibid., p.15). Visuospatial reasoning is about manipulating visuospatial information, be it through real-world (external) representations or mental imagery, through transforming these mental representations, inferring new information from them or gaining insights.

The processing codes are defined "*by the distinction between analogue/spatial processes and categorical/symbolic (usually linguistic or verbal) processes. Data from multiple task studies (Wickens, 1980) indicate that spatial and verbal processes, or codes, (…) depend on separate resources*" (Wickens, 2002). To distinguish which process is active at any given moment, we will rely on the active modalities (inputs and outputs, auditory, visual, manual and vocal), since different modality action are associated to one or the other process (Boles 2010; Boles and Law, 1994; 1998; Wickens, 1984; 2002; Hostetter and Alibali, 2008). They can signal that their respective processing code is active.

To identify if either or both processing codes are engaged in an interaction, we have to monitor which modalities are active at any given time.

4.2.1.1 "Inputs"

Boles and Wickens go into more details regarding the relationship between different modalities and the verbal or spatial processes. They stay close to the cybernetic analogy referring to perceived modalities as encoded resources or "inputs" and responding modalities as "outputs" (Boles and Law, 1998; Boles, 2010; Wickens, 2002).

Wickens details the visual modality into two types, focal and ambient vision (Leibowitx and Post, 1982; Previc, 1998, *as cited in* Wickens, 2008). Focal vision is a wide category associated with object recognition and high acuity perception (and loss of peripheral vision) active with both verbal and spatial processes. On the other hand ambient vision is specific to spatial processes (point 5h in Table i, next page). Boles and colleagues (Boles, 2010; 2002; Philips and Boles, 2004; Boles and Law, 1998) further differentiate auditory and visual processes, as visual and auditory input activate the verbal or spatial processes, into sub-processes thus identifying a large number of process-specific mental resources, listed in Table i.

The modalities' inputs and outputs have been used to analyse the video data in the last two studies.

1. **Auditory**-emotional (Boles and Law, 1994); resources associated with recognizing emotional tones of voice, using auditory input

2. **Auditory**-spatial (Wickens, 1984); Resources associated with generalised spatial processing, using auditory input

3. Auditory-verbal-linguistic (Wickens, 1984; Boles and Law, 1998); resources associated with generalised verbal processing, using auditory input

4. **Tactile**-figural (Boles and Law, 1998); resources associated with recognising shapes, using tactile input

5. **Visual**-spatial (Wickens, 1984); Resources associated with spatial processing using visual input; specifically:

    a. Facial figural (Boles and Law, 1998); resources associated with the processing of faces or facial emotions, using visual input

    b. Planar categorical (Boles, 2002); resources associated with simple left-vs.-right or above-vs.-below relationship, using visual input

    c. Spatial attentive (Boles and Law, 1998); resources associated with the deployment of attention in space, using visual input

    d. Visual concentrative (Boles, 2002); resources associated with recognition of the density of

clustering of numerous objects, using visual input

e. Spatial emergens (Boles, 2002); resources associated with the separation of figure and ground, using visual input

f. Spatial positional (Boles and Law, 1998); resources associated with the identification of precise locations, using visual input

g. Spatial quantitative (Boles and Law, 1998); resources associated with the recognition of analogue numerical quantities, using visual input

h. Visual-ambient (Horrey, Wickens and Consalus, 2006); resources associated with distributed vision across entire visual field, preserving its peripheral vision, active in orientation and movement, using visual input

6. **Visual**-temporal (Boles and Law, 1998); resources associated with the recognition of timing of events, using visual input

7. Visual focal (Wickens, 1984); resources associated with object recognition and high acuity perception (and lost of peripheral vision)

7. **Visual**-verbal (Wickens, 1984); resources associated with verbal processing using visual input, specifically:

a. Visual lexical (Boles and Law, 1998); resources associated with recognizing words, letters, or digits, using visual input

b. Visual phonetic (Boles and Law, 1998); resources associated with evoking verbal sounds, using visual input

Table i. Probable process-specific mental resources (auditory or visual) (as cited in Boles, 2010, p.446; Wickens, 2002)

These probable process-specific mental resources show that resources are structured both between and within each of the verbal and spatial processing codes.

4.2.1.2 "Outputs"

At the response stage, the modalities are manual, vocal (Wickens, 1984), and facial motive (Boles and Law, 1998) with manual and facial motive resources associated to spatial processing codes and vocal resources to verbal processing codes. Manual resources are associated with responding with hands (gesturing to handling), facial motive is associated with responding with facial movement unrelated to speech or emotion, and vocal resources are associated to responding with the voice.

This research is concerned with how information is encountered; therefore, the source of the response is important. Gestures are found to be particularly good at

expressing spatial and motor information (Alibali, 2005; Hostetter and Alibali, 2008) and occur more often with speech about spatial information than with speech about non-spatial information (Alibali, Heath and Myers, 2001; Krauss, 1998; Rauscher, Krauss and Chen, 1996; as cited in Hostetter and Alibali, 2008). Yet, Wagner, Nusbaum and Goldin-Meadow (2004) suggest that gestures can be produced directly from propositional representations; while Xu and colleagues found that symbolic gestures (e.g. a finger on the lips to communicate to be quiet) and spoken language are processed by a common neural system (Xu et al., 2009). In short, evidence suggests that gestures actually accompany and facilitate speech, most often stemming from mental images, but also from propositional or symbolic communication according to needs (Table ii; Figure 7).

Likewise, movements and body postures appear to be spontaneously coordinated with speech (Fowler et al., 2008). As for vocal modality, i.e. speech, because we are looking for receptive channels that use designers' expertise in the nonverbal codes of material culture, we will not consider it in this grid, but in the assessment of the task. Speech needs to be considered in terms of meaning and context, i.e. in conversations. Therefore, to interpret body posture, we will link it to the analysis of the task.

9. **Manual- verbal**; resources associated with responding with the hands

   a. Gestural propositional (Wagner et al., 2004); resources associated with responding to mental propositions in support to speech

   b. Gestural symbolic (Xu et al., 2009); resources associated with responding by symbolic communication

10. **Manual-spatial** (Hostetter and Alibali, 2005); resources associated with responding with hands expressing spatial and motor information

   a. Gestural spatial (Hostetter and Alibali, 2008); resources associated with responding to spatial mental images

11. **Facial** motive (Boles and Law, 1998); resources associated with responding with facial movement unrelated to speech and emotion

12. **Vocal** (Wickens, 1984); resources associated with responding with the voice

Table ii. Probable process-specific response resources (manual and vocal);

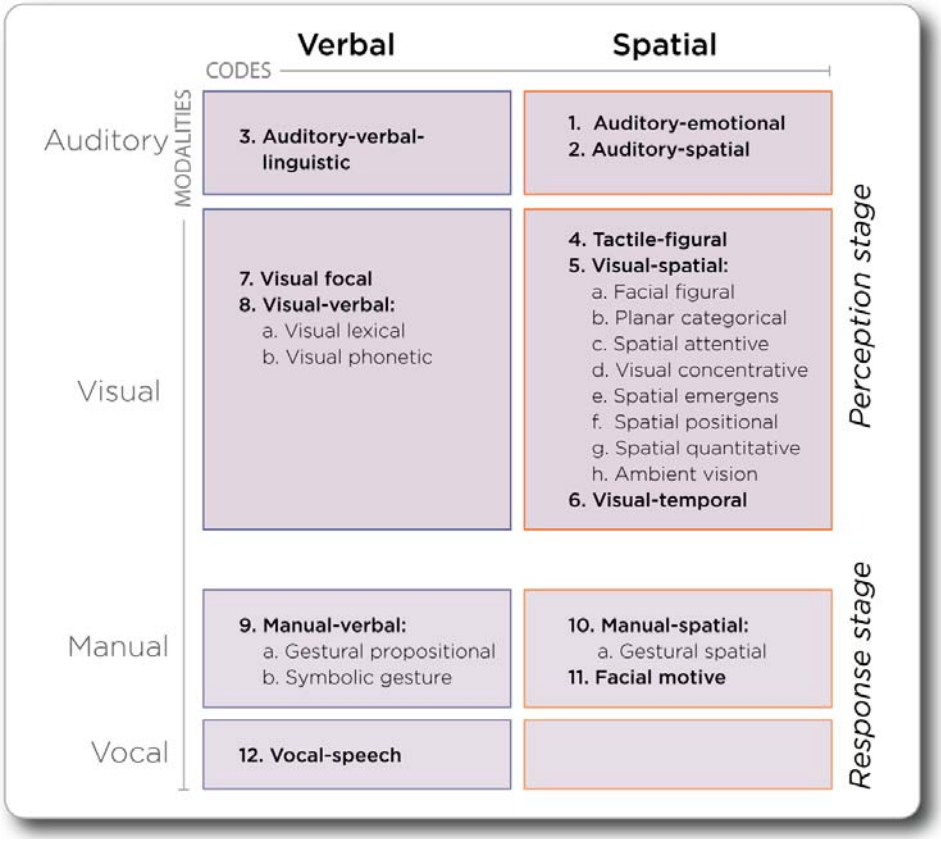

Figure 7. Diagram of the process-specific modalities (visual or auditory) and responding resources (manual and vocal) from Wickens (2008), Boles (2010), Hostetter and Alibali (2005; 2008), Xu and colleagues (2009)

4.2.2 Hemispheric differences and the RH coarse semantic coding theory

Keeping a narrow focus on seeking to understand how information is encountered, the RH coarse semantic coding theory explains how the LH and RH "read" information, i.e. encode meaning. The right / left hemisphere literature is quick to offer a strong warning against oversimplification. *Early model of cerebral laterality ascribing complex mental abilities* or style of information to one or the other hemispher *(Marshall, 1981*; as cited in Chabris and Koslyn, 1998, p.8) e.g. the LH as verbal or analytic and the RH as spatial or creative. It appears that the LH and RH will tackle the same verbal or spatial task simultaneously, processing it differently (Beeman, Bowden and Gernsbacher, 2000; Bowden and Jung-Beeman, 2003).

According to the RH coarse semantic coding theory (Bowden and Jung-Beeman, 2003), upon encountering information, both hemispheres encode it in their respective way: *LH engages in relatively fine semantic coding, strongly focusing activation on a single interpretation and a few close or contextually appropriate meanings, while RH engages in coarse semantic coding, weakly and diffusely activating alternative meanings and more distant associates* (Bowden and Jung-Beeman, 2003, p.731). In other words, the RH activates itself when faced with information carrying diffuse meaning, like jokes, metaphors, inferences (Ibid.), paralinguistic information (Beeman and Chiarello, 1998). For instance, while listening to a discourse, the RH diffusely activates, but *the inference is too weak to be acted upon. When a break in the story's coherence occurs, this weak activation provides a good cue to search for information to fill the gap* (Beeman and Chiarello, 1998, p.6). Whereas LH is quick to categorize information, encoding fine and *closely related meaning and a single interpretation*, the RH *seems to maintain activation of distant semantic relations of words, multiple meanings of ambiguous words, and metaphoric interpretations* (Ibid., p.4). This gives LH a clear advantage to comprehend most direct language, while RH engages in the comprehension of indirect language (Bowden and Jung-Beeman, 2003). RH coarse semantic coding activation theory has similitudes with visuospatial reasoning in that it associates meaning not through direct link but through proximity, pattern and ressemblance, in short through indirect association.

For Bowden and Jung-Beeman (2003), people make conscious decisions influenced by partially independent activation in each hemisphere, i.e. reasoning is fuelled by simultaneously and asymmetrically active hemispheres. Yet, they argue that RH *engages in cognitive processes that specifically facilitate solving insight problems* (Ibid.). They have identified something of a privileged relationship between the RH processes and the insight experience. They have observed that participants revisiting and solving previously failed problems had an insight-like experience when they succeeded; the initial failure serving as priming experience. This occurred more often in RH than LH. Consequently, such RH activation was associated with the a-ha! experience.

4.3 Summary

Chapter 4 presented different frameworks addressing how our brain encounters sensory and linguistic information and 'encodes' it, or assigns meaning to it. Wickens (2008; 2001), Boles (2010), Alibali (2005) and their colleagues have provided a framework for inputs and outputs as these related to either verbal or spatial coding processes. Bowden and Jung-Beeman (2003) explain how the LH and RH make sense of the same linguistic information differently in their RH coarse semantic coding theory; as information reaches us, both hemispheres are activated to code it, the left by making quick and direct association to a single meaning, the right by seeking distant associations; if the left fails to find a satisfactory meaning, the RH activation becomes conscious and provides further possiblities. The RH activation is particularly called for where presented with diffuse communication. Visuospatial reasoning and RH activation are both associated with inference and insight.

Chapter 5: Research framework

Chapter 5 presents the main research question with ensuing proposals for inquiry and secondary questions. This leads into our research approach, setting up the stage for our methodological framework.

Earlier, we established that there were two issues with UX knowledge as it stands: (a) it is still incomplete and (b) it falls short of being compatible with the creative process of designers. From these problematic issues we devised a main research question and two underlying reseach questions. The main question for this research is:

- If usability guides the design of interactive systems in regard to being usable, useful and efficient, what principle(s) guide(s) the design of interactive systems when it comes to giving form to the subjective dimension of the user experience?

The secondary questions underlying it are: (1) What constitutes *an experience*? And (2) how do we encounter information?

To answer the secondary questions, we are proposing two hypotheses: (1) The autotelic experience could be a model for Dewey's *an experience* (explained in chapter 3). (2) The verbal and spatial processes could give us pertinent information about how meaning is assigned to information; specifically, the RH coarse semantic coding theory can shed light on how meaning is assigned to *diffuse information* (explained in chapter 4).

Another way to present the implications of the secondary questions is to separate the research territory in two focuses. (1) One focus is external to the autotelic experience, i.e. it pays attention to the contrast between the intrinsic autotelic experience and the extrinsic task-related experience, seeking to distinguish *an experience* from *experiencing*, the lesser-known autotelic from the well-known pragmatic experiences, important to

define the actual autotelic moments. (2) The second focus is internal to the autotelic experience: it is set on the relationship between verbal / spatial processes in use and this experience; the purpose is to observe how material and linguistic communication impacts the autotelic experience; key to be able to be able to propose a new UX principle.

5.1 Research approach

The goal of this research is to observe and understand the autotelic experience in combination with the verbal and spatial cognitive processes, in order to integrate the designer's ability to conceiving interactive products or systems. With this research we aim at proposing to the UX community an in-depth understanding of a memorable UX, as modelled by the autotelic experience.

There were challenges with having as central research object a phenomenon that has not been the object of many empirical studies (but described in theoretical or phenomenological terms) and that was not a familiar concept in the scientific or lay community. The fact that the autotelic experience is a little-known phenomenon dictated an inductive exploratory research approach. And as is common in inductive exploratory research (Gauthier, 2006), we set off with a partial theoretical road map that was completed by the first study.

Because the theoretical framework explaining the autotelic experience was not sealed or extensively studied, we chose to observe it as it occurs, outside of controlled experiements. We sought out situations that would naturally deliver these experiences.

The first study focused on the experience with a world-renowned office chair; this experience was chosen because the chair has garnered such respect and recognition over the last two decades, we figured, if a design product could foster an autotelic experience, this chair would. The first study consolidated the autotelic experience's framework by adding Schaeffer's aesthetic experience to the Flow and play experiences we had identified. They both describe the autotelic experience as motivated by itself,

however Csikszentmihalyi contends that it can only happen while engaged in an action, while Schaeffer stresses that it happens during a receptive engagement. The second and third studies are case studies addressing these differences, the second one exemplifying the receptive engagement typical of aesthetic experiences, the third, the active engagement that is a prerequisite for Flow.

Because the current state of the art can supply guidelines to design a basic UX, and that we are seeking the extra information that will allow a design solution to provide a memorable UX (one step above straight forward *experiencing*) we needed to look to a finer realm of UX to catch the autotelic experience. For this reason, we opted for low sampling case studies for the second and third studies, because the more the participants, the less details we can extract from a study, their amount pushing the results towards the common experience (Gauthier, 2006). These case studies were able to capture the essence and complexity of typical examples of autotelic experiences.

The second study focused on the art appreciation experience, typical of the aesthetic experience; this setting was likely to yield enough cases of autotelic experience to inform us on the nature of this experience. The number of potential cases of such experiences is as numerous as there are artworks to be viewed and as short as the time it takes to view one; 67 Flow experiences were reported (a high number of effectives). The last case study followed a pair of design students collaborating on 2 landscape architecture projects each done with a different tool. With this last study we were able to observe two projects unfurl over more or less an hour each, giving us much insight into the elements part-taking into the autotelic experience.

Whereas with the two first studies we cast our observations at situations where we had good chances of coming upon autotelic experiences without manupulating their setup, the last case study was 'borrowed' from a lab-protocol conducted by the Hybridlab for another research. But as with the first two studies, the autotelic experiences we observed there were not set up, nor provoked in anyway. In this case, the participants appeared to have had an outstanding experience. Considering the breadth and quality of

experience the two participants appeared to have had, we decided, to use the data from that protocol for an in-depth case study examplifying active / pragmatic engagement. This is how we made sure for each study that the autotelic experiences had occurred of their own accord.

The first study was designed on its own, its three groups completing each other to reach data saturation and diversity with the (one) first study. The two case studies were designed in relation to one another, to complete each other, covering together multiple levels of focus: where one had more effectives (34 minutes of Flow attached to 67 artworks), the other had more depth (32 minutes of Flow spent on only two projects); where one required a receptive engagement in a leisurely context (museum visit), the other demanded an active engagement in a professional capacity the former examplifying Schaeffer's aesthetic experience, the latter, Csikszentmihalyi's Flow.

5.2 Methodology

5.2.1 Sampling

As explained above, the object of this research dictated an inductive approach to which we applied theoretical and non-probability sampling in support of in-depth analyses of examplar experiences (case studies); which is in line with standards of exploratory research (Gauthier, 2006). Theoretical sampling was used to ensure diversity and data saturation within the first study on its own, and between the two later case studies.

In the first study, internal diversity was a consideration when picking participants for the two groups in order to make sure the data would saturate (would cover the spectrum of experiences for this case) (Pires, 1997). The participant for the one-week use-test was chosen for his expertise (a theoretical sampling decision). Both case studies were assigned theoretical sampling to cover each aspect of a typical situation out of the fewest participants. The museum visit was willingly designed to include participants of all levels of art expertise for internal diversity reasons (this study did seek quantity of autotelic experiences). The co-design study sampling was chosen because the participants

had demonstrated an ability to work together and to deliver a typical (best) example of an autotelic experience in co-design context.

Furthermore, since this research's goal is to find out as much as possible about a little-known phenomenon, and since the participants have been chosen to exemplify this phenomenon, we have analysed together the data collected within an experiment. The purpose for this is to keep the focus on the general experience, to stabilise our knowledge of the autotelic experience. For the same reason, we have not distinguished between men and women's experiences either, especially since the literature does not mention gender in the presentation of the Flow or aesthetic experience. In future research we could consider studying various participant profiles.

5.2.2 Methodological framework

In keeping with the evolutive nature of inductive research (Gauthier, 2006), and along with the progression of the theoretical framework, the methodological framework evolved from the first to the last two studies.

5.2.2.1 Methodological framework for the first study

In the first study, we assessed the three known dimensions of the subjective experience as presented in Desmet and Hekkert's (2007) framework for product emotion, in this order: affective dimension (Norman, 2004), cognitive dimension (looking at how objects carry meaning) (Bih, 1992) and aesthetic (Schaeffer, 2000); a fourth dimension addressing how meaning is attributed in the brain (Beeman, 2005) was also used. These were applied to content analyses of the interview transcripts for each of the three experiements. These were all descriptive content analyses, aiming at identifying the characteristics of the autotelic experience as expressed in the participants' discourse. The affective and cognitive dimensions were assessed through quantifying through comparative word-count, the statements related to each category within these dimensions; the purpose of the comparative assessment was to identify in what categories were expressions of autotelic experience to be found. The dimensions related to aesthetics and language comprehension were assessed through qualitatively pulling out best examples of these

dimensions. With the last two dimensions the goal was to verify if these dimensions were representative of the autotelic experience, and how so. This is how the aesthetic and language comprehension dimensions came to be integrated to the theoretical framework of the autotelic experience.

5.2.2.2 Methodological framework for the second and third studies

The methodological framework of the case studies reflects the internal and external focuses on the autotelic experience, as presented at the beginning of this chapter.

The ***methodological framework supporting the internal focus***, centred the relationship between the autotelic experience and the spatial and verbal processes active during this experience, relies on an assessment of the Flow experience, the physical gestures (visual, manual modalities and body posture) and verbal / nonverbal discourse.

Flow assessment: As stated in chapter 3, Csikszentmihalyi (1975) defined the Flow experience after the autotelic experience, the latter being at the core of Flow. He specified that the autotelic experience is narrower than the Flow because it exists only during the interaction whereas the Flow includes the lingering emotional effects of the autotelic experience. Therefore, if a participant expresses to be experiencing Flow in the midst of an interaction, this person is actually experiencing an autotelic experience.

Flow has been assessed through a number of methods for nearly thirty years (Csikszentmihalyi and Larson, 1987; Massimini and Carli, 1988). We are using it here although we have some reservations about how Flow has been theorised. Defining Flow as a psychological state found when one's *perceived skills* meet the *perceived challenge* is using a performance-oriented vocabulary and, by extension, easily associated to extrinsic goals. Yet, this research is about the intrinsic experience. We are not questioning the Flow experience at all, simply having reservations about the language used to define it and the seeming bias it induces.

The Flow data was collected through auto-confrontation in both studies: the participants were met individually, and watched a visual recording of their respective task

(different for each study; to be specified in respective chapters), signalling to the researcher in what psychological state they remembered being at a given time. This post-protocol interview was recorded in the exact same way for both studies: as the participant sat in front of the computer and beside the researcher, the laptop camera would film them looking at the visual material provided, and the whole screen interface was thus recorded (with task's visual material, the camera shot filming the participant) (Figure 8), a printed of screen-based Flow wheel (see Figure 5, Annexe A p.ii) was visible by or on the laptop as a reminder. In the museum visit the psychological state was assigned to the artwork and applied to all the time spent talking about that artwork. The participants could modulate their answer by giving more than one psychological state. In the co-design study they were recorded on a time line matching that of the protocol recording.

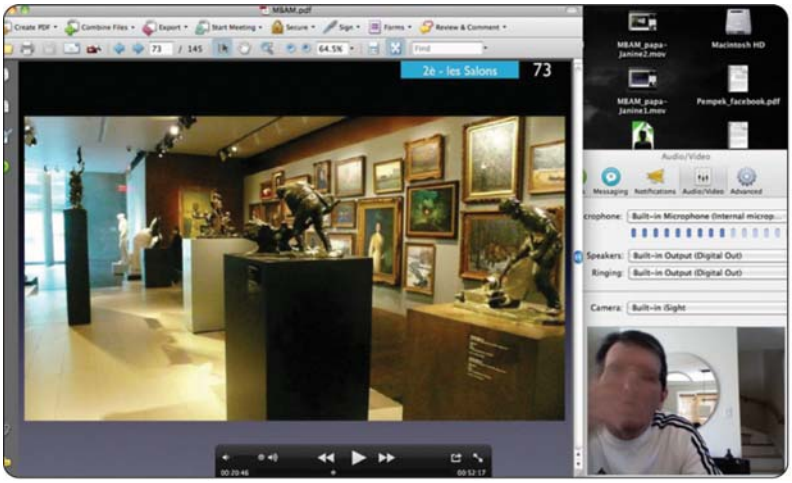

Figure 8. Typical experimental set-up: Visual recording of the task (here the artwork encountered during the museum visit). In the second study the participant was filmed from the laptop's camera through the audio/video preference window of the Skype application (Skype was used to display the participant). The laptop screen was recorded through QuickTime, thus synchronizing voice, image and task visual at once. In the third study, one participant was done at a distance and recorded through Skype.

The participant was in control of the visual recording of the initial task (slideshow of artworks seen in the museum; audio-video recording of the co-design protocol); they could linger on specific artworks, or stop the co-design video if they felt like it. The delay between the initial protocol and the auto-confrontation to collect the

Flow data collection was done a few hours after the initial activity in most cases and up to a couple of weeks for a few participants. Researchers on memory recall (Vermersch, 2004; Janet and Paul, 1925) have known for a long time that effective recall can be expected through strong sensory triggers. Using auto-confrontation through video review appears to be such a case as the delay did not seem to affect the participants' memory. All participants remembered the artworks or co-design moments that had brought them strong emotions (Flow, anxiety) and were not as clear with the other states, whether hours or weeks away. This is in keeping with Csikszentmihalyi (1975; 1988) description of Flow as a memorable state.

Physical gestures assessment: The nonverbal activity was assessed through the physical gestures of the participants. We relied on the list of process-specific mental resources from chapter 4 (reprised in Figure 9) to determine which of the verbal or spatial processes were active. Each study associated modalities (visual focus, hand and arm movements, body posture) to specific, unambiguous gesture related to the study's task (talking about art or co-designing).

The gesture data was coded from video recordings, noting for every 10-second increment, all the gestures of each participant.

Verbal / nonverbal discourse assessment: In both studies, the task involved talking (co-design requires partners to communicate; relating their art appreciation experience to a researcher in an interview is a verbal task). Both tasks allowed for a lot of verbal communication and some nonverbal discourse; in the art appreciation, most participants became speechless and still as they recalled and re-visited some of the artwork they had seen in the visit (these were coded as such if the participant delayed a response or commentary for more than 4 seconds); in the co-design study, there were times when participants spoke very little, communicating through the visual representation.

The verbal / nonverbal assessment is a binary assessment: The video recording of the task was coded (in the same 10s increments) as verbal discourse when the participant spoke, and nonverbal when the participant withheld from speaking (e.g. did not respond

verbally to a question but was still involved in the discussion). Eventhough, this is a binary coding, because of the 10-second timeframe, these were not mutually exclusive, meaning that within a single 10-second increment, a participant may end with speechless response and launch into a fluent verbal comment. Were not coded: moments when the participant manipulated the visual recording of the task or the researcher's questions.

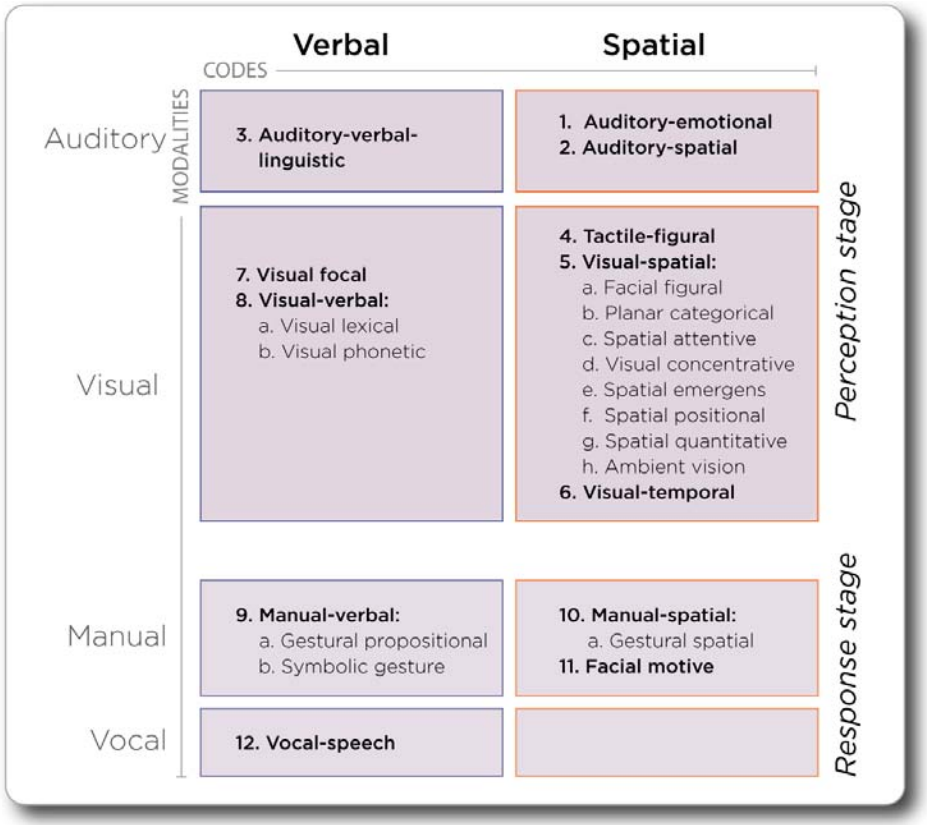

Figure 9. Diagram of the process-specific modalities (visual or auditory) and responding resources (manual and vocal) from Wickens (2008), Boles (2010), Hostetter and Alibali (2005; 2008), Xu and colleagues (2009)

The ***methodological framework supporting the external focus***, centering on the contrast between the extrinsic-goal, task-related experience and the intrinsically valued autotelic experience was pursued in the third study. Telling about a museum visit, the second study, is a leisure-oriented task and as such is not the most exemplary case of extrinsically motivated activity. That study discusses the extrinsic and intrinsic nature of

the types of verbal statements and what it says about the progression towards the autotelic experience.

The co-design study is set in a context (a co-design task) that offers a strong contrast between its extrinsic and autotelic experiences. To compare them, in addition to the assessment of gestures / discourse (spatial/verbal modalities) to psychological experience, we have assessed tools and task (Figure 10). The external focus has been the concern of usability all along. In order to frame the autotelic experience, the relationship between these two experiences needs to be studied at once. This research uses the external focus to contextualise the internal aspects of the experience. The co-design study relies on the NASA TLX Workload questionnaire (Vidulich and Tsang, 1985) (questionnaire in Annexe A, p.i) to assess the tools and the task is monitored through the Design Conversations (Dorta et al., 2011). The tools and task are also assessed with the Flow, gestures and discourse frameworks presented above.

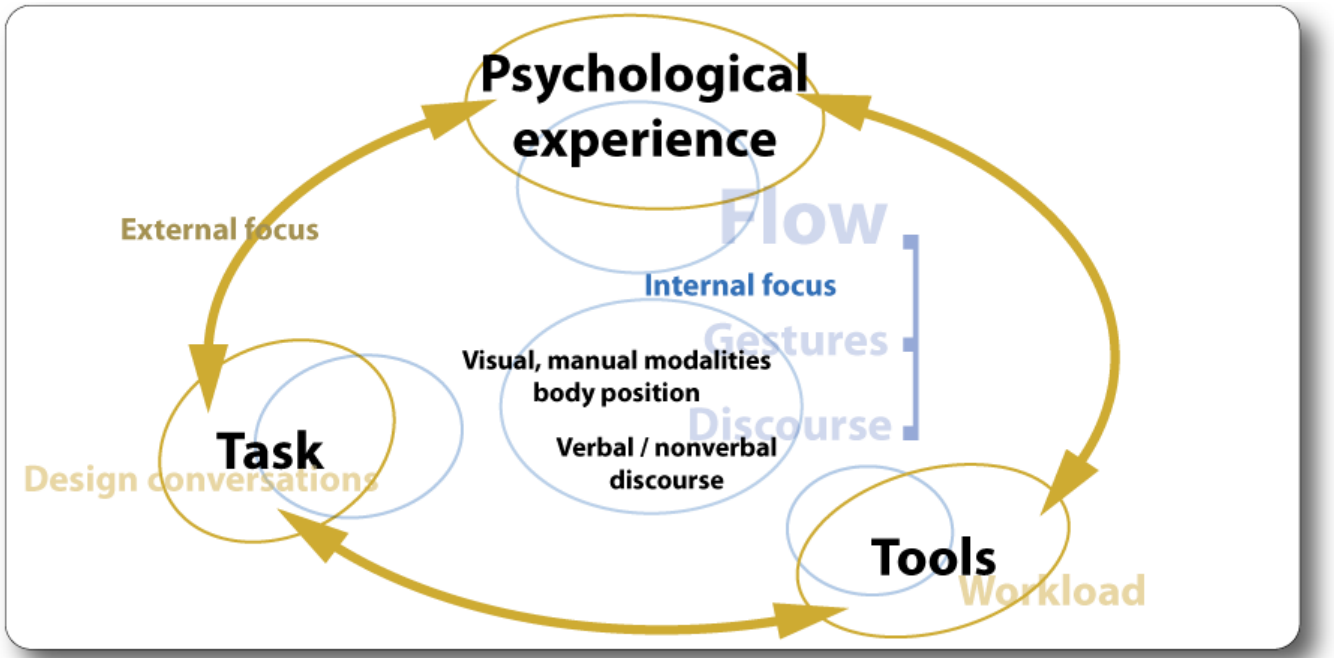

Figure 10. Diagram of the external and internal methodological focus

5.2.3 Qualitative and quantitative analyses: getting a clearer picture

This is a qualitative research, where we have collected qualitative data, some of which we have quantified to be more precise in our analyses. The case studies compare three to five levels of data; the descriptive quantitative analysis helps organise the results. The purpose is to describe the experiences we have observed more carefully by being able to hightlight links between variables that otherwise would have gone unnoticed.

The quantitative analyses look at the possible association between variables through relative deviation (RD). The RD is a descriptive implementation of a statistical approach to data analysis. RD does not make statistical inference; it is strictly descriptive. It allows us to interpret quantitative data by evaluating if the concentration of effectives that has been observed is higher or lower than would be expected if the two variables were independent from each other (had no impact on each other).

A key advantage of RD is that it normalises the number of observations, bringing them to the same scale. This allows comparing variables at a glance.

5.2.3.1 Relative deviation calculations

The RD is calculated by multiplying the column magin (*CM*) by line magin (*LM*); this gives the theoretical effective (*Fth*), which is devided by the total amount of onserved effectives (*Fo*):

$$(CM \times LM) / Fo$$

Then, substract the theoretical effectives (Fth) from the the total observed effectives (Fo), divided by the theoretical effective (Fth):

$$(Fo - Fth) / Fth = \text{the relative deviation}$$

The relative deviation is a ratio, also called the rate of association, which gives a distance from the theoretical effective, i.e. what would be expected if the two variables had no particular association. 0.0 suggests the two variables are independent from one another, have no influence on each other (no association).

In this research, following standard practice, a distance equal or greater than +0.25 has been taken to imply there is a higher concentration of effectives than expected which implies there is a link between the two variables. A distance equal or smaller than -0.25, indicates an absence of expected concentration, implying an inverse association: the two variables repel each other.

5.3 Summary

The research approach was influenced by the fact that we are studying an unfamiliar experience. It led us to choose experiences that were 'naturally' occurring. It dictated an inductive approach, looking for exemplary cases to reveal the workings of the autotelic experience. Because we wanted to get a deep understanding of this experience we opted for case studies. The two case studies were designed in relation to one another, to complete each other, covering together multiple levels of focus: where one had more effectives (34 minutes of Flow attached to 67 artworks), the other had more depth (32 minutes of Flow spent on only two projects); where one required a receptive engagement in a leisurely context (museum visit), the other demanded an active engagement in a professional capacity, the former exemplifying Schaeffer's aesthetic experience, the latter, Csikszentmihalyi's Flow.

Part II: Three studies

Chapter 6
First study: Sitting on an office chair

Chapter 6 presents the first study of this research. This study was conducted early on, its results influencing how to frame the autotelic experience in this research. The goal of this study was to directly observe signs of the autotelic experience to get an initial understanding of this experience and to complete our theoretical framework for this research. It was conducted over multiple rounds of analysis of three different experiments: a short user-test and exit interview with 10 participants; a one-week user-test and interview with one participant; and a focus group with 7 participants who have sat on the chair at work for four to ten years. The data from all the interviews was analysed successively through four frameworks: (1) Norman's (2004) emotional appraisals, (2) Bih's (1992) types of meaning built by objects, (3) Schaeffer's (2000) aesthetic experience, and (4) Beeman's (2005) bilateral language comprehension. The results of the first two analyses pointed to a gap in UX knowledge about how users receive or encounter sensory information prior to emotional appraisals. The aesthetic experience and bilateral language comprehension frameworks have prouved useful to study and document how sensory information is received.

For this first study, we observed the experience of an office chair[5] renowned for its outstanding ergonomic features and style. The goal of this exploratory study was to observe the autotelic experience through either direct observation or through signs of the experience as related in post-interaction interviews, in order to get a better sense of its workings, and of how it should be studied in the rest of this research. We did three experiments: two user-tests with interview; a focus group with long-time users. Four layers of analysis have been successively added, one at a time, as we sought to observe and document the actual experience and not only its effect (the ensuing emotional appraisal).

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[5] This experiment was done in conjunction with a research assignment from the chair manufacturer who has asked to remain anonymous.

The chair chosen for this study is produced by a design-driven American manufacturer of office furniture. When this chair came out in the mid-nineties, it created something of a revolution in the office furniture paradigm. It was considered the best office chair there was for a long time. It has received numerous prizes and it has been widely recognised for its 'innovative and extremely effective' user experience (Veryzer and Borja de Mozota, 2005; Martin, 2009). It is a high-end chair that penetrated the market from top to bottom: from design museums to corporate workplace, all the way to offices of self-employed workers who felt that the benefits of sitting on it all day justified the expenditure. This kind of market-penetration is not delivered only by strong brand-image; it rests on the users' enthusiastic appreciation (very strong for the first 10 years and still going on twenty years later). That appreciation appears to go beyond what good products usually get. The chair manifacturer did all in its power to ensure the chair stood out; but the success, in sales, awards and over time, is exceptional. For these reasons, we felt that if a design product can deliver an autotelic experience, this office chair would. As we looked for the autotelic experience, we sought what makes the experience of that chair outstanding; i.e we looked for the DNA of the experience of that chair.

6.1 Experimental setting

This being the first study on the autotelic experience, we decided to cast as wide a methodological net as possible over the observed situations. So we devised three samplings: a short protocol where 10 participants used the chair for 15 minutes while working on a computer, a one-week long user-test, and a focus group with seven people who have sat on these chairs at work for 4 to 10 years.

The goal of the short protocol was to witness a first encounter with the chair in as normal a setting as possible, to see the chair's impact on a very short encounter, and to witness participants using the chair. The one-week protocol aimed at understanding the mid-range experience with the chair (over 25 hours of use—a fair amount of time, but not long enough to develop "a history" with the chair). And we wanted to hear what long-term users of the chair had to say about it after several these years. With the focus

group we sought to hear about in-depth experiences of the chair, using the focus group format to get a lot of information at once, to produce insights that might be less accessible without the interaction found in a group (Morgan, 1988).

(1) Short protocol: There were two issues we had to take into account while conceiving a use-test for the chair; (1) an office chair is indirectly supporting a work-related task, i.e. an office worker will likely be directly interacting with tools located on the desk when at work, the office chair holding a structural role that affords little to no direct interaction during extrinsic office tasks. Furthermore, (2) we did not want to skew the participant's attitude by drawing undue attention to the chair. So we came up with an experimental setting where the participants did an eight-minute task at a computer, while sitting unsuspectingly on the chair. For participants to experience the chair as they would any work chair, we set-up a situation: they were told this was an experiment on a new simple household-design interface were they had to design a kitchen and dinning room, with Sweet Home software. Before each new participant arrived, we would "disadjust" the chair, setting it very low, to see if the participant would adjust it in an automatic gesture.

Once the task was done, there was a 5-minute semi-structured interview where they were told the test was about the chair. They were asked to play with the settings and adjust the chair to themselves, this way we could witness a conscious, direct interaction; after the experiential questions, we presented the chair's history, awards and price, to see how this information changed their appreciation. Each participant responded to four questions (Annexe B, p.iii) and sat on the chair for no more than 15 minutes in all.

(2) One week protocol: We asked a participant to use the chair for a week in his office. After the week of use, he gave us a 37-minute semi-structured interview, answering 7 open-ended questions (Annexe B, p.xii). The purpose of the one-week user test was to gather data bridging the short experience and the longterm experience with the chair, ensuring different levels of focus that tie into one another in a steady progression.

(3) Focus group: The group and interviewer convened in a large meeting room at their company headquarters, sat around a table and talked. The participants knew each other

professionally. The focus group was audio recorded. The group took an hour to respond to 5 open-ended questions (Annexe B, p.xx).

In the interviews, most questions concerned the participant's direct experience with the chair, while one asked them to find a metaphor to describe the chair. This last question is a standard "*portrait chinois*" or assessment through analogy (Boulaire, 2004). We asked each participant if the chair were an animal, what animal would it be for her/him. The purpose of this question was twofold: first, we wanted to see if their knowledge and proximity with the chair was rich enough to spill into their imagination. Secondly, to switch the participant's discourse from rational and descriptive to experiential, i.e. expressing their impressions by way of analogy. This kind of analogy provokes spontaneous associations bypassing linear rationality (Boulaire, 2004).

6.2 Sampling

(1) Short protocol: We met with 10 participants, all graduate students in engineering or physics, 22 to 42 years old. There were two women out of 10 participants; the only two who knew of the chair before the test. These 10 participants were chosen to be representative of people working in an office who had no particular knowledge of design.

