eksig 2011

DRS special interest group
on experiential knowledge

SkinDeep - experiential knowledge and multi sensory communication

International Conference 2011 of the
DRS Special Interest Group on Experiential Knowledge

Conference Proceedings

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EKSIG 2011

S k i n D e e p - experiential knowledge & multi sensory communication

Proceedings of the International Conference 2011 of the DRS Special Interest Group on Experiential Knowledge.

Editors: Kristina Niedderer, Kerstin Mey, Seymour Roworth-Stokes.

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EKSIG 2011: S k i n D e e p – experiential knowledge & multi sensory communication

Editorial

Kristina Niedderer, Kerstin Mey, Seymour Roworth-Stokes

EKSIG2011: SkinDeep – experiential knowledge and multi sensory communication was organised to provide a forum for debate about the multi faceted, multi sensory and multi modal possibilities of communicating knowledge in the creative disciplines. These proceedings contain the papers accepted through double blind review to be given at the EKSIG2011: SkinDeep conference held on 23rd and 24th June 2011 at the University for the Creative Arts. The papers presented by the keynote speakers will be available on the conference website at a later stage.

Conference Theme & Call

The need to address the issue of communication has arisen because of the different approaches and

requirements regarding the dissemination of knowledge and experience in research and creative practice. For example, creative practice tends to convey its content and meaning through its outcomes, such as artifacts and various other kinds of manifestations. We interpret artefacts here in the widest possible sense to include any kind of creative output in whatever format. These outcomes can relate to different, often intersecting or converging sensory stimuli such as visual, aural, tactile or olfactory. Equally, procedural or process knowledge - in the creative disciplines more commonly known as skill - relies on demonstration and first hand experience for its communication as much, or more so, than on written text.

In contrast, the presentation of research traditionally has been fixed to its verbal and textual articulation with a whole tradition of dissemination, mainly in written formats, such as peer reviewed conferences and journals. This predominance of textual presentation has long been questioned in the creative disciplines, and recent workshops on the role and balance between text and other forms of the communication of research, and on the multi-modal presentation of research have indicated a strong interest and need to exchange knowledge and experiences on the issue of multi-sensory communication of research.

Recent developments are providing more and more examples of how textual communication can be augmented by other forms of articulation and exchange. The developing understanding arising from these examples is that the inclusion of research processes and outcomes evolving through creative engagement and sensory experience can help integrate and/or articulate insight or understanding that cannot easily be made explicit, such as the tacit part of experiential and procedural knowledge, commonly known as tacit knowledge.

This conference aimed to explore the different ways in which tacit knowledge can be given more appropriate consideration within the framework of research. This includes for example investigations into the nature, aims, validity, evaluation, and/or necessity of different modes of communication and exchange.

Questions of interest are, for example:

- What do we mean when we say we 'communicate knowledge'?
- How can we articulate and/or communicate tacit knowledge/knowing within the process of research?
- Why is the communication of tacit knowledge important for the understanding of research?

- What frameworks, modes and methods are there to guide the communication and presentation of research (process and/or outcomes)?
- What frameworks are there to guide the communication of the contribution to knowledge?
- What frameworks are there to guide the reception and interpretation of any research communication, for example research exhibitions or performances, etc?
- What contribution can the use of creative practices make to the understanding and communication of tacit knowledge in research?
- What issues evolve from criteria of research such as repeatability and transferability for the foregrounding of tacit knowledge in research in the creative disciplines?
- Can we talk about the communication of tacit knowledge, or should we talk about a transfer, etc?
- What means and methods do we have to transfer and iterate tacit knowledge?

Responses

As in previous years, the EKSIG conference call received a great international response with submissions from 20 countries including Australia, Belgium, Canada, Czech

Republic, Denmark, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Portugal, Russia, Spain, Sweden, Switzerland, UK, USA.

Submissions were interdisciplinary and from a variety of disciplines and discipline areas including fine art, applied art/craft, architecture, performance and drama, film, product design, graphic & communication design, knowledge management, education, engineering, philosophy, and social sciences.

For the conference, contributions were selected in a two-stage process comprising abstract and full paper selection, through a double blind review process by an international review panel. From the contributions, six strands emerged, of which the first two deal most directly with experience *per se*, one concerning the articulation of personal experience, the other dealing with the tangible exploration and experience through the material world.

Strands 3 and 5 explore experience within the design perspective, investigating the design process and issues of sustainability from different perspectives, including design, engineering, craft, knowledge management and education. Strands 4 and 6 deal with experience of the body, motion

and space, encompassing perspectives from dance, performance and architecture.

Strand 1: Articulating Experience

Strand 2: Touching the Senses

Strand 3: Design Process

Strand 5: Sustainability

Strand 4: Performance & Motion

Strand 6: Space & Motion

The conference is opened by the first keynote by Professor Richard Shusterman who is Dorothy F. Schmidt Eminent Scholar in the Humanities at Florida Atlantic University. He explores the experiential basis of style, centering on the idea of *somatic style* and its relevance for the expression of both self and society as well as philosophical and ethical ideas.

His keynote is followed by strands one and two. Strand one focuses on knowledge creation from the perspective of the creative professional and the articulation of personal experience through appropriate means. Tom McGuirk explores how drawing may be conceived as a tool for

knowledge creation. Paul Harper's research seeks to develop theory that is grounded in the experience of practice, and Andrew Jackson critically examines the experience and motivation of the amateur maker.

Strand two addresses the tangible exploration and experience of the material world. Bruce Montgomery and Phil Sams explore the experience and knowledge we gain through touch. Susan Benn and Kerstin Mey look at sensory possibilities in relation to urban planning, and Marie O'Mahony and Tom Barker demonstrate how the materials library can be used to communicate multi modal knowledge in research. Day one is concluded by the duo Antonia Taddei and Ludovic Nobileau, X-tnt, France, who use STRESS FREE as a tool to challenge the audience's sense that reality is malleable.

Day two is opened by a keynote by Professor Magdalene Odundo who reflects on how experience provides creative stimulus and shapes our making. Her contribution is complemented by Professor Christoph Zellweger's closing address, which mirrors Shusterman's theme, investigating how the human body and its experience "has become the subject of design, a luxury item and a commodity to be optimised and aestheticised".

Inbetween the two keynotes, day two offers two double-strands, one exploring the design process in design, engineering and education (3 and 5), the other exploring space and movement from perspectives of performance as well as architecture (4 and 6). Strand three begins with Gerardo Alducin and Manuel Contero who introduce social tagging technology to collect implicit knowledge during the product design process. James Self, Hilary Dalke and Mark Evans explore unconventional ways of communicating design research through the IDsite design resource. Vincent Rieuf, Carole Bouchard and Améziane Aoussat have researched how industrial design could be assisted by virtual reality tools thus using multiple layers of experience to enrich communication. Strand five expands the theme more specifically focusing on the imperative of sustainability. Ian Hankey presents research demonstrating how the experience of the maker