(2) One week protocol: We enlisted one participant to use the chair for a week in his office. The participant was a professor in cognitive ergonomics with a personal history of backaches, which made him a very attentive expert user of office chairs. To invite this participant was a theoretical sampling decision; at the time, a tight study schedule limited the amount of one-week user tests we could pursue (we only had one chair to lend), so we sought out a participant who could voice a well-informed opinion. Ideally, we would have done a few more to saturate the one-week user-test data, but this weakness was partly compensated by the richness of the data collected.

(3) Focus group: We convened 7 participants for a focus group that lasted 60 minutes. The participants had been using the chair for at least 4 and for up to 10 years at work. They worked at an oil and gas company in Calgary, Alberta. There was an administrative

secretary, a team lead, two managers, an accountant, an engineer and the general manager, which may have pressured some to perform smartly. These 7 participants, three men and four women, were chosen to be representative of office workers, with no professional ties to design, but also as representative of all the echeleons in the company.

6.3 Data processing frameworks

For this study, we chose one type of the data collection and three analysis frameworks to assess all the known dimensions of the subjective experience as presented in Desmet and Hekkert's (2007) framework for product emotion (affective, cognitive and aesthetic) as well as an extra framework considering how meaning is attributed (Table iii).

Office chair	N	Experimental setting	Data collection	Audio/Video recordings Frameworks for analysis	Interview verbatim
Short protocol	10	A station w/ a computer and the chair 15 min / participant	• Semi-structured interview • Video recordings (short protocole) • Audio recording (other 2 protocols)	• Emotional expressions (Norman, 2004) • Expressions of meaningfulness of objects (Bih, 1992) • Aesthetic experience (Schaeffer, 2000) • Bilateral language comprension (Beeman, 2005)	3230 words
1 week protocol	1	The participant used the chair in his office for a continuous week, where we had the interview.			3240 words
Focus group with long-term users	7	One hour focus group			3560 words

Table iii. Parameters of first study: sampling (N), settings and data processing (collection and analysis, with respective word count from interview verbatim) in 3 settings

The interviews were video-recorded then transcribed, their content analysed. The analysis was done by identifying segments of the verbatim according to the four frameworks (Norman, 2004; Bih, 1992; Schaeffer, 2000; Beeman, 2005). For the first two analyses, the categories were compared according to word count. The short protocol's ten exit interviews added up to an hour of video. Because the participants were asked to play with the chair during that time (a rather silent activity), the total verbatim only added up to 3230 words. The one-week user-test interview lasted 37 minutes, with 3240 words verbatim. The focus group lasted 60 minutes, with a 5550-word complete

verbatim, but once the greetings and friendly banter were taken out, the verbatim considered for analysis added up to about 3560 words (Table iii).

6.3.1 Norman's emotional appraisals

Norman has 3 categories of emotions: the visceral, the behavioural and the reflective (Table iv). Sentences or sections of sentence that express an emotion belonging to each category, were tagged. The total number of words used in each category (notwithstanding the number of interventions) were tallied and compared to the other two categories.

Categories	Description of categories
Visceral	Rapid judgments (such as good or bad, safe or dangerous, wow or dull)
Behavioural	Active usage of the product and functionalities, playing, showing it to friends and colleagues, upgrading it, etc.
Reflective	Watching over, reflecting upon, aiming at influencing the behavioural level. Based on information coming from the other levels and on one's knowledge, experience, culture, and, or values, the reflections about the product will be positive, neutral, or negative.

Table iv. Description of the three types of emotions according to Norman (2004)

6.3.2 Bih's types of meaning associated to objects

For Bih's framework (1992) (Table v), we identified sentences or sections of sentences that expressed one idea, and counted the number of statements (no matter their length). The statements were tallied and compared with those of the other test. The short protocol was not included because it has provided almost no statement expressing how the chair builds meaning for the participant, their 15 minutes of use being too short to engage in meaning-building.

Type of meaning	Description of type of meaning
a. Objects for instrumental purpose	Concerns the function of the object
b. Objects as embodiment of	Object as an embodiment of cultural or personal values, ideals, or beliefs to improve the respondent's thinking, guide actions, or help make sense

values or ideas	of life.
c. Objects as manifestation of achievement	Objects could be a tangible mark of achievement, such as a transcript or an award, or the end product of a person's devotion of personal energy.
d. Objects as extension of memory	Objects can give a tangible manifestation to the fleeting moments of joy and pain. They might represent a particular event
e. Objects for deepening experience	People get enjoyment or pleasure and express or transform their feelings and emotions through **interacting** with the object.
f. Objects for social exchange	Objects, such as posters on the wall or photographs on display, can easily function as an initiator or a topic of social conversation.
g. Objects as extension of self	Objects as expression of the 'core' self. These objects constitute a very important part of a person's life. The boundaries between self and object are blurred in this category.

Table v. List of the seven types of meaning an object can acquire (Bih, 1992).

6.3.3 Schaeffer's autotelic experience

For the later round of content analysis, we analysed only the data from the focus group, identifying sentences or segment of sentences that carried a whole concept. This last content analysis differs from the previous ones in two ways: (1) There is no count of any sort, but simply analysis of different individual segments looking for traces of an autotelic experience with the chair; (2) we not only considered *what* they said, but *how* they said it too. The key indicators for the autotelic experience, according to Schaeffer's account of the aesthetic experience are listed in Table vi.

Key feature of autotelic experiences	Indicators –Looking for signs of…
(1) A switch from everyday attention (means to an end) to aesthetic attention (an end in itself)	…considering the interaction as an end in itself
(2) "At a given moment, sensitive information strikes the person's awareness and triggers aesthetic attention"	…special awareness triggered by sensory information
(3) "This sudden realization is accompanied by the imperceptible tension of wanting to prolong this moment of awakening to prolong the pleasure it generates."	…wanting to prolong the moment of interaction

(4) Pleasure is central (4a) Although pleasure is central, it may run parallel to other emotions experienced simultaneously	… potential for a complex layered awareness within the pleasurable experience
(5) Experience is subjective; beauty is "in the eye of the beholder", i.e. that aesthetic appreciation is a cognitive activity and not a property of an object or event.	… personal appreciation (away from commonplace opinions)
(6) The aesthetic experience is associated to the receptive, yet cognitively active moments.	…actively receptive stance
(7) The aesthetic attention is autotelic, in that its goal is to keep the awareness of the attention going, it runs in a loop driven by the pleasure it generates.	… a loop-like dynamic between heightened personal awareness and the pleasure it brings

Table vi. List of key characteristics of the autotelic experience according to Schaeffer's aesthetic experience

6.3.4 The RH coarse semantic coding theory

Beeman (2005) explains how the LH and RH make sense of the same linguistic information differently, how the LF process makes a quick and direct association to a single meaning, the RH seeks distant associations. The RH activation is particularly called for when presented with diffuse communication. The interest of this theory for this study is the difference in quality the LH and RH activation provide: the LH is clear direct focused; the RH provides distant associations, coarser match for meaning and a slower processing time. The RH is associated to providing contextual information to the LH pointed information (Jung-Beeman, Bowden and gernsbacher, 2000).

6.5 Results

6.5.1 Expressions of emotional appraisals: Reflective appraisals are the richest over time

We used for this analysis Norman's visceral, behavioural and reflective emotions' framework (2004). Examples of visceral expressions are: "*Whoaaaah*", "*It's beautiful*" and "*When I first saw it, I thought it had more style than other chairs*".

Examples of the behavioural expressions we collected are: "*When you're sitting you feel it. It's comfortable*" or "*the lumbar support makes all the difference in the world*".

Reflective expressions come in a much wider variety because they are rooted in personal views, values, sensibility, and previous experience, and because one can reflect through many different lenses (e.g. from brand image to personal interpretations, to emotional considerations). Examples from this data are: "*a trophy chair*" (expression of social status), "*It's well engineered, very classy, not tacky. It reflects my values*" (association through personal values), "*it also empowered you… for me, it empowered me to, at last, have a chair that would fit me. Instead of just the standard one-size fits all*" (expressing an emotional reward beyond the behavioural realm), or "*but it also has a multi-jointed quality like a giraffe*" (appropriation through personal analogy).

Within the limitations that come from comparing not-quite-symmetrical samplings, the raw numbers (Table vii) tell an interesting story.

	Short protocol	1-week user-test	Focus Group
Visceral	101 words	134 words	123 words
Behavioural	157 words	260 words	309 words
Reflective	85 words	157 words	662 words

Table vii. Words per category of emotional expressions, per experiment

***Expression of visceral emotions*:** The number of words used to express visceral emotions inspired by the chair is surprisingly similar in all three samplings. Ten people in their first contact with the chair, in one-on-one interviews, have almost as much visceral emotions about the chair than someone using it for a whole week or for a group of them sitting on it for 4 or more years. It appears that the visceral emotions come up in the first few minutes and do not vary much after that (Figure 11).

***Expression of behavioural emotions*:** The number of words used to express behavioural emotions inspired by the chair sees a slight increase over time (Figure 11): from the first

few minutes to the first week a hundred words were gained, whereas from one week to four years and more, just 50 of so words. It appears that the behavioural experience almost levels off after the first week of use.

Expression of reflective emotions: On the other hand, the number of words used to express reflective emotions inspired by the chair go from 47 in a few minutes experience, to 157 after a week of use, to 650 after 4 years of use; this number has kept increasing long after the first week (Figure 11). Participants exposed their reflective emotions every time they related their experience of the chair to another part of their lives (e.g. values, self-image, personal analogies).

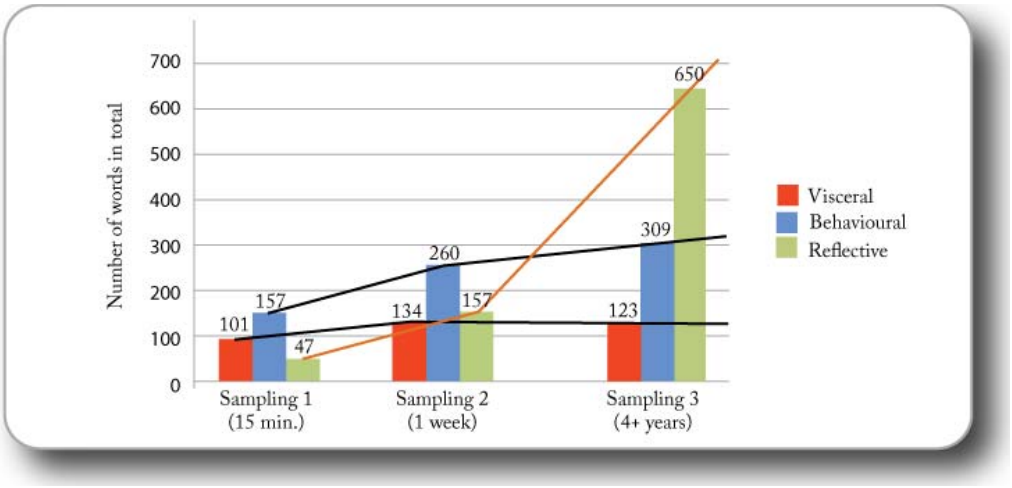

Figure 11. Diagram of the number of words per category of emotional expressions per sampling

Reflective emotions could be found in the answers to any of the questions asked, but the question that elicited reflective emotions from the most people was: *if the chair were an animal, which would it be?* The participants with the least exposure to the chair, in the short protocol, had a hard time coming up with an analogy. Of those who offered an answer, most made an analogy based on the colour of the chair as the only criterion, while one, who knew of the chair beforehand but had never sat in one before that day, came up with an analogy based on three criteria. The participant in the one-week user-test offer an analogy founded on functional and social-status criteria, putting the brand image of the chair in perspective of his own values. In the third sampling, every participant, however

startled by the request, had ideas of what animal this chair was to them and explained at length why they felt that way. The criterions here ranged from rational and functional to poetic and personal; all came across as stronger personal expressions than those of the other samplings.

This result suggests that the long-term emotional appeal for the chair is to be found in the expression of reflective emotions. The growth over time of reflective expressions appears to echo the prolonged appreciation the chair receives from its users. Now, the autotelic experience being a specific experiential state "*so desirable that one wishes to replicate it as often as possible*" (Csikszentmihalyi, 1988), it is likely to be the object of reflective emotions (as it is expressed, replayed, sung, expounded, and appropriated through the reflective discourse) long after the interaction. In short, reflective emotions may express the memory of an autotelic experience after the fact.

6.5.2 Results from the expressions of meaningfulness: Expressions of instrumentality comes out on top

For this analysis we considered only the one-week user and the longterm users; the short protocol participants did not have enough knowledge of the chair to have integrated the chair in their world.

According to the data collected, the chair was seen first and foremost as an object for instrumental purpose (Figure 12). This is understandable since it is an office chair, and one reputed for its ergonomic qualities. In a distant second impression, the chair appears to be seen as an object for deepening experience.

Bih describes these objects as holding an important share of the meaning imbued to a larger experience (e.g. a tea set imbued with all the potency of the daily ritual of having tea). Here the chair was apparently not only associated to the work experience (A: 40 in one-week user test and 64 words in focus group), but added depth to this experience (E: 23 words in one-week user test and 19 words by focus group). For example, one of the focus group participants explained how the chair was emblematic for him of his career move, reminding him daily that he was where he wanted to be. Another

example is this participant's impression of the message that the chair carries at their work place: "*This is personal, but I think an organisation that is providing all its employees with [those] chairs is saying: "We give you the best, and we expect the best.*"

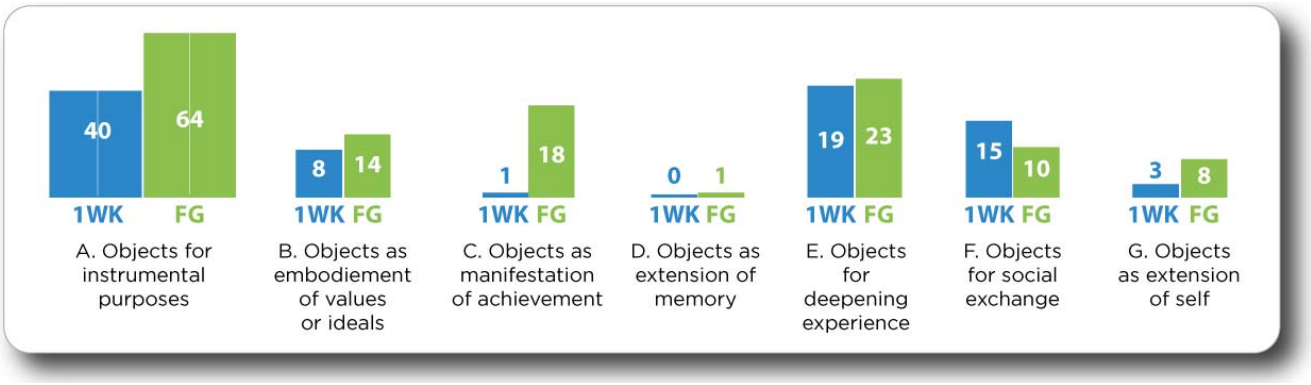

Figure 12. Number of statements relating to Bih's 7 categories (1992) from interviews verbatim for the 1 week-participant and the 7-people focus group

Although the subjective experience of sitting in this chair is undoubtedly good, the two results so far skirt around the subjective experience at the moment of interaction. The emotional appraisal may suggest echoes of a previous autotelic experience, yet it speaks of what happened after the interaction while the building of meaning integrates the user's new and previous experiences (well removed from the blind immediacy of an autotelic episode). We turned to the aesthetic experience, looking for signs in the verbatim of how users experienced the chair while interacting with it.

6.5.3 Results from the aesthetic experience: Giant three-toed sloth and personal narratives

This last round of content analysis concentrates on the third experiment, a seven-people focus group, because the autotelic experience is probably at the root of the reflective emotions and long-term users have expressed the most reflective emotions (see Figure 12). We considered only this segment because these participants have had years of real-life experience with the chair and because the group dynamic underscored some interesting differences in their answers. We kept in mind how Schaeffer (2000) describes the autotelic quality of the aesthetic experience (see Table vi, p.88) looking for signs of this experience. For this content analysis we considered all the statements of the focus

group without quantifying them. Two exchanges bear the signs of a past aesthetic experience.

To the question "if your chair were an animal, what would it be?" the answers convened a menagerie made of a bear ("…*because it hugs you like that*"), a cat, two dogs (*"P2: … A house pet. A lot of times they're just there. (…) It's just a comfort factor. They're … P4: dependable."),* a horse, a giraffe ("…*a multi jointed quality*") and a giant three-toed sloth.

> *P3: […the sloth] is kinda like a bear, but it could be dangerous. It's kinda jointed, but it's not. It does its own thing. It's exotic. (…) it's comfortable, but if you happen to fall into its knot, it's not. So it has this dexterity…(…) the sloth looks like the orang-utan, but it's scarier. It has an exotic… specially when you see the claws… but it's so slow, it's not gonna do anything. So it's a false danger. It's like seeing that chair. It's like uh...*
>
> *P2: (...) if you use all the levers and stuff… (…) Lots of people don't like touching the levers either. They just sit, and won't touch it.*
>
> *P3: …Yeah, you don't touch the sloth*. (See verbatim, Annexe B, p.xxx)

The sloth analogy captures what participant P3 perceives to be the "attitude" of the chair as a whole. The holistic nature of this description contrasts with others. It expresses a complex situation where different dimensions of the chair are intertwined; here comfort and technology create new meaning together, whereas most other participants have addressed these as separate. With all its unfinished sentences, as if no words were right or easily found to name what is felt, this statement is not so much descriptive as it is evocative. Furthermore, far from being commonplace, this analogy appears to build on personal perception, runs counter to the chair's brand image (an unlikely personal association, a trace of heighten awareness). To be sure, the participant adamantly loves his chair, and this is not a critique but an *insight* that came from a unique and personal awareness of the chair. This description calls on Scheaffer's aesthetic experience in different ways: P3 is responding to what he perceives of the chair, he "*lets the chair act upon him*", seeking the right mental image to correctly represent it. He is discriminant and playful in his description and he describes being with the chair, making

sense of it and how it makes him feel (the emotional appraisal that closes the aesthetic experience—see Table vi, p.85), not the instrumental quality of the chair. This description suggests that P3 has had an aesthetic experience with this chair.

In another exchange, concerning a real-life experience of the Barcelona chair by Mies van der Rohe, a participant expressed a very sensitive appreciation of a formal detail. It was a rich exchange where the group was self directed and engaged, apparently enjoying this experience vicariously.

> *P1: What I find is that the back is inclined; super comfortable. It's just a very slight incline.*
> *P3: Yup.*
> *P7: So it's very contemporary?*
> *P1: It's super contemporary*
> *P3: It's 50 years old*
> *P1: …It was presented by Mies in 1929. But it looks modern.*
> *P4: Yeah…*
> *P1: that small incline makes it super comfortable. You can spend hours in that chair, even though there are no arms.*
> *P3: yeah…*(Verbatim, Annexe B, p.xxvii)

This exchange denotes an experiential awareness to formal detail (akin to the aesthetic experience's heighten awareness to sensory information), which was expressed in a moment where the group was agreeing around the evocation of a pleasurable experience. This was a special moment in the discussion: it was a four-way conversation involving a fair amount of repetition (P1 repeating how comfortable the incline of the back was, with P3 and P4 responding with "yeahs" in echo of this statement). The transcript of this exchange does not do justice to the pregnant quality of that exchange. The group came together at that point, appearing to understand through their own baggage and through few words what the experience of this lounge chair was. The lingering, the repetitious discourse suggest they did not care to get out of this imagined experience. This matches Schaeffer's description of the loop-like autotelic experience. Remembering the Mies van der Rohe chair appears to have set off a moment of collective aesthetic autotelic experience in the midst of the focus group.

Some less peculiar statements also express personal reflections. For instance, a participant felt *empowered* by the chair (quoted earlier) because it came in the right size for him. Again it is not commonplace to associate appropriate size to feeling empowered, associating unlike categories (Lakoff, 1990). It suggests that there must have been a moment of awareness, perhaps when sitting in the chair and appreciating it. These might be signs of awareness of past autotelic experiences.

These examples further suggests that the aesthetic experience framework allows the researcher to peer into an interaction with instrinsic rewards to see what attracked the participant's awareness *before* the emotional appraisal was issued.

6.5.4 Two ways of attributing meaning to the chair: clear and direct vs. distant associations

Although all agreed that the chair was great, they repeatedly argued about what made it so. The participants were split between opposing sets of appreciations: those who explained the chair through instrumental arguments, versus those who projected complex, open-ended and personal meaning onto the chair. Those attached to the instrumental views were very clear about the reasons the chair was great. For instance:

> (At that point in the focus group, the functional aspects of the chair had been discussed at length, and the researcher was asking about the impact of the look and brand image.) *R: Okay, so when your environment looks good… does it help you perform?*
>
> *P4: (…). It gives you enough comfort to stay there an extra hour or two.* [Back to a functional analysis]
>
> *R: But aside from the physical support for your back, what about the cool factor?*
>
> *P4: not really. When you're sitting, you feel it.* [Interesting functional analysis following a clear negation of any impact of the brand image]
>
> *P7: I think it does to some degree. If you were sitting in an old stained, frayed chair you're not gonna feel the same sense of pride, or that you are valued as much as if you're provided with this beautiful high-end chair.* [Making sense of the chair's brand image through hedonic reward]

> *P6: It's no different than being in an inside office, no windows, on the second floor, or having a view of the entire city.* [Analogy in support of previous point]

The way either group voiced their arguments, their apparent opposition, made us wonder if these were two distinct ways of perceiving a situation, relying on different sets of mental processes that could not be reduced to one or another, they were so different.

The RH coarse semantic coding theory (Beeman and Chiarello, 1998) explains at a neurological level how meaning is attributed. The way the two groups of participants expressed themselves seems to match how the LH and RH attribute meaning. The participants who expressed the functional view spoke in clear, descriptive sentences, making unambiguous cause and effect links between elements (e.g. "*if you supply people with a good chair, they don't have back problems and it doesn't develop into health problems*"). The LH is responsible for attributing a single interpretation of a word and a few close or contextually appropriate associates, this hemisphere (most often the LH), will encode the great majority of the words encountered.

The non-dominant hemisphere (often the RH), also involved in semantic coding, provides contextual coding and distant associations when clear meaning is not readily available (Beeman and Chiarello, 1998). The participants with a more personal and evocative communication expressed not-so-obvious considerations, like the sloth analogy or associating the right size chair to feeling empowered.

The remaining three participants (P5, P6 and P7) went from functional to more personal opinions (for instance referring to the style of the chair as "*from outer-space*"). The ease with which the last three participants went from one discourse to the other suggests that the two types of discourse are not the prerogative of a particular personality type, but can be picked up by anyone according to the situation.

6.6 Wrap-up of the first study

The autotelic experience is not frequently encountered; this study sought to observe and get an initial insight into its workings. We were glad to have found signs indicating that some participants have experienced an autotelic experience. Also, the participants of all three settings assumed the chair great. We observed that a clearly positive appreciation could be equally attributed to instrumental and non-intrumental goals.

The RH coarse semantic coding theory addresses natural language comprehension, and as such may or may not apply (it is not known) to attributing meaning to nonverbal information, such as the diffuse information one gets from a chair and its use. But the similarities between the instrumental/pragmatic and LH activation and aesthetic experience and RH activation suggests that it is pertinent to look into how information is processed, and not only at the residual emotional appraisal. As it turns out, the participants who have expressed the more creative opinions about the chair also happen to be those who have expressed the most insightful reflections.

From the personal analogies and reflections, we retain that these may be signs of past awareness or insights triggered by their experience of the chair. Schaeffer states as possible expression of the aesthetic experience what he calls a mundane epiphany or illumination, a self-sufficient moment of "absolute immanence". By which he means moments where everything in a situation make sense as it is, that "*things fall into place, asserting their presence in a sense of being that is an end in itself, calling for no other existential justification*" (Schaeffer, 2000, p.16).

Lastly, the Barcelona chair story suggests that autotelic experiences can be rekindled when recalling them. Turn-of-the-century psychologists, Janet and Paul (1925) have established that people psychologically relive an event if their memory is triggered experientially (e.g. through a photograph, a film, a strong odour, a significant object, etc) (Vermersh, 2004). What appeared to have happened in the focus group was a fleeting autotelic aesthetic experience, occurring right there and then, akin to the experience of listening to a storyteller.

The two contributions of this study to our research is (1) the addition of Schaeffer's aesthetic experience and (2) having determined that How information is received, the addition of the neuro-cognitive (Beeman, 2005) and psycho-cognitive (Tversky, 2005) to our framework..

6.7 Summary

The goal of this first study was to see if the autotelic experience could be observed and what could we learn about it. We had devised three protocols with a high-end office chair: a short 15-min use-test, a one-week use-test and a focus group with long-term users. Signs of autotelic experience with this chair appeared to be located in the participants' reflective appraisals of the chair (Norman, 2004); the chair was associated mainly to instrumental meaning and to a lesser degree to deepening experience (Bih, 1990). The content analysis through Schaeffer's aesthetic experience (2000) allowed peering into the interaction itself. The chair appears to have triggered moments of aesthetic awareness that led to insightful reflections (e.g. the giant three-toed sloth). There was what appeared to be a moment of collective autotelic aesthetic experience where the researcher witnessed a slowing down in the discourse, using fewer words and lingering in the reverie by repeating segments over in a way that match Schaeffer's description of the autotelic loop. The focus group displayed two contrasting ways of explaining why the chair was great, which led us to consider that how the information was processed could have an impact on the nature of the positive experience, as intrumental or non-instrumental positive experience.

Chapter 7
Second study: Visiting and telling about a visit to the art museum

The second study looks at a typical aesthetic experience (Schaeffer, 2000) in our investigation of the autotelic experience. 7 Participants have enjoyed a receptive engagement, as they toured a new wing of the Montreal Museum of Fine Arts housing a familiar art collection. Their experience was assessed according to 3 categories of variables: the psychological experience through the Flow framework (Massimini and Carli, 1988), the physical gestures (Wickens, 2002; Boles, 2010; Hostetter and Alibali, 2005; Tversky, 2005) and verbal discourse (Wright, Wallace and McCarthy 2008). We sought out the associations between the elements of each category using relative deviation (RD). Two Flow patterns became apparent: the speechless and receptive pattern and the innovative reflections pattern. The results suggest that the receptive (Schaeffer, 2000) and active (Csikszentmihalyi, 1988) autotelic experiences are part of the continuum of a single experience; in this case, the receptive leading to the actively innovative autotelic experience.

7.1 Visiting and reconsidering the experience

The previous study, the experience of sitting on an office chair, looked at a somewhat passive engagement, as one sits on a chair, carrying-on office work, paying no or indirect attention to the chair or the act of sitting for most of the day. We wanted to follow up by looking into a receptive engagement, typical of the aesthetic experience: we focused on encountering artwork in a museum. The goals of this study were to learn more about the autotelic experience, to witness it firsthand, and to identify what is the place of spatial and verbal processes in this experience.

In a pre-test done in the museum with a fellow lab assistant, the participant stayed quiet and kept to himself, resisting questions. The hushed atmosphere, with other members of the public and security staff around, appeared to encourage a more

introverted experience. It was realised that by requesting any type of commentary on the spot from the participant, the verbal activity was compromising his experience. Therefore it was decided to separate the museum visit from the data collection and proceed through re-visiting the experience later by presenting them pictures of the artworks they had seen. This was decided to respect the participants' silence 'bubble', which appeared to keep in balance the public context and the private nature of the experience.

Consequently, the data collection was done exclusively during the interview, after the visit when the researcher met in person with participants individually to review a series of 145 photographs taken from the six floors of the exhibition. For each picture, the participant would say if s/he remembered this particular artwork and if they did, to state, according to the Flow framework (Massimini and Carli, 1998), how they felt at the time. Most participants went beyond simply stating their psychological state and volunteered explanations and reflexions. Participants exhibited two radically different behaviours in the two parts of the protocol. Whereas in the museum their behavour had been quiet and discreet, in the re-visit, they were generally verbose, demonstrative and happy to share their impressions.

The "task" we studied and are presenting in this chapter is the retelling of visiting (known) artworks at the art museum. The initial visit was leisurely. Retelling an art experience is different but no less ligitimate an aesthetic experience than experiencing it directly; specially when the initial experience was strong enough that it is rekindled by revisiting it through good visual documentation (Janet and Paul, 1925; Vermeesch, 2004). Relying on Wright, McCarthy and colleagues' research on the direct and recounted aesthetic experience (Wright, Wallace and McCarthy, 2008; McCarthy and Wright, 2004; McCarthy et al., 2006) we are presenting here our observations on an autotelic aesthetic experience, and how spatial and verbal processes played into it.

7.1.1 Visiting the Montreal Museum of Fine Arts

We accompanied and interviewed nine people through the new wing of the Montreal Museum of Fine Arts (MMFA). The newly opened Claire and Marc Bourgie Pavilion

showcases the museum's Quebec and Canadian art collection. Although the Bourgie Pavilion was new, the art collection was familiar to the long-time visitors of the museum. This visit was for most participants a moment of recollection as they were familiar with these artworks as long-time members of this museum. They appreciated bumping into old favourites in a new context. For some participants, the visit led to something of a reconnection with their national identity through the artworks, as well as a new or renewed aesthetic encounter.

The visit started on the top floor with the Inuit Art Exhibit, and travel down 6 (six) floors, each of them holding a single thematic exhibit inside a large room (themes per floor: Inuit art; Founding Identities, 1700-1870; The Salons Era, 1880-1920; Paths to Modernity, 1920-30; Time of Manifestos, 1940-60; Open Fields, 1960-70). The artworks on display were mostly paintings, with some sculptures and religious objects. It took each group 1h15 to 1h30 to walk through the six galleries.

The participants visited the museum in three different groups: one group of five people who knew each other and two couples; the researcher accompanied each group. The participants were accompanied by a docent giving a tour and answering questions, and by the researcher in observation mode.

7.2 Methodology

7.2.1 Sampling

This experiment was conducted with 9 people of 36 to 77 years old, 5 men and 4 women, all of French-Canadian descent. Nine participants were all that was needed to attain data saturation and get a sampling that covered the whole range of art expertise, from novice to knowledgeable, with one having done undergraduate art classes and another having been an exhibiting artist for over forty years. When asked to rate their knowledge about art on a scale of 1 to 5, one answered 1, two 1.5, one 2.5, two 3, two 3.5, and one 4.5 (Table viii).

When analysing the data, it was decided to pull out the data of two participants; one had not reported having experienced any Flow during the visit and another for a combination of general reticence, shyness and data collection issue. The initial group of nine was therefore reduced to seven participants.

Age group	N	Gender	Fine arts expertise (1=poor, 5=strong)	Participants
35-45	2	FF	1.5, 3.5	P1, P5
46-55	2	MM	1, 3	P2, P4
56-65	~~2~~	~~MF~~	~~1.5, 2.5~~	OUT
66- 77	3	MMF	3, 3.5, 4.5	P3, P6, P7

Table viii. Distribution of sampling according to age, gender and expertise

7.2.2 Protocol

The participants were aware from the onset that the protocol was in two parts: First the museum visit, then the data collection as soon as scheduled allowed; for some it was hours after the visit, for others 2-3 days and up to 12 days following the visit.

At the museum, before the visit, the participants were instructed on the concept of Flow (with diagram and explanations), in preparation of the data collection to come later. During the visit, the researcher observed, took notes and refrained from distracting the participants; the only research intervention was to probe from each participant as they exited a floor, in as brief a manner as possible, a general appreciation by having them point at the Flow wheel. The purpose was to have them practice identifying their psychological state, so it would be easier to recall them. This data was not analysed as it related to a large and unclear collection of art objects.

7.2.3 Data processing

Participants' experience was assessed according to 3 dimensions: the psychological experience, assessed through the Flow framework (Massimini and Carli, 1988), the verbal discourse they used to explain their experience (Wright, Wallace and McCarthy, 2008) and the physical gestures that accompanied their recounting (Wickens, 2002; Boles, 2010; hostetter and Alibali, 2005).

Their experience was accounted in total time spent (in seconds). The coding followed the participants' discourse. The discourse was coded in segments, or occurrences; each occurrence lasting as long as there was no change in discourse category (detailed below) or end of intervention. Some types of discourse produce occurrences lasting only a few seonds, others minutes.

7.2.3.1 Assessing the experience: Flow and the neighbouring state of 'Alert-Control'

While in the museum, before the visit, they were introduced to the concept of Flow and shown a Flow Wheel (see Figure 5, Annexe A p.ii). Massimini and Carli's articulation of Flow was explained; a key condition for Flow being that one's perceived skills meet the perceived challenge. If this relationship is uneven, other psychological states rise up: worry, anxiety, arousal, control, boredom, relaxation, and apathy.

We collected the experience assessment through experimental introspection (*entretien explicitatif*, Vermersch, 2004). As they looked at the photographs of the museum exhibition they had just seen, their memory was jogged and their experience remembered. As far back as 1925 it has been observed that a strong perceptual stimuli (a clear visual, a taste or a smell) not only *awakens the memory, but gives the impression of reliving it* (Janet and Paul, 1925, as cited in Vermersch, 2004, p.28).

For each of the 145 pictures, the participant was instructed to first establish if they remembered it; if they did, what psychological state did they remember experiencing (worry, anxiety, alert, flow, control, boredom, relaxation, or indifference, referring to a Flow Wheel). Their answers were noted in association to the picture. Later, when the verbal and gestural content of the interview was analysed, the given psychological state was associated to the whole discussion surrounding the picture.

"Almost in Flow, small Flow, big Flow." Participants were instructed to use Massimini and Carli's Flow wheel, which splits the possible meeting of challenges and skills in eight different psychological states. Although they did use all eight qualifiers, they felt compelled to qualify their Flow state further by splitting it in 'small Flow' and

'big Flow'. This came up spontaneously in the first three interviews. We then mentioned it to the other participants who all chose to use this new distinction (all but one).

By small-Flow or almost-Flow, participants described being positively aroused or comforted by the artwork. This corresponds to the last degrees of alert just before Flow and the first degrees of control right after Flow on the Flow Wheel. The small /almost flow would be a hybrid liminal state on either side of Flow. Because it was meaningful to and used by the participants, this neighbouring 'Alert-Control' state was integrated in our data analysis.

Once all the data was coded, we decided to limit our analysis only to the data associated to the episodes of Flow experiences (small and big, or as we named it Alert-Control and Flow) for two reasons. Firstly, since the focus of this study is the autotelic experience, and this experience is contained in the Flow experience, we analysed only the data pertaining to artworks that triggered Flow experiences or its neighbouring Alert-Control state. The Alert-Control to Flow distinction provided enough contrast to identify and qualify the actual Flow experience, leaving out unrelated experiences. This is a defendable decision since each artwork is an aesthetic experience on its own right. We have seen a strong experience influence the following one, in which case the Alert-Control hybrid state will account for modulated introduction or exit to the Flow experience.

Moreover, when reviewing the visit, the participants easily remembered their stronger experiences (Flow, anxiety), and not so clearly the less engaging ones, whether they had visited hours or weeks before. The Flow experience was clearly remembered by all participants, which is inline with Csikszentmihalyi (1975) description of Flow as a strong and memorable experience.

7.2.3.2 Discourse analysis: 7 types of verbal statements

Since the task was to verbally describe, retell, explain their experience at the museum, it was important to monitor the verbal communication. Listening to the videos, we have established a list of the 7 types of verbal statements made by the participants: (1) visceral

expressions (*Aw. I like that one!*), (2) descriptions of the visit (*I remember, he came by and said…*), (3) external references (*this reminds me of this other painting by…*), (4) seeking to understand the artist's process either in terms of means and materials or in psychological terms, what lead the artist to do this artwork, (5) deep reflexions spawn by the artwork (e.g. anthropological and historical considerations triggered by Inuit art), (6) empathetic comments about a character or the topic of a painting (*I looked at her and I could just feel how…*), and (7) speechless, no words would come out. This last category imposed itself at the end although it is in fact an absence of verbal statement. There were a number of times when the participants were engaged, had reported being in Flow, but were unwilling to speak; when probed by the researcher answered little or not at all; although they controlled the pace of the presentation, they would not go forward. If all these signs were present and lasted more than a few seconds, we coded these moments as them being speechless (Figure 13). These verbal statesments were mutually exclusive. They defined what was coded for each artwork that was experienced as either Flow or its neighbouring Alert-Control hybrid state.

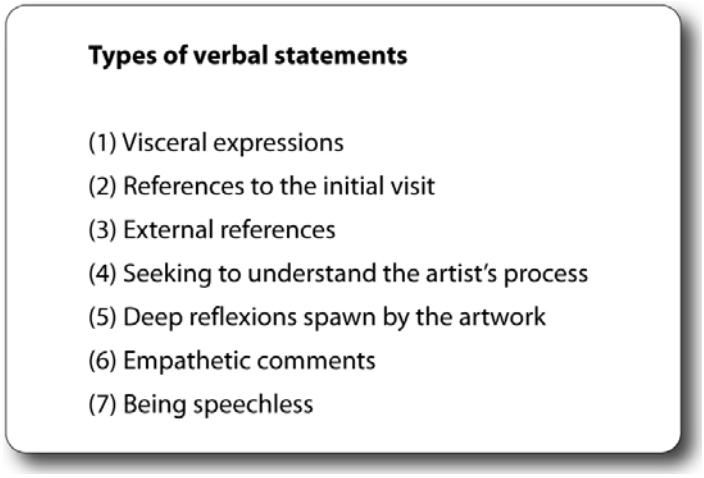

Figure 13. List of the categories that were used in the content analysis

These observed categories of verbal statements match some of Wright, Wallace and McCarthy's (2008) processes involved in making sense of an aesthetic experience:

"**Connecting**" applies to both Visceral expressions and Speechlessness. *Following Shusterman [2000], we make a distinction between the immediate, prelinguistic sense of a*

situation and our linguistically mediated reflection upon it. Connecting is our term for this immediate sense of a situation. In the moment of encounter, the material components impact us in a nonreflective way and generate a prelinguistic response (Wright, Wallace and McCarthy, 2008, p.18:6).

"**Interpreting**" applies to making sense through External references and Seeking to understand the artist's processes. *The process of finding narrative in the encounter, what has happened and what is likely to happen and how this relates to our desires, hopes, and fears and our previous experiences* (Ibid., p.18:6).

"**Reflecting**" is the same. *This often takes the form of an inner dialog with oneself. It is a form of inner recounting that takes us beyond the immediate experience to consider it in the context of other experiences* (Ibid., p.18:7).

"**Recounting**" applies to Recalling the visit. *Like reflecting, recounting takes us beyond the immediate experience to consider it in the context of other people's experiences. It is where the personal, social, and cultural meet* (Ibid., p.18:7).

Only Expressing empathy is not clearly represented in these authors' list of sense making processes. Expressing empathy would overlap "Connecting" in the sense of emotional, preverbal connection, but it was collected as a verbal statement, which makes it overlap with the process of "Interpreting".

7.2.3.3 Assessing physical gestures: visual, manual and body gestures

The participants used a limited number of physical gestures complementing their discourse; these were commonly observed throughout the interviews. They fall in three categories: visual gestures (if participants looked at or away from the computer screen with the slideshow, or at the researcher), manual gestures (pointing in space or talking with hands, or not using their hands at all) and sitting position (sitting back, sitting up) (Figure 14). Eyes, hands and sitting posture could occur simultaneously, but within each of these categories, the gestures are mutually exclusive. These gestures were coded from the interviews videos. Figure 14 shows typical examples of each gesture.

Figure 14. Examples of the coded gestures; 1: eyes fixed on screen screen, 2 looking at the researcher, 3 looking away from the screen and talking with her hands, 4 eyes on screen and pointing, and 5 sitting back

7.2.3.4 Experimental set-up for the revisit interviews

The researcher met with each participant in his or her home within 12 days or less of the museum visit. The participant sat at a table in front of the researcher's computer, with the researcher by her/his side. Proximity between the participant and researcher was used to encourage the participant to speak freely. The 145 pictures were mounted in a PowerPoint presentation. The participant controlled the mouse and the time spent on each picture. A recording software (QuickTime™) was used to record the computer screen (presentation and live-camera image[6] of the participant looking at the presentation) as well as the conversation (Figure 15). It generally took 50 minutes, and was video recorded (sound and image).

[6] We used the camera embedded in the laptop screen, using the video window from the preference menu of Skype, to facilitate filming all the relevant information in synch and at once –sound of the interview, images being looked at, mouse over pointing, face and general physical activity filmed head-on, from a central position. Skype was never used as distant communication application.

The coding of the different gestures and verbal statements were done separately by listening and re-listening to the videos. The coding was done in real-time with the help of a small mixer board with 8 sliders programmed at Hybridlab member. As the video rolled, we would lift a slider whenever the element associated to this slider was active. This method delivered an Excel sheet where actions were coded to the second.

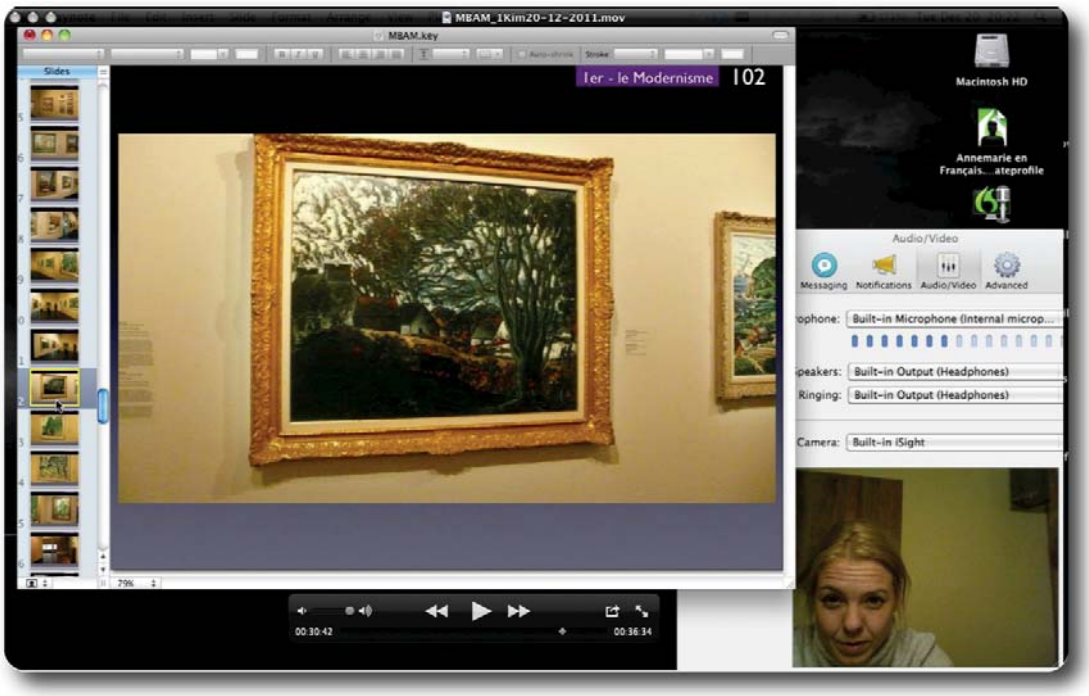

Figure 15. Screen capture of experimental set-up, typical of the recorded interviews

7.3 Results

7.3.1 Overall Flow data: Twice as much Flow than neighbouring Alert-Control

Table ix presents the Flow data: Out of the 7 interviews (totalling 19,253 seconds or 321m 51s), 2991s were considered for this study (968s spent in Alert-Control, 2087s in Flow). In 30 occasions did a participant report experiencing Alert-Control in the presence of an artwork, while there were 67 occasions of Flow overall. Some participants spoke very little of their experience (e.g. P6), while others were very generous with their comments (e.g. P2 and P3).

More time was reported spent in Flow than in Alert-Control (in the box at right) in a ratio of 67.3% to 31.7%, or a little more than 2 to 1, with the total number of artwork that triggered an Alert-Control or Flow states (in bold).

	Participants								
	P1	P2	P3	P4	P5	P6	P7	Totals	Ratio
Alert-Control	**3** (106 s)	**7** (384 s)	**3** (104 s)	**6** (73 s)	**7** (235 s)	**0**	**4** (66 s)	**30** (968 s)	31.7 %
Flow artworks (seconds)	**10** (297 s)	**13** (646 s)	**7** (582 s)	**8** (194 s)	**1** (44 s)	**21** (101 s)	**7** (223 s)	**67** (2087 s)	68.3%
Interview time	2696 s 44 m 56 s	3417 s 56 m 57 s	3434 s 57 m 14 s	2502 s 40 m 52 s	2823 s 47 m 03 s	1757 s 29 m 17 s	2682 s 44 m 42 s	19,321 s 321 m 51 s	

Table ix. Data considered for this study: Neighbouring Alert-Control and Flow for each participant, number of artworks that triggered either states and time spent talking about them (in seconds); bottom: total interview time in seconds above, minutes below

7.3.2 Art proficiency matched the amount of Flow experienced

Art proficiency to **Flow** and **neighbouring Alert/Control**							
Art proficiency	4.5 /5	4.0 /5	3.5 /5	3.0 /5	3.0 /5	1.5 /5	1.0 /5
Participants	P6	P1	P3	P2	P7	P4	P5
Alert/Control	**0**	**3** (23%)	**3** (30%)	**7** (35%)	**4** (36%)	**6** (43%)	**7** (88%)
Flow	**21** (100%)	**10** (77%)	**7** (70%)	**13** (65%)	**7** (64%)	**8** (57%)	**1** (12%)

Table x. Ordered list of participants according to their art proficiency; in bold: amount of artworks that triggered with percentages per participant

The list of participants' self-professed art proficiency from most to least knowledgeable about art also reflects the most to the least Flow occurrences (Table x). Inversely, the occurrences of Alert-Control evenly rose as the perceived art proficiency declined. This suggests that a participant's art proficiency is directly related to the likeliness of experiencing Flow, the higher the proficiency the more likely the Flow occurrences, the

lower, the more Alert-Control is experienced. The art proficiency could be assimilated to the skills in Massimini and Carli's model (1988).

In this study, the participants experienced a Flow experience with 7% of the artwork they encountered. What were the conditions favouring the onset of Flow? The first clue is that participants with a higher self-rated art proficiency had more Flow occurrences; they could make sense of a given artwork through their past experience. For example, P5, who only had one Flow occurrence, said this (original French verbatim in Annex B):

> (11: 20) P5 : *That's the archangel… yup. That's wow.* [Silence]
>
> (11: 24) P5: *Because it reminds me of artworks I have seen in the past…* [all spoken very slowly, absent-mindedly] (…) *and that kind of art speaks to me. For instance,* (…) [pause again] *I've got the feeling I've seen this work when I was young;* (…) *I remember very well visiting the Uffizi Museum in Florence, bumping in the Birth of Venus; when I was small, it was on the cover of a history book I had at school. And... eh... I fell on my butt when I saw it for real. To a lesser extend, this artwork here, has had somewhat the same effect on me.*

Or P1 speaking about two Flow inducing artworks:

> (4: 46) P1 : *That! I adored that! I would've stayed in front of it… and that's when, in this whole exhibit, I went "wow!"*
>
> R : *We're talking flow? …*
>
> P1: *Yeah! I completely got it. I was into the artist process. I remember the guide explaining what it was and I was completely under the spell… then.. yes, I could even see myself in this, there!*
>
> ---
>
> (29: 40, slide 99) P1: *yeah-yeah. That has captured my attention. To me, Marc-Aurèle Fortin refers to my childhood; in Québec city. It brings me back to my first desire to paint something. When I started to draw, I wanted to do trees. I drew Marc-Aurèle's trees I don't know how many times in my life. It's an inspiration. It feels familiar. And even in my experimentations, when I started experimenting with colours, his technique was known to me; his black background, working with that; I did that often in my canvases; and I always*

loved this perspective. And I loved that [the guide] *spoke about this. I was in total Flow*! [P1 was almost silent for next 6 slides / 94 seconds, in Flow]

7.3.3 *Sitting back* associated to Flow

Table xi presents the amount of time each physical gesture was used in Alert-Control and Flow with the relative deviation value for this amount of time. In one instance, *Sitting back* while in Flow, did we observe a concentration of time that was clearly higher than what could be expected if there were a link between the two variables (RD value <+0.25), which suggests that they attract each other.

Inversely, there are 2 occurrences of pairs of variables that repulse each other (RD value >- 0.25): *Looking away from the computer screen* and *Sitting back* are less likely than expected to occur when experiencing the neighbouring Alert-Control state. It is worth noting that there is no particular link between any manual gestures and Alert-Control or Flow.

Gestures to Flow and neignbouring Alert-Control

	Visual gestures			Hand gestures			Sitting positions	
	Eyes focused on screen	Eyes away from screen	Looking at PC/researcher	Talking w/ hands	Pointing	No hand gesture	Sitting back	Sitting up
Alert-Control	775 s *+ 0.12*	78 s *- 0.52*	115 s *+ 0.01*	94 s *+ 0.05*	32 s *- 0.18*	842 s *0.00*	32 s *- 0.75*	936 s *+ 0.12*
Flow seconds	1415 s *- 0.06*	425 s *+ 0.24*	247 s *0.00*	189 s *- 0.02*	91 s *+ 0.08*	1,807 s *0.00*	378 s *+ 0.35*	1, 709 s *- 0.05*

Table xi. Results for visual and hand gestures, and sitting positions; top two rows: results in time spent (seconds) with relative deviation value in italic; bold underline: attraction between the 2 variables; Fine underline: repulsion between the 2 variables; no underline: no link

7.3.4 *Recalling the visit* and *Expressing empathy* associated to Alert-Control, *Being speechless* to Flow

Table xii, two types of verbal statements had higher than expected time concentration while experiencing Alert-Control, *recalling the visit* and *expressing empathy*, and one

associated to Flow, *being speechless*. *Visceral expression, external reference* and *understanding the process* show no link to either Flow or Alert-Control.

Verbal statements to Flow and neignbouring Alert-Control

	Visceral expression	Recalling the visit	External reference	Understanding the process	Reflecting	Expressing empathy	Being speechless	Overall
Alert-Control	147 s *- 0.10*	179 s ***+ 0.49***	84 s *+ 0.13*	234 s *+ 0.22*	112 s *- 0.32*	160 s ***+ 0.91***	52 s *- 0.70*	968 s
Flow seconds	367 s *+ 0.05*	199 s *- 0.23*	151 s *- 0.06*	370 s *- 0.10*	407 s *+ 0.15*	105 s *- 0.42*	488 s ***+ 0.32***	2087 s

Table xii. Results for verbal statements in time spent (seconds) with relative deviation value in italic; bold underline: attraction between the 2 variables; Fine underline: repulsion between the 2 variables; no underline: no link

7.3.5 Following up on Alert-Control's associations

In the assessment of time spent making verbal statements and physical gestures in Alert-Control (Tables xi-xiii), only 2 variables had a positive association (attraction) with this neighbouring state: *Recalling the visit* and *Expressing empathy*. Table xiii details how these two verbal statements associate to gestures in Alert-Control. In this case, when, in Alert-Control, participants have *recalled their visit* at the museum, they have tended to *Look away* from the artworks' visual record on the laptop, *talk with their hands* but with lower than expected *Pointing* gestures and *Sitting back* moments. In contrast, when participants *Expressed empathy*, they spoke without paying particular attention to the laptop or to letting their gaze roam the room, using their hands and *sitting back* less than would be expected. They appear to have been just speaking with less gesture than with most other verbal statements.

Both behaviours have no particular visual link to the artworks (no eyes on the screen), which implies that whatever has triggered their state of Alert-Control, they do not need to have direct, sensory information from the artwork to keep this experience going. In *Recalling the visit*, the participants have spent much more time than expected

looking away from screen, remembering the experience. In the Expressing empathy statement, feeling empathy may have been a prelinguistic, immediate connection (Wright, Wallace and McCarthy, 2008), but once it is expressed, it takes on a verbal process; furthermore if it is retelling a past feeling ('*it made me feel sad…*"). Worth noting: the four variables repulsed by Alert-Control, *Reflecting*, *Being speechless*, *Looking away* and *Sitting back* are very active in Flow (next section).

Verbal statements to **Physical gestures** in neighbouring Alert-Control

	Visual gestures			Hand gestures			Sitting positions		Overall Alert-Control (100 %)
	Eyes focused on the screen	Looking away from screen	Looking PC /researcher	Talking w/ hands	Pointing	No hand gesture	Sitting back	Sitting up	
Visceral expression	128 s *+ 0.01*	13s *- 0.02*	6s *- 0.14*	11s *- 0.32*	0s *- 0.06*	136 s *+ 0.04*	17s ***+ 2.61***	130 s *+ 0.09*	147 s
Recalling the visit	136s *- 0.12*	36s ***+ 1.24***	7s *- 0.18*	10s ***+ 0.63***	11s *- 0.54*	158 s *- 0.04*	0s *- 1.00*	179 s *+ 0.03*	179 s
External reference	71s *- 0.02*	2s *- 0.74*	11s ***+ 1.76***	19s ***+ 0.36***	6s ***+ 1.43***	59s *- 0.11*	7s ***+ 1.60***	77s *- 0.05*	84 s
Understanding the process	194 s *- 0.04*	23s *+ 0.09*	17s ***+ 0.53***	15s ***+ 0.29***	13 s ***+ 0.36***	206 s *- 0.05*	7s *- 0.07*	227s *0.00*	234 s
Reflecting	107s *+ 0.11*	0s *- 1.00*	5s *- 0.06*	6s ***+ 0.70***	1s ***+ 0.75***	105s *- 0.11*	0s *- 1.00*	112s *+ 0.03*	112 s
Expressing empathy	147s *+ 0.07*	13s *- 0.10*	0s *- 1.00*	30s *- 0.28*	8s *- 1.00*	122s *+ 0.08*	0s *- 1.00*	160s *+ 0.03*	160 s
Being speechless	52s *+ 0.16*	0s *- 1.00*	0s *- 1.00*	0s *- 0.87*	0 s *- 0.86*	52s *+ 0.14*	0s *- 1.00*	52s *+ 0.03*	52 s

Table xiii. Association between verbal statements and physical gestures in neighbouring Alert-Control with relative deviation values in italic; bold underline: attraction between the 2 variables; Fine underline: repulsion between the 2 variables; no underline: no link

7.3.6 Following up on Flow's positive associations reveals two Flow patterns

Only 2 variables have been observed to have a positive association with Flow: One verbal statement, *Being speechless*, and one physical gesture, *Sitting back*. When we look at how gestures and verbal statements associate in Flow (Table xiv), we can see that *Being speechless* and *Sitting back* actually repulsed each other, and instead delineated two behaviour patterns that share no overlap.

As explained in the methodology section of this chapter, verbal statements are mutually exclusive, but gestures are not; therefore *Being speechless* can associate only with gestures, whereas *Sitting back* can (and does) associate with 3 different combinations of verbal statement and gestures.

Verbal statements to **Physical gestures** in Flow

	Visual gestures			Hand gestures			Sitting positions		
	Eyes focused on the screen	Looking away from screen	Looking PC /researcher	Talking w/ hands	Pointing	No hand gesture	**Sitting back**	Sitting up	Overall Flow (100 %)
Visceral expression	322 s *+ 0.21*	27s *-0.64*	18s *-0.29*	23s *- 0.32*	15s *- 0.06*	329 s *+ 0.04*	38s *- 0.41*	329 s *+ 0.09*	367
Recalling the visit	151s *-0.02*	64s ***+ 0.40***	0s *-1.00*	30s ***+ 0.63***	4s *- 0.54*	165 s *- 0.04*	69s ***+ 0.68***	130 s *- 0.14*	199
External reference	88s *-0.14*	48s ***+ 0.65***	15s *-0.49*	19s ***+ 0.36***	16s ***+ 1.43***	116s *- 0.11*	34s ***+ 0.29***	117s *- 0.06*	151
Understanding the process	253s *-0.06*	67s *-0.12*	50s ***+ 0.96***	44s ***+ 0.29***	22s ***+ 0.36***	304s *- 0.05*	16s *- 0.72*	363s *+ 0.15*	370
Reflecting	159s *-0.46*	204s ***+ 1.42***	44s ***+ 0.57***	64s ***+ 0.70***	31s ***+ 0.75***	312s *- 0.11*	195s ***+ 1.19***	212s *- 0.25*	407
Expressing empathy	86s *+ 0.13*	17s *- 0.22*	2s *- 0.72*	7s *- 0.28*	0s *- 1.00*	98s *+ 0.08*	1s *- 0.94*	104s *+ 0.20*	105
Being speechless	455s ***+ 0.29***	8s *- 0.92*	25s *- 0.26*	6s *- 0.87*	3s *- 0.86*	479s *+ 0.14*	31s *- 0.65*	457s *+ 0.14*	488

Table xiv. Association between verbal statements and physical gestures in Flow with relative deviation values in italic; bold underline: attraction between the 2 variables; Fine underline: repulsion between the 2 variables; no underline: no link

In one of the two patterns, speechless participants keep their *eyes focused* the artwork pictured on the laptop screen, refraining to engage in any other gesture (*Being speechless* repulses 5 out of 8 gestures). This pattern is uniquely devoid of signs of verbal communication, yet it is the only 'verbal' statement associated to Flow. This suggests it is a key Flow pattern.

On the other hand, the second pattern, anchored around the *Sitting back* position appears to be verbose. Table xiv shows that when in Flow, Sitting back attracts three

types of verbal statements: *Recalling the visit*, making *External references* and *Reflecting* out loud. In all 3 cases (and only with these 3 types of statements) the participants have looked around the room, eyes away from the computer more than would have been expected by a fair margin (+0.40, +0.65 and +1.42 in RD); and they have *Talked with their hands* more than expected, *Pointing* at the artwork as they were making *External references* and *Reflecting* out loud.

Looking even closer, *Sitting back* appears to have had the most attraction for *Reflecting* statements (RD of +1.19), showing a much higher attraction than could have been expected. Going back to the description of each type of verbal statements, *reflecting* is the discourse the furthest away from a descriptive statement. It is also the one where participants have displayed the most personal reflections and analysis. *Reflecting* stems from the artwork but takes the participant into novel considerations, yielding the most abstract thinking of the seven categories. Of all the types of verbal statements observed in this study, *reflecting* appears to habor the most innovative and personal thinking, as seen in these examples (French verbatim transcript, Annexe C, p.xxxiii):

> *(15:55) P3 : I really loved this.* [Visceral expression]
>
> (15:57) … [P3 is speechless, looking at a slide of a landscape painting from the Group of Seven].
>
> *(16:16) P3: …It's a little like pure philosophy: it isn't because it was never explained to you that you can't understand it. (laughter) It's fundamental.* [Reflection]
>
> *(16: 32) R: But not everyone likes this…*
>
> *(16:46) P3: these would be people for whom art does not transcend reality. Reality is …there. And for them, art is always* ***within*** *reality. (…) Is this a rock? …a rock on the edge of water? Yeah, okay, yeah it's a rock, a boulder on the edge of water; and there is a sky, yeah. But that's not what I am seeing here. No. Not what I'm seeing here. Others may be too tied to reality to see beyond what's right before them. The fictious, the imaginary, (…) the symbolic. So he drew God. How do you want to draw God? You can draw him in a thousand and one ways. He drew God this way.* [Reflection]

Or:

> P4 [talking about a large Inuit print]: *Our Eskimos were probably as smart as those who came up with hieroglyphs and drawings ... whether in caves or even better on pottery or objects. (…) For me, this is writing. It is a way of writing. Communicating. For me, the Chinese and these people have developed a writing system; pictograms (...) probably an Eskimo who knew about these things could look at this and talk for hours.* [Reflection]

These participants did not plan to tell us these things, nor were they re-hashed, known considerations; the participants were essentially ad-libing, thinking out loud as opposed to describing what they had thought or felt during the museum visit. It appears reviewing these particular artwork rekindled their original Flow to the point where they did not simply relate to the researcher what they had experienced, they re-experienced it, which is in keeping with Janet, Paul (1925) and Vermersh's (2004) 'reflexive return'.

In spite of their apparent differences, the *speechless* and the *reflecting*-out-loud patterns may share the fact that in both cases participants were not describing a past experience, but were fully invested in the moment, reliving and adding to their initial experience. We take this to be a sign of an autotelic experience.

7.3.7 Receptive and innovative autotelic experiences

The two patterns that came to the fore as a result of the analysis of the data in this study appear to match each type of autotelic experience. The first pattern, *speechless*, *eyes fixed on the screen*, is not an active moment. When probed by the interviewer, the participants enjoying this silent state reluctantly spoke or dismissed the probe with as small an answer as possible. This suggests that this silent and intense moment is not conducive to verbal communication (a nonverbal moment). These appear to align to Schaeffer's aesthetic experiences with a receptive engagement.

The second pattern, *reflecting* while *looking away*, *sitting back* in their seat, talking animatedly with *hand gestures*, is clearly a fully involved verbal and gestural communication. *Reflecting*, a novel and personal analysis stemming from a particular artwork, appears to be a kind of creative undertaking, as the participant broke new ground in their own reflections. This second pattern appears to align to

Csikszentmihalyi's Flow in that it is active, and engages a wide range of gestures and processes.

Looking at their occurrences in the data, we have found that the speechless pattern happens independently from reflective pattern, but the reflective pattern appears to follow the speechless pattern. In Figure 16, we have noted the sequences of verbal statements preceding the reflective pattern. The sequences are marked by two interesting facts: (1) the verbal statements are dominated by 5 occurrences of *visceral expressions* followed by 4 occurrences of *being speechless*. (2) All verbal statements prior to an occurrence of *reflecting* are accompanied by keeping *eyes fixed on the screen*, all but for 4 seconds of *looking away*.

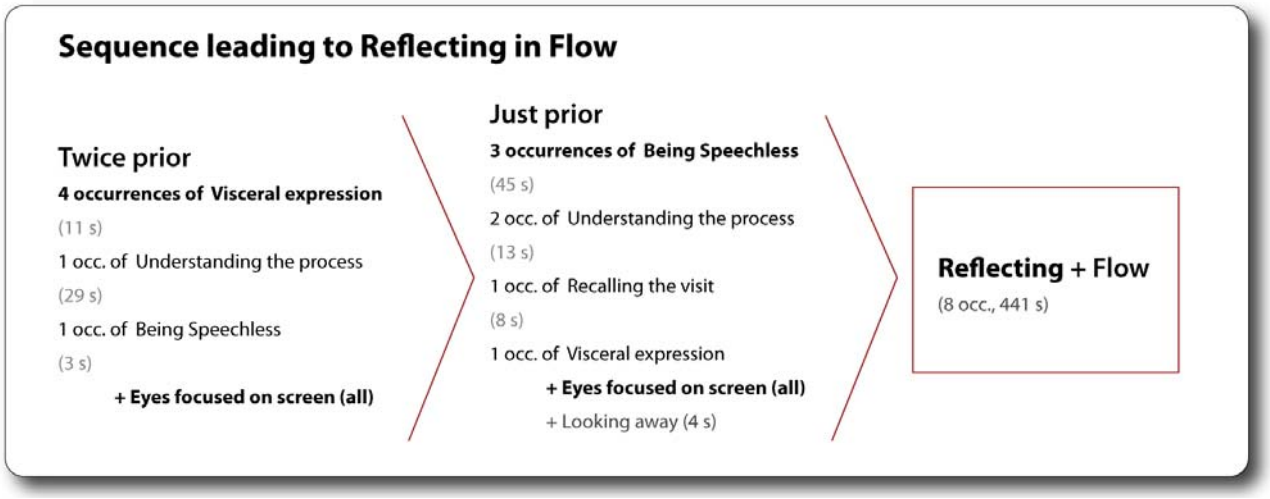

Figure 16. Sequence of verbal statement that found to precede occurrences of Reflecting, while in Flow

This suggests that when in Flow, *visceral expression* is a part of the experience of *being speechless*, both accompanied by *eyes fixed* on the artwork (Visceral expressions' RD values did not show higher than expected, but the raw time count was high, Table xi, p.108). These observations are further supported by Wright, Wallace and McCarthy's (2008) process of "Connecting", describing prelinguistic recognition while in direct contact with the artwork.

Flow was apparently experienced in a two-pattern sequence: first, *visceral expressions* + *speechlessness* with *eyes fixed on screen* and less than expected of all other gestures (introverted pattern) followed by *Reflecting* out loud, *sitting back*, *pointing* and *talking with hands* (extroverted pattern).

This two-pattern sequence found while engaged in a typical aesthetic experience, suggests that these were not two autotelic experiences, but two moments in the continuous autotelic experience: first, a receptive engagement that sometimes leads to an active and innovative undertaking.

7.3.8 Priming innovative, verbal Flow

In this two-pattern sequence, the receptive is nonverbal or prelinguistic (Wright, Wallace and McCarthy, 2008), and the innovative reflections are verbal. The priming effect of spatial processes has been established (Bowden and Beeman, 2003) in the literature about insight, inference and creativity. In this study, there were a number of descriptive verbal statements: recalling the visit, making external references and seeking to understand the process, and expressing empathy to a point. Visceral expressions and being speechless are prelinguistic. Reflecting denotes a unique verbal activity in its innovative character. The whole sequence might be: first a descriptive verbal activity, then a strong activation of prelinguistic / spatial processes, sometimes followed by innovative verbal processes.

7.4 Summary

The aesthetic experience of visiting a fine art exhibition and retelling it yielded the following observations: greater art proficiency assures greater quantity of flow experiences; two very different behaviours associated to Flow: speechless and still, and verbose and reflective. Going back to the raw data, we see that these patterns are part of the sequence of an autotelic experience. Furthermore, this sequence corresponds to 3 verbal statements: starts with visceral experession, then being speechless, then may move into innovative reflections beyond the immediate context. This proposes a cognitive sequence that goes from descriptive verbal processes when participants relay the past visit, to occurrences of prelinguistic/ spatial processes (Visceral expressions and speechlessness), the later acting as priming agent to innovative verbal processes.

Chapter 8
Third study: Co-designing with Vyew and the Hybrid Ideation Space (HIS)

Chapter 8 presents the last study of this research. In order to fully grasp the autotelic experience, we have observed the internal experience (the modalities related to spatial / verbal processes and the psychological experience) against its external context (considering the psychological experience, the tools and the task). Two participants collaborated on two landscape design projects using two different design tools. The qualitative analysis considered these elements in their chronological unfurling; quantitative analysis uses descriptive statistics to highlight the strength of association within the variables. The results yielded a model of the autotelic experience observed in this case study.

8.1 An exemplary case of Flow experience

The literature review has highlighted gaps in the knowledge about UX that make it difficult to design and deliver a remarkable experience. Our first research hypothesis is that Dewey's memorable experience is related to the autotelic experience (Schaeffer, 2000; Csikszentmihalyi, 1988). Our second research hypothesis is that the autotelic experience may be related to how we process information. The purpose of this third study is to get a better understanding of the autotelic experience from a direct observation of an active engagement; specifically, see if the interplay of verbal, visual and manual modalities related to verbal and spatial processes have any play at explaining it.

Researchers at the Hybridlab take part in a number of research projects and are encouraged to have their own and the lab's research coincide. This experiment was retained for this research, as it appeared to yield an exemplary case of *an experience*. In 2010-2011, the Hybridlab design research laboratory directed by professor Tomás Dorta conducted a series of three co-design experiments with professor Yehuda Kalay from the

Architecture School at University of California, Berkeley, of which Berkeley-2 was the ground for this study.

This study involved co-localised co-design done by a team of landscape architecture students using two different design tools (an Internet-based whiteboard software, Vyew, and an immersive ideation system, the HIS). They had to complete a design project with each tool over the course of a weekend, a different tool and project for each day. Both tools were new to the participants. Playing into our decision to retain this co-design study was the participants' spontaneous positive assessment of their performance at the end of each project. After the session on day 1, in an unrequested observation, they said Vyew worked well and it had been a productive session; likewise after day 2, adding that they were glad they worked with Vyew first, since the HIS was more impressive and would have affected their opinion of Vyew. We were surprised at this spontaneous and equally good assessment because our initial impression was that they had had two very different experiences; they carried themselves differently with each tool. With Vyew, they behaved as colleagues would, collaborating at some office work on a laptop; in the HIS, they used expansive gestures, making used of the space around them to sketch their design in the air and on the immersive screen. Plus, in the HIS, they seemed to feel there was something more: why would they have said their experience in the HIS would have overshadowed their impression of Vyew had they been presented in the inverse order? For all these reasons, we felt this data was a good place to look for and study the autotelic experience.

To capture the autotelic experience we relied on the Flow framework (Csikszentmihalyi, 1988). Flow is longer than and it encompasses the autotelic experience: the autotelic experience sets off the Flow experience and the Flow lasting well beyond the autotelic experience. Flow in this study has been observed to occur at times when some aspect of the task was achieved, which suggests that it can be task-related (oriented toward an extrinsic goal; expressing the satisfaction of achieving the task or a portion of the task) as well as to be intrinsically motivated. The autotelic experience is strictly intrinsically motivated (Schaeffer, 2000; Csikszentmihalyi, 1988). In order to

access the autotelic experience, we need to distinguish between the task-related and autotelic Flow experience. This study 'peels the layers of experience' as it were, progressing through a series of analyses in an exploratory research approach.

Considering the data we chose to analyse, Berkeley 2, and the need to understand the autotelic experience as distinct from the task-induced Flow, this study has sought to answer two more questions: First, trying to understand the task-related Flow: what explains that the experience with Vyew and the HIS appeared to have been so different, while they were assessed to be both good and productive? Then, seeking signs of autotelic experience: are there factors that could explain why they felt the experience in the HIS was more impressive than with Vyew?

The experimental setting respected the following parameters: to observe the autotelic experience as it occured naturally in the course of an activity; to have an interaction involving an interactive system that engaged the participant proactively, where the user drives the interaction, taking initiative in improving current circumstances or creating new ones. To these parameters, essential to fulfil the requirement of the research, we added one more for methodological reasons: that we should observe a collaborative task in order to witness dialogue between participants during all moments of the interaction. The participants' discourse would give us some insight on what the participants were thinking and experiencing without relying on talk aloud.

8.2 Method

8.2.1 Sampling

As described in chapter 5, the fact that we studied a little-known phenomenon that was closely related to usability, called for a methodology favouring in-depth understanding of an exemplary case. The purpose was to shed light on the dynamic relationship the different elements of the autotelic experience entertain. As explained above, we identified this case study as a particularly good example of outstanding UX.

This case study involves a pair of third year landscape-architecture students who had been recommended to us by their professor who judged them to be good designers who communicated well together as they had been a design team for over a year. They had complementary skills (one slightly stronger in drawing, the other slightly stronger at verbal analysis).

8.2.2 Task and protocol development

Collaborative design, as a task, requires that participants do design (here, conceive a solution to a landscape architecture problem) on the one hand, and collaborate together doing so. The design task calls upon spatial processing (in terms of cognitive processes), as it requires one to visualise spatial arrangements, and mentally move around and in the problem space (Tversky, 2005). On the other hand, collaborating relies mostly on verbal communication (but not solely), which activates verbal processing in the brain. Basically, co-designing involves both cognitive processing abilities, the spatial and the verbal.

The comparison between two different experiences completed by the same team doing collaborative design was done through two tools, Vyew and the HIS, with which to pursue the conceptual design of two ad-hoc landscape design projects using the same site. Each tool needed a very short training (5-10 minutes) before the participants could manage them fluently. Both tools are "intuitive", i.e. require few menu-base actions, they offer drawing areas to be used with the laptop's pen for freehand sketching over real-life images or photographs and both have short learning curves (less than 10 minutes to use comfortably; Dorta, Lesage and Pérez, 2008).

The study ran over two days, using Vyew for 75 minutes on the first day, and the HIS for 49 minutes on the second. This discrepancy in time accounted for the fact that on the first day, they were allowed more time to get acquainted with the site, time that was understood to be an investment for both projects.

On the first day, participants went through two phases: an analysis of the site from Internet maps to identify all the variables and issues linked to the project; followed by an ideation phase. On the second day their work in the HIS went through three

phases. First they worked on a concept until they realised it led to a dead-end. There was a short breakdown in communication, as they looked for a way forward. Then there was an ideation session yielding a concept they were pleased with.

8.2.3 Experimental setting

As previously stated, this co-design study used two conceptual design tools supporting collaboration, Vyew, an Internet-based whiteboard software and the HIS, an immersive ideation system; both were used co-locally.

8.2.3.1 Vyew: an Internet-based whiteboard software

Vyew™, a whiteboard application accessed through Internet supporting remote and local collaboration, was accessed through a modified MacBook laptop with a 15" screen, shared by the two participants (Figure 17). The participants used plan views retrieved from Bing, Google maps and Google street view, which they used as background for their sketches.

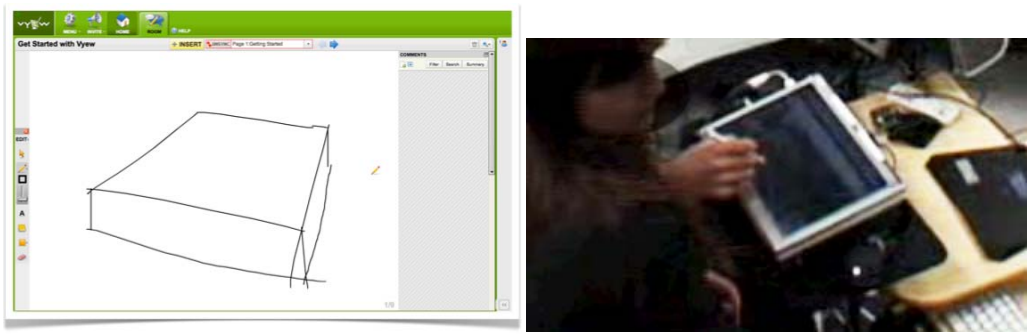

Figure 17. Screen-grab of the Vyew interface (left), on laptop (right)

8.2.3.2 The Hybrid Ideation Space (HIS)

The HIS is a hybrid (analogue / digital) immersive system developed by the Hybridlab (Dorta, 2007) allowing immersive, intuitive, freehand sketching on a laptop, and immersive physical model making, in real time and life-size. The designers stand inside their representations, which are projected on a 5m diameter semi-spherical screen surrounding them. It augments traditional tools (sketch and models) with digital capabilities. The HIS has been evaluated and compared a number of times (Dorta, Pérez

and Lesage, 2008; Dorta, Lesage and Pérez, 2009) and appears to consistently enhance ideation and collaborative ideation (Figures 18 and 19).

Figure 18. Left: Screen-grab of the HIS seen from above with participants working; Right: same view, but the HIS with no immersive representation

Figure 19. Left: immersive representation; right: laptop representation

8.2.4 Data processing

To understand the autotelic experience, we did a series of analysis: First, there was a qualitative appreciation of the data in chronological display, the overall data and four windows exhibiting more Flow. Then we have assessed: (a) Flow and other psychological states (Massimini and Carli, 1988); (b) physical gestures from an analysis grid based on the Multiple Resource Theory of Wickens (2008) and Boles (2010); (c) verbal / nonverbal design collaboration; (d) the tools have been assessed through the NASA TLX workload questionnaire (Vidulich and Tsang, 1985); the progression of the co-design task was monitored through the Design Conversations (Dorta et al., 2011).

8.2.4.1 Data collection

In this experiment, data was collected in two ways: a questionnaire, NASA TLX workload test, and the video recordings of the sessions that fed the other data analyses:

(a) Flow and other psychological states about the experience (Massimini and Carli, 1988) collected through auto-confrontation (Flow wheel in Annexe A, p.ii),

(b) the data about the cognitive processes by observing active modalities described in the Multiple Resources Theory (MRT, Wickens, 2002) and extended theory (EMRT; Boles, 2010),

(c) the discourse data relative to verbal/ nonverbal modalities modalities (Wickens, 2002; Tversky, 2005; Bowden and Jung-Beeman, 2003), and

(d) the task progression through Design Conversations (Dorta et al., 2011).

All sessions were recorded with two different cameras. The primary camera took on a god's eye view, as it was clamped on the upper rim of the spherical screen (Figure 20); this camera recorded the participants and most of the immersive representation they were working on. We also collected the[2] feed from the IP cams facing them.

8.2.4.2 Appraising Vyew and the HIS through workload assessment

We used a NASA TLX workload questionnaire (Vidulich and Tsang, 1985) to get an assessment of the two tools being compared in this study (questionnaire in Annexe A, p.i). This workload assed six parameters: mental demand, physical demand, temporal demand, effort, performance, and frustration. Performance was assessed as followed: the participants rated the performance as low if they perceived their performance as poor and high if perceived good; this was the only parameter where a high rating expressed a positive experience. Consequently, we have not tallied a whole workload value.

8.2.4.3 Assessing the psychological experience

The psychological experience was assessed using Csikszentmihalyi's (1988) concept of Flow and Massimini and Carli (1988) eight dimensions of the experience (suggesting the 8 psychological states of worry, anxiety, alert, Flow, control, boredom, relaxation and indifference).

We chose to collect the experience assessment through an auto-confrontation (Mollo and Falzon, 2004) or experimental introspection (*entretien explicitatif*, Vermersch, 2004), after the interaction to avoid disrupting the task. Each participant reviewed with us their videos of the experimental protocol, to identify their psychological states (Figure 20). As they watched the recordings, their memory jogged by watching the actual interaction (Janet and Paul, 1925; Vermersch, 2004), they called out their psychological state. They could volunteer more than one state at a time if this was a better description of their experience. They often gave a number of states in close sequence and then skipped for 30 to 60 seconds. When they skipped more than 30 seconds, we probed them, but they were instructed to speak up only if they remembered how they felt.

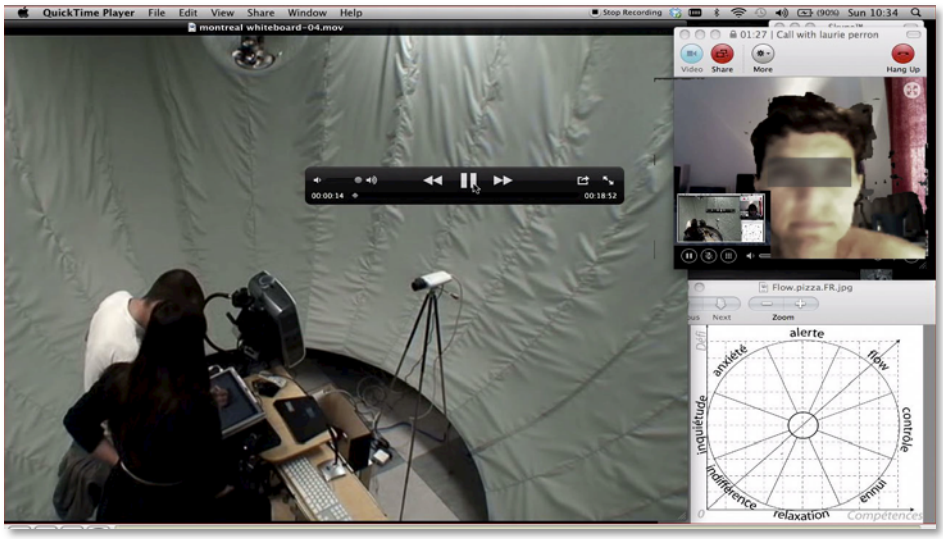

Figure 20. Screen grab from an auto-confrontation recording done through Skype™; participants could refer to Flow wheel as they reviewed their recordings

Data was collected on average every 30 to 40 seconds. The auto-confrontation was audio-video recorded (Figure 20), their responses noted on a datasheet divided in 10-

second segments. More than one state could be recorded in a 10-second increment, in line with Schaeffer's stating that in autotelic experience, one can experience more than one emotion at the same time (2000). Participants could have felt aroused *and* anxious within a single 10-second lapse; but a given state could only be recorded once per 10-second increment.

8.2.4.4 Assessing physical gestures (nonverbal activity)

We based our analyses on Wickens' (2002) Four-Dimensional Multiple Resource Theory (MRT), and Boles (2010) Expanded Multiple Resource Theory (EMRT), as explained in chapter 4. We sought to know through which modality (visual or auditory) sensory information reached designers, and through which modality (manual or verbal) did they respond.

We identified nine co-designing "gestures" the participating designers regularly used during these experiments. These gestures fall into three categories: visual modality, manual modality (use of pen tool, hands & arms as design tool), and body posture, (Figure 21). The gestures were associated to either the verbal or spatial cognitive processes according to Wickens (2002) or Boles (2010) (Figure 8.8), as explained in chapter 4.

For the first category, visual modality, we noted where 3 visual postures (just these three because they were directly involved in the design task; we have not coded when participants were looking at researchers, or dealing with the laptop (Figure 21):

(A) *Focusing on laptop*, [Focal vision (Wickens, 1984), high acuity, focussed attention, lost of ambient vision—verbal processing];

(B) *Scoping the immersive representation on the spherical screen* (looking around, turning the head, scanning the screen with their eyes), using wide focal vision including some ambient vision; this gesture covers 5 categories of visual spatial vision (Figure 21).

(C) *Looking at partner* away from the representation typically when discussing [Facial figural (Boles and Law, 1998)]. This gesture is attributed to a participant looking at her/his teammate, who may or may not be looking back.

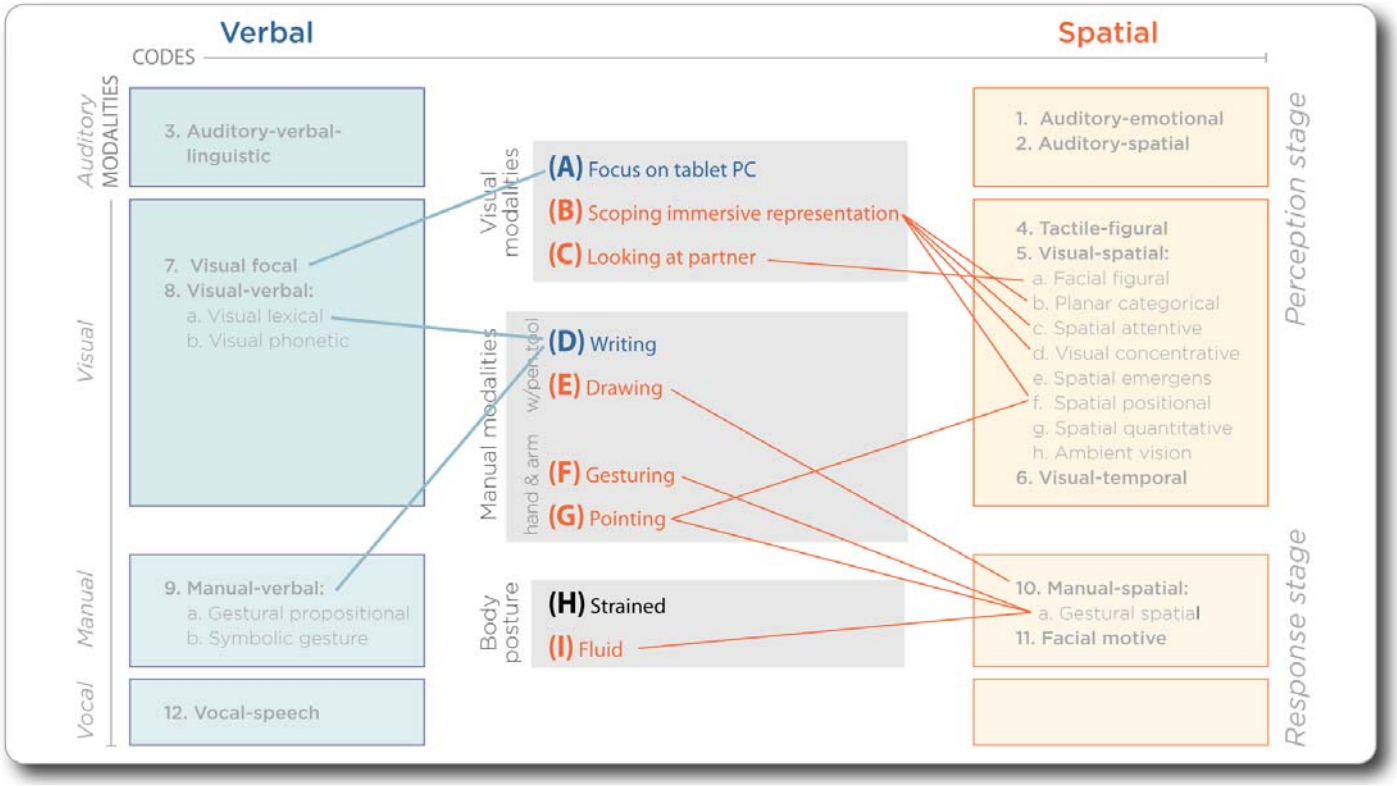

Figure 21. Co-design gestures used for analysis of the experience as matched to verbal/spatial modalities and processing codes

According to Wickens' model of multiple resources, we can assume that when a participant was in conversation while focusing on the laptop or the immersive representation, their attention was comfortably spread between the visual input and the verbal output (on going conversation), i.e. either discourse and visuals were coherent and attention was not divided nor were they dissonant but both required a low amount of attention. In both cases, the participant was always in direct contact with the visual representation of the design proposition. When a participant looked at their partner or when they looked at each other, 100% of their attention was taken away from the evolving visual representation and devoted to the conversation.

The second category, manual modality, includes the use of the pen tool for:

(D) Writing notes on the representation [manual-verbal; resources associated with responding with the hands; visual lexical (Boles and Law, 1998); resources associated with recognizing words, letters, or digits] (verbal processing) or

(E) *Drawing*, adding to the representation [manual-spatial, resources associated with responding with the hands; gestural spatial (Hostetter and Alibali, 2008); resources associated with responding to spatial mental images] (spatial processing);

The use of hands and arms as tool (Figure 21) for:

(F) *Gesturing*—drawing in the air with hands and arms—[also manual-spatial, as is drawing] (spatial processing) and

(G) *Pointing* to the representation with finger or laser pointer [spatial positional (Boles and Law, 1998); resources associated with the identification of precise locations] (spatial processing).

The last category is body posture, **(H)** a *strained* or a **(I)** *fluid* posture.

While these appear to form a dichotomy, they actually stand for two different physical behaviours that are not opposites although they are mutually exclusive. A strained posture **(H)**, as understood here, is a negative experience, where the participant stands motionless, arms cramped to the body with shoulders hunched forward or has needed to brace his or her back with one arm, in what appears to be an uncomfortable posture. We coded only the clearest signs of discomfort, to stay away from ambiguous postures. The strained posture was coded as neutral (Figure 21).

The fluid posture **(I)** appears to be an amplification of something, a larger spatial gesture or an expression of relief or enthusiasm. It occurs spontaneously, with participant freely moving about, arms Flowing. Fowler and colleagues (2008) reported that posture coordinates with speech. In the co-design context, gesturing appears to promote spatial reasoning (Tversky, 2005a).

8.2.4.5 Assessing the verbal / nonverbal design collaboration

The verbal processes were assessed through the discourse carried by the participants during the design process. We simply coded it into two categories:

(1) *Verbal design collaboration*, meaning that the participants are discussing the design project. This category calls upon two kinds of resources according to the MRT and EMRT, auditory-verbal-linguistic at the perception stage (Wickens, 1984; Boles and Law, 1998); resources associated with generalised verbal processing, using auditory input; and vocal (Wickens, 1984); resources associated with responding with the voice (both associated to verbal processing).

(2) *Nonverbal design collaboration*, as they worked together in silence, both appearing to be attentive to the design solution, one drawing while the other observes the progression through the representation. This category constitutes an absence of discourse, and as such is not associated to a verbal resource allocation from the MRT and EMRT models. The Design Conversations considers this kind of quiet collaboration as typical of the Collaborative Moving pattern. The coding was done in 10-second increments, i.e. it would take 10 seconds of nonverbal exchange while (drawing or pointing at the representation) to code a silent collaboration.

By simplifying the data into verbal and nonverbal design collaboration, we can compare and associate this data to the physical gestures data to get a more complete picture of the cognitive processing (verbal and spatial) when enjoying episodes of autotelic experience. This data was included in both qualitatively and quantitatively analyses, like that of the physical gestures.

8.2.4.7 Monitoring the task through the Design Conversations

As stated in chapter 5, to get a complete sense of the Flow experience, we need to identify the task-related sources of Flow in order to distinguish the actual qualities and sources of the autotelic experience. Monitoring the progress of the task is done through the Design Conversations framework (Dorta et al., 2011).

Dorta and colleagues (Dorta, Pérez and Lesage, 2008; Dorta et al., 2010; Dorta et al., 2011a) have developed a methodological instrument to assess the design activity based on the verbal conversations held between designers during the design process. The design conversations came from the realisation that before any sketch or plan is drawn designers working together "speak" their ideas to each other. These collaborative ideation (CI) conversations help follow the creative design process.

Design conversations are made of three elements: the CI Loops, Collaborative Conversations (CC) and Collaborative Moving (CM) (Dorta et al., 2011). These elements, based on the known design actions of *naming, constraining, negotiating, decision-making,* and *moving* (Goldschmidt, 1990; Bucciarelli, 1988; Schön, 1983), have recognisable patterns and appear to follow a progression that matches the design process. One more element is also considered along with the patterns of design conversation, Schön's backtalk (1983). A backtalk occurs when the representation, in its ambiguous and imprecise early state, suggests an unforeseen design solution to the designer.

CCs are either in the form of *presentation* of previous ideas or design brief, or as *discussion* of related topics. Here, the main pattern consists in a single speaker dominating the conversation in uneven exchange (e.g. during a presentation) with no addition to the design solution.

CI Loops go from immature (i-CI Loop) to mature (m-CI Loop), the first one centring on identifying a satisfactory design concept, the latter, on substanciating it. CI Loops are recognisable by their recurring negotiation patterns running in loop-like pattern, where each speaker alternatively initiates or closes a new agreement in a back-and-forth conversation. There is an increasing amount of moving actions (often in the form of sketching / drawing) as the CI Loops evolve from immature to mature.

CMs consist in collaboratively completing the concept that was identified during the mature CI Loops; here, progress is made through the representation. CMs are marked by a dominance of the moving actions and little verbal conversation. Key characteristics: this is a collaborative endeavour albeit an often-silent one, with one of the

participant controlling the pen tool and the other conducting visual analysis of the progressing representation, the two punctually exchanging short verbal comments.

The Design Conversations are used to identify the task progress.

Dorta, Pérez and Lesage (2008) have studied how Flow reacts to the accomplishment of design goals (e.g. identifying a good concept, resolving one aspect of a design problem, etc.); they refer to this Flow pattern as Design Flow. In this pattern, Flow is an indicator that the ideation delivered positive results.

8.2.4.8 How our brains code diffuse information

To help us interprete our results, we have called upon notions of linguistic and visuospatial reasoning (Tversky, 2005; 2005a) and neuro-cognitive science (Bowden and Jung-Beeman, 2005), explained in more details in chapter 4.

RH and insight correlates

For Bowden and Jung-Beeman (2003), people make conscious decisions influenced by partially independent activation in each hemisphere. Yet, they argue that RH *engages in cognitive processes that specifically facilitate solving insight problems*. They have identified something of a privileged relationship between the RH processes and the aha! insight experience. They have observed that participants revisiting and solving previously failed problems had an insight-like experience when they succeeded; the initial failure serving as priming experience. The priming action was associated to insight experience and occurred more often in RH than LH.

Linguistic and visuospatial reasoning: Insight

Visuospatial reasoning is as basic as finding one's way around town, catching a fly ball or packing the trunk of a car. It is something we are all expert at (Tversky, 2005a). Visuospatial reasoning is about manipulating visuospatial information, be it through real-world representations or mental imagery, through transforming these mental representations, inferring new information from them or gaining insights (Ibid.).

External representations are cognitive tools. (…) [They] *transform internal memory and information processing into external memory and information processing, relieving the severe constraints of working memory* (Tversky, 2005, p.17). External representations are more productive than linguistic ones at reasoning, inference and leaps of imagination, as they transform abstract problems into spatial ones, and *people have extensive experience of solving spatial problems* (Ibid., p.16-17).

8.3 Results

Quick recall note of parameters of experiment:
***Sampling**: 2 landscape architecture students used to working as a team for over a year; recommended to us by their teacher as "very good students".*
***Protocole**: Same two participants worked on 2 differents landscape design projects involving the same site, doing the first project in Vyew on day 1, the second in the HIS on day 2. More time was allotted to the first project/first day to get acquainted to the site, which was not needed on the second day.*
***Flow coding**: Participants coded Flow through auto-confrontation, as they reviewed the videos of their co-design sessions a few weeks after the 2 protocols. They assured us that they only coded what they remembered, and appeared to have remembered well. They gave out their psychological states on a voluntary basis; they could volunteer more than one state at a time if this was a better description of their experience. They often gave a number of states in close sequence and then skipped for 30 to 60 seconds.*

8.3.1 Chronological analysis: Looking for interesting data patterns

Seeking to learn about the autotelic experience, and wanting to discriminate between the segments with little and more Flow, we considered the complete collected data in chronological perspective (Figure 22). Then, we zoomed in on richer moments (four such windows) to analyse them in more detail. The following qualitative observations (sections 8.3.1.1 – 8.3.1.5) serve as introduction to the data and to the whole experience. This qualitative chronological analysis highlighted patterns that helped us focus the next level of analysis, which is a more pointed quantitative analysis, specifically, appearance of repeated association between gestures and discourse during reported Flow segments.

Seeking rich data patterns, we looked for Flow episodes corresponding to active co-design segments (signalled by mature and immature CI Loops) and emerging ideas.

We have identified 4 "windows" (in boxes, Figure 22), where stretches of continuous Flow take place during very active co-design sequences, as suggested by the high rate of recorded physical gestures.

On day 1 (Vyew session), a progressive amount of Flow was recorded, between minutes 44-54 (Window 1) and again between 59-74 minutes (Window 2). These correspond to the development of a concept (Window 1), developed further (Window 2). Both windows are characterised by higher instances of *Looking at partner* visual modality (in dark red in visual modality graph, Figure 8.10).

During day 2 (HIS session), there was a higher concentration of Flow at the end (Windows 3-4), after a segment of stressful experience. Window 3 (29:30-37:30 min) is spent developing a new concept after the previous one had failed. An interesting pattern in the visual modalities takes place in Window 3: very high *Focus on the laptop*, low to no *Scoping of the immersive representation*, which is different than at other times in the HIS. Window 4 (38:10-48:00 min) is spent in mature CI Loops, giving form to their concept. It received the most Flow of the whole experiment, and saw the most *Scoping the immersive representation*.

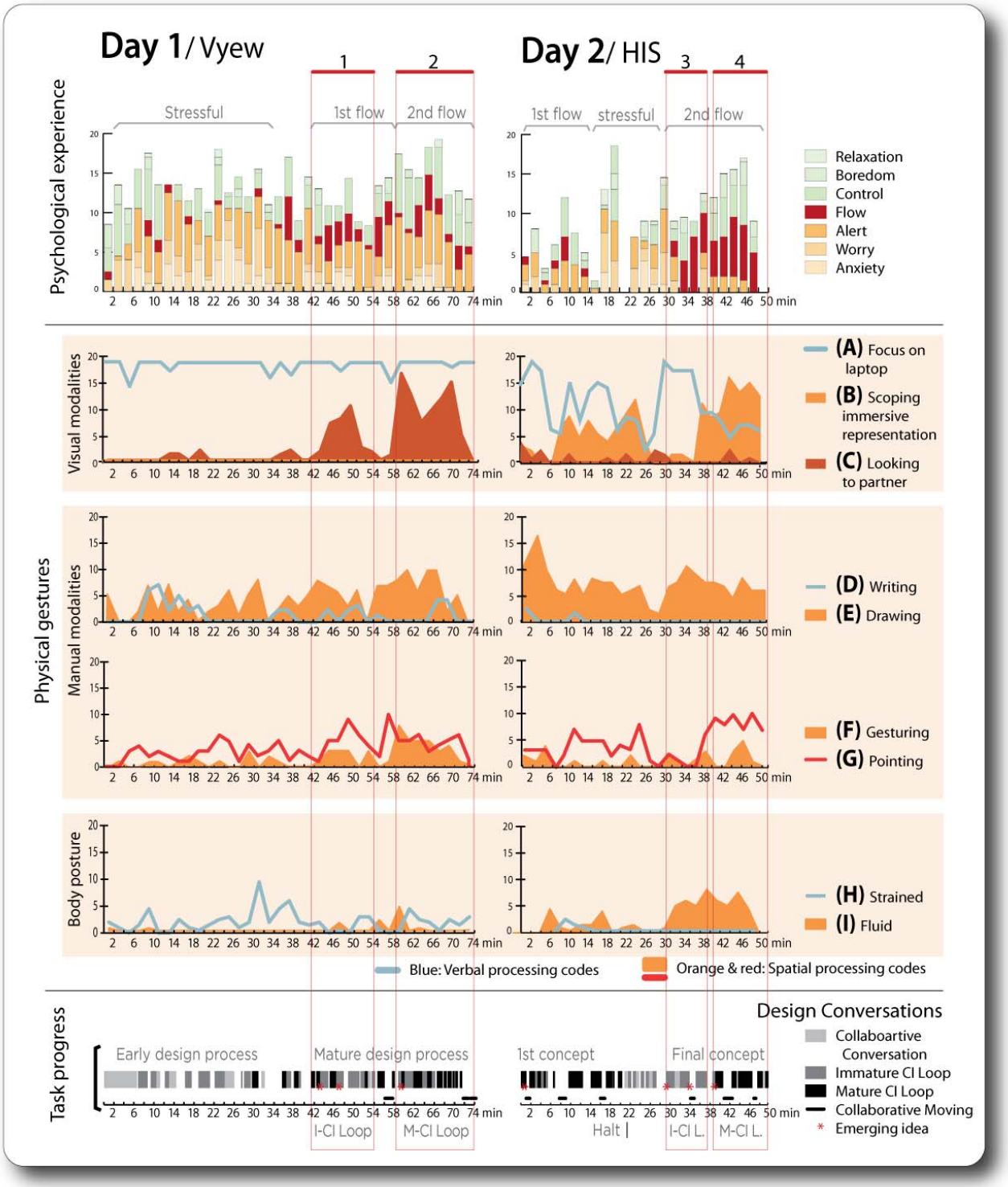

Figure 22 Chronological overview of psychological experience, physical gestures (four bands in centre) and task results; each column stands for 2 minutes of collected data. The task data is laid out respecting the same horizontal time-scale.

8.3.1.1 Windows 1-4: Up to and into Flow

By identifying moments of Flow correlating to productive design, these close-ups provide the right setting to look at what cognitive processes are active. The advantage of laying out the data in its chronological sequence is not only to point to general correspondence, but to see what context fostered the sequences of Flow, and if a particular pattern was inducing them.

The close-up windows (Figures 23-24, 26-27) display 30-second columns of collected data for psychological experience, physical gestures and design discourse.

The graphs for psychological experience and physical gestures are traversed by a horizontal dotted line. The dotted line of the psychological experience is at the 6th recorded-entry mark. Since each column accounts for 30 seconds of activity and there were 2 participants, if each participant had given a psychological state at every 10-seconds increment, there would be six recorded psychological states.

The fact that participants recorded their psychological state on a voluntary basis as they recalled them, explains why there is often less than 6, while the columns with more than 6 are due to the fact that they could name more than one state in the same 10-second increment. During autotelic experiences, participants may experience more than one emotion (Schaeffer, 2000); moreover, Flow is a memorable state (Csikszentmihalyi, 1975), therefore participants would tend to express more than one.

The dotted line in the graphs for physical gestures marks the height of 3 recorded physical gestures, i.e. the maximum gestures of one kind that could be done by a single participant within a 30 second span. Any result within one column that rises above the 3-mark implies that both participants have engaged in this gesture during those 30 seconds. There is no such horizontal dotted line in the task progress graph because discourse requires the participation of both designers.

Each window has yielded a main observation which is noted in the subtitle of its section.

8.3.1.2 Window 1: Ideas emerged prior to Flow

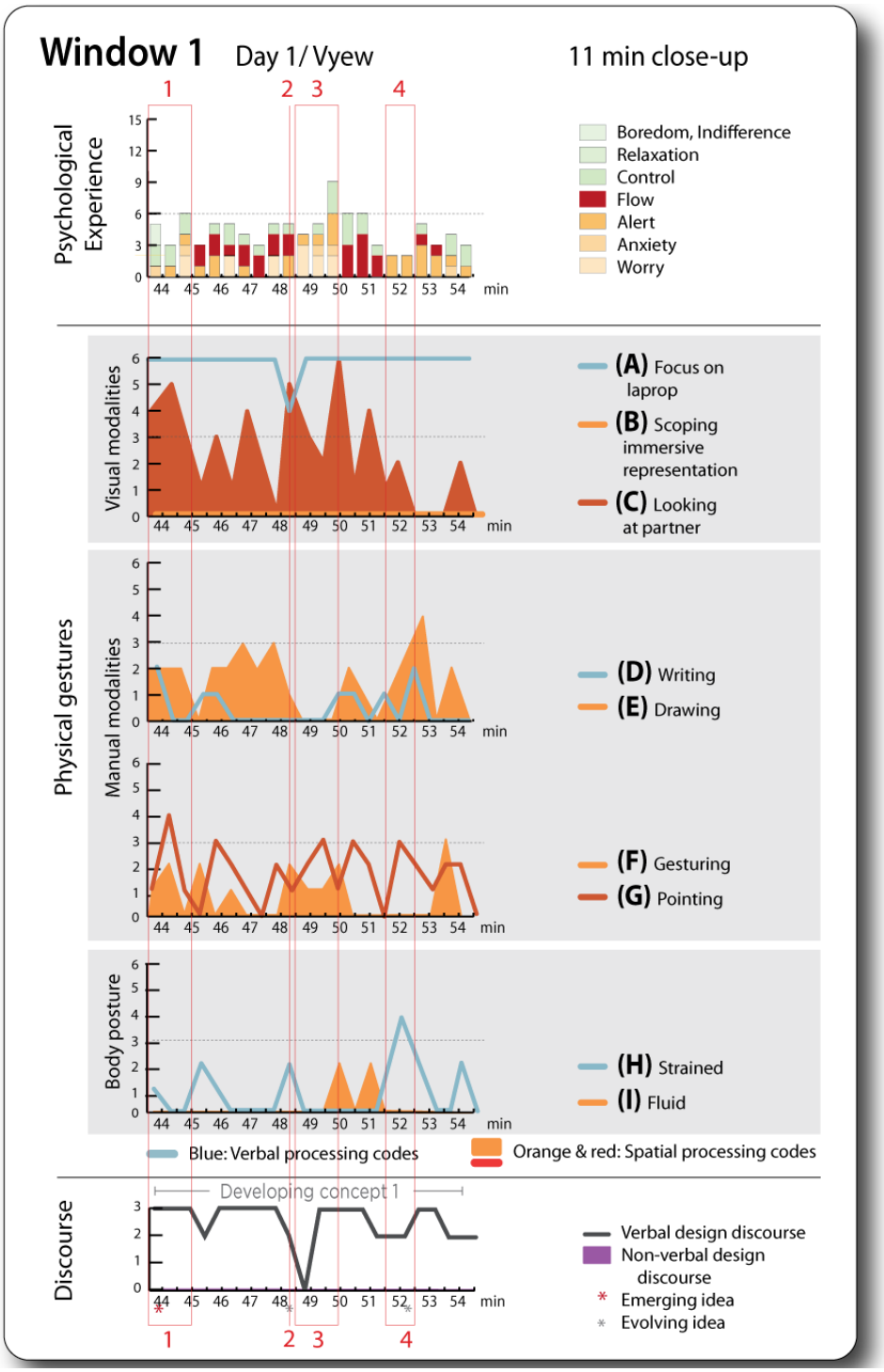

Figure 23. Window 1, from day 1 while using Vyew; chronological display of results from psychological experience, physical gestures (four bands in centre) and discourse

Window 1 (Figure 23) focuses on 11 minutes (from 43:30-54:30 min) of concept development, delivering one new concept and two iterations, with reportedly three bouts of Flow experience. Window 1 presents alternating moments of cautious states preceding sequences dominated by Flow. This articulation of **cautious states** and Flow sequences is the place to look for triggers of the transition to Flow.

The new concept (in box 1, Figure 23) occurred at a time when the participants declared experiencing the states of alert (1 occurrence) and control (2 occurrences), a minute before they reported experiencing Flow. The first iteration (line 2) was proposed by the participant experiencing alertness and was followed by 1:30 minute of experiencing worry, anxiety, alert and control (box 3) before Flow was experienced again. Likewise the last iteration was proposed while experiencing alertness for a minute (box 4) before 2 occurrences of Flow were recorded, i.e. all new design propositions, in this case, have been borne out of cautious psychological states (alert, worry / anxiety, or control). There seems to be a delay between the emergence of a new concept, and its full appreciation by the team. This could describe the process of identifying a new concept through negotiations before reaching an agreement (Dorta et al., 2011).

At 48:00 min (Figure 23), line 2 highlights a mixed column of alert, Flow and control, when an iteration of the concept was proposed. Participants became silent for 10 seconds, releasing their focus from the laptop, looking at each other, gesturing and drawing. It is a transition moment ("cautious states") because the participant who proposed the iteration reported being in alert state with no Flow.

8.3.1.3 Window 2: Looking at partner, Writing, Pointing, stronger prior to Flow

Window 2 (Figure 24) highlights a segment of design activity expanding the concept developed in Window 1. In Window 2, participants looked at each other the most of that day (Visual Modalities graph) while the design solution was rapidly evolving as attested by the 2 new ideas and 9 iterations. At a glance, *Verbal design collaboration* appears to accompany *Looking at partner* and *Gesturing*; *Drawing* is active throughout, but is particularly sustained during nonverbal discourse. Going back to the video recording

itself, we notice that there seems to be a pattern in this mature CI Loop sequence where the participants make their design proposal by drawing or miming them with their hands (*Gesturing*) while *looking at the partner* as in the verbatim descriptions below:

> (64:55) Participants are looking at a reference photograph of the site, *gesturing* the possible placement of different flat rocks in the air above the tablet, looking at each other.
>
> (65:22) A writes quick notes and mimes his proposal to B.
>
> (66:30) B points to the design representation explaining her proposition, but since its large scale prevents her from discussing a specific detail (distance between 2 outdoor stone-tables), she changes the scale of the representation by miming her proposal from her own body out (as if she was sitting at one of the tables), always looking at A. (Figure 25)
>
> (67:19) A: "*We want some shade!...*" As A says this, he gestures above his head something akin to a large tree branch. This gesture does not only illustrate the design proposition but the user experience as well, in life-like scale.
>
> (68:09) B: "*This! Let's keep it, and adapt it some.*" B verbally makes a note to change an element at a later stage, rather than trying to "fix" it in Vyew.

Figure 25. Participant B miming (*Gesturing*) a design proposal

Not all design propositions were done away from the design representation in Vyew, but a noticeably large number were; enough to leave a visible trace in the chronological data display of (C) *Looking at partner* and (F) *Gesturing* (for comparatives see whole data, Figure 22; and Window 2, Figure 24).

Window 2's Flow sequences are not as clearly defined in Window 1's. Boxes 1, 4-5 are dominated by alert and control states, but between 63-66 min, a mixture of psychological states has been experienced (worry, anxiety, alert, Flow, control) with no clear dominance. In this section, an emerging idea and an iteration occurred through backtalk (Schön, 1983), at 64:20 min (Line 2, Figure 24) and 65:50 min (Line 3). These backtalks took place at a time of reported stressful and Flow states.

Looking at the physical gestures' graphs in Windows 1 and 2 (Figures 23-24), it is hard to see any real difference. This suggests that when using Vyew, the immature CI Loops (Window 1) and the mature CI Loops (Window 2) call upon roughly similar physical gestures. This is a contextual information about task and tool that will help understand the character of the autotelic experience in Vyew.

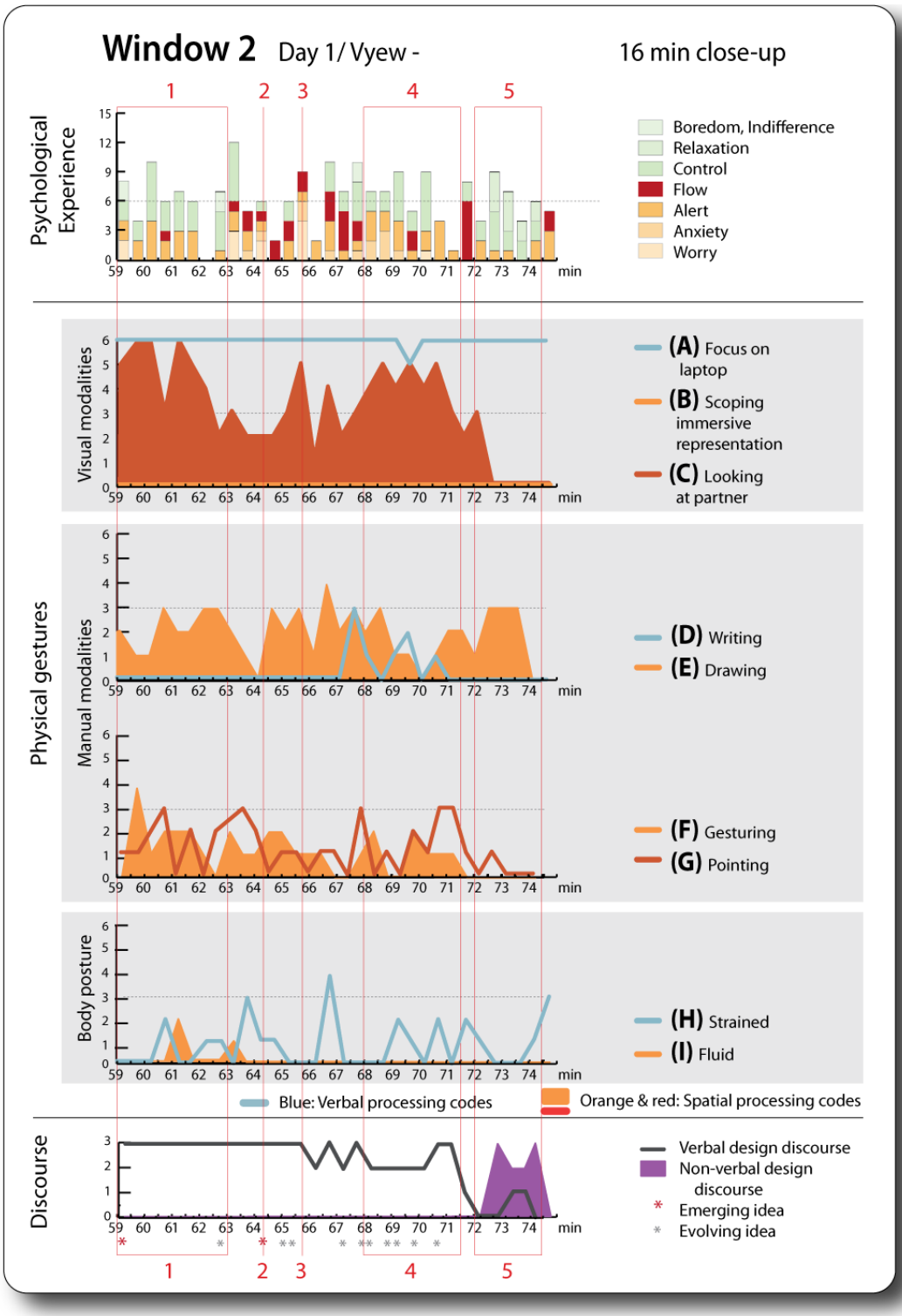

Figure 24. Window 2, from day 1 while using Vyew; chronological display of results from psychological experience, physical gestures (four bands in centre) and discourse

8.3.1.4 Window 3: Immature CI Loops relied on sustained focus on laptop; In the HIS, Pointing and Scoping the immersive representation during Flow

Window 3 (Figure 26) focuses on 8 minutes of productive development of a new concept after having dismissed 25 minutes of work on a previous concept deemed a failure. In the minutes prior to Window 3, they reported the most anxiety of the experiment. In Window 3, the participants made extensive use of the laptop representation (A), with noticeable absence of use of (B) *Scoping of the immersive representation* (also noticeable in overall data, Figure 22).

Along the sustained (A) *Focus on laptop*, participants pursued their co-design task through constant *Verbal design collaboration*; five times did they both draw or pointed in the same 30-second[7] with no signs of strained posture and some signs of fluid posture, which hints at an active and animated collaboration.

Window 3 begins with the proposition of a new concept (29:30 min), a time when states of alert and relaxation were reported, as they were for the next two minutes (Box 1, Figure 26), as well as anxiety, control and worry. At 31 minutes, there is a transition: no psychological states reported, the sustained (A) *Focus on the laptop* was complemented with both participants also (B) *scoping the immersive screen*, halting (E) *drawing* gestures, (G) *Pointing* (peaking at 4 gestures), (F) *Gesturing* some, with some signs of (I) *Fluid body posture*. Then follows a sequence of 7:30 minutes dominated by Flow with some worry, control and relaxation (Box 2).

[7] As a reminder, the maximum number of occurrences per column of physical gesture is 6, each column carrying 30 seconds of data, i.e. 3 x 10-sec increments x 2 participants. When a column reaches above 3, it means that both designers have made this gesture during the given 30 seconds.

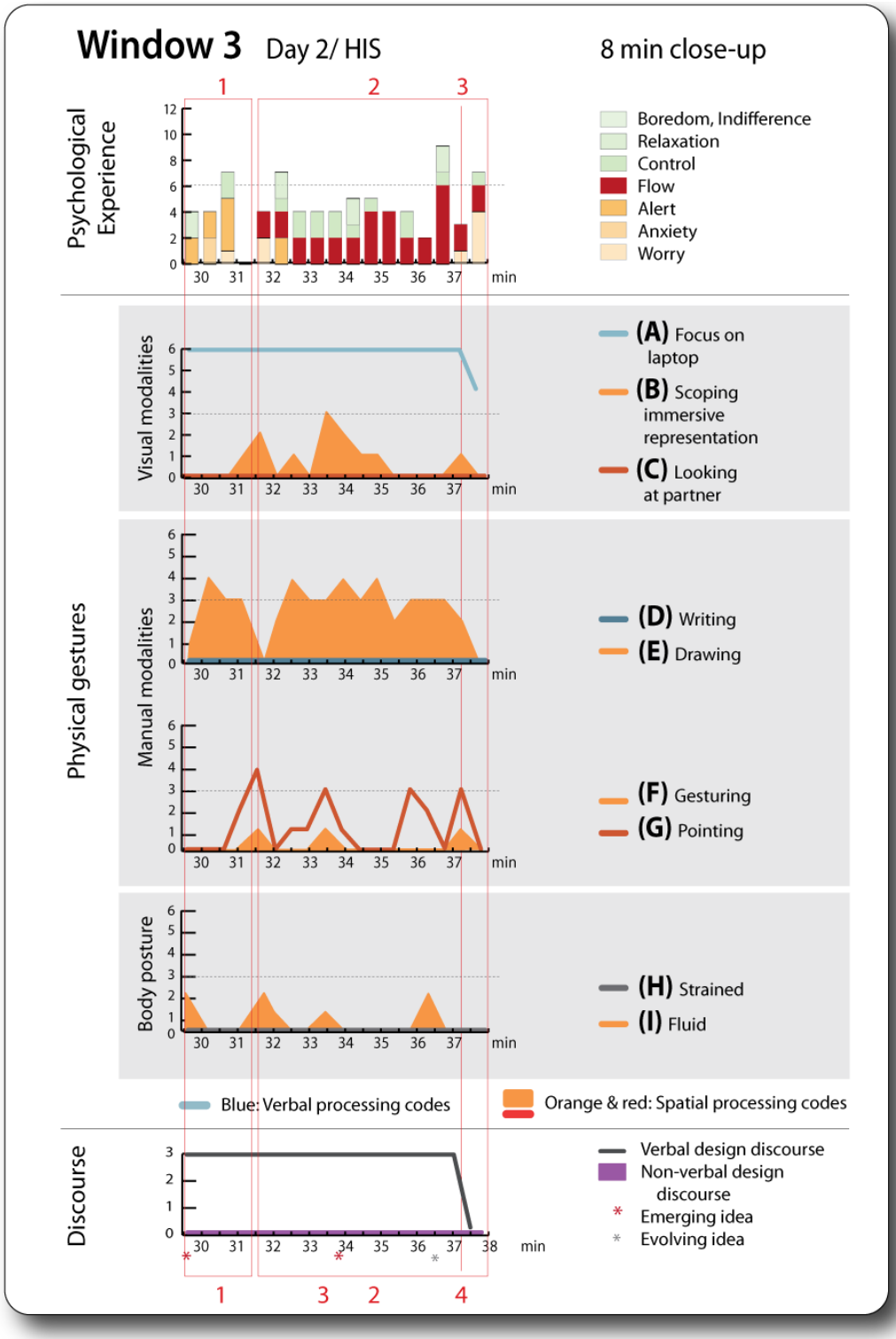

Figure 26. Window 3, from day 2 while using the HIS; chronological display of results from psychological experience, physical gestures (four bands in centre) and discourse

8.3.1.5 Window 4: Scoping, Pointing and Drawing appear to associate while in Flow in the HIS

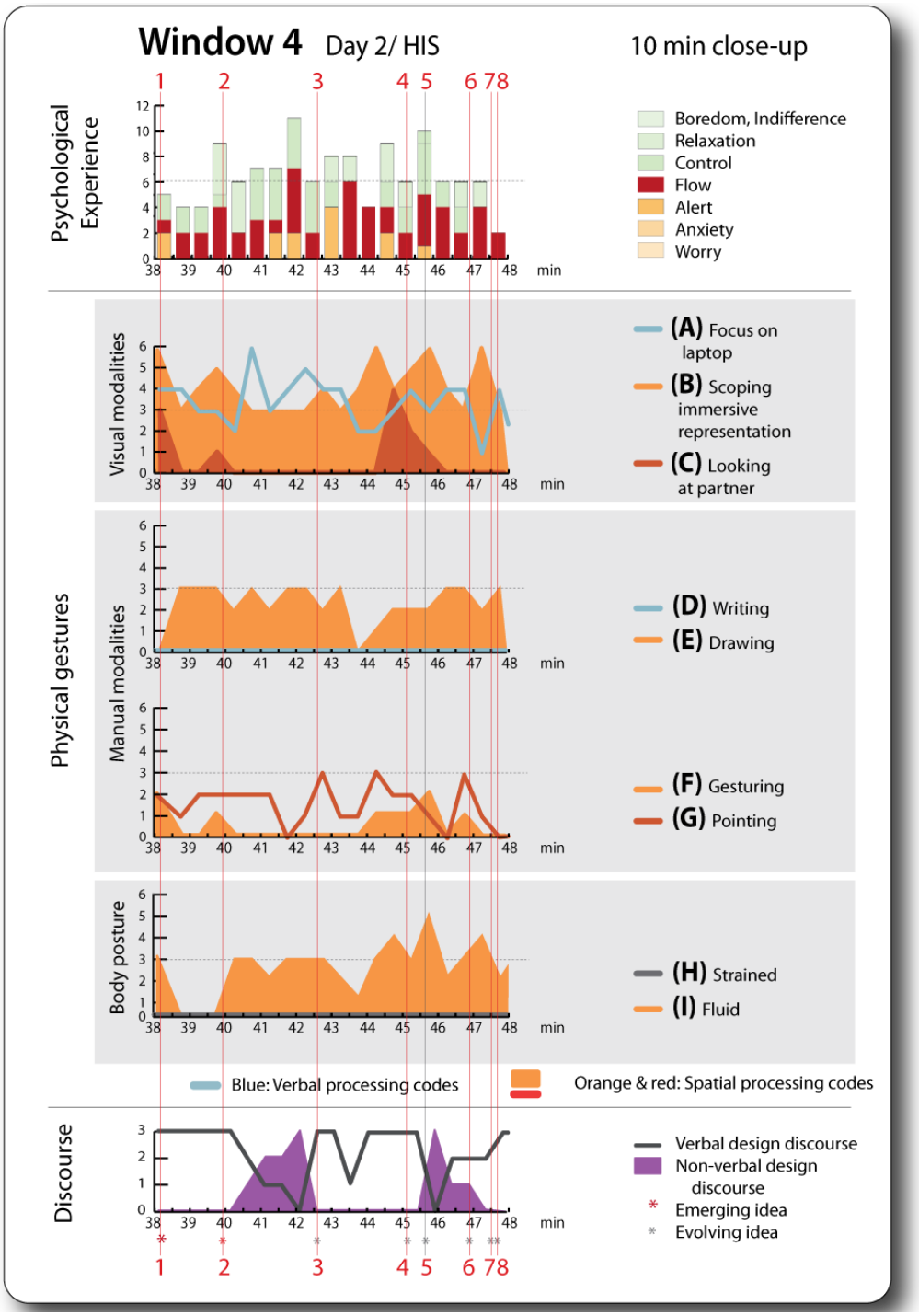

Figure 27. Window 4, from day 2 with the HIS; chronological display of results from psychological experience, physical gestures (four bands in centre) and discourse

Window 4 (Figure 27) focuses on the last 10 minutes of day 2, when participants moved the concept developed in Window 3 into a concrete form. Flow was recorded throughout the 10 minutes (the most Flow of the 2 days), accompanied by mostly control and relaxation (low stress states). (B) *Scoping the immersive representation* (which never dips below 3) prevails over (A) *Focusing on the laptop*, with 6 occasions when both participants joined in looking at the immersive space. At the same stage in the design process in Vyew (the whole Window 2), participants relied extensively on (C) *Looking at partner*, which was not used that much in the HIS.

Going back to the video recordings, we see that the non-drawing partner *scopes the immersive representation* continuously, and sometimes the other participant joins him for some discussion. They appear to bounce off this immersive representation in their design exchange (as well as in their joking).

There is no *Writing*, and we observed the highest amount of signs of (I) *Fluid body posture*. In the process of recording the psychological states, participant A made this comment about the freedom to move around (French verbatim of the few impromptu comments from data collection interview, in Annex C):

(33:15-35:04) A: *I feel the freedom of being able to move my arms…*

Researcher: *Can you elaborate on that?*

A: *You're in space… I bet it helps a whole lot… it's for the body: you're not stuck like this* (he mimes being hunched back over the laptop). *I think to be able do this, is a physical freedom that supports, I imagine, creative freedom; a little like doing stretches. A bunch of ideas converged at that very moment, it seems. The physical expression is a kind of exclamation of that cohesion. Maybe Flow expressed itself in this physical freedom. I don't know. It's hard to express. I think there is a link.*

Researcher: *…an exclamation? Like after something: "super! Let's rejoice"? Or was it a door that opened on...*

A: *oh no, it was a door! It was more like the physical manifestation of coherence, in fact, that seemed shared.* (Annexe D, p.xxxvi)

This comments from Participant A confirms that the fluidity in his posture was somehow linked to a special experience (experiencing "coherence", in his words) related to Flow. Another ad-hoc comment concerned the scale of the immersive representation: (41:22) A (looking at the video) : « *It's crazy how the drawing matches our scale! The scale set-up between the landscape picture and our physical presence is good!"*

There are 2 sequences of productive nonverbal design collaboration. Over the 10 minutes, 8 new ideas and iterations have come forth.

Looking at the physical gestures' graphs in Windows 3 and 4 (Figures 26-27), the differences between immature (Window 3) and mature CI Loops (Window 4) are visible: the visual modalities' graphs of Windows 3 is dominated by the (A) *Focus on laptop*, in Window 4, all three visual modalities are very active. The (E) *Drawing /(D) Writing* graph in Window 3 shows a few instances of both participants drawing at once, while the *Drawing* curve never rises above 3 (a single participant handling the pen). These suggest that for some reason, in the HIS, the immature CI Loops have been experienced differently than the mature CI Loops, which was not the case with Vyew.

8.3.2 Comparative assessment of the tools: workload, Flow, design progress, physical gestures and design discourse

8.3.2.1 Workload: A lower mental demand in the HIS

Assessing the performance as a positive factor, a typical workload will have matching performance and mental demand, which is the case for Vyew (Figure 28), but in the HIS the mental demand is low while the performance is very high (in red, Figure 8.16). Temporal demand was higher in the HIS as the participants reported feeling pressed by time (they had less time than with Vyew), which appears to have led to greater effort. (For questionnaire, Annexe A, p.i)

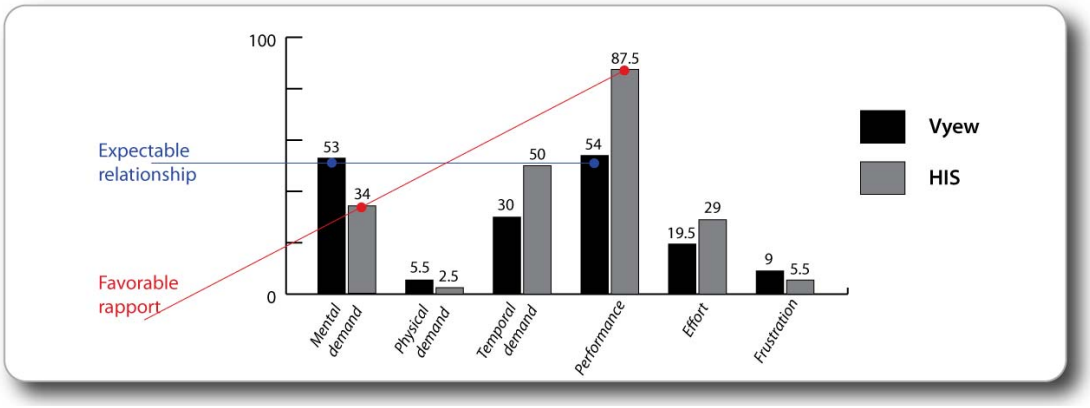

Figure 28. Workload results for both tools

When considering this data through the relative deviations between tools and the six variables for workload, the previous picture gets reinforced (Table xv): Vyew has attracted higher ratings in mental demand, physical demand and frustration; conversely the HIS repelled these 3 variables.

The performance, temporal demand and effort appear to have been equally distributed between the two tools, which echoes the participants' spontaneous positive feedback after each session.

	Mental demand	Physical demand	Temporal demand	Performance	Effort	Frustration
Vyew	53 +0.35	5.5 +0.53	30 -0.17	54 -0.15	19.5 -0.11	9 +0.38
HIS	34 -0.29	2.5 -0.43	50 +0.14	87.5 +0.13	29 +0.09	5.5 -0.31

Table xv. Relative deviations between the tools and the 6 variables for workload

According to Vidulich and Tsang (1985), frustration can be understood as being linked to the tools' interface and therefore has an indirect impact on the psychological experience. Physical demand was noted in the relative deviation, but was in fact very low. The shift in mental demand between the two tools is the result most useful to start understanding the difference in quality of experience.

8.3.2.2 Flow per tool: More Flow in the HIS

The goal of this assessment is to get a sense of what was experienced in each tool. The HIS attracted Flow whereas Vyew appear to have no particular link to Flow (Table xvi). Furthermore, the HIS attracted Relaxation and repelled Boredom and Indifference, whereas Vyew repelled Relaxation. Worry, Anxiety and Control occurred in both tools with apparently no particular association to either tools.

	Vyew (803)	**HIS (574)**
Worry	123 *-0.01*	91 *+0.02*
Anxiety	84 *+0.12*	45 *-0.16*
Alert	193 *+0.11*	106 *-0.15*
Flow	101 *-0.17*	108 *+0.25*
Control	239 *+0.02*	162 *-0.03*
Relaxation	39 *-0.26*	51 *+0.36*
Boredom & Indifference	24 *+0.18*	11 *-0.25*

Table xvi. Amounts of 10-seconds increments of each psychological state in both tools, with RD in italics

8.3.2.3 Physical gestures per tool: HIS attracted spatially driven gestures

Physical gestures and tools are in direct relationship with one another, therefore the cognitive processes active while interacting with a tool may be saying something about that tool. Table xvii lists for each physical gesture the amount of 10-second increments that were recorded in each tool, its RD value in italics below. The RD higher than +0.25 (on darker backgroud) signals a positive association (attraction) between the two variables; the RD lower than -0.25 (on light gray backgroud) signals a negative association (repulsion) between the two variables.

Vyew has attracted (A) *Focusing on the laptop* and (D) *Writing* notes, the (H) S*trained posture,* and also (F) *Gesturing* and (C) *Looking at partner* and away from the

design representation. In Vyew, the participants could only access the representation on the narrow screen of the laptop; they have apparently compensated for the lack of acces to the laptop interface by looking at each other (C) and drawing in the air with their hands (F).

	Visual modalities				Manual modalities					Body posture		
	A	B	C	*Total*	D	E	F	G	*Total*	H	I	*Total*
Vyew	764 *+0.27*	0 *-1.00*	270 *+0.25*	1035	37 *+0.91*	126 *-0.04*	27 *+0.31*	32 *-0.37*	222	123 *+1.11*	63 *-0.51*	186
HIS	411 *-0.28*	416 *+1.06*	151 *-0.26*	978	13 *-0.58*	213 *+0.03*	26 *-0.20*	98 *+0.23*	350	7 *-0.90*	222 *+0.41*	229

Table xvii. Number of recorded 10-second increments of each gesture in each tool; RD in italics

The physical gestures most used in the HIS all make use of the space, (B) *Scoping the immersive representation*, (G) *Pointing* and (I) *Fluid posture*. In the HIS, looking at the representation could be done (A) on the screen of the tablet (verbal) or by (B) *Scoping the immersive representation* (spatial), which was done in equal quantity, 411 and 416. This suggests that the HIS can support the needs of verbal and spatial cognitive processes.

8.3.2.4 Task progress per tool: the HIS associates with mature co-design

Table xiii presents the amount of 10-second increments in each type of design conversations with each tool. These results draw a picture: with Vyew, 197 of the 317 10-s increments were spent in conversations associated with early or immature co-design (CC/collaboration conversation and immature CI Loops). In the HIS, 161 of the 247 10-s increments were spent in mature co-design (mature CI Loops and CM/Collaborative moving). The HIS has a positive association with the later phases of co-design.

	CC	i-CI Loop	M-CI Loop	CM	*Total*
Vyew	57 *+0.41*	140 *+0.18*	89 *-0.22*	31 *-0.30*	317
HIS	15 *-0.52*	71 *-0.23*	113 *+0.28*	48 *+0.39*	247

Table xiii. Time spent (in 10-s increment) in each Design Conversations with each tool

8.3.2.5 Discourse per tool: the HIS associates with mature co-design

Table xix presents the amount of time (in 10-second increments) spent verbal and nonverbal design collaboration. The RD suggests that the used of verbal design collaboration was not linked to either Vyew or the HIS, but the HIS appears to have attracted nonverbal design collaboration, while Vyew repelled it.

	Veverbal design collaboration	Nonverbal design collaboration	*Total*
Vyew	297 *+0.06*	20 *-0.45*	317
HIS	225 *-0.07*	47 *+0.52*	247

Table xix. Number of 10-s increments of verbal and nonverbal design collaboration, with RD in italics

8.3.2.5 Summary of tool assessment

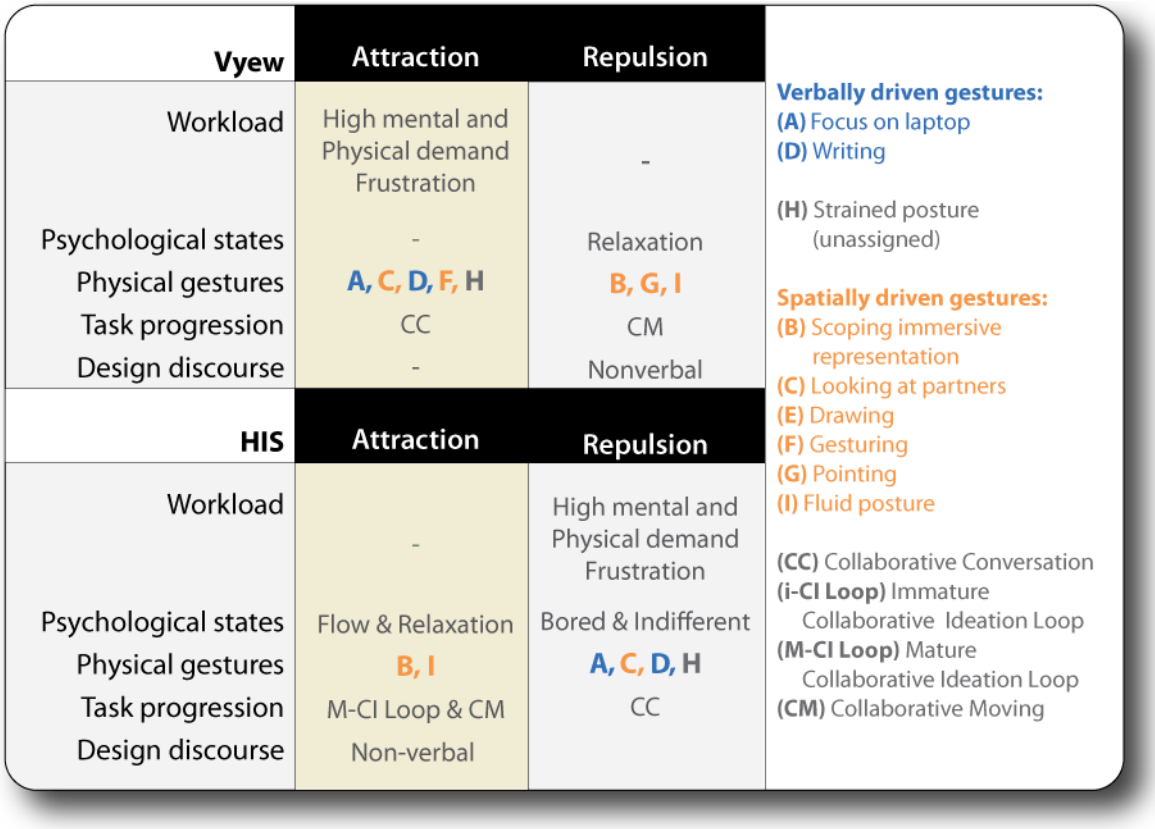

Figure 29. Summary of relative deviation results for Vyew and the HIS

From these results we get a sense that in this experiement, Vyew and the HIS offered different quality of experiences (Figure 29). Vyew is associated with high mental demand, verbally driven physical gestures and early design process pattern while repelling Relaxation. The HIS attracted Flow and relaxation, spatially driven physical gestures, later design patterns and silent collaboration.

8.3.3 Preparing the data

8.3.3.1 Verbal and nonverbal design collaboration to gestures

This analysis (Table xx) outlines gestures associated to verbal and nonverbal collaboration within Windows 1-4, during Flow. (A) *Focusing on the laptop*, (E) *Drawing* and (I) *Fluid posture* are the only gestures that have been active in Flow in nonverbal collaboration. (C) *Looking at partner*, (D) *Writing*, (F) *Gesturing*, and (G) *Pointing* are associated uniquely to verbal design collaboration.

Physical Gestures	(65) Verbal design collaboration	(8) Nonverbal design collaboration
(A) Focus on laptop	58	**7**
(B) Scoping immersive screen	18	1
(C) Looking at partner	14	0
(D) Writing	2	0
(E) Drawing	30	**6**
(F) Gesturing	6	0
(G) Pointing	12	0
(H) Strained posture	4	0
(I) Fluid posture	10	**3**

Table xx. Physical gestures in verbal and nonverbal design collaboration in Flow in Windows 1-4

8.3.3.2 Cautious states attract Worry, Anxiety and Alert

To identify the triggers of the autotelic experience, we need to look at what goes on just prior to this experience. The chronological analysis has revealed that segments of cautious

states preceeded Flow. The overall account of psychological states (Table xxi) preceeding Flow shows that cautious states have a strong positive association to Worry, Anxiety and Alert. On the other hand, Control and Relaxation show no particular link with cautious states (their presence does not imply that this would be a cautious states segment) and Boredom & Indeference is repulsed by it. Consequently, when analysing how gestures and discourse associate to Flow and Cautious states, only the data related to Worry, Alert and Anxiety will be tallied for cautious states.

	Cautious states	**Flow**
Worry	15 *+0.50*	12 *-0.29*
Anxiety	13 *+1.50*	1 *-0.89*
Alert	59 *+0.67*	36 *-0.40*
Flow	4 *-0.92*	131 *+0.54*
Control	66 *+0.24*	77 *-0.14*
Relaxation	16 *-0.02*	28 *+0.01*
Boredom & Indifference	4 *-0.41*	15 *+0.24*

Table xxi. Occurrences of psychological states occurring cautious states and Flow sequences in all 4 windows with RD in italics

8.3.4 Gestures and discourse to cautious states and Flow

This assessment addresses the internal focus on the autotelic experience, looking inside the experience at the relationship between modalities (gestures and verbal/nonverbal design collaboration) and Flow. Gestures and discourse indicate what verbal / spatial processes are in use.

Tables xxii-xxiii present the data from windows 1-4, according to what part of the design process it corresponds to. From the four types Design Conversations with which we monitored the task, we are not presenting the modalities to flow assessment in CC (Collaborative conversations) because no Flow was collected in CC. Table xxii

presents the modalities to Flow and Cautious states in immature and mature CI Loops; and in CM (Collaborative moving, the last stage of co-ideation) and the overall results for Table xxiii. We have separated the Flow data in two groups: when Flow had been experienced along other states and when experienced alone, for more clarity in the results.

>> (# 10-sec increments) Psychological states	Immature CI Loops			Mature CI Loops		
	(43) **Cautious states**	(15) **Mixed (w/Flow)**	(6) **Flow**	(31) **Cautious states**	(12) **Mixed (w/ Flow)**	(15) **Flow**
(A) Focus on PC	39 *-0.07*	15 *+0.06*	**6** *+0.55*	3 *0.00*	10 *+0.06*	11 *-0.05*
(B) Scoping immersive representation	3 *+0.07*	1 *+0.06*	0 *-1.00*	6 *-0.40*	**5** *+0.58*	**6** *+0.56*
(C) Looking at partner	23 *+0.13*	6 *-0.13*	0 *-1.00*	21 *+0.23*	3 *-0.44*	5 *-0.24*
(D) Writing	0	0	0	3 *0.00*	1 *+0.22*	1 *-0.15*
(E) Drawing	11 *-0.18*	5 *+0.12*	**3** *+1.47*	13 *-0.17*	4 *-0.06*	**9** *+0.46*
(F) Gesturing	**8** *+0.27*	1 *-0.53*	0 *-1.00*	4 *-0.05*	1 *-0.13*	2 *+0.21*
(G) Pointing	14 *+0.05*	5 *+0.12*	0 *-1.00*	**13** *+0.27*	3 *+0.08*	1 *-0.75*
(H) Strained posture	2 *-0.33*	**3** *+0.50*	0	1 *-0.13*	**1** *+0.75*	0 *-1.00*
(I) Fluid posture	**4** *+0.33*	1 *-0.50*	0	7 *+0.02*	3 *-0.13*	2 *+0.17*
Verbal design collaboration	43	15	6	31	12	15
Nonverbal design collaboration	0	0	0	0	0	0

Table xxii. Comparative account of gestures and discourse in Cautious states and Flow in immature and mature CI Loops, with RD in italics, darker gray background: attraction; light gray background: repulsion; no background: no link

8.3.4.1 Two patterns: verbal cautious states and nonverbal Flow.

Flow has attracted (B) *Scoping the immersive representation* and (E) *Drawing*, both also related to spatial cognitive processes and to nonverbal design collaboration (See Table xx, p.148). Although this association of nonverbal / spatial gestures could seem to be empeding collaboration, the immersive representation is actually a collective representation accessible to both participants. This suggests that Flow is not necessarily

an introverted experience, although it appears to be less verbal than the preceding segments. In turn, this further suggests that (E) *Drawing* in mature CI Loop and in CM may have been enjoyed vicariously through the immersive representation by the partner who was not drawing.

Task progress:	CM / Last stage of co-ideation			Overall co-design task		
>> (# 10-sec increments) Psychological states	(8) **Cautious states**	(7) **Mixed (w/Flow)**	(14) **Flow**	(83) **Cautious states**	(34) **Mixed (w/ Flow)**	(35) **Flow**
(A) Focus on PC	7 *-0.08*	6 *+0.13*	12 *-0.01*	76 *-0.06*	31 *+0.08*	29 *+0.08*
(B) Scoping immersive representation	1 *-0.45*	1 *-0.21*	**4** *+0.38*	10 *-0.37*	7 *+0.23*	**10** *+0.88*
(C) Looking at partner	**2** *+2.30*	0 *-1.00*	0 *-1.00*	**46** *+0.30*	9 *-0.29*	5 *-0.58*
(D) Writing	0	0	0	3 *+0.06*	1 *-0.02*	1 *-0.13*
(E) Drawing	0 *-1.00*	**5** *+0.25*	11 *+0.15*	24 *-0.30*	14 *+0.12*	**23** *+0.64*
(F) Gesturing	**1** *+5.67*	0 *-1.00*	0 *-1.00*	**13** *+0.35*	2 *-0.43*	2 *-0.49*
(G) Pointing	2 *+0.02*	0 *-1.00*	1 *-0.44*	**29** *+0.31*	8 *0.00*	2 *-0.78*
(H) Strained posture	1 *+0.02*	0 *-1.00*	1 *-0.30*	4 *-0.08*	**4** *+0.53*	1 *-0.51*
(I) Fluid posture	0 *-1.00*	**1** *+0.40*	4 *+0.12*	11 *+0.03*	5 *-0.23*	6 *+0.21*
Verbal design collaboration	3 *-0.32*	4 *+0.04*	9 *+0.17*	77 *+0.03*	31 *0.00*	30 *-0.06*
Nonverbal design collaboration	**5** *+0.39*	3 *-0.04*	5 *-0.20*	5 *-0.29*	3 *+0.02*	**5** *+0.66*

Table xxiii. Comparative account of gestures and discourse in Cautious states and Flow in CM and overall, with RD in italics, darker gray background: attraction; light gray background: repulsion; no background: no link

The cautious states have attracted visual and manual gestures associated to verbal design exchange (see Table xx, p.148), (C) *Looking at partner*, (F) *Gesturing* and (G) *Pointing*. These are usually associated to spatial cognitive processes (Boles, 2010); in this study, they are associated to talking about design (a spatially driven task). As they are

found in segements preceeding Flow, these verbal design exchanges are probably negotiations, one of the basic elements of design conversations (Dorta et al., 2011).

8.3.4.2 Worry, Anxiety and Alert as project matures

There was a steady decrease of the time spent in cautious states as the design process matured, from 43 to 31 to 8 (Tables xxii-xxiii, pp.150-151, also clearly visible in the chronological diagrams, Figures 23-24, 26-27, p.134, 138, 140-41). Yet there are always some stressful states (Worry, Anxiety or Alert) before or along the Flow. These moments of stress seem essential to the design process (they are present even in CM, when the concept is well identified). Since the design process is strongly goal oriented, the stress appears to act as pressure pushing the process onward until it finds a resolution, marked by a measure of Flow. Our results show that each phase of the design process has been punctuated by some Flow indicating the accomplishment of each phase's purpose.

8.3.4.3 Drawing and the design task

There was a steady progression of (E) *Drawing* as projects matured (3 occ. out of / 6 total in immature CI Loop, 9 / 15 in mature CI Loop, and 11 / 14 in CM). It appears to correspond to the increase of reported Flow. This suggests that drawing is an indicator of the advancement of the design process, i.e. of an extrinsic, task-related process.

8.3.4.4 Summary of results

Figure 30 presents the summary of all the quantitative data in this study. On the left, the verbal pattern: (G) *Pointing*, (F) *Gesturing,* (C) *Looking at partner,* (D) *Writing*, (H) *Strained body posture*, and (A) *Focusing on laptop* as associated to Vyew, and cautious states. The design phases are those associated with the segments preceding Flow. On the right, the nonverbal /spatial pattern: (I) *Fluid body posture,* (B) *Scoping the immersive representation* and (E) *Drawing*; the HIS had associated to mature CI Loop and CM (the end of the design process).

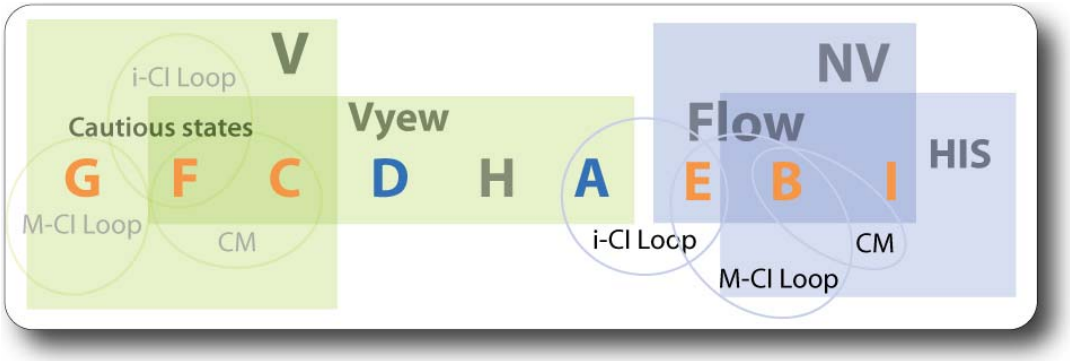

Figure 30. Summary of quantitative analyses; gestures are: (A) Focusing on laptop, (B) Scoping the immersive representation, (C) Looking at partner, (D) Writing, (E) Drawing, (F) Gesturing, (G) Pointing, (H) Strained body posture, and (I) Fluid body posture; blue letters: verbally driven modalities; orange letters: spatially driven modalities

It would be a misleading simplification to associate the nonverbal design collaboration gestures (B, E) to drawing activity; it is more accurate to associate them to the use of representation and representational support. The representational interface stabilises the concept (supporting ideation), lowers the mental demand (Tversky, 2005) and makes it available to the whole team (supporting collaboration) (Heiser, Tversky, Silverman, 2004). The fact that the HIS offered two perspectives and scales of representation (small sections seen with precision on the laptop and whole, expansive scope on the immersive screen at life-size scale) has made the representation available to both participants, and in two different conceptual scales.

Furthermore, the HIS' representations may have "fuelled" the later design process, as the non-drawing partner watched, absorbed and reacted to the evolving representation, proposing new development without looking at the drawing partner. Vyew, on the other hand, was a window placed on the laptop screen; it was not as easily accessible to the non-drawing partner. Vyew appears to have served as a repository of concepts worked out verbally (drawn in the air, looking at each other instead of looking at the representation). This may explain the higher mental workload with Vyew. *External representations transform internal memory and information processing into external memory and information processing, relieving the severe constraints of working memory* (Tversky, 2005, p.17). And external representations are *more productive than linguistic ones at*

reasoning, inference and leaps of imagination, (…) *as they transform abstract problems* (…) *into spatial ones*, [and] *people have extensive experience of solving spatial problems* (2005, p.16-17). In short, it suggests that the HIS was appropriately equipped to support *and participate* in the design process, and not just record the outcomes of the process.

First stab at main inquiry: Flow associated to spatial modalities

With this summary of results comes the beginning of an answer to our main research question: in the context of this co-design task (a task both spatial and verbal in nature), Flow has attracted modalities that called upon spatial process and nonverbal discourse distinct from the modalities serving verbal design collaboration in the stressful segments preceding Flow. But it should be noted that our results also suggest that even when the design has reached stages where Flow is strong, Flow has been accompanied by stressful states. This suggests that the nonverbal, spatial Flow experience may be distinct from the stressful and verbal states, but we should be careful before considering them independently from one another.

8.4 Signs of autotelic Flow

Before presenting our findings related to signs of autotelic Flow, it is useful to keep in mind a description of the Flow experience: The person experiences focused attention, merging of activity and awareness, a sense of control over outcome (in principle), a distorted sense of time, and a temporary loss of self-awareness[8] (Csikszentmihalyi, 1988, pp.32-33). We could add that the autotelic experience finds its goal within the experience of the interaction in and of itself. When an autotelic experience occurs it holds the person experiencing it in its own awareness, the awareness that something special is occurring; and further referring to the teleonomy of the self, this awareness of self is a goal of a higher order according to Csikszentmihalyi (1988, pp.17-24). It is elusive in the sense

[8] There are other parameters (clear goals, quick and unambiguous feedback, balance of challenge and skills) but they concern the conditions known to induce Flow.

that it comes upon the subject not out of will, but out of what seems like sensory information striking one in a fresh way (Schaeffer, 2000).

Paying attention to the total amount of manual modalities (Tables xxii-xxiii, p.150-151), it is noteworthy that in the design phases, there was less time spent in manual activity than in Flow. In immature CI Loop, only 3 out of 6 ten-second increments, spent in Flow were not accompanied by a manual action; in the other 3, the results show participants busy looking at the representation on the laptop while engaged in verbal exchange. The share of Flow time disengaged from manual modalities may belong to the partner not drawing. But similarly disengaged time in CM raises questions: 2 out of 14 ten-seconds increments of Flow were spent disengaged from manual gestures, and 5 out of 14 spent collaborating nonverbally. Did these disengaged and silent moments overlap? And if so, what were they 'doing' or what was going on (as they looked at the representation) that had them reported being in Flow and in no other psychological state? Going back to the videos, we identified 10 instances of a participant reporting to be in Flow while not engaged in manual modality. Table xxiv lists what they were doing.

(HIS) 1 x 10 sec: Participant A **describes** a good design project that could be used as a reference.
(HIS) 2 x 10 sec: Participant B **listens** to participant A describe the proposal, **looking** at laptop representation. Agrees.
(HIS) 1 x 10 sec: Participant A **watches** the design representation evolve on the immersive screen. Little words. Seems absorbed.
(Vyew) 2 x 10 sec: Twice participant A lets participant B have the pen. L**istens** and **watches** while B completes the proposition. Participant A makes a joke; proposes a correction.
(HIS) 1 x 10 sec: Participant A **describes** design options **while staring** at immersive design representation. Seems absorbed by what is seen.
(HIS) 3 x 10 sec: Participant A seems **absorbed by immersive representation**, not looking at participant B, seeming unaware of own arms (half raised in the air, motionless), spins on self. After 30+ seconds, breaks the silence by asking: "So, where're we at?" playfully in English (their collaboration was done in French) as if coming out of a reverie. (See pictures, Figure 31)

Table xxiv. Descriptions of what a participant was doing at a time they reported being in Flow but not being actively using any manual modality

Figure 31. Participant A (left) appeared **absorbed by immersive representation**, not looking at participant B, not talking, not seeming unaware of own arms (half raised in the air, motionless for well over 10 seconds in a row)

While in Flow but not using their hands in any way, participants spoke or listened to their partner, and in the HIS were absorbed in looking at the design representation. Referring back to the conditions defining the Flow experience, (which they reported to be experiencing at these moments), some are more observable than others: focused attention (all cases, but particularly in the HIS), loss of self awareness (when participant A keeps one arm halfway up in mid-air, as if stopped in motion, for more than 10 seconds, seemingly unaware of the arm or of being seen, Figure 31), distorted sense of time (participant A breaks his silent observation of the immersive representation with the question "*So, where're we at?*" as if he had lost track of time). These are observable signs confirming that participant A (in these cases) was probably experiencing Flow unmitigated by other state as he reported. The other cases listed Table xxiv have to be assumed to be Flow since they were reported as such, but there are no particular signs we can latch onto. This led us to consider the following possibility: because we have presented Flow through Massimini and Carli's framework (1988; "Flow happens when your perceived skills meet the perceived challenge", along the loss sense of

time, loss of self awareness etc.), what they reported as Flow was really a task-related dimension of Flow: the sense of release and pride at each task successfully achieved.

In short, in parallel to the drawing gestures augmentation, the participants spent some time just looking at the representation while being in Flow. Therefore, we have to consider that if some of the Flow experience is task-related (i.e. more drawing as the design process matures), some instances (very few, but some nevertheless) are seemingly unaffected by the design process and show a more contemplative engagement, even in a strongly goal oriented task such as design.

8.4.1 About the apparent differences in the quality of experience with each tools: two factors to explain it

The general goal of this study was to observe the autotelic experience in action and to deepen our understanding of it in the light of verbal and spatial cognitive processes. To address this goal we chose to study the Berkeley 2 data because the participants appeared to have experienced working with Vyew and in the HIS in radically different manners. With Vyew, they looked like two people working together on a laptop. In the HIS, they visibly were working out design issues in space (landscape space). We were attracted to this experiment because it seemed to touch at the heart of the autotelic experience in an active, goal-oriented context.

Two local questions were brought forth by the nature of the Berkeley 2 experiment: What explains the differences in quality between the experience of the two tools? What justified their comment suggesting the experience in the HIS was somehow better than with Vyew (since the performance was equal)? These questions led us to explore how the task-related and autotelic dimensions of the Flow experience were intertwined.

According to our results, the apparent qualitative differences between the participants' experience in each tool could be explained by a combination of two factors: (1) Immature CI Loops attracted gestures associated to verbal exchange, and later design process attracted spatially oriented gestures (i.e. gestures making use of the spatial layout

of the representation). (2) Vyew supported verbal processes more than it supported spatial processes, while the HIS supported both equally (Figure 22, p.132).

Assuming each step of the design process attracted what it needed to fulfil its respective goal, this implies that Vyew was well suited to support the early design phase but not so much the mature CI loop and CM. Participants complemented their use of Vyew with a strong reliance on (C) *Looking at partner* and (F) *Gesturing*, spatially inclined visual gestures associated with verbal design communication, when they were in mature CI Loop. In lieu of an interface offering them what they needed to pursue their task, they adjusted to Vyew, responding in ways acceptable to the tool. Therefore the immature and mature CI Loops activated similar physical gestures (Lesage and Dorta, 2010).

On the other hand, the data suggests that the HIS was able to support both verbal and spatial physical gestures (Table xvii, p.146), and this is part of what made the difference between the two tools specially noticeable. In the HIS, before developing what turned into their best concept, the participants had dismissed 25 minutes of work deemed not good enough. They launched into their final concept with a fair amount of stress (from previous concept failure and time pressure—they had a fixed amount of time to deliver a resolved design solution). They went through the immature CI Loops with a high focus on the laptop screen. Once the immature CI Loops had delivered what they felt was a good concept, they used the spatial qualities of the HIS to substanciate their landscape design proposition. Time pressure and frustration (see workload results, Figure 28, p.144) made them extra sensitive to their design needs, making sure these were met; they sought out and focused on the support for verbally driven modalities the HIS could offer. Then they were equally intent in responding to their mature-CI-Loop-needs, again using the spatial and physical qualities of the HIS to the fullest. This would explain what we witnessed and judged to be radically different experiences.

Explained this way, the last segment in the HIS (Window 4) was not so much an expression of autotelic-Flow, as it was the case of two designers habilitated to truly align their (spatial) needs and processes via a tool and environment that allowed them to deliver their task without compromise. Said differently, the most obvious differences

(deskwork behaviour vs. expansive spatial gestures) apparently concerned the task-related dimension of their Flow experience.

8.4.2 About the impression that it was better in the HIS: an autotelic experience?

Initially we thought the expansive gestures seen in the HIS were related to an autotelic Flow. Furthermore, the ad-hoc comment of participant A about freely moving in the HIS being linked to Flow kept us thinking it may be the case, but our analysis of the data so far leans against this interpretation for now. Yet, the participants said as they came out of the HIS, that they were glad they had worked with Vyew on the first day, otherwise the experience in the HIS would have cast a different light on their experience of Vyew. They seemed to suggest the HIS offered something more.

The only sign we found of a true autotelic experience was participant A, losing sense of time and awareness of self as he was absorbed in reflections looking at the immersive representation, admittedly in unmitigated Flow. It lasted about 40 seconds out of 6:20 min of Flow, itself out of 45 minutes of analysed co-design; this was hardly a substantial amount of data. Thinking the autotelic experience was a separate layer on top of the task-related experience would have us consider this a rather slim harvest. Reconsidering the layered model, if the core of autotelic experience is not to be found outside of the goal-driven task-related Flow, perhaps it lies within it.

If indeed the roots of the autotelic experience lay in a unified/holistic experience (which is how it is experienced), then the 40 seconds of participant A's autotelic Flow pinpoints moments when a combination of factors led to this autotelic experience. These 40 seconds of autotelic experience occurred in the HIS while the team was working through the later design process shared the following characteristics:

(1) ***High positive pressure***: the resolved previous phase had brought its share of Flow; the positive feeling carried over the beginning of this later phase, yet, the pressure to deliver on the design task and to do it quickly were still present, which assured a full engagement;

(2) ***Low mental demand***: the task, process and tool were cognitively aligned (centred around the cognitive needs of the design task), thus "relieving" the designer from excess mental workload (Heiser, Tversky, Silverman, 2004); the freshly freed-up mental demand allowed for mental resources to be re-allotted to other activities, as if 'primed' for more (Bowden and Jung-beeman, 2003);

(3) ***Task implied possible surprises or insights***: the task called on design creativity, insights (Heiser, Tversky, Silverman, 2004), surprises (Schön, 1983) or burst of development in the on-going reframing of problem/solution spaces (Dorst and Cross, 2001). This expectant attitude, the understanding and willingness to be surprised in order to pursue the task seems to us to be key in capturing the autotelic experience, more so than the concept of creativity at large.

(4) ***Receptive mode***: Because this was a collaborative task (participant B drawing, participant A analysing the evolving representation) the engagement of participant A was in full receptive mode; he was not manually active, yet involved in the creative process in the wake of B's actions, following the development of the design solution through the immersive representation. A fifth alternative element should be accounted as well, the ***Proactive mode***. By proactive we refer to *taking initiative in improving current circumstances or creating new ones* (Crant, 2000, p.436). Participant A's proactive mode had receded to make way to a receptive mode.

And this is when we suspect his attention went from ordinary to autotelic. The few moments when we caught sight of participant A loosing track of time and of self awareness were the receptive moments topping a successful task-related process. The receptive stance may have been what toppled the pragmatic experience into an autotelic one, but the first three conditions seem equally important, pre-requisites, as they combined and triggered each other. The positive pressure assuring engagement, the low mental demand allowing for attention to be allotted to more than the most immediate needs, and openness to the unexpected were all apparently working together when the pressure to deliver momentarily receded and the designer had time to "take in" what was going on. This synergy appeared to have created a mental space marked by highly

charged receptivity where more consciousness was summoned. His 'actively' receptive engagement may have been the last requirement before his task-driven experience tipped overboard into autotelic Flow.

Figure 32 diagrams what we propose was at work during the autotelic Flow in this study. We propose that the autotelic shift occurred because of the receptive stance, allowing the ordinary means-to-end attention to shift into autotelic attention and by extension, autotelic experience. But we also suspect that this shift was possible (when the receptive stance occurred) because the participant had been 'primed' by previous activity and now had low mental workload, and because the task made him open to unexpected insights. In this case, this receptive stance was possible because the task was collaborative: one drew while the other observed and analysed.

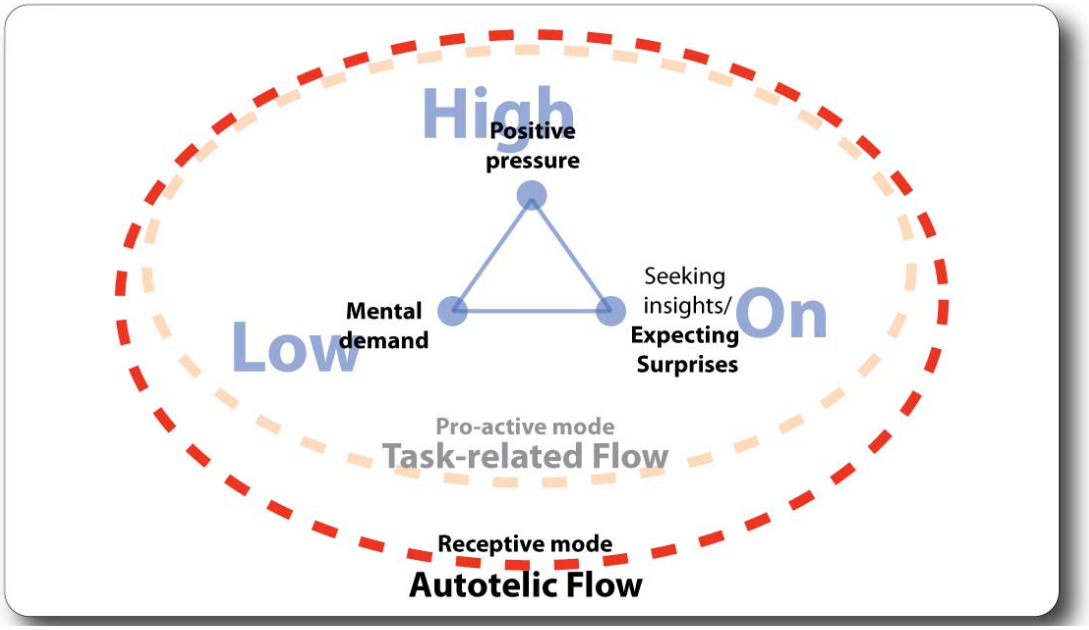

Figure 32 Model of the autotelic experience in the co-design context

Therefore a few seconds worth of signs of autotelic experience may indeed be enough to tell us that the shift had occurred, because the autotelic experience seems not to be an extra feature added to the functional experience, but *a shift in attention* illuminating the pragmatic experience, not unlike the aesthetic experience described by Schaeffer (2000). It is not an added ingredient as much as it is the condition that allows

for a shift from forward-motion, extrinsic drive, to the 'circular', self-referential nature of the autotelic motivation. The pragmatic and autotelic otherwise fuel from the same factors (positive pressure sustaining high engagement, low mental workload and openness to unexpected insight).

In chapter 6, we related how a design company came to us dismayed that all their careful planning was oddly surpassed by the magnitude of the positive response their office chair received. Dwelling on the mathematical analogy, we propose that the autotelic experience does not *add* itself to the mix, but multiplies the existing experience, magnifies it by bringing a new awareness, an attention shift leveraging the whole (and holistic) experience. And this would explain the shift from Dewey's *experiencing* to having *an experience*.

8.5 Summary

In our quest to understand the difference between Dewey's 'experiencing' and 'an experience', direct observation and identification of an example of autotelic experience have served us well. Along the model of the autotelic experience as it was witnessed, we will carry onto the next step these key findings: First, the elements of the task-related and autotelic experience are one and the same. Second, the autotelic experience was observed when Participant A was, for very short amounts of time, in receptive mode, appeared to be considering the experience of the design project itself and not just driving toward its resolution. This leads us to believe that the autotelic experience occurred when a shift from task-related, goal-driven attention to the autotelic attention occurred. The attention shift appeared to parallel the shift from proactive to receptive mode; the friction between these two modes might have played a role in the activation of the autotelic attention. Stemming from a shift in attention, the autotelic experience does not appear to result from adding something else to the pragmatic experience, but renewing the perspective, shedding new light on the existing experience. This contrasts with the dual extrinsic motivations of Hassenzahl's pragmatic / hedonic model (2004).

Witnessing the autotelic experience from up-close, made the theoretical differences between Csikszentmihalyi's active experience and Schaeffer's receptive aesthetic engagement seem less like differences than different scope: Flow concept encapturing a large event, analytic aesthetics zooming in on a very delicate moment.

Part III:
Discussion and conclusion

Chapter 9: Discussion

The discussion reviews what we have observed and learned about the autotelic experience in the light of the three patterns of Flow and of its model. The last section brings back this research's findings to design education and practice.

9.1 Contributions

9.1.1 Patterns within Flow: task-related, autotelic and innovative

When Csikszentmihalyi (1975; 1988) defined Flow, he was identifying a complex set of experiences that sprang from an initial autotelic experience (1975); to focus only the autotelic experience was too narrow for his purpose, therefore under the name of Flow, he regrouped the initial detonator (the autotelic experience) and its associated psychological experience. In this research, we have followed the inverse path, going from general Flow experience (used as methodological tool), seeking to identify the real-time initial autotelic experience. In doing so, the last two studies have identified different forms of Flow, which were associated to different verbal/spatial signature and which appear according a specific chronological order. We have called them *task-related*, *autotelic* and *innovative*. All three are part of Flow, all three occur during interaction, all three appear related in time; only the second one is the autotelic experience. Their chronology and differences shed light on the autotelic experience.

The museum study highlighted two different behaviours in Flow, one when participants were observed to be speechless while looking at the slide of the artwork, the other when participants were observed to ad-lib and reflect out loud, sitting back, not even looking at the artwork that had prompted this reflection (Figure 33).

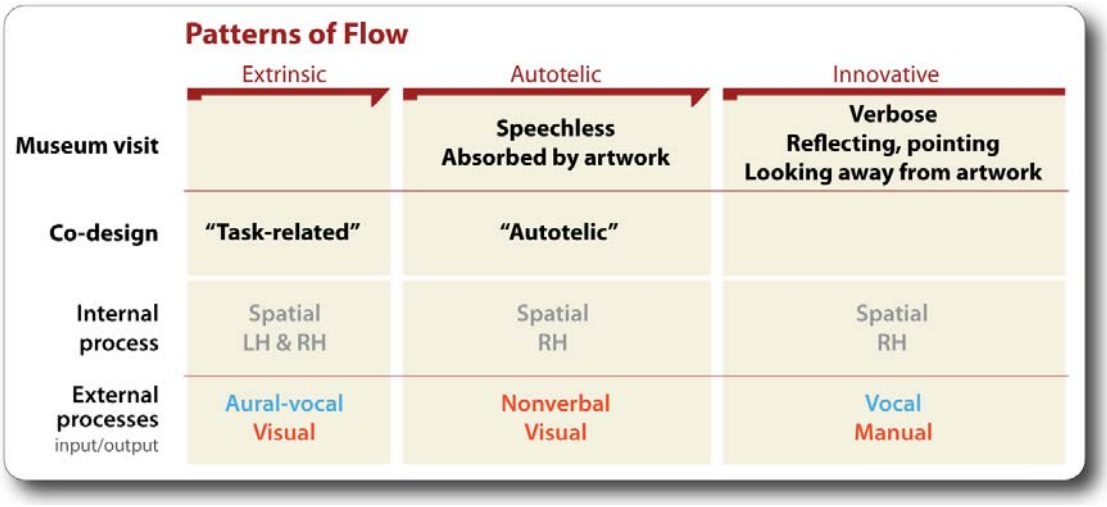

Figure 33. Patterns of Flow identified in this research

It was observed that the verbose Flow followed *Being speechless* 7 out of 8 times. This led us to propose that the verbose pattern was in effect a reaction to a Flow assimilated at first in silence. We also qualified this verbose Flow of innovative expression, in the sense that it displayed novel and personal reflections that were not familiar or rehearsed; furthermore, these reflections stemmed from the artwork but went beyond its viewing experience.

In the co-design study, task-related Flow was differenciated from the autotelic experience, both being recognized as proper Flow experience as defined by Csikszentmihalyi (1988) and Massimini and Carli (1988). Our results made a distinction between a rewarding, extrinsic Flow and an autotelic Flow, mentioning that the two are received differently but come from the same interaction. The task-related Flow has occured when the task was at an end; in the small lapse of time when still in action and the extrinsic goal had been reached or just about. The difference is the point of view of the participant: one focused on the accomplished task (satisfied about achieved goal), the other took in the scope of what was being experienced in real-time, gaining pleasure from this momentary awareness. In the chicken-and-egg argument about what makes Flow "optimal", is it the awareness or the pleasure, we side with Csikszentmihalyi (1975). He

explained that the autotelic moment of awareness is the real motivation for Flow; the pleasure it brings is a confirmation of this momentary sense of coherence.

From our results we propose three different patterns within Flow (Figure 33): the task-related Flow, the actual autotelic experience and the innovative autotelic Flow. This last pattern is likely to have autotelic quality; participants were lingering in their thoughts, loosing sense of time.

Furthermore, we also propose a mapping of verbal/spatial processes according to external and internal processes. For the external processes (active modalities) were observed as follows: in the co-design study, during task-related Flow, participants were watching, listening and talking, even joking together. In both studies, in autotelic Flow, they were nonverbal and absorbed in the visual representation. In the museum study, the innovative Flow was marked by vocal soliloquy (i.e. solitary conversation), accompanied by hand gestures emphasis (gesturing promote spatial reasoning (Tversky, 2005).

Accompanying these external processes, are internal ones. We have no data telling us for sure what internal processes were active, we can only deduce from the external one and from the general situation the participants were in, what internal processes were active. In the task-related Flow, the object of the task (co-design) calling on spatial reasoning, we propose that both LH and RH coding were active, LH responding to known information and RH doing inference from the old representation towards a new representation; both processes worked at resolving the design challenge. The Flow was real and was really fuelled by some RH activity mixed in LH process.

In autotelic-Flow, as previously described, we suspect the internal processes are dominated by RH activation. And in the active and innovative Flow, seeing how participants display a pattern of fresh and creative connections between different notions, they appear to still be in RH process, except that they were structuring and outputting these reflections through linguistic articulation. Our proposal draws a picture whereby extrinsic Flow displays a strong mixed verbal/spatial reasoning and modalities, followed by a shift to all spatial processes (internal and external), leading to an aftermath-Flow

where the internal processes are still driven by RH activation with a verbal (supported by spatial/manual) outpour.

9.1.1.1 Extrinsic, intrinsic and autotelic motivation

These three types of Flow patterns, differing in their motivation quality, raise the question of extrinsic, intrinsic motivation and the autotelic experience. The autotelic experience is not extrinsically motivated, that much is clear. If extrinsic motivation is a drive to action, a wilful impulse, the autotelic motivation is more a wish than a will to maintain the interaction, prolonging the pleasure it brings. The autotelic experience occurs not by will, but once that experience has being triggered the autotelic motivation springs into action. From what we have observed, the autotelic experience can be courted, but not willed, as it appears to occur when expectations are displaced (or *unexpected*).

If the autotelic motivation is clearly different from extrinsic motivation, it is less clear to us that it automatically equates with intrinsic motivation. The issue here is the role of wilfulness to induce the experience. The autotelic motivation shares with the intrinsic motivation a focus on the inner properties of an interaction, but it does not trigger the autotelic experience, it follows it, aiming to maintain it.

9.1.1.2 Critique of Massimini and Carli's instrument to measure Flow

Our parcelling of the Flow points to the limits of the Massimini and Carli (1998) Flow assessment framework. Csikszentmihalyi's description of Flow (1975; 1987) holds well to the closer lens of the autotelic experience because it included it from the onset. On the other hand, it appears that Massimini and Carli's use of skills and challenges has biased the participants' assessment of Flow toward performance and extrinsic goal accomplishment (see section 8.4.1, p. 157-159). In the light of the autotelic and innovative Flow, we question the pertinence of using perceived skills and challenge to assess the subjective experience. Other parameters, still part of the Flow experience, could assess autotelic properties.

9.2 How verbal and spatial processes work together and why spatial process is a key to UX

In both case studies, Flow has attracted nonverbal responses and spatial processes, whereas the states framing Flow drew verbal discourse, although their discourse was about a visuospatial activity (visual arts, landscape design). Yet, Flow was closely accompanied by stressful states at all times.

In the two case studies, the psychological experience was modulated in two: Flow and a composite of 'Alert-Control' in the museum study, and a trio of Worry-Anxiety-Alert. These modulations of the psychological experience were helpful to contextualise the experience, to shed light on the events leads to an autotelic experience, to its triggers. And looking at the results from the co-design study (Figure 34), we see that verbal and nonverbal go side by side, in the three studies.

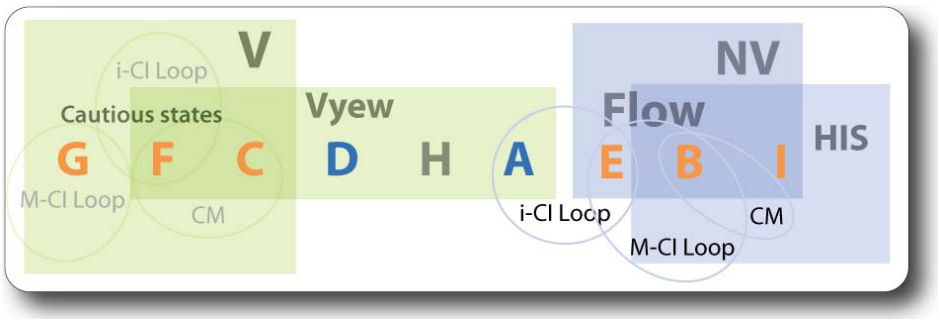

Figure 34. Summary of results in co-design study

The contribution that comes from understanding the role the spatial and verbal processes (internal reasoning or coding, and their related external representation) is a better understanding of the role of experiential information in UX. As seen previously, one of the outcomes of UX research is that greater importance has been given to the experiential dimension of experience. This came from an emphasis on the aesthetic experience in different framework (Desmet and Hekkert, 2007) and models (McCarthy and Wright, 2004). Our results suggest they were right because the optimal experience was observed to be associated to spatial reasoning and output, and therefore was probably processed through RH coarse semantic coding (Bowden and Jung-Beeman, 2003).

McCarthy and Wright were correct in advocating greater spatiality in the UX design. Our results suggest that the key is spatial reasoning, of the inference or insight-seeking kind, or the RH coarse semantic coding of diffuse information process. The spatial coding process is at the heart of the autotelic experience.

This implies that Flow is fueled by a ***rich indirect semantic input***, i.e. that the situation at hand offers purposeful information that calls on RH activation, engaging *in weakly and diffusely activating meanings and more distant* associations (Bowden and Jung-Beeman, 2003).

That Flow attracts spatial / RH processes goes against Krug's (2000) *Don't Make Me Think* approach to usability, since spatial and RH processes demand more resources and time; verbal / LH processes are fast at coding fine information. But the process of reaching out to indirect information in one's baggage increases ownership and pride in the experience. Krug's how-to opus does underscore the fact that reflective thinking is considered to weigh down on the performance of an interactive system. The implications of this finding for the practice may be in conflict with some interpretations of usability principles if applied bluntly.

Our results suggest that although the spatial process is key to a remarkable UX, the verbal is there to carry the extrinsic and once primed to be innovative. UX would best be served not by approaches dominated by one style or the other, but by triving to emulate how we process information: with close and distant meaning building reflexes.

9.2.1 Experience modelling of proactive and receptive autotelic engagements

The distinctions within Flow (above) allow for clearing the ambiguity or contradictions between Csikszentmihalyi (1975) 'active' Flow framework and Schaeffer (2000) 'receptive' aesthetic experience. In the light of our results, at the heart of the Flow experience lies a moment of nonverbal activity where the participants appear to "take-in" the experience, in a receptive stance. Yet all three studies have examples of such moments: the focus group members stretching the Barcelona chair reverie with 'aahs', and

'hm-mm'; the artviewers' speechlessness and insitance at not responding to the researcher's questions in those moments, the airy spaciousness in participants' innovative reflections; all have a subtle quality. When we consider the task-related Flow in the last study (5:40 min): it is 13 times greater than the 40 seconds of autotelic experience we have observed. Extrinsic drive in that study has been much more present than the autotelic motivation. In contrast, the autotelic experience appears, in all three studies, to have kicked in with a delicate "none state" (nonverbal, no gestures, prelinguistic). These moments are so faint as to be perceptible only through its 'non-action'; in the midst of active, goal-oriented task, it may have gone unnoticed by previous studies.

9.2.1.1 The model

The experience model (Figure 35) is built from the user's point of view (what participant A appeared to be experiencing when autotelic Flow was observed). By modelling one person's experience, our goal was to offer a deep comprehension of a good example of autotelic experience as a ground to work from. It is a proposal.

There are three central elements: high positive pressure, low mental demand and an openness to the unexpected, surrounded by two engagement modes, proactive and receptive. Each of the central three elements is the culmination of several conditions (Figure 35).

High positive pressure: is a product of factors building up to the participant's psychological experience. It leads to strong and sustained engagement. The *high positive pressure* come from: (1) a mix of recent Flow and stressful / control states, (2) the stress of having to deliver on task requirement, (3) time pressure, (as per workload results), (4) a wide understanding of skills and challenge (perception, past experience, strengths and weaknesses, values, etc as set against the proposed or required task, whether a leisure or work-related activity), and (5) high concentration, borrowed from the Flow framework.

This dimension belongs to the user; it has to do with his/her motivation, be it extrinsic or intrinsic, and engagement.

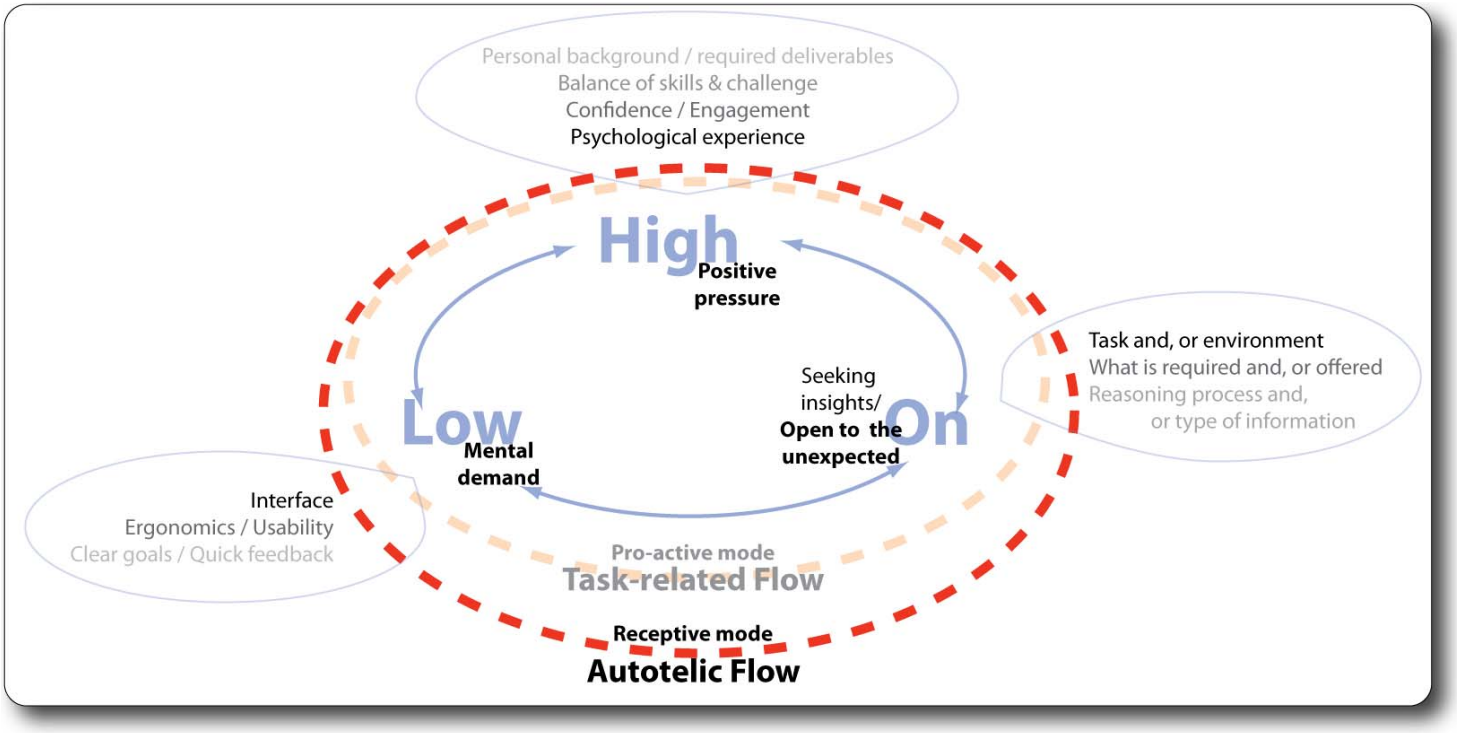

Figure 35. Model of the autotelic experience with conditions that led each element

Low mental demand: surfaced from interface concerns. In this study, the low mental demand came from: (1) the workload assessment, (2) the appropriateness of the HIS to the co-design task, fully supporting the needs of the different design phases, (3) having being "primed" by a failure early in the session (Bowden and Jung-Beeman, 2003) and warmed up by a (successful) concept development where most of the information was held in their heads with sketched notes on the laptop; when transferring to the immersive screen, the participant's mental resources were probably relieved and available for other uses (Tversky, 2005). Clear goals and quick feedback could fall in this dimension, but did not appear to be a factor in this study.

This dimension addresses the interface (at large: object, system, service, environment or event) and gathers related ergonomics and usability concerns.

Openness to the unexpected / seeking insights: This element can be anchored in the task or in the environment; it has to do with setting up an expectation for the unexpected. The purpose of this displacement of expectations is to keep the RH processes on alert,

ready to seek beyond the predictable or the obvious for new meaning; this would set the stage for a possible autotelic shift, should the opportunity arise.

This element is concerned with how information is exchanged and, further below the surface, how we receive and process this information. This element was derived from our assessment of the cognitive activity.

This third element is new to the models of UX, so we will present it further. Openness to unexpected information can be inscribed in the task or activity, in the environment, materials, surfaces, tone or emphasis operating a semantic displacement, or by surprising associations, rhythms, sequence, and so on. There are a number of ways and levels at which to set this displacement of expectation. Consequently, the design team should enjoy plenty of freedom in interpreting this last dimension, making sure it stays fresh. Any formal prescription would likely result in missing the point altogether. And if crudely implemented, it might compremise basic usability.

From the three studies presented here we can point to three configurations setting up their respective autotelic experiences: In the office chair study, the signs of autotelic experiences were noticed when participants used their own words to capture the complexity of their perception of the chair; the giant three-toed sloth analogy in particular and its explanation denotes a depth of experience that goes beyond the neat brand image packaged by marketing experts. The collective endearment surrounding the recollection of the Barcelona chair appeared to owe its lever to the fact that it was a unexpected piece of personal experience shared by a participant which fell a little outside the proposed topic; furthermore another participant chimed in on the recalling of the Barcelona adding to the picture, either speakers not knowing where the other was going with this. This kind of improvised co-construction of a memory functions somewhat like musical improvisation, where two musicians strike up a collaboration to the delight of people listening: it may have been hoped for but was not a given. In the case of the Barcelona chair, this co-construction came from left field.

In the museum visit study, the participants came in with an open attitude; they had some expectations about the art works they were coming to see, but also knew they could/would likely be surprised, confirmed and, or disturbed by individual pieces. Interestingly, the participants with the most art experience sought out and were most moved by the art pieces they knew the least (Inuit art), while the participant with the least art knowledge reported experiencing Flow when he came upon a painting that was familiar to him. We suspect that for this last participant, the whole museum experience was so unfamiliar it needed to be offset by a familiar artwork achieving an acceptable level of "unexpectedness" to trigger an autotelic experience for him. On the other hand, the art aficionados among the participants needed a displacement of their expectations to strike the right balance, to make them tip towards an autotelic experience. In this case, art appreciation, as an activity (or task), calls for openness even before steping into an exhibition hall.

In the co-design study, participants were engaged in a creative task, therefore on the lookout for as-of-yet unforeseen solutions; creative tasks inherently require participants to be open to the unexpected. Because of this disposition, Participant A was able, in a moment of receptiveness, to appreciate the whole situation (the new tool, the smooth collaboration and the progress on the task) in real-time.

These examples allowed us to conceive that *openness to the unexpected* was the element that had gone unnoticed in the difference between usability and UX approaches. Future research will enlarge this narrow pool of examples into a proper taxonomy.

The *openness to the unexpected* may seem light, yet its presence is a determining factor in the autotelic experience. The novelty of this proposal is to understand why keeping the RH processes on alert (and on full working mode when appropriate) supports the occurrences of optimal experiences. For example, this model could apply to the very pragmatic design of an airplane cockpit. The autotelic approach would not transform an airplane cockpit into a video arcade; pilots are responsible for the lives of hundreds. But they sit in the cockpit, in front of the most awe-inducing sight: the open sky. The question for cockpit designers would be: how to make the dashboard highly functional,

usable, and intuitive *and* include a very subtle formal gesture saluting the open sky? The goal is not to send pilots day-dreaming, but to offer them a unified experience, uniting the technical needs of flying and the awareness of how awesome it is to fly (technically, in terms of human or personal achievement, of beauty of gesture, and of mastery, etc…). Perhaps it could be done through the relationship between the seat, the knees and the arm's reach, the double views of dashboard and sky. For instance, a transparent screen might be projected on the left of the window on call for low-priority information. When calling for it, the head and shoulders turn and if nothing else is demanding attention, the pilot may be struck by an awareness of the speed of clouds flying by, of being both in control of the plane as well as out there floating in thin air. Of course the autotelic experience is not a new phenomenon, it has occurred the world over forever, just not by that name; and often not by design.

The RH activation is done through information that is too coarse or diffuse to be coded semantically by the LH processes. The results of the co-design and of the office chair studies suggest that the autotelic Flow overlapped exactly with the task-related Flow, which suggests in turn that the diffuse information should be in the axis of the most appropriate, most pragmatic needs for the task. We suspect that the power of this RH activation is multiplied by its appropriateness to the situation (which ties in with the high positive pressure). In the case of highly pragmatic situation, we suspect that information perceived as not essential is less likely to tip the experience toward the autotelic.

Modes of engagements: The mode of engagement leads to experience a task-related Flow or autotelic experience. This is where the receptive Flow from the museum visit and Schaeffer's aesthetic experience integrates the proactive autotelic model. In the proactive mode, attention is given to fulfilling the extrinsic needs and goals of the task. In the receptive mode, the drive forward is momentarily held up and treading, allowing the autotelic motivation to engage in its own loop-like action.

9.2.1.2 Triggering the autotelic experience

If a synergy between the first three elements of the model (*high positive pressure*, *low mental demand* and *openness to the unexpected*) sets the stage for the autotelic experience, what triggers it is to receptively take it all in, even only for a brief moment. The challenge for the design team consists in supporting such respite or such vantage point without enforcing it. Participants will (or not) switch into that mode of their own accord. The seemingly innocuous action of switching from active to receptive stance needs to be owned completely by the user in order to deliver the empowerment the autotelic experience holds.

The design team will have to meet the challenge of setting up the slight instability to keep users open to the unexpected *and* to afford breather space for users to slip into receptive mode in spite of high positive pressure. This promises to be a constantly renewed *wicked problem* or stimulating challenge.

9.3 Implications for design

9.3.1 Why designers are best suited to implement the autotelic experience

There are at least three reasons why designers are particularly well equipped to implement the autotelic experience. The first reason has to do with their expertise in the nonverbal language of materiality. The second is related to their particular ability for responding to unique problems (Rittel's wicked problems) with innovative solutions. And the third reason is tied to design's co-evolution process.

1. Because of their expertise in the nonverbal language of materiality. *High positive pressure* and the *low mental demand* comprise known considerations that can deliver a good task-related experience. *Openness to the unexpected,* the third element, holds the potential of toppling a good task-related experience into an autotelic experience. And the autotelic experience fuels on spatial and nonverbal processes, which is design's native language (Figure 35, p.171).

2. Because of their ability to respond to unique problems with innovative solutions. The central place of innovation in the design practice makes designers perfectly equipped to produce new and fresh solutions, thus keeping the potential for the unexpected renewed and alive at every new project.

3. Because of the design process. One of the points we stressed about the third element of the autotelic model, *openness to the unexpected*, is that it needs to be subtly and purposefully integrated to the core purpose of the interface being designed. If it is applied as an extra layer, it will come across as superfluous, insignificant and will not support the autotelic experience. This subtle displacement of expectations needs to stay fresh. Designers are trained to analyse, infer, project, reframe until all requirements are fulfilled and presented in a seamless solution. *Our job is to give the client… not what he wants, what he never dreamed he wanted; and when he gets it, he recognizes it as something he wanted all the time* (*Denys Lasdun* as cited in Cross, 2007). The creative design process would insure that not only the diffuse language of materiality be used impeccably in the core of the interaction, but the solution amounts to more than the sum of its parts.

9.3.2 Integrating the autotelic experience to design education

> *An experienced heart surgeon was instructing an intern prior to an open-heart surgery: "…his heart will stop beating, and then we have 30 seconds to do the procedure before the anaesthetist has to bring him back up. And when you have only 30 seconds, you know what you do? You take your time".* (As told by *Kornfield, 1995)*

The situation related in this story has a high potential for an autotelic shift. Teaching how to design for autotelic experience is teaching how to bring users to the brink of the autotelic shift. And in order to teach design students how to do that, the knowledge that was developed in this research has to be presented in two forms: in its academic human science format, sharing the science behind the autotelic experience and, most importantly, in a 'projectable' format, so that designers can integrate this knowledge into their intuitive ways of designing, i.e. into their tool box. Both of these formats (the theoretical and the 'projectable') would be taught through studio course; the theoretical base being fairly succinct; the projectable, demanding time and repetition.

9.3.2.1 Transforming a social science knowledge into a projective, design knowledge

Up to this point, this dissertation has followed a social science methodology and approach, seeking to *reveal that which is there, in use, but left unacknowledged* (Pires, 1997). This implied identifying, analysing and modelling the autotelic experience as best as our data would let us. Now, using Dilnot's expression (1998), we have to translate what we have found from a culture of '*world-telling*' into one of '*world making*'.

The translation of the theory behind the autotelic experience into projective design knowledge will rest on two types of learning experiences: Experiencing the autotelic experience for themselves and applying the model in their design.

(1) ***Experiencing for themselves and identifying it in others.*** Going backwards, the designer will first have to identify being in the midst of an autotelic experience; then they have to be able to recognize for themselves the moments prior to the onset of the autotelic shift. It is as important for a designer to intimately know what an autotelic experience is for them, through their filter, as it is for a chef to know what great food can taste like. They will experience the autotelic rush, be moved by it, knowing they have to become aware of this experience. The experiencing segment of the training will ask them to describe it, to get acquainted with their type of autotelic experience (as oriented by their interests, sensibility, values…); how does it make them feel, emotionally, in terms of creativity, in their relationship to the environment they were in, etc. in order to increase and educate their awareness to this phenomenon. They have to develop opinions, be able to compare experiences the way one can compare different interpretations of a Bach sonata, or interpret subtle moods from the eyes and tone of voice of their loved-ones. This way, designers in a studio setting can develop a common and personal vocabulary around the autotelic experience. The difference between *getting acquainted with* and *experiencing* an autotelic rush is that everyone has experienced an autotelic moment (even if unknowingly); no particular education is required to experience it. Education is required to set one up by design. This training seeks to enable designers to include in their design the potential for these subtle awakenings.

(2) ***Using the autotelic experience model as guideline to design these experiences.*** In the studio, the model would be presented twice: once in its original social science framework, and a second time as a design heuristic. The theoretical presentation would be first and would be short enough. It would occur after the experiencing segment has started, to anchor the theory in the real world quickly. It should not be a part of some theoretical lecture course on cognitive sciences and the human experience. It has to be included in a hands-on studio so that the model can move from theoretical information to a design heuristic. Practicing with this heuristic would take the rest of the semester and would evolve in tandem with the experiencing segment.

The autotelic model would be presented as a design heuristic by morphing its descriptive and normative nature (i.e. in its social science incarnation, it embodies a set of rules) into a metaphor that can be used as blueprint for design. Said differently, instead of interpreting the model as a prescription to be followed, designers would be encouraged to interpret the model based on their autotelic experience so far and on the instructor's guidance with the fluidity this model affords. By design heuristic we mean a metaphor. The metaphor for the autotelic model serves as a way to summarize and evoke the dynamic nature of the relationship between all the elements. The heuristic metaphor should be as rich and coherent as possible. In the midst of the projective activity, recalling it quickly could help take design decisions shaping the vision of the whole interaction in support of its autotelic potential.

The design heuristic will be shaped by the autotelic experiences they will have experienced or seen others experience. The first such heuristics will come from this research, and we trust that the core elements are likely to remain the same as we conduct future research. But the qualitative way to interpret these elements may vary or evolve.

For example, the surgeon story's heuristic potential lies in the counter-intuitive warning of taking time where there is none to take. This stops us in our tracks and opens a space of possibilities around this event. All of a sudden the novice is empowered to have time to access his skills. What we are describing here is a situation where, although there is a lot of pressure and support (known considerations), there is also some space to

distance oneself from the pressure and expectations of the procedure. A design heuristic mapped on this story would be to remember the dynamic tensions between the pressure, the support and the arresting thought that served to stop the user and empower him.

If it were mapped on the co-design study, we would remember the time pressure, the release that comes from the narrow escape of having turned a failed concept into a good one, the lightness of having many square meters to sketch on, as well as the privilege of having his ideas expressed through B's hand, as she was a better draftsman. (*Pour moi il y a une satisfaction d'avoir pu passer certaines des idées dont j'avais l'intuition à travers… la main de B.*). The displacement of expectations was carried by the novelty of working in the HIS. There was a joyful feeling. The mnemonic snapshot would be that short moment when she was drawing and he was following on the immersive screen; to remember the sense of pressure and lightness (to be so well supported) with a whole lot of space in the middle to improvise. This space would be something like a space of possibilities; a space where nothing is prescribed may be enough to let a person's engagement momentarily shift modes from ordinary active attention to receptive autotelic attention. Each heuristic can act as a map to overlay on the projected solution every so often to see if we are still aligning to an autotelic experience.

The prescriptive information is the same in both examples; the modulations are as many as designers will come across in their investigation of real-life autotelic experience. The purpose of this approach is to ensure that designers acquire the ability to conceive of great UX in a way that is completely indigenous to their creative process. It is also to make sure this new knowledge does not land in the 'specs' (specifications list) but in their toolbox as educated empathy.

The way to teach the autotelic experience is to build up a formal vocabulary by translating real-life experienced autotelic moments into designed interactions bearing strong autotelic potential.

Furthermore, this way to integrate this knowledge would ensure that UX solutions be innovative and renewed, thus naturally supporting a displacement of

expectation with every new project. And lastly, designers, according to their sensitivity and experiences, would develop their own style of autotelic experience, therefore being more likely to find an interest in investing themselves into this type of design.

9.3.3 Integration of autotelic experience to design practice

Once designers will be trained and fluent in conceiving UX with strong autotelic potential, their place on multidisciplinary teams will change, because designers, working with science-based disciplines, will be the only ones trained to be 'intuitively' able to set the stage for potential autotelic shift *("intuition" is the processing system that guides us throughout our daily activities, being effortless, automatic and unconscious*, Kahneman, 2003). Designers will complement the others' knowledge with a unique skill and knowledge of their own.

Conclusion: The autotelic approach, a design answer to UX and usability

Over three different studies we collected testimonies, observed and analysed different user experiences, seeking first-hand accounts of the autotelic experience. Conducting these studies has been fascinating from a designer and user of designed products' point of view.

We had asked ourselves if usability guides the formal organisation of interactive systems in regard to being usable, useful and efficient, then what principle(s) guide(s) the formal organisation of interactive systems when it comes to giving form to the subjective dimension of the user experience.

This question was derived from identifying two problematic gaps in UX knowledge, namely that (a) it is still incomplete (UX knowledge does not provide information on the makings of Dewey's *an experience*) and (b) the models and frameworks associated to UX fall short of being compatible with the creative process of designers. The findings in this research suggest that the autotelic principle could bridge these gaps and be the UX complement to usability, delivering the promises of *an experience*.

One of the key findings about autotelic experience is that it does not add itself to the extrinsic task-related Flow it 'multiplies' it. This multiplication of the task-related Flow appears to occur through casting fresh attention on the current interaction, leaving the extrinsic perspective aside for as little as a few seconds. The 40 seconds we were lucky to have witnessed in the co-design study matched the height of autotelic Flow as described by Csikszentmihalyi (1988). The multiplying effect actually explains the importance Schaeffer (2000) and Csikszentmihalyi (1988) have given to the autotelic experience. It also explains the "larger than the sum of its part" effect of the famous office chair. The autotelic experience is in effect exactly that: larger than the sum of its parts. The way the autotelic experience springs from the task-related Flow is not unlike the way *an experience* comes out of *experiencing*.

Why this research had to be conducted by a designer?

The short answer is because no other discipline should be expected to speak for designers. It was slightly bold of us, as design researchers, to borrow so deeply from other disciplines in order to conduct our own research. In the light of the problem issues we identified, we felt it was important to push against our disciplinary territory in order to enlarge it.

We chose a methodological approach that combined ethnographic data collection with measurable, quantitative analysis, threading on the fine overlap between social science and applied-science research. We need to learn about experience and about how materiality (our native tongue) is received by people to educate the designer's empathy. Social science researchers have developed empathy design, by adding different techniques to the analysis phase, in order to gather more information about user to the design phase. The drawback or the weakness of this kind of exercise is that it has to be repeated with every new project; this is not a 'designer's tool', it is an information gathering technique bringing sound information to the team, but it adds to the workload of the project. For design practitioners a tool is an implement that saves us time, which shortens a process and delivers better results. Empathy design tools improve the results but do not save anyone any time. This can be said of many inserts from other disciplines that have to be executed anew with each project.

The designer's empathy we wish to strengthen and educate is active in the design phase; it is part of the designer's trained ability to put him/herself in the user's shoe. Few researchers mention it at all (Zimmerman, Forlizzi, Evenson 2007; Cross, 2007), yet it persistently is learned and practiced in the design studio. Our challenge was to make sure we were proposing a real tool, one that is compatible with our culture and one that takes workload away from the designer and thus from the multidisciplinary design team. And that had to be done by a design researcher.

Conceiving and creating complex interactive systems requires a multi-disciplinary approach and teams. Our HCI partners on these teams are social and applied-scientists whose praxis adjusts constantly to the influx of new knowledge from their research

efforts. Unlike these disciplines, which have increased their core competencies, design has not changed its core competencies but has a tradition of associating to other disciplines (e.g. Gropius' "art and technology: a new unity", 1923, Weimar). With the autotelic approach and the use of design heuristics to stimulate and educate designers' empathy, we are hoping to augment designers' core competencies of highly trained and seemingly 'intuitive' skills.

Limits of this thesis

The strength of this experience modelling research is the depth at which we have analysed the experiences we have focused on. The purpose was to verify if the autotelic experience existed at all, and if so, what could we find out about it. We were able to articulate and substantiate its behaviour in a model, and that is the limit of this dissertation. The approach we chose, the data we had, and the results we obtained are exploratory and form a theoretical proposal. This is one limit.

The choice of doing case studies favours depth over the ability to generalise to a wide population. Our results have shown that the differences between usability and the autotelic approach are subtle, and might have disappeared in studies using larger sampling. This research will serve as road map for future studies that may call on a wider sampling.

Another limit has to do with the way the psychological states were collected. At the time of Berkeley experiments, doing auto-confrontation was the best way we had found to collect in-the-moment Flow data without disrupting the experience. Nevertheless, we are aware that there are shortcomings to this method. First, not everyone would be a good participant for this type of data collection. Although research has shown that video recall triggers memory, some people have little to no memory of the minutia of their experience, even when they see themselves on a video. The participants in this research remembered very well and had a keen understanding of the concept of Flow and relevant other dimensions. Another limitation of this method is that because we rely on the participant voluntarily telling us the state they were in, the data is uneven;

some moments would be bombarded with recalled states (many in a row) while others could be barren for minutes. By and large, the segments that made least impression were those less involving. The last limitation is related to the 10-second increment; a lot can happen in 10 seconds. 10 seconds at a time was the best we could do at the time; it was labour intensive to collect, yet somewhat lacking in precision.

Future works

Verifying and strengthening our research findings

In future studies, we want to test what we have found by observing slightly larger sampling of people experiencing autotelic experience and particularly trying to catch the autotelic shift. For instance, we will want to see if the receptive to active sequence holds up all the time in autotelic Flow. The next studies should be done in controlled environment to be able to focus on specific parameters, and the post-hoc interviews will be more pointed now that we know what to expect from this experience.

We also want to partner with researchers in psychology so that future research can soundly refer to their discipline. Because so much of the user experience relies on users making sense of a situation, we would continue not to use biometrics to assess the experience, and instead pay attention to the semantic load in their exchange with an interface and other people. At this point, we do not feel the need to associate with neuro-scientists although we do reference their work.

Developing a new tool to assess Flow

As seen in the last two studies of this dissertation, Massimini and Carli's assessment instrument for Flow is not adapted for the receptive autotelic experience. The next assessment tool should also consider the modulations within the Flow experience. Again, our bias lies toward assessment based on users' conscious states, their opinions, how they feel and what makes sense to them. This would have to be done in collaboration with a psychology researcher.

Autotelic experience over time?

It appeared in this research that experience modulated gently over time. The three patterns of Flow open the door to the works of other researchers that have studied how experience evolves over time (Karapanos, Zimmerman, Forlizzi, and Martens, 2009; von Wilamowitz-Moellenborff, Hassenzahl and Platz, 2006). We have focused on the intimate beginning of the positive experience; in the next round of research, it would be interesting to see what kind of patterns develop as the autotelic experience is evoked later, retold, rekindled with expectations.

Co-experiencing and the social aspects of the autotelic experience

Although we have approached the autotelic experience as very personal experience, we observed at least one case of collective speechlessness, suggesting that there very well could be a social exponent of the autotelic experience. Future research in this direction would reach to Battarbee's (2004) notion of co-experience and as well as to our own research on the collaborative aspects of design (Dorta et al., 2011). Studying people having autotelic experiences would a natural continuation and a particularly rich terrain because of the natural conversation between them.

Building a taxonomy of the kind of settings that can induce users to be open to the unexpected

From the many studies on the autotelic experience to come (particularly those with students), we plan on gathering an ordered list of settings supporting *openness for to the unexpected*. This taxonomy would serve experience design practice as well as design education.

Teaching autotelic experience design, study how it is received and what comes out of these first classes

Honestly, I can't wait to teach a studio class in autotelic UX design. As with any new course, but especially in the case of a new course on a body of knowledge never before tested in the practice, the first three years will be exciting. The whole point of this research is to bring in a new way of practicing UX design. As described above, a large part

of these classes will be for the students to observe and experience the autotelic shift for themselves, analyse them and then, reproduce them in their own designs.

The teaching project will be part of to the future studies as well. The classes will produce a lot of new information about the autotelic experience and this information will be recorded and analysed. We expect that it will take about three years of teaching the autotelic experience to saturate the data, in order to hunt out all the major modulations that can come out of our autotelic experience model.

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Annexe A – Tools

NASA TLX - Workload questionnaire

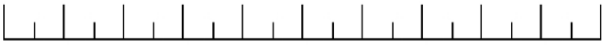
NOM_____ Date_____ Outil _____

ÉVALUATION DE LA CHARGE DE TRAVAIL

Marquer d'un X les propositions suivantes

Exigence mentale

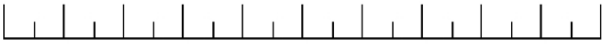
1. Dans quelle mesure avez-vous senti nécessaire de faire appel à vos ressources mentales et perceptives (par exemple : identifier, localiser, évaluer, différentier).



Pas du tout Énormément

Exigence physique

2. Est-ce que cette activité a été physiquement éprouvante ?



Pas du tout Énormément

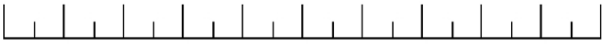
Performance

3. Dans quelle mesure avez-vous atteint les objectifs que vous vous étiez fixés (par exemple : forme, proportion, espace)

Pas du tout Énormément

Effort

4. Avez-vous du faire un effort (mental et/ou physique) pour produire votre design à travers l'outil utilisé ?



Pas du tout Énormément

Frustration

5. Avez-vous ressenti du stress, ou avez-vous été découragé, irrité ou encore ennuyé ?

Pas du tout Énormément

Exigence temporelle

6. Vous êtes vous senti(e) pressé(e) par le temps ?

Pas du tout Énormément

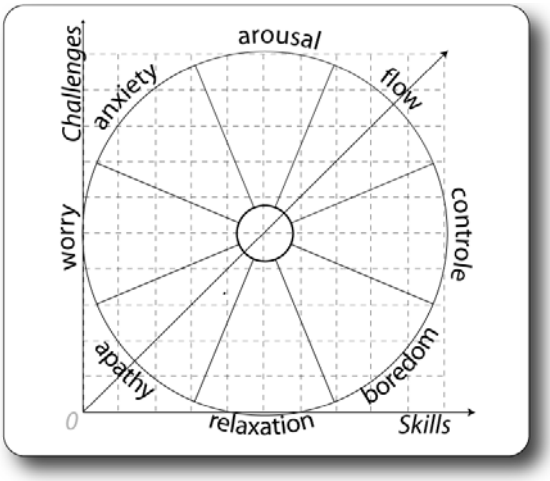
---

7. Lequel des 6 critères précédents (exigence mentale, physique, performance, effort, frustration, écoulement du temps), a été le plus influent sur votre activité d'idéation ?

Encerclez un mot par cadre

Effort ou Performance	Exigence temporelle ou Frustration	Exigence temporelle ou Effort	Exigence physique ou Frustration	Performance ou Frustration
Exigence physique ou Exigence temporelle	Exigence physique ou Performance	Exigence temporelle ou Exigence mentale	Frustration ou Effort	Performance ou Exigence mentale
Performance ou Exigence temporelle	Exigence mentale ou Effort	Exigence mentale ou Exigence physique	Effort ou Exigence physique	Frustration ou Exigence mentale

Flow wheel inspired by Massimini and Carli / 8 psychological states



Annexe B - The office chair study

Short protocol for the office chair research

Set up:

1. The participant will be invited to do 3 short planning exercises with a basic planning application (Sweethome 3D®), as part of a pretend research related to our work on Flow and interfaces in a design activity. (45 min for the total experiment)

2. We will tell them that we are studying the first 10 minutes of work on a new task with a new, simple tool to see how fast (if at all) it takes them to get into the Flow, how fast they start having fun with this. We are also looking at the impact of using the same tool 3 times for 3 different tasks.

3. In the lab (4038-MATI) there will be 3 work areas with each a laptop (Edgar's, mine and one from Hexagram). The two adjustable chairs in the lab have been set for an unrealistically small or tall person. We will apologize saying the last participant was very small or very tall.

4. A camera with a fish-eye lens will be set on a shelf pointing towards the first station. Edgar will turn it on with the remote as soon as we ask them to sit down at the first station.

Actions:

1. "Please sit down at this first work station and make yourself comfortable."

2. If they notice anything about the chairs, and say something along the lines of "If you remind me, we'll address this after the exercises, but for now, let me say that we are assessing the whole experience. And since we are on a timed task, we'll ask you to simply use the chair provided for each station."

3. The 3 exercises are: design (1) a bathroom, (2) a kitchen, (3) an open dinning room and living room (increasing the challenge slightly from one task to the next). THINK ALOUD.

After the 3 tasks:

1. Once the last questionnaires of the third task are turned in, we tell them that the experiment was both aimed at the Flow and at studying the impact of the chair on the Flow while doing a task.

2. Small interview: what is your opinion of the 3 chairs? Let them talk about the chairs freely.

3. To see them interact with the chair, we will ask them to adjust it to their body (act of appropriation).

4. Tell them the price of the office chair: Does this change your appreciation?

5. Ask them to talk about a favourite object of theirs. What words do they use? On what axis / vector does "favourite-ness" expresses itself for them?

6. Finding an analogy, see how far they can go: If the chair were an animal, what would it be?

7. Please do not mention anything about the chairs to you colleagues. Stick to: an experiment on Flow during a design task with a new simple interface, while in high concentration.

Verbatim of short protocol exit interviews

Tous les sujets

Sujet 1 –

AL : Je vais te demander de l'ajuster pour toi-même, pour que tu sois confortable.

S1 : ah l'ajuster pour moi-même

AL : oui pour que tu sois confortable et qu'on puisse se parler un peu. (Elle lui explique le but de la recherche)

Il se met la tête entre les genoux pour chercher les boutons. Il trouve la manette qui fait monter.

S1 : ah… (Soupir de satisfaction)

AL : C'est confortable?

S1 : Oui. Je suis plus haut. J'aime pas ces bureaux là, ils sont vraiment trop bas. Je suis démonté chaque fois que je rentre chez moi (il mime d'être plié en deux).

AL : notre étude était double : voir le flow et voir l'impact des chaises sur la tâche. As-tu des opinions ?

S1 : c'est celle que j'ai le moins aimé là-bas (il pointe la station 2, où était la chaise test). Parce que après la salle de bain, tu trouves que l'outil est simple, parce que c'est vraiment pas compliqué, tu poses tout dessus; et arrivé à la cuisine, … ben.. je sais pas si c'est parce que je ne savais pas du tout comment faire une cuisine, ou parce que je ne trouvais pas le mobilier que je voulais, mais c'était comme (il fait un air surpris abruti) ouais. Ben j'sais pas comment dire, mais c'était là où s'était le plus ennuyant. Tu trouves pas les trucs que tu veux mettre dans ta cuisine. Et toutes formes biscornues, aussi… meubler un truc où c'est rond…

S1 : donc là c'était bien (1), bof (2), et mieux (3).

AL : Les chaises elle-même. As-tu des opinions sur une chaise plutôt qu'une autre?

S1 : ben celle-là (cuisine) définitivement pas bien. (RIRE) tu peux rien régler. C'était soit coincé en dessous, puisque j'ai des grandes jambes, t'es comme tout… des trucs coincés en dessous… et les accoudoirs sont pas à la bonne taille. Moi j'aime pas les accoudoirs sur les chaises parce que... Je sais que dans ces bureaux à la MATI rien n'est à la bonne taille et je n'arrive jamais à régler. Sois qu'ils sont trop hauts ou trop bas, je n'arrive pas à les régler. Ici les accoudoirs sont… ah oui, ils sont réglables. Mais quand ils sont trop hauts, ça me crispe là (épaules et cou) et la nuit je me réveille : j'ai des migraines affolantes. Alors je laisse mes accoudoirs descendus à fond pour pas être embêter. Et le bureau, la table-là est trop basse pour moi. Parce que moi je vais être bien à cette hauteur là et moi je tape dedans!

Mais là (il réfère à la chaise) ça va. Elle a l'air beaucoup plus flexible.

———

Sujet 2 – Interview (film écourté)

S2 : c'est pas chez Ikéa qu'on trouve ça.

AL : aurélien est de toute évidence plus lourd que toi. Bon quand tu vas avoir les pieds parterre…

S2 :AAAAHHHH!!!! (Satisfaction. Grand sourire)

AL : Là c,est ta hauteur.

S2 : ah okay… aaahhhh. (Il se laisse basculer par derrière. Quelqu'un entrant dans un bain tourbillon réagirait semblablement. Il est assis complètement dans le fond de la chaise, il profite pleinement de sa forme).

AL : bon alors…

S2 : Salut!! (Et il fait semblant de partir en roulant avec la chaise. Je parle de la chaise) …Elle existe depuis 1993?

AL : ouais 1994

Sujet 3 – Interview

Toi tu aimes mieux celle-là ?

S3: Oui Celle-là (la chaise droite). Ouais je sens elle est adaptée à ma hauteur, et tout, et tout. Peut-être, parce que je n'ai pas la possibilité de changer, je me fais une raison. je reste comme ça. L'autre je vais chercher ma position. Une chaise de cuisine, je la prends comme ça.

AL: J'aimerais que tu te rassoies dans la chaise test et que tu t'amuses à l'ajuster pour toi

S3: Ça d'abord, je ne suis pas un gros cul, mais quand je rentre, c'est déjà gênant. (Référence aux appuis coude qui étaient rentrés par l'intérieur)

AL: mais tu peux les ouvrir.

S3: ça, je ne savais pas. (Il fait un geste des mains). Il faut savoir. C'est pas intéressant de se fermer dessus. c'est pas du tout intéressant. Juge d'abord, il y a le balancement voilà, comme si je réfléchis… Mais je ne trouve pas du confort. Je ne trouve pas du confort. Elle est trop courbée ici, (il pointe le dos)

ED: tu peux ajuster.

S3: ça je sais, ça fait descendre. Le trouble, c'est que je suis tombé. Sur les autres chaises je peux trouver les réglages. Tu cliques, tu descends, tu montes. Pis ça, là je ne sais pas à quoi ça sert, mais il faut que j'essaie.

AL: Celle-là sert à soutenir le dos

S3: Ok, je crois que la plus part des chaises sont faites de la même manière. C'est surtout la position selon la hauteur de la personne. Ce qui est bon ici...c'est que le dos... c'est le dos qui prend la forme et pas la chaise qui prend la forme du dos. c'est un avantage. Avantage, mais j'aurais aimé que cette forme monte jusqu'ici par exemple. Donc la, ça prend que la partie la plus basse. Et c'est la qu'on a le mal du dos. Mais je ne me sens pas dans une chaise confortable qui te reçoit à bras ouverts, ou tu peux d'enfoncer, cotonneuse.

AL: est-ce que tu aimes travailler dans une chaise où tu t'enfonces?

S3: Non. Pas du tout, pas du tout. Si je laissais sur les tables… Ça peut faire l'affaire.

AL si je te dis que cette chaise se vend 1200$, est-ce que ça change ton appréciation?

S3: oui, ça change mon appréciation. oui. Je te l'achèterai pour 100 $. 1200, d'emblée comme ça non. Il faut la connaître.

AL: Toi c'est d'abord le confort...

S3: ouais. Ça n'a pas de prix le confort. Le confort passe avant tout, le prix vient en second lieu.

AL: As-tu des objets préférés dans ta maison?

S3: Mon BBQ, parce que j'aime cuisiner pour ma famille, pour mes amis, pour ma femme; j'aime m'en servir.

AL: Comment tu l'as choisi?

S3: Selon l'espace qu'il occupe à la maison, au balcon, comment il va occuper l'espace. Il faut que ce soit utile, le moi et de place, le moins encombrant. Pas de fonctions spéciales parce que les meilleurs BBQ sont les BBQ les plus simples. Comme la chaise la plus simple, une chaise simple peut faire mon affaire.

Sujet 4 Interview

L'impact des chaises.

S4: ah oui. J'y ai bien pensé.

AL: ton évaluation des 3 chaises:

S4: mais tu sais, quand je m'assit au début, je sais que c'est plus confortable. Mais après ça, je l'oublie. La différence ne m'a pas est influencée. Je pense que les réponses ne sont pas différentes. Peut-être que sur une longue période de temps,… Mais là, ça ne paraît pas.

AL : si t'as le choix de passer 3 mois sur l'une de ces chaises?...

S4: oui-ouais, ça va faire une différence,

Al ta première perception?

S4: ben c'est que la compagnie fait attention à ses employés... et je vais me poser des questions sur comment ils veulent qu'ils performent... pour que les employés performent, t'essaies de leur donner des bons outils... c'est pas de travailler dans le luxe, mais si la personne est assis tout le temps... j'ai déjà eu des problèmes d'ergonomie… à force de travailler avec la souris...

AL: elle se vend à 1200$...

S4: ahhhh!!! Ok. C'est cher. (il se repositionne)

AL: ça change ta perception?

S4: Ça dépend c'est quoi le prix des autres

AL: c'est la plus chère. Celle-là: 150$

S$: moi je travaille là-dessus et je suis assez confortable... si j'avais des problèmes d'ergonomie, peut-être que je changerais de chaise la chaise de cuisine n'est pas assez confortable, elle est beaucoup trop dure. Mais celle la. (Chaise de bureau ordinaire) est tout à fait confortable.

AL: Animal?

S4: (il rit-il cherche...ne trouve pas) qu'est-ce qui est noir?... elle est noire?...un corbeau?

ED: peux-tu essayer de l'ajuster pour toi?

S4: Ça fait quoi ça?

AL: c'est pour la tension, quand tu recules.

S4: ah oui... il faut que je l'ajuste pour que je sois bien? ok on ajuste le dos... ici... ah ok. aahhh! ok, mais il faut que tu l'ajustes correcte.

Sujet 5 – Interview

S5: pas remarqué de différences de confort. J'étais vraiment concentré sur la tâche à faire.

AL: C'est une chaise (…), tu connais?

S5: oui, j'avais fait une recherche sur l'ergonomie des chaises en mèche. 5-6 minutes...non-non. Si tu t'installes pour plusieurs heures ça vaut la peine.

ED: ajustez la chaise

S5: oui, ben là, j'ai compris. je l'ai ajusté à la hauteur ... elle est correcte, là. Mais là c'est différent... c'est sur que si c'était à mon bureau tout ça, je me rendrais compte,

ED: Mais jouez un peu..

S5: mais je vais vous dire, ça c'est un contrôle de hauteur où on ajuste facilement les bras... je suis habituée d'avoir des clenches pour les ajuster...,les clenches sont loin, pis elles sont comme en deux étapes tantôt je les ai essayées. J'ai eu de la difficulté à la monter et à la descendre, trop de trouble pour 8 minutes. Ça valait pas l'effort pour 8 minutes. (Elle joue dans la chaise)

AL: objet préféré?

S5: Ça peut être un vêtement? J'en parlais récemment d'un manteau que j'aime. On parlait de l'argent. On se disait que l'argent que ça compte pas du tout ; mais non, on peut s'acheter des affaires qu'on aime. Des objets fonctionnels, mais aussi des objets qu'on aime. Mon manteau ça a été ça: C'est un objet que j'aime et à chaque fois que je l'utilise, cet objet la (elle se tient les coudes) j'ai une pensée. Donc c'est émotif en plus de sa fonctionnalité.

AL: décrire ce que tu ressens face à la chaise?...

S5: quand je l'ai vu j'ai trouvé qu'elle faisait beaucoup plus stylisée que l'autre. c'est sure qu'à confort égal, que si j'ai beaucoup beaucoup d'argent, mais ça dépend de la valeur que je mets au design, je prendrais elle parce que je la trouve plus belle. Et tant qu'à faire, on va s'entourer de beaux objets. Mais avec huit minutes, j'étais tellement concentré, que j'ai pas vu de différence de confort. Pour un objet plus utilitaire, je choisirai plus de confort, par-dessus l'apparence.

AL: un animal?

S5: c'est ce que la couleur d'influence un petit peu, je l'associerai plus à une panthère. J'ai l'impression que c'est plus stylisé, c'est sleek, un p'tit peu. Moins rond pis mou. Un intérêt pour les lignes plus stylisées.

Sujet 6 – Interview

AL: comparez les 3 chaises

S6: Étrangement, j'ai eu plus de succès sur la chaise la moins confortable. Je me suis senti le plus, il faut dire qu'à la fin j'étais un peu tanné. Cette chaise là (test) est assez...

AL: ajuste-la

S6: ce qui est agréable c'est qu'elle à un petit jeu… dans le dos elle est correcte.

AL: branding de la chaise...

S6: Si ça change qqch? Je ne le vois plus en termes de longévité. Si ça fait longtemps, et que c'est pas une mode passagère, de qualité, de design qui plait, de l'esthétisme, qui va dans différents environnements... Je serais peut-être plus allumé si je sais que ça fait longtemps... Mais le Look est aussi assez épuré, assez beau. Il y a des chaises de travail qui sont plus massives, plus ... On la regarde de loin, et je pense qu'elle a peut-être l'air de rien… Je suis déjà confortable d'être assis dessus.

AL: 1200$

S6: Ok. Quand même.

Al: ta relation à la chaise change-t-elle? ..... C'est juste une information de plus?

S6: Ouais.

AL: objet préféré?

S6: Mon lit... mon matelas, c'est assez important... On l'a choisi... le rangement aussi... J'ai beaucoup de meubles dont je suis content de comment ils ne prennent pas trop de place. On peut ranger beaucoup de trucs et de cacher… J'aime ça quand les pièces sont vides. Le plus possible on laisse cacher ce qui n'est pas de la déco; dans les espaces de rangement. Je les apprécie pour le côté pratique.

Sujet 7 – Interview

Je suis en génie mécanique.

Impact de la chaise sur le développement du flow avec une tâche simple as-tu remarqué que tu étais assis sur 3 chaises différentes?

S7: Oui. Pas d'impact là, mais si j'avais à faire ça pendant plusieurs heures par journée pendant plusieurs jours, oui, comme… Après quelques heures j'aurais,… Si je travaille de journée que je prends la chaise…

AL: Ajuste-la pour toi

S7: woah... (Il se balance. il a trouvé le bon ajustement pour sa grandeur. il sourit). Wow. Ça coûte combien une chaise comme ça?

AL: 1200$

RIRE!!!

AL: Pis?

S7: je savais que c'était une chaise chère, mais je ne pensais pas d'être confortable comme si tu m'as dit que ce serait comme 3 heures, je changerais de chaise.

AL: animal?

S7: sais pas. (Il se lève et regarde). Rien

AL: un film?

S7: un film... eh...rien

Sujet 8 – Interview

S8: je savais qu'il y avait des différences mais je pensais que c'était parce que c'était l'ordi de quelqu'un d'autre. (...) ah ok, (…).

AL: ajuste-la.

S8: C'est la chaise que je trouve plus inconfortable. (Elle manipule la chaise) je ne sais pas, je l'ai sentie comme inconfortable, mais j'ai senti tellement dans l'expérience (du logiciel) que j'ai pas senti.... peut-être à la fin... (Elle continue à manipuler la chaise...)

AL: ok...elle est pas trop haute pour toi?

S8: je l'aime comme ça...

AL: ok. C'est bon.

ED: si l'exercice était de 4 hres...est-ce que ces chaises auraient eu un impact?

S8: oui, non, bien sure, je préfèrerais ça, ou celui-là (la chaise de bureau trad) je suis plus habituée à la mienne (la chaise de bureau trad), parce que c'est la mienne. je suis arrivée comme une enfant, il y a un sentiment d'appartenance. Mais si on me dit qu'on change, je la prends parce que c'est (rire) mais ça dépend plus de l'interaction entre chaque chose. La chaise, la table et l'ordi. Par exemple, je sais que c'est un MAC mais je suis un peu inconfortable avec le mac. Je suis habituée au double clic... c'est des détails à changer chaque fois, mais dans ces changements on se sent pas à l'aise.

AL: Objet préféré?

S8: Pour moi tout a été donné à mes amis. Ma valise! Ma valise et mon computer. Pour moi, ma vie, c'est l'information que j'avais ... mais comme les choses les plus importantes à moi sont toutes dans un disque dure d'un ordi. Je suis plus nomade. Une fois mon ordi c'est fait volé et c'était choquant.

Sujet 9 – Interview

J'ai remarqué,… Et même cette chaise la même au niveau du confort c'est assez remarquable. Comme on commençait avec celle-là (cuisine)...toutes ces chaises-là je suis habitué. Facque, ok, je m'assoie là-dessus...ok... c'est pas.... j'ai pas pensé à ma stature. Quand je me suis assis ici (bureau trad.) je me suis volontairement assis comme ça (sur la bout du siège) pour volontairement avoir plus de confort. j'y ai pensé. la seule fois que j'ai eu une réflexion, ça été cette fois-ci (trad), je me suis mis sur le bout comme ça, dans cette position, dépendant d'où était mis l'ordinateur. c'est la seule fois que j'ai réfléchi à la partie chaise.

AL: essaie-la encore (test)

S9: celle-là je l'ai remarqué quand je l'ai replacé. Il y a un support lombaire intéressant. Comme moi je ne fais jamais attention quand je m'assoie, je n'ai probablement pas pris une position confortable quand je me suis assis.

AL: J'ai remarqué que dans les 3 chaises tu ne te sers pas du dossier.

S9: Ouais! C'est une question de vision aussi. Les écrans étaient petits. Je me suis mis à une distance que je suis habitué d'être.

AL: question hypothétique: tu te présentes pour un stage de 4 mois, et cette chaise-là (cuisine) qui t'attend…

S9: ah ça me frustre! Je ne tolère pas ça en fait. (la chaise régulière:) je l'accepte.

AL : Si c'est celle-là? (test)

S9:... (rire) je trouve qu'ils en font trop. Ok, si la job est devant un ordinateur, je comprends. La chaise c'est important. Mais je ne vais pas juste m'attarder à la chaise, il faut que je regarde... est-ce que j'ai des écrans de 24" ou est-ce que j'ai un écran de 10"... Si qq'un me dit tu as le choix entre la chaise confortable et un écran de super bonne qualité, pour moi c'est beaucoup plus important l'écran.

ED: ajuste la chaise

S9: Je vois que les affaires sont bien indiquées sur le côté. Parce que les autres chaises on voit rien, à moins que tu te lèves et que tu les regardes. Mais je ne regarde jamais ça jusqu'à quand je vois les indications. (Il bizoune) (Il se berce). Ouais. C'est vrai: je n'ai jamais été dans une chaise aussi sophistiquée. (Il apprécie--il prend son temps en silence). Il ajuste un tenseur. Ah ouais, c't'affaire-là!... ça c'est cool...

Sujet 10 – Interview

Il est grand.

C'est l'affaire dans le dos qui est le plus important.

AL: J'ai remarqué que quand tu travailles, tu travailles accoté.

S10: ouais. ouais-ouien. Ben je travaille à la journée longue à l'ordinateur.

AL: Opinion générale (test)

S10: Le support lombaire, pour pouvoir l'ajuster la hauteur… c'est vraiment une des meilleur choses. Les bras j'ai pas eu le temps de les ajuster. J'ai vu qu'ils se tassaient de côté, mais pour la hauteur c'est bon. Le spring dans le.... (Il se lève pour voir l'assise) ... je préfère qu'avec un coussin. J'imagine que ça doit être moins chaud. (Il ajuste d'autres manettes)

AL: ...1200$

S10: !! Ouais. En la voyant, je me doutais que ça devait être une chaise qui valait pas mal chère. Je sais qu'une chaise comme ça (trad) qui n'a pas grand chose dessus, c'est plusieurs centaines de $. La complexité et le design des bras. Qu'ils soient attachés sur le côté, tu le vois direct, ça se voit. Qu'il n'y ait pas d'ajustement de métal, c'est vraiment super. Pis,

ED: as-tu travaillé mieux dans une chaise?

S10: pour un petit travail pas long, j'ai pas porté attention. Mais je me suis fais mal à l'épaule juste en travaillant mal, parce ... les bureaux sont trop bas... j'avais ajusté ma chaise pour être à la bonne hauteur pour mes jambes, mais mon bras était un peu plus haut mais un moment donné, Je me suis relevé en poussant sur mon bras et je me suis fais mal à l'épaule. Depuis ce temps là j'ai monté ma chaise au maximum, pour avoir les pieds sur... parce qu'à longueur de journée je suis avec ma souris. Mes bras je les mets comme il faut, la hauteur. Je fais attention.

AL Stage de 4-5 mois chaise cuisine?

S10: la chaise ça me dérange pas comme tel. Si elle est à la bonne hauteur, ça me dérange pas.

AL: Même stage, mais cette chaise-là (test)

S10: ... (Rire) Ils ont beaucoup d'argent!.... non je sais pas... je porte pas beaucoup attention.

AL : animal?

S10: !!!! Rien! qui s'ajuste... une pieuvre, tient. Une voiture ? *A Cadillac*!...

One week user-test

Questions that structured the one-on-one interview

1. Comment a été la semaine?
2. Est-ce que ça t'est arrivé pendant la semaine d'être absorbé ou entre deux tâches et de penser à la chaise?
3. C'est une chaise 2. C'est un peu petit pour toi. Est-ce que tu as l'impression qu'elle a été trop petite pour toi?
4. Elle se détaille à mille deux cents dollars. Est-ce que savoir ça change ton appréciation?
5. Une des qualités de cette chaise est le treillis ouvert. As-tu ressentis une différence de température?
6. Parle moi des qualités esthétiques, les qualités technologiques…
7. …de la couleur?
8. Aurais-tu des améliorations à suggérer?
9. Comment as-tu apprécié le look de la chaise? Est-ce que les collègues et étudiants qui t'ont visités ont fait des commentaires sur la chaise?
10. Si cette chaise était dans un film, quel genre de film ce serait? Et quel genre de scénario ferait-on? Un exercice de projection.

Verbatim of one-week user interview

Verbatim de l'entrevue avec P1

AL : Comment ça été la semaine?

P1 : Ben écoutes, ça c'est bien passé. Elle est cool, non?

AL : Est-ce que tu y pensais des fois?

P1 : oui.

AL : est-ce que tu y pensais parce que j'allais te l'enlever dans quelques jours?

P1 : oui parce que je savais que tu venais la chercher, et que je devais l'évaluer. Mais c'est une chaise qui est très agréable. Elle est belle, même. Elle est confortable. Et eh bon, j'ai essayer un paquet de réglage parce que ça me tentait de jouer avec quand même. Écoutes, elle est bien, hein.

AL : Est-ce que tu l'as montré à tes étudiants?

P1 : Non j'ai oublié de l'apporter. Mais si tu me la laisses, je ..

AL : Non. (Rire)

P1 : J'ai oublié de l'apporter mardi, oui. Je voulais l'apporter devant le cours.

AL : Est-ce que ça t'es arrivé pendant la semaine d'être absorbé ou entre deux tâches et de penser à la chaise?

P1 : oui. Parce que selon les tâches que j'ai à faire je vais utiliser des réglages de la chaise. Quand je lis, j'enlève mes lunettes, et à ce moment-là, tu vois, plutôt que de lire en position comme ça, je vais baisser la chaise au max, tu vois, je vais baisser la chaise, je vais enlever mes lunettes et je vais faire ça, tu vois et là quand j'ai fini je remonte la chaise et je recommence.

AL : ah alors tu l'articules beaucoup.

P1 : et ensuite quand je suis en réunion, je veux pas me bercer devant les gens, ça fait pépé en maudit; je bloque la chaise. À ce moment-là tu vois, je peux tourner un peu comme ça (j'ai la bougeotte souvent), mais j'évite de…, pis en plus c'est très fatiguant comme ça là (il démontre la bougeotte) ben, c'est fatiguant pour les yeux, pis en plus j'ai des collègues qui font ça pis mon dieu que ça fait gnangnan, ça fait p'tit vieux dans un centre d'accueil, t'sais. Alors, bon, je bloque la chaise dans ce temps-là.

AL : okay. Et tu fais ça consciemment avec toutes tes chaises.

P1 : oui.

Al : ah

P1 : donc j'utilise les réglages et comme c'est une nouvelle chaise… où est-ce qu'y sont? On trouve les réglages, alors tu te dis « Bon, ben ils sont bien placés »

AL : Ça c'est une chaise 2. C'est un peu petit pour toi. Est-ce que tu as l'impression qu'elle a été trop petite pour toi?

P1 : Non. Quand même, elle aurait pas été plus de support pour la tête, quand même..

AL : parce que c'est une des différences : elle aurait été plus haute dans ton dos. L'autre te serait montée au niveau des épaules. Elle te serait montée jusqu'ici.

P1 : ah oui. Remarque bien qu'à vrai dire ça ne change pas grand chose. C'est pas la tête. C'est sure qu'elle monte un peu plus haut. Celle-là tu vois, elle monte un peu plus haut, mais eh. Mais ouais, j'aurais aimé ça un peu dans le haut du dos, j'aurais aimé ça. Ouais, un peu court.

AL : et si cette chaise allait être à toi pour le reste de sa vie (20 ans, c'est une bonne chaise.. au prix qu'elle coûte)

P1 : Combien?

AL : ah tu sais pas? Devine?

P1 : celle-là est 300$.

AL : celle-là est la plus chère sur le marché.

P1 : ah oui. Ça c'est du solide. On a l'impression qu'elle est hyper solide. Mille cinq. 1500 piastres.

AL : ah t'es bon. C'est mille deux. Mais il y a un modèle fait en acier qui monte jusqu'à 2000. Avec un support différent.

P1 : Ce que j'ai aimé c'est qu'il y a un appui lombaire. Ça WOW, ça c'est quelque chose! Un appui lombaire.

AL : Une des qualités de cette chaise-là est le tissu ouvert. As-tu ressentis une différence de température?

P1 : Ouais. C'est moins chaud en ce moment.

AL : est-ce que c'est trop frais?

P1 : non. Mais on sent la différence. Il est certain que l'été ce serait extrêmement agréable. Parce que l'été, effectivement là-dessus il fait chaud. Et des fois tu rentres pis c'est humide pis la chaise … évidemment c'est ma chaise donc ça va. Mais avec ça respire. C'est superbe. Mais on sent bien, parce qu'à la maison j'ai une chaise comme ça aussi, et c'est plus chaud. Et je vis dans des pièces où c'est pas surchauffé. J'aime pas ça. Et comme évidemment comme on ne bouge pas dans les bureaux il faut que c soit chaud. Donc je ne sais pas si cette chaise était chez moi (chez moi c'est plus froid qu'ici en ce moment) et donc tu bouges pas, tu travailles le soir et tout, j'ai l'impression que là ça serait froid un peu. Remarque un foulard, tu bouges pas mais t'as quelque chose à lire, ou ben carrément j'ai une veste, je me mets une veste sur les jambes. Mais là en dessous, en dessous, il faut mettre quelque chose.

AL : il faut mettre un coussin. Mais là ça change le design de la chaise un peu là.

P1 : Donc oui pour l'été c'est magnifique. Dans un pays froid, où dans des pièces qui ne sont pas surchauffées, pendant les périodes plus froides, ça… oups,… y'a quelque chose à faire là

AL : il faudrait vérifier

P1 : ben si c'est moins chaud… je le sens dans le moment. C'est moins chaud en dessous et c'est moins chaud derrière. C'est évident. J'en ai pas épais moi en plus. Je suis maigre.

AL : C'est une chaise américaine quand même. T'es pas tellement sur le gabarit. Est-ce que ça changerait quelque chose si Poly te l'achetait. Ou si c'était une bourse?

P1 : je serais content je la prendrais.

AL : pas de regret de retourner à ta chaise ordinaire?

P1 : pas de regrets…? Ben je sens que je perds quelque chose là. Ouais ouais. Mais bon, j'serais pas en dépression.

AL : les étudiants?

P1 : Les étudiants qui l'ont vu l'ont trouvé belle. Ils ne connaissaient pas [le manufacturier]. Elle est pas banale. Elle est originale parce que tu la regardes et elle est pas comme les autres. Elle a quelque chose de… elle dégage une image de meilleur design. « well engineered »

AL : ok. À cause de quoi?

P1 : t'as l'impression que c'est un produit qui fait l'objet de plus de recherche, qui est un cran au dessus. Maintenant pourquoi? Elle a quelque chose de plus élégant. Regarde la forme du dossier. Y'a quelque chose de plus élégant, oui. Elle est élégante cette chaise. On a l'impression que c'est du beau design

AL : Donc elle est reconnaissable du fait qu'elle a un look design.

P1 : oui. Elle est belle. Elle est belle à cause du dossier comme ça. C'est vrai que c'est beau. Y'a un coté techno en même temps. Qui ne me déplait pas moi.

AL : qui fait partie donc de son esthétique

P1 : ouais. T'sais le fait de voir à travers de voir les manettes à travers l'assise et à travers le dossier, y'a un coté techno qui me plait. On est dans une école techno. Bon.

AL : Cette chaise ici, à poly, c'est un bon fit?

P1 : C'est parfait.

AL : on la garde, c'est parfait.

P1 : ben oui.

AL : aurais-tu des améliorations à suggérer?

P1 : dossier un peu plus long. Tu peux t'asseoir comme ça (il démontre une posture droite) mais à vrai dire tu restes pas comme ça longtemps. Regarde tu t'assoies comme ça (démontre une posture décallée avec le cul au centre de l'assise, le milieu du dos sur le bas du dossier. Genre ado attardé…) Tu vois y'a une partie qui est longue (il décrit l'assise même, entre les fesses et le fond du siège) donc y'a une longue partie qui sert pas. Ça m'a toujours gêné. Regarde t'es assis…

AL : …su'l bord d'la chaise.

P1 : ouais, su'l bord d'la chaise. Souvent j'suis comme ça.

AL : Ça aussi c'est la différence entre la chaise 2 et la chaise 3, pour qq'un de ta grandeur. La chaise 3, l'assise a 4 pouces de plus. Et 4 pouces de plus, de plus haut aussi.

P1 : Ça me gène un peu. Tu vois. Je suis conscient du fait qu'il y a une grande partie de l'assise qui ne me sert pas. C'est bizarre. Et j'ai jamais eu de chaise qui font ça : pourquoi l'assise ne suit pas quand on fait (glisse vers l'avant), quand tu veux faire ça, tu veux te donner un angle plus confortable. Pourquoi l'assise ne suit pas à ce moment-là ton mouvement de fesse, là? Autrement dit quand je passe de ça et je veux … au moment où je frotte il faudrait qu'elle, elle se pousse. Qu'elle me suive, quoi. Comme ça je suis bien, mais j'ai pas d'appui là.

AL : oui oui. C'est pas bête.

P1 : Ça j'ai aimé ça. (Il parle des accoudoirs). Parce que …

AL : Selon si ontape ou si on lis

P1 : Ouais, ouais, tu te mets comme ça là. (il démontre d'avoir les coudes proches du corps) Ça a un coté cool à ça, c'est encore plus facile (à bouger latéralement). C'est un peu plus large que les autres. c'est des appuis. C'est des vrais appuis.

AL : oui oui. Pas juste esthétique.

P1 : oui oui. Ici aussi remarque bien (sur sa chaise de bureau ordinaire), mais ils sont plus étroits, regarde.

AL : eux autres sont vraiment faits pour taper. Juste sur le bout des coudes. Pas pour t'appuyer. Hmm ç'aurait été intéressant le faire avec la bonne grandeur de chaise. Mais même la bonne grandeur, je sais que le siège avance pas en avant. Mais autrement, c'est une chaise qui te suit assez dans tes différentes postures. Et toi t'es qq'un qui utilise…

P1 : Regarde y'avait quelque chose que j'avais remarqué : regarde elle bloque en avant. Un moment donné, je me demandais mais qu'est-ce qui se passe? Je pense que je la réglais mal parce qu'à vrai dire elle était bloquée. Pis là comment faire ? Je l'avais mal bloqué, parce qu c'était comme si l'assise était un peu comme ça (?) coup donc! Un moment donné j'ai joué avec ça, et

AL : il y a 2 boutons : le bouton d'en avant règle l'assise et le bouton d'en arrière le balan

P1 : Le bouton d'en avant, j'ai jamais réussi à… y marche pas! Tiens regarde : lui j'ai taponné là-dessus. À quoi sert-il lui? Tiens regarde là (il est en pleine manipulation): tu vois, l'autre affaire, si je veux aller par là, je fais quoi? Je monte ou je descends? (il critique le pictogramme du bouton gauche avant, celui de l'assise). Je sais pas. Tiens regarde si je monte, elle est barrée. Si je descends, elle est barrée aussi?!

AL : oui elle a l'air barrée.

P1 : elle est barrée. Çà, moi j'ai jamais réussi à faire marcher ça. Pis finalement, j'ai jamais compris… ben là je vois que c'était l'assise qui est sensée bouger, mais

AL : alors si tu débarres l'autre, si tu débarres l'arrière, pis là rejoues avec le devant.

P1 : ouais, j'ai essayé les deux en combiné. Je me suis dit que peut-être que les 2 marchent en combiné. HA! Oui! LÀ elle bloque.

AL : donc c'est quand l'autre, là tout est débarré.

P1 : là elle bloque, là elle bloque un peu, là, oups. Ah ben c'est ça. Moi j'étais bloqué là moi cette semaine, pis si tu fais ça… oups… ah, mais tu vois, ça c'est pas évident, ça.

AL : ouais, ça c'est assez subtile.

P1 : tu vois là elle est bloquée, pis tu ne sais pas… là ah voilà, là elle est correcte. J'imagine qu'il faut… Pourquoi il faut être en haut? Là je la bloque là, là elle est parfaite.

AL : ah oui.

P1 : et celui là. Avant aujourd'hui j'ai essayé de taponner. Pis un moment donné, je l'ai essayé en combinaison avec l'autre, pis je me disais, coup donc qu'est-ce y'est sensé faire lui? Pis je le voyais, là mais c'est pas évident.

AL : ouais-p. c'est pas claire. Okay.

P1 : Y'a quelque chose qui ne marche pas là-dedans. T'es d'accord avec moi?

AL : même si ça marche, c'est pas claire

P1 : est-ce que c'est sensé marcher tout seul ou pas? Oui? Ce bouton est sensé marché tout seul.

AL : il est sensé marcher comme les autres. Quand tu fais quelque chose tu vois un impact.

P1 : pis là si je le mets en bas, bon, il barre un peu, si je le met en haut.. je vois pas la différence.

AL : J'ai l'impression que si tu le mets en haut, le ratio entre l'assis et le dos peut s'élargir. Tandis que si tu le mets en bas, l'angle entre le dos et l'assise reste le même.

P1 : Mais c'est comme pas évident, là. Peut-être que c'est ça.

AL : je pense que c'est ça en te regardant aller.

P1 : en tous cas ce bouton là, y'est pas évident. L'autre je l'ai utilisé souvent parce que je barre pis je débarre. Ça j'aime ça. Pis quand je parle au monde. (Immobile) sinon, sinon c'est pépé.

P1 : en plus j'ai tourné la poignée? Pis çà, ça marche. Ben oui.

AL : est-ce que tu te sers des roulettes?

P1 : oui. Entre là et là. Y'a des fois ça roule pas bien (d'autres chaise). C'est des roulettes à prélarts? Pas à tapis? Ce que je n'ai pas aimé cependant, c'est que la base est sale. Tu la salie parce qu'on met des souliers dessus. Et je trouve ça un peu dommage. Évidemment, c'est inévitable. Évidemment, c'est gris.

AL : donc ça paraît.

P1 : c'est sale là. Regarde de l'autre coté : regarde.

AL : je vois.

P1 : donc c'est sale, mais ça c'est un peu inévitable. Mais c'est un peu dommage : c'est une belle chaise mais si elle est toute sale, ça y'enlève un peu de sa classe.

AL : okay. En s'éloignant un peu de la chaise, parle moi d'un objet personnel que tu apprécies particulièrement :

P1 : ma collection de toupies?

AL : si c'est ta collection de toupies. Quelque chose auquel tu es attaché.

P1 : Mon couteau suisse. Je l'aime mon couteau suisse.

AL : Pourquoi?

P1 : ben parce que je l'ai depuis 30 ans. Parce qu'il m'a accompagné en voyage un peu partout. C'est un couteau suisse, y'a pas énormément de fonctionnalité, c'est pas un gros affaire épais comme ça. Y'a un tir bouchon, y'a deux lames, y'a un cure dent, une pince, des choses de base. Ça m'a accompagné partout. Ça me dépanne partout. J'aime avoir, un gars en plus, on aime avoir un couteau.

AL : comment tu fais pour le passer dans les avions? Dans ta valise…

P1 : oui.

AL : tu t'en sers combien de fois par mois? Par semaine?

P1 : le couteau, eh, assez régulièrement. Il est sur ma table, sur mon bureau. Assez régulièrement. Grattez un ongle ave la lame… ou-oui j'aime ça.

AL : ce couteau, c'est comme un ami?

P1 : il me suit. Je ne le considère pas comme un ami, mais je suis content de l'avoir. Écoute pour te dire : c'est un couteau suisse et l'an passé, j'étais en suisse. J'avais cassé un moment donné, parce que je bricole un peu,

j'avais cassé une des facettes rouges dessus. Ah c'est dommage. J'ai trouvé un endroit en suisse où ils les réparent. Le gars m'a réparé ça, ça a pris 5 minutes. Y dit : écoutez, ça va vous couter tant, mais voilà, pour le même prix vous aller en avoir un beau neuf à coté. J'ai dit non. Celui-là! Il m'a changer les 2 faces (les deux cotés rouges) il m'a mis 2 faces, l'une avec un cure dent, l'autre la pince, ce que je n'avais pas avant, donc une petite amélioration. Mais le couteau est le même. Et j'étais fier de ça. Je voulais garder ce couteau là.

AL : Ça ressemble à l'histoire de Jason et les argonautes.

P1 : voilà et j'ai une collection de toupies depuis quelques mois.

AL ah oui? Des toupies?

P1 : oui. Je mets ça sur ma table de cuisine et c'est un espèce de porte bonheur. Écoute tu fais tourner des toupies, c'est gratuit, elles sont élégantes en plus. Je m'en suis fait offrir pour noël. J'en ai une quinze, une dizaine.

AL : déjà! Ok. T'as passé le mot et tout l'monde dans la famille a compris, le fou des toupies…

P1 : ben oui. Ça coûte rien. Tu les laisses sur la table et on fait tourner des toupies. On les fait tourner à l'envers. Pis là j'ai un fils qui un moment donné a inventer un jeu : il lance la toupie elle fait ça comme ça (il trace un arc de cercle). Il met la bouteille, il lance la toupie, pis la toupie fait le tour de la bouteille. Voilà, ça coûte rien pis on s'amuse. (Il rit) c'est pas pire, hein.

AL : oui, oui, c'est très bien.

Pause chocolat.

AL : si cette chaise là était dans un film, quel genre de film ce serait? Et quel genre de scénario ferait-on? Un exercice de projection.

P1 : je la verrais dans un bureau de prof d'université.

AL : Pourquoi?

P1 : Confort, qualité, esthétique, solidité. Elle a un coté classe cette chaise. En même temps c'est pas une chaise chromée. Elle est belle, y'a tout ça. Pis moi ça reflète bien mes valeurs, parce que tu te dis, voilà elle est solide. Je pense qu'elle est ergonomique, elle a un bon support lombaire, bon accoudoir. Tous les réglages sont là, sauf le réglage qui ne marche pas. Les roulettes vont bien donc, elle est solide, confortable, elle est belle, donc je l'aime. Pis en même temps c'est pas chromé. Je voudrais pas avoir une grosse patente, c'est pas moi, c'est pas mon style … j'veux pas être là-dedans. J'veux pas la grosse affaire qui va donner une image « voilà le gros PDG », j'en ai rien à cirer, je suis pas là, moi. C'est pas mes valeurs. Donc elle est classe, elle est belle, belle esthétique. Elle est solide, elle est ergonomique, elle est élégante, et juste au niveau, c'est vrai que le dossier pourrait être un peu plus haut, mais je ne voudrais pas un dossier qui me dépasse de 2 pieds de la tête.

AL : un peu scénario. Où vois-tu cette chaise pourrait-elle être en action?

P1 : je pourrais la voir dans un bureau de médecin. Où t'as la cliente d'un coté et la médecin de l'autre coté qui est en train d'expliquer ses radiographies ou etc. Des gens qui discutent, donc intellectuel, intelligent. Pas gnangnan, pas tarlet, là. Une discussion intelligente et pertinente de 2 personnages qui sont sympathiques et tu vois que l'un est cliente et que le médecin est sur la chaise.

AL : pourquoi le médecin est sur la chaise? Pourquoi pas l'inverse?

P1 : Ben, parce que tu dis ça c'est une chaise… y'a un coté recherché là-dedans. Est-ce que tu donnes ça à tes clients? Je suis pas sure. Tu verrais pas des chaises comme ça dans le bureau d'attente d'un médecin. Ni d'un dentiste. Pis c'est pas la place. C'est qq'un qui passe du temps à son bureau.

AL : dans les 2 cas, médecins et prof, tu as placé cette chaise là dans les mains du personnage en position d'autorité. Est-ce que tu vois cette chaise là comme ayant ou ajoutant à l'autorité? Ou non?

P1 : ta question est pertinente. Ça peut aller avec, mais de là à dire… est-ce que ça ajoute du poids? Ça va avec un élément d'une image professionnelle, je devrais dire. D'établi, de solide, de recherche de qualité, d'esthétique. De qq'un qui fait attention à ça. Et donc si t'es client et que tu vois que l'autre en face est arrangé comme ça, effectivement ça peut contribuer à ca (rapport d'autorité). Y'est pas assis sur un pouf, là t »sais. Cela dit, oui ça peut aller dans le même sens, mais la chaise toute seule ne fera pas de différence. Mais je comprends que ça peut contribuer. À asseoir, à confirmer, à aller dans le même sens que.

AL : t'as l'air de dire que les qualités esthétiques, les qualités technologiques sont aux limites de leur registre sans changer à gros pdg, chromé. Ils sont dosés

P1 : ça reste discret.

AL : discret donc, mais dans les limites supérieurs de

P1 : oui ouais! C'est comme si t'avais une Volkswagen. Elle est class cette petite voiture. C'est pas chromé, mais elle est class.

AL : elle performe bien

P1 : oui elle performe bien. T'es bien dedans, *it's well engineered*. C'est du beau design, c'est solide. C'est pas de la camelote. Pis en même temps c'est pas (je connais pas les voiture super luxueuse) mais en même temps c'est pas à ce niveau là mais au niveau où elle est, c'est vraiment très bien. C'est un peu ça. Dans son créneau, elle occupe bien son créneau pis elle le tient bien.

AL : un BM?

P1 : la BM est quand même un cran au dessus de la Volkswagen. Ça pourrait être BM.

AL : une question personnelle pour tester cette affaire là : toi est-ce que tu te vois à conduire une BM ou une Volkswagen?

P1 : Je ne conduis ni l'une ni l'autre. Parce que je ne me valorise pas par ça. Parce que je préfère garder mon argent pour voyager. Des choses qui sont plus importantes. Cela dit, si j'avais du pognon, je serais en BM. Ben oui. Parce que … pis j'ai essayé des BM pis c'est vrai que c'est WOW, super confortable. Mais je fais pas assez d'argent pour me payer ça, pis je veux pas jouer le chromé non plus. C'est pas moi. Mais elle ça pourrait être une BM.

AL : donc une BM qui pait pas de mine, ou une Volks top of the line. On fait dans l'ingénierie allemande de toute façon.

P1 : Tu m'as pas pausé de questions sur la couleur!

AL : C'est vrai. Qu'est-ce que tu penses de la couleur?

P1 : Noir me convient. Mais je pense qu'il y a des gens qui pourraient souhaiter avoir d'autres couleurs. Des femmes, des designers, des artistes un peu. Même moi, je ne suis pas artiste, mais si on m'offrait des couleurs… Noir évidemment c'est hyper class, c'est sur. Hyper classe. J'sais pas comment ça se fait comporte avec de la poussière? Le noir ça se salie.

AL : du fait du treillis, la poussière est moins visible rapidement. Mais c'est comme n'importe quoi, il faut l'épousseter de temps en temps.

P1 : j'imagine qu'il y a des gens qui voudraient un dossier et une assise de couleur. Moi, noir me convient. C'est classique ça va partout.

AL : disons qu'on te fait le cadeau d'une chaise à ta grandeur, est-ce que tu crois que tes collègues vont remarquer?

P1 : On sort pas avec nos chaises. Je ne sais pas quelles chaises mes collègues ont. Pis de toute façon quand on se voit, c'est au salon des profs, c'est au photocopieur, c'est... finalement peu de discussions dans les bureaux avec des collègues. On se voit dans les réunions. Donc on ne voit pas les chaises de nos collègues.

AL : je pensais à sa à cause du noire. Je me demandais si ce serait trop cool?

P1 : Non. Pas tout l'monde. Pas tant que ça. Je suis en ergonomie. Comme ergonome, tu fais plus attention à ça. Je pense en tout cas. En design, évidemment en design, pour des raisons évidentes, mes collègues de génie indutriel qui sont en production… bon… ben je pense qu'ils vont moins la remarquer.

AL : tes étudiants qui sont venus te visiter : est-ce qu'ils l'ont remarqué parce que T'en a parlé ou est-ce qu'il l'ont remarqué sans que t'en parle?

P1 : parce que j'en ai parlé. Hey bonjour. Je me lève. Ils ont pas dit vous avez une nouvelle chaise… non.

Focus Group

The questions that structured the (lively) one-hour group conversation

Do you all know each other? How many years have you been sitting on an [test] chair?

1. You knew you were coming to talk about this chair; you probably gathered your thoughts on it. So, briefly or not so briefly, do you like your chair? Why or why not?
2. If you walk in one morning and all you have to sit on is Ikea's best, how would you feel?
3. Please tell us about an object in your home that you really appreciate.
4. If the chair were an animal, which animal would it be?
5. To wrap it up. Collectively name the top 3 reasons why you like this chair.

Verbatim transcripts of the Focus Group

Verbatim of the Calgary Focus Group

Researcher presents the project. The implication of the chair producer in this research. The three parts of the experience.

Participants presentation, from my right around the table to my left.

P2: […] I've been working in engineering field for over thirty years, so I guess I've tried a few chairs in my days. I've always been working in the oil patch, sort 'o speak. So a combination of places, either here in Calgary or in other centres, some small towns, some bigger towns.

R: Thank you.

P3: […] I've started of in geology, now in accounting, spending a lot of time sitting and getting up.

R: so you're an expert at chairs!

P3: Yup. It's getting there.

P5: […] and I'm an accounting staff and I have worked forever… [hard to understand]

P4: I'm the officer who had to buy the chairs. I can't take credit for having bought the chairs because they were here when I started but I continue to buy them. They are very very good chairs. They are my favourite chairs. And I have been in equipment services for 25 years.

P1: You did a selection process at D…

P4: Yes, at D Energy, before I came over to P W, we did a selection process where we had 7 chairs brought in and … seven people sat in them for a week and the [test chair] actually came in second, the […] chair came in first, and the [test chair] in second. But the [test chair] was my favourite.

P6: Hi, I'm […]. I'm P1's assistant. I've been in heating most of my life, so I've sat in warm chairs for a long time. (laughter) I actually was involved in the selection of the chairs. Previously, did we buy the [test chair]…? Because the big cost of them …. Only certain people were allowed to have them.

P3: vow to the chair…

P4: Yeah, yeah… definitely

R: That's interesting. And lastly?

P7: Lastly. I'm […]. I work in a department that's called Surface Land and Oil & Gas for as long as P2 as been in the business. (laughter)

P2: Go ahead, say it! 30+ years!

(laughter)

P7: And it's an office job, lost of typing, paper work…

P6: you have carpal tunnel issues where the chair would make a difference as well…

P7: Yeah. Yeah. When we were merged into T, we had these chairs for what it seems… quite a few years and, eh?

P4: Yes, yes.

P7: and the company I had been at prior to that had that same chair. So I've been sitting in those chairs for a long time. I'm tall so I found that it was great that there were sizes, A and B and C. I thought that was kinda cool. Last summer, I broke my arm really bad; really bad. And from that now I have sever caporal tunnel. So the chair's been really helpful in trying to manage that and do my job comfortably.

R: How many years have you been sitting in a [test chair]? (to the whole group) …roughly.

P2: I would guess 4 or 5.

P5: I got mine when I was at…

P6: that was 2001

P4: I got mine when I started. That was 2001.

P3: Help me… how long did we have it at C-P?

P4: no you didn't have it then, yours has been 3 years. 4 years?

P3: 4 years.

P5: I probably had mine for 10 or more.. you [P6]?

P6: 4. 4 years.

(missy, [P6] says we didn't have them before)

P3: yeah, at C-P, we had, something similar but not…

R: Do you all know each other?

Hm-hm (meaning yes, absolutely)

R: My first question is the obvious one: you knew you were coming to talk about the [test chair], and probably gathered your thoughts on it. So, briefly, or not so briefly, do you like your chair? Why or why not?

P3: For "3s"; the size of the chair is a major bonus, because we have different sizes; and for anybody that's got back problems, it's actually really beneficial. I mean it promotes posture, if you're using it properly. So if you have backaches, you have that little more support in the back that's adjusted, it's perfect. Some of us who work very late hours, if you're sitting in your chair for 12 or 16 hours, and if it's not comfortable, then, you can't do anything. You're either passing out or your in pain.

R: …you quit working. You have to leave.

P3: yeah. Even when you think of the people in the office who had to use the balls to sit on, because they had back problems or just issues; and yet the chair seems to work for most cases. Mine has been good.

P4: there are very few people in the company that don't have it. There is John M. who just doesn't like it. Probably 5 out of 400 that don't like it.

R: …That's good!

P5: There's one girl on my floor who doesn't like it because it's cold. (Small understanding laugh) the air goes through

P4: yes. It's cold because of the mesh. You don't have a… People like it because it breathes and some dislike it because it breathes.

P3: Yeah.

P4: Yeah. That was one of the serious problems, the person trying it was cold then. Something about the fabric being a nice feature.

P6: The one thing with that chair is if it doesn't fit you or your body, then it's not comfortable at all

P3 & P2: yeah.

P6: If you had sat in somebody's chair that was too big, like the big chair; if I sat in the big chair it would be too big for me at all. So it is very critical that the chair meets the body type. Even the small chair, I'm on a size 2, sitting in a small chair,

R: still not it? Size 2 makes sense?

P6: yeah, it's great. It beats the centre chairs (LOL)

P4: For me, at house keeping, if a new person coming in has a 3, and doesn't fit in 3, I will continue to run around and find him … Now Leroy, when he started last week, he's small in size, and he had a 3, and it was too big for him. So. I gave him a 2 yesterday, and he came back and said "can I have my chair back, I like it better". So. I adjusted it for him. I would have usually showed him but he had a client in his office so I couldn't take his time. I showed him this morning how to use it. Because it does make a difference …

P2: Maybe the good part of it is the personalized service when [P4] comes by (LOL) and tells you how to use it… "and you can adjust that"… But I would reflect what [P2] said: that if you have a lumbar support problem or a back problem, sometime chairs are just uncomfortable, and … if you're lucky enough to get up and move around, but over extended periods with other office chairs through the years it could be a nagging problem. And it hasn't been a problem that I have noticed with the [test] chair.

P4: it's because you can adjust it. That's why it's a big deal for that lumbar support an inch up or down an inch, it's easy to do and you do it. It was very hard to do that, you'd just don't do it. Where's ours it only take 2 seconds to adjust.

P5: I have a back support on mine. Maybe I'm not using it right (LOL)

P4: Do you want me to look at it???

P5: I have another little cushion that I put on the chair, to keep warm.

R: does the back support actually warms up that area of you back

P5: it just makes me sit straighter. And it makes me sit towards the back.

P4: Most people don't sit back in the chair properly.

P3: hm-mm

P4: So they aren't using the back support, as they should

(pause)

P1: My opinion of it has been shaped by my very first experience of it. And it was 2001 when I started at MK. When I saw that we had the [test] chairs there, I had seen them on TV, I had heard about them, there was a myth around them, and eh, I was very excited to finally have one to use. I thought that compared to the chairs I had before as a lawyer, I spent a long time sitting; the [test] chair was just utterly… in terms of comfort... and I thought they looked cool, too. So..

R: And that was important?

P1: Yeah, I felt really good about the chair, and that's when my opinion crystallized. I've never challenged it since. Except when at some point, when I started here, last summer. The [test] chair I had had 2 problems: some of the levers didn't work (that was annoying; you expect these adjustments to work, right?), and the other thing was that it was too small for me.

P4: Yes. The guy before you had a 2.

P1: so [P4] came to my office and went "What are you doing on that chair? It's way too small!..." So she brought me a brand new, full size, and it's been great ever since. And that month with that bad chair really pissed me off.

(LOL)

P4: you see how important the right size is. I mean it really does make a difference.

R: [P1], I've got a question: when you did that transition from law to business, the way you told the story, it sounds like the chair was actually a metaphor for that transition. Or did I hear this wrong?

P1: it was a… actually law is a very old profession, things change slowly, it's stuffy so we had chairs from the 70s in my office. Since I was a young lawyer, I had not even second hand, third and forth hand chairs that had been passed down by old partners. And so it was crappy. But it's just the way it was. So, when I was hired by MK, a AAA quality firm, everybody had a top notch chairs up to date. So it was actually me moving into a much higher quality organization.

R: so you are making a relationship between the brand image of MK or the fact that MK is top of the line in its own field, the chair that matches it, kinda thing?

P1: Yup. Cuz for MK, they were about best practice and everything. And they claim they are. So they needed to have the best chairs.

R: Okay.

P4: and if you supply people with a good chair, they don't have back problems and it doesn't develop into health problems… you have to out for carpal tunnel, you have to out that problem… and so, if you give them the right tools to start with, that alleviate a whole bunch of issue down the road. And that is besides that they look "cool". When it first came out, before it was even on TV and everything, I thought it was the coolest chair. Because of the whole look and the whole… well there was a whole new generation of wow-factor, as well as ergonomics and sensibility.

P6: When I first … yes

P3: That's still a budgetary issue, you know. If you work for a small company you'll never have that chair, unless you're an executive.

P4: oh no! At … we had it.

P3: But oil & gas is exceptional, we are going to have money, we're going to spend it. I mean when we can over from AC before we went over to CP, we had a similar chair but it would be something that you would find at Staples. You know, as long as it was comfortable and enough to get through the day without you falling out, that what you used. But that's the thing: if you want to be top tiered, and you have the money to be top tiered, sure! You want your employees to be happy, right? Without giving any rooms rules?

R: Which brings me to my next question: Let's say [P4] decides to change all your chairs, and you walk in one morning and all you have to sit on is Ikea's best. How do you feel about that?

(ROAR from everyone)

P7: I'd ask for my old chair back.

P4: I think everybody would.

P7: I sat on a lot of bad chairs

P6: I would not stay at my desk. Because I sat on worst chair when I started at P W.

R: is your appreciation of the chair strictly about comfort? What if they gave you a […]?

P4: We have […]. N L had […]. If you gave them a […] chair, you won't run into problems. If you gave them an IKEA chair, you would run into problems.

R: and your decision would be strictly based on comfort. Along the lines of "I can't work 16 hours a day in that " and that's all.

P4: Yes. I would think so.

P2: if it wasn't comfortable and I…, you know. You might find a less expensive chair. But if it's not comfortable for that 8/10-hour day, and the longer stretch, you just stop using it and would change your work pattern and feel less comfortable. You just wouldn't want to work there.

P3: and depending on your level you really don't have much of a choice, depending...

P2: Sure!

P3: It's nice that the chair has aesthetic appeal but it's not the decision. It's even better if it's comfortable, if you can work at it. But a lot of decision is out there. If they decide to replace the one with the other because of cutbacks, well, that's what they do, right?

P2: It's a lot like at home, where everybody as a favourite chair, or a comfortable chair. Hopefully there are enough of them so that everyone has one, and you're not all fighting for the same piece of furniture. (LOL) But they are just very very comfortable, eh. If they replace it with something equally comfortable, not a problem. If it was less comfortable, [P4] would hear about it, I guess.

P4: You wouldn't quit your job over it, but you would call me about it.

P3: Yeah! I would say, come down here and adjust this chair because there is something wrong here!!! (LOL) and she'd go suck it up princess (LOL) Well thanks for you time [P4].

P4: And also the other side of it is, that I don't think that there should be an echelon, an upper echelon that gets it, and the worker bees didn't get it. I think that very unfair because people, who sit in that chair for 10 hours a day, are not necessarily the upper echelon. It's not fair that because they get paid more they get nicer chairs. So yes

P5: all or none.

P4: yes all or none. That was always the mentality of the company. That aspect of it goes around the whole company and people feel more special in that chair because "hey, I got the same chair as [P1]. " (LOL)

P6: yeah

P4: it feels really cool.

R: [P1], how about you. What if you walk in one day after a week away on business, and you've got a different chair that is not of the same tier.

P1: assuming I have heard nothing about it prior, and [P6] decided to change the chair, or [P4]… Well I'd ask questions. I feel that we've got the best chairs and I'm excited about them. So I would have questions. Now, I'm an easy going guy, so if the answer is logical and it makes sense, I'd get on with life. But I would expect a big line-up at my office (LOL) from my direct report. I have a bunch of VP that report to me, and you think that VP are more mature and more.. but I'd say they complain more than the average person. (LOL) they definitely voice their opinions on things around the organisation, even small things.

P4: because they're VP. Sales clerk don't complain

P6: Actually when I started I didn't have one of those chairs. And when I finally got one of those… "oh cool!!!

R: another question: a detour: please tell us about an object in your home that you really appreciate.

P7: My bed. My pillow.

(LOL)

P6: one for your hand and one for your head.

P7: actually we spend a lot of money on our pillows. Yup.

P6: My feather lamp.

R: you like your feather lamp. Why?

P6: Nobody else likes it. (LOL) it's a Feather lamp. It's a really neat lamp. It's a buffet lamp, with a unique pattern shade on it and all around the bottom of it, there is feathers. It's burgundy and gold, and it matches my house, and I had to beg, borrow and steal to get it for Christmas present and everybody goes (moue), but I like it. It's upstairs. Yes I use it.

R: how about you Fred?

P1: It's an interesting question because I've moved twice in two years now, so I've been through all my stuff twice. And I re-equipped twice. You tend to throw out a lot of stuff

R: but you chose to keep some stuff?

P1: yeah.

P6: You would keep the feather lamp.

P1: Absolutely! (LOL) We didn't keep a lot from a bunch of stuff, which I'm very excited. You saw my new chairs. Barcelona chairs. It has always been my dream to have those chairs and now I have it.

P3: Are they black?

P1: I went for dark burgundy.

P3: Oh yeah!

P1: You know the one I'm talking about?

P3: Interesting choice.

P1: It's my wife's choice…. (LOL) ok. But the chair was mine. To me a chair doesn't look good. It's funny, I don't like chairs. It's not my favourite piece of furniture. I think chairs look awkward. I like tables. I can shop for tables for days. Chairs I find boring. But this one chair, the Barcelona, …

P3: …a piece of art

P1: …is just so gorgeous. I always dreamt of having one; so bad.

R: And now that your dream has come true how do you feel to own one, to have one in your environment?

P5: Do you sit in it?

P1: Yah, I sit in it. I cover the chairs with a sheet so the cats don't go sit on them. I have my computer next to it, and yeah, when I'm home, that's my seat now. I have a lamp over it, I do my stuff. I'm very excited.

P7: What is a Barcelona chair?

P1: You see them sometimes in hotel lobby

P3: It's straight, it's leather, with buttoned cushions and …

P6: Yea-yeah.

P3: …the back and the seat are the same and it's usually on a chrome base,

P1: …either black or white, but they also do them custom. So you pick the leather. And what I find is that the back is inclined, super comfortable. It's just a very slight incline.

P3: Yep.

P7: So it's very contemporary?

P1: It's super contemporary

P3: It's 50 years old.

P1: …and it was presented by Mies in 1929. But it looks modern.

P4: Yeah.

P1: That small incline makes it super comfortable. You can spend hours in that chair, even though there are no arms.

P3: Yeah.

P4: And it is kinda low in your back, for a guy as tall as you. That is interesting.

P3: it's a low chair. Yup.

P4: I want to say that mine is my Jacusi (?) couch recliner. You just get in, pull the lever and "okay, I'm comfortable". And it goes back to what you spend the most time in when you are at home, when you are sitting in front of the TV. If you're going to spend 8 hours in bed, you want a good bed and a good pillow. You spend time in front of the TV, you want a good couch. We have 2. (LOL)

P5: Mine is not a furniture it's an appliance: my stand-up Kitchenaid mix-master. (LOL YES!)

R: Explain it. If you just say that, it might make you look like a maniac in the kitchen, but tell me why you like this?

P5: I love to bake. And that is one thing. What I like about it, it's hands free, so I can multitask (LOL) while I'm in the kitchen. And it's pretty on the counter.

R: What about the black and Decker version? Same thing?

P5: I like the Kitchenaid, it's antique-ish. The old look.

R: …the look is part of its charm?

P5: Right. Everyone in my family has one, over the years. So my grandma has the old-old one. It's a family touch. It kinda grows from generation to generation.

P4: I inherited my mom's mix-master. I bought the big beautiful one, but I have my mom's mix-master; It's a family touch too.

P6: yeah me too.

P5: You must have one [P3]?

P7: I thought you love to cook? That's different?

P3: I don't bake.

P5: You can make pasta on it, and meat.

P3: That's what uniss is for (LOL) ???

R: Ok. So about you [P3], what's your favourite object?

P3: I have a 20 y-o big bulky brown leather couch that has followed me all over. It is perfect. You can sit 6 people across comfortably, you can lie in it and fall between the cushions, fall asleep for 2 days and no one would find you. It's perfect. It's cool in the summer, kinda sticky. And in the winter, you throw a piece of lambskin to keep it warm. It follows me around.

R: This is the equivalent of a friend in the furniture world.

P3: Yup. Reliable.

P6: You don't have to buy him lunch. (LOL)

P3: Or wash the sheets in the morning…

(LOL)

P2: The object that would be irreplaceable in my world is a reading chair, but it's getting to be a competition with the other members of my family, cause they discovered it as well as. (LOL)

Ah yeah…

P4: with a comfortable chair you can do that. (LOL)

R: ok. Now let's come back to the [test] chair. And I understand that the [test] chair is in your work world, so they can't really compare, but how would the [test] chair compare to these favourite objects?

P4: I think it's totally different. I don't think you can put it in the same sentence even. Because your home stuff is something that you pick for yourself, where as in an office I direct who gets what. So you don't have a choice. You may come attached to it, because these are really good nice chairs, but you didn't pick it. So they don't have the same feel for it.

(pause)

P7: When the chair came out, it was like outer space as opposed to traditional office furniture.

P4: lots of people had good chairs. But this one was big, spacey, wow it looked really cool. It was dark contours, it was mesh, it was not fabric, it was a new space-age thing. It looked really cool, but when you sat in it, you went "oooh!" it wasn,t just..

P5: it was sexier than regular office furniture. Giggle. For lack of better word.

P1: it also empowered you… for me, it empowered me.. to at last have a chair that would fit me. Instead of just the standard one-size fits all.

R: Okay, so when your environment looks good, …does it help you perform?

P4: that's what [P2] and I said while these guys were getting a desert. It gives you enough comfort to stay there an extra hour or two.

R: But aside of the physical support for your back, what about the cool factor?

P4: not really. When you're sitting you, feel it.

P7: I think it does to some degree. If you were sitting in an old stained, frayed chair you're not gonna feel the same sense of pride, or that you are valued as much as if you're provided with this beautiful high-end chair.

P6: It's no different than being in an inside office, no windows, on the second floor, or having a view of the entire city.

P1: This is personal, but I think an organisation that is providing all its employees with [test] chairs is saying "we give you the best, and we expect the best"

P4: yep

P6 & P5: yes.

P1: so there is this subconscious incentive to perform.

And we expect the best … (LOL)

(pause)

R: do you have chair conversations? About your [test] chair? Who talks about their chairs?

(all say they do, yet no one could remembers some such conversation specifically)

R: for instance [P1], how did I find out that you had [test] chairs at work?

P1: I think I brought it up. You were explaining what you were doing in your Ph.D. and I said, "It's like my chair at work". All the nobs and levers, trying to find an example of a rewarding interface. That's the first thing that came to my mind when you were explaining your Ph.D.: The [test] chair.

R: That is interesting. Here's my second to last question: If the chair were an animal, which animal would it be?

P7: Is this where your Ph.D. comes in? (LOL)

R: I'm just asking the same thing from a different angle.

P4: I would almost say *bear*, because it hugs you like that.

MS & P6: Yeah.

P4: you can take a meaning and turn it around, but you think: bear hug as opposed to "GRRR" grizzly bear. You think nice bear, cuddly, it makes you feel warm, even though she gets cold, whatever. It makes you feel warm. The arms are comfortable to pay with; cuddly bear kinda thing.

P7: I was gonna say a horse and saddle, if you're braced.

R: ah??? Do you like being in a saddle?...

(LOL…….. save that question for the last…. LOL)

R: sorry, I'm not a horse person. Is that good? Is that a positive thing?

P7: Yeah. It's great. I haven't ridden since I was a kid, but it's great.

R: so it's a positive thing. (LOL)

P2: I would have picked a dog or a cat. A house pet. A lot of times they're just there. You really just don't think about them… but Shelley, you have a dog.. they always come to the door if you call their name, they want to be scratch behind the ears.. it's just a comfort factor. They're …

P4: dependable

P2: …very, very low maintenance.

P1: dogs are high maintenance: you have to walk them out, cats are low maintenance.

P2: dogs are a good reason to go and get some exercise. Ok, If it's a chore… but they're a good reason to go out and play in the snow.

P6: Dogs are a good one for me. (metaphor) I agree with [P2] and [P4]. If I go and D's watching football or basketball, I'll go upstairs and watch a movie, and the dogs will come up and cuddle in where ever they fit in the chair or on the sofa with me. So it's kinda really cozy. And they're not a chore at all. Just a reason to get out.

P1: I think the bear hug quality is definitely there. But also a multi jointed quality like a giraffe.

R: I like that.

P1: Every part of the chair can be adjusted to you. So if I think of the animal kingdom, which animal has many, many joints, it's a giraffe.

P4: and it's graceful.

P1: It is!

P4: the chair is very graceful.

R: and you?

P3: Oh mine is so totally not what you guys are saying. My take is it's a giant three-toed sloth.

(ah! A what? LOL)

P3: It's kinda like a bear, but it could be dangerous. It's kinda jointed, but it's not. It does its own thing. It's exotic.

R: It's from Madagascar!...

P3: If ya happen to fall into it, it could be comfortable, but if you fall into its knot, it's not. So it has this dexterity… Again, if it's the wrong size, or if you sit it incorrectly…

P2: You should've picked an orang-utan

P3: no … they automatically instil some kind of… the sloth looks like the orang-utan, but it's scarier. It has an exotic… specially when you see the claws… but it's so slow, it's not gonna do anything. So it's a false danger. It's like seeing that chair. It's like ouuuh.

P7: if you use that chair..

P4: if you use all the levers and stuff… but if you just sit in that chair you're going to have "resposo???" but if you use it…

P5: yeah it hangs out here…

P4: Lots of people don't like touching the levers either. They just sit, and won't touch it. So it's education as well as a cuddly bear. Or a sloth.

Yeah…

P3: you don't touch the sloth

R: Ok. Great. To wrap it up: Collectively name the top 3 reasons why we/you like this chair.

P4: It definitely has to be because it's comfortable. The fact that you can have 3 sizes.

P7: It's easy to figure out. Some chairs have twist nobs, stand up and sit down. And..

P4: Yep.

P5: I don't know that I can talk for every body, but it's... a snobby thing… but like [P1] said, it's a classy chair, it's expensive, it's something you can brag about.

P1: A trophy chair!

P5: yeah…

P1: Sure a trophy wife, why not a trophy chair!

R: OK. Who else?

P3: Adaptable. Even if it's the one chair, if your lumbar moves around, you can change it too. Change the height. If you're wearing heels, butts a little higher …

(LOL)

P5: Actually the chair wrecks your heels…

R: How come?

P5: Any chairs with rollers hitting the back of your heels, actually…

R: Adaptable, comfortable, easy

P3: Easy to keep clean too

P6: Ah…nah…

P3: Well if you make a mess, the crumbs fall through… (LOL) if you spill your coffee you don't look like you peed your pants…

(LOL)

P4: But we do get them cleaned every couple of years, by professional cleaners. We do get them cleaned. Look at the back to see how much dust there is there . oooh… but they don't show the dirt, I guess.

P3: It would be nice if they came in red. (LOL)

P4: But we're not doing any office in Red. No, no, no.

P3: When they gave me my computer I said I wanted a red desktop and they wouldn't do it.

P6: It's too hostile.

R: Talking about personalisation. Have you ever tried, or heard of people who have personalised their [test] chair? Carve or write your name on…

P5: I have my name on mine. It got stolen.

P4: Yes, it got stolen. It got stolen for a while.

R: Ah? And you don't let any people…

P4: No, we don't let people carve their name on it

P5: But I still have my name on mine.

P6: People mark them with whiteout because whiteout doesn't hurt the chair.

P4: But now that most people have them we don't have that problem. But at the beginning, when they first started coming in, everybody carved names on them.

R: So people were attached to them?

P4: Yes. Yes. If someone leaves the company.

P5: They were stolen…

P4: That chair was moved to a new office; 25 to 5 pm that chair would be gone.

P2: Just like staplers… (LOL)

P4: Yep. The vulture syndrome. As soon as somebody left, somebody would be in there "ah, dang! It's already gone!"

R: And that's just because it's comfortable?

P2: Comfort is the highest..

P5: Comfort and the image…

R: okay so like the chair because of how comfortable it is, but you steal it because of the image?

P5: I think so!

P2: I don't..

P4: I think both…

P2: I would steal it because it would be comfortable

P5: It was stolen because people thought it was comfortable. Because the name saying it was comfortable. They didn't try it. They just stole it.

R: So is it one of those things: I only drive Ferrari because they are "comfortable"?

(LOL)…

P2: That the catch of the dog. Cute little dog… chick maintenance… (LOL) That and small kids.

P6: But I'll accept a red Ferrari…

(LOL)

R: Well, that's it. Thank you so much. Thank you for coming.

Annexe C – The museum visit study

Verbatim transcripts of extracts of post-visit interviews

P5

Verbatim de P5 qui parle de son ange. Son FLOW

(11 :20) P5 : Ça c 'est l'archange… ouais. Ça c'est pas loin du WOW. [Silence]

(11 :24) P5 : Parce que ça me rappelle des œuvres que j'ai vu dans le passé…. Ça a un style qui me rappelle certaines œuvres que j'ai vu… pis ce genre d'œuvres-là me parlent. Par exemple, je peux te faire un lien niaiseux, mais pas niaiseux, mais un lien qui est…eh… Il me semble [il pointe l'œuvre] que cette œuvre-là je l'ai déjà vu quand j'étais petit; et sans nécessairement avoir fait tous les liens que je peux faire maintenant… mais je me rappelle très bien quand j'avais visité le musée des Officines à Florence, j'étais tombé devant la naissance de la Vénus, et quand j'étais petit, ça ornait un livre d'histoire que j'avais à l'école. Et eh… j'étais tombé sur le cul quand je l'avais vu en vrai. Alors, à un degré moindre, cette œuvre –là m'a fait un peu le même effet.

P5 Riopelle

(25 :38) P5: Ça en ayant vu la grande c'est comme des prémisses. C'est bien. Flow.

Verbatim de P1 qui parle de gravures inuites. Son FLOW

P1 : Je reviens à mon concept que j'avais dit là-bas, que… Nos esquimaux étaient surement aussi fins que ceux qui ont fait les hiéroglyphes et les dessins… que ce soit dans les cavernes ou mieux encore sur de la poterie ou des objets. Ce qui me surprend toujours, c'est : pourquoi des gens?... parce qu'eux devaient avoir un plaisir à faire ça… qu'est-ce qui les amenait à faire ça? Pour eux était-ce le simple plaisir ou est-ce que ça avait une signification? Pour moi je me dis, c'est de l'écriture. C'est une façon d'écrire. De communiquer. Pour moi, nos chinois et ces gens-là ont des écritures. Des pictogrammes, (…) probablement qu'un esquimaux qui s'y connaît regarde ça pis peut parler pendant 3 heures!

P2 : sur le groupe des sept. (P2 était bouche-bée)

R : penses-tu qu'il faut l'avoir vu (le paysage) pour l'apprécier (la peinture)?

P2 : Non. (pause) Pas du tout. C'est un petit peu comme la philosophie pure, c'est pas parce qu'on ton l'a jamais expliquée que tu ne la comprends pas. (rire) C'est fondamental.

R : comment est-ce que tu explique certain n'aiment pas ces peintures?

P2 : ce sont des gens pour qui l'art ne transcende pas le réel. Le réel est l'ultime catégorie et l'art est toujours DANS le réel. (…) is this a rock? …a rock on the edge of water? Yeah, okay, yeah it's a rock, a boulder on the edge of water; and there is a sky, yeah. But that's not what I am seeing here. Not what I'm seeing here. Others may be too tied to reality to see beyond what's right before them. The fictious, the imaginary, (…) the symbolic. So he drew God. How do you want to draw God? You can draw in a thousand and one way. He drew God this way.

P1 / inuit

(4 :46) : P1 : ÇA! J'avais adoré ça! (Emphase!! [4 :37 elle a les traits détendus] Ça là, je serais restée devant… et c'est là où dans toute cette exposition-là j'ai fait « wow !!»

AL : est-ce qu'on parle de flow? Est-ce que ça t'a frappé qu'on..

P1 : Ouais! Je suis entrée carrément là-dedans! J'étais dans le cheminement de l'artiste. Et je me souviens que tu expliquais c'était quoi pis j'étais carrément envouté par ça… Pis… oui! Pis je me retrouvais même là dedans, là!

Diapo 99.

(29 :40) Slide 99. P1 : Oui-oui. Là, ça avait capté mon attention. Moi, Marc-Aurèle Fortin ça réfère à mon enfance. À Québec. Ça m'amène à mon premier désire de vouloir peindre de faire qqch. Quand j'ai commencé à dessiner, je voulais faire des arbres. J'ai dessiné les arbres de Marc-Aurèle je sais pas combien de fois dans ma vie. C'est une inspiration. Ça ressemble à du connu. Pis même dans les expérimentations que j'ai fait, quand j'ai commencé à expérimenter les couleurs, sa technique m'était connue, l'histoire du fond noir, de travailler ça; j'ai fait ça souvent, moi, dans mes toiles, et j'ai toujours adoré cette perspective là. Là, j'aimais ça qu'elle en parle de même. J'étais en flow total.

Diapo 100.

(30 :24) P1 : O-ouais, j'étais en flow total. Pis elles étaient belles les toiles.

Diapo 101.

AL : pis y'en avait de toutes les périodes.

P1: celles-là m'avaient intriguées, là… j'avais trouvé ça intéressant. On voit pas ça souvent des Marc-Aurèle

Diapo 102.

(Silence; dans ses rêves)

Diapo 103.

(30 :46) P1 : ah oui, oui, oui… là j'étais en flow. Je serais restée là longtemps.

Diapo 104.

(30 :49) P1 : je me serais laissée imbiber par ça…

Diapo 105.

(Silence; P1 ne veut plus parler. Elle veut restée dans sa rêverie)

Diapo 106.

(31 : 07) P1 : ouip. Là j'étais en flow.

Diapo 107. (ss. Les modernes-Mousseau)

(31 :35) P1 : Pis ça ben, Mousseau… tu vois, ça aussi c'est du connu. Mais c'est du connu différent. (sa voix est redevenue réaliste). Je les avais jamais vue celles là… Pis moi, là, je suis en flow, mais c'est en lien avec les fait que Mousseau, lui, son art est un art utilitaire… dans le sens où, c'est là pour servir. C'est pas là juste pour être beau, mais pour interagir avec les autres… tu sais les Moussathèques… tu sais les espèces de discothèques dans les années 70 (ha oui??) oui, y'en avait une ou deux, je pense, à Montréal. Tu rentrais là-dedans, pis l'idée c'était d'amener l'art aux gens. De pouvoir être en interaction avec cet art-là, ça faisait partie … ça vit, pis ça alimente ton expérience. Fait que moi, j'aime toujours ça le voir, pis… Je suis tellement en accord avec son processus à lui que … je trouvais ça l'fun qu'il soit là, parce que ça vient un peu justifier toutes les raisons pourquoi moi j'adhère à l'art comme tel…

Annexe D - The co-design study

Verbatim extracts from post-visit interview

Screen Recording.mov

(5:03) A: Beaucoup plus relax que l'autre jour. On bouge plus.

(Beginning of day 2- 6:30) A: Un peu Flow qui est en train de se manifester. Il y a comme une synchronie… tu sais, il y a vraiment une espèce d'harmonie qui se passe au niveau de la communication. (7:10) on sent qu'il y a une co-création qui a l'air de fonctionner; je sens qu'il y a un contrôle de la situation.

(Participant A at the beginning of Window 4, --HIS, starting their last sequence of mature CI Loop and CM)

(33:15-35:04) A: Je sens la liberté de pouvoir bouger les bras…

Researcher: Peux-tu m'en dire plus à ce sujet?

A: T'es dans l'espace… Je pense que physiologiquement ça doit aider en "estie"… C'est pour le corps. T'es pas pogné comme ça. J'pense que pouvoir faire ça, c'est une liberté physique qui encourage, j'imagine, une liberté de création; un peu comme quand tu fais des étirements… C'est plein d'idées qui ont convergées à *ce* moment-là, j'ai l'impression. L'expression physique est juste une espèce d'exclamation de la cohésion. Peut-être que le flow s'est exprimé en cette liberté physique. Je sais pas; c'est difficile à exprimer. Je pense qu'il y a un lien.

Researcher : une exclamation? Comme après… super! Let's rejoice! Ou si c'est une porte qui ouvre..

A : oh non, c'est une porte! C'est plus comme une manifestation physique d'une cohérence, en fait, qui me semblait être partagée.

(37 :09?-38 :47) (Looking at the final sketch being drawn) Researcher : Est-ce que c'est ce que vous aviez en tête dès le début?

A : C'est sure, c'est une négociation d'idées; pas tout le temps des idées nouvelles, pis scrape celles que.. Pour moi, il y a beaucoup d'idées du début. Puis une chance que (Participant B) a pris la relève à la fin; j'aurais jamais pu les exprimer aussi bien, en fait, que ça… c'est complémentaire, veut, veut-pas. Pour moi il y a une satisfaction d'avoir pu passer certaines des idées dont j'avais l'intuition à travers… la main de B. ouais.

(41 :22) (spontaneously out of the blue) A: « C'est fou comme le dessin est à l'échelle de nous. La mise en échelle est bonne entre la photo du paysage et notre présence physique »

(42 :40) A: "Wow. Je suis épaté devant ce paysage qui s'anime devant mes yeux!... Contrôle, relaxe"

Screen recording22.mov

(38 :00) A: Honnêtement, je vise l'harmonie dans n'importe quoi que j'essaie de faire, à moins que je sois avec des pas-d'allure. Là, c'est sure que B et moi étions "on our best behaviour".

Screen recording17.mov (Vyew)

(20 :39) A: T'as vu comment B a répondu? J'ai senti que son mouvement était brusque; elle probablement sentait mon inquiétude. Elle est très sensible.

(30:03) A: la sensibilité, c'est un de mes trucs; je suis très sensible aux autres.

(37:40-38:21) A: Là on touche un peu au Flow, en fait. C'est drôle, j'ai remarqué que mon vocabulaire change; son vocabulaire aussi; on passe du « tu » au « nous » ("Celui qu'*on* a fait"). Tu sais, tantôt c'était: « ton truc », "tes", "ta", "mon", "tu", "toi", "ma"; donc là tu sens qu'il y a une séparation dans le vocabulaire; très personnel, très individuel. Là, on est plus dans le « nous », le « nôtre », « nos »… ouais, en commun. Je sens qu'avec ça, au moins c'est un indice qu'on est dans le Flow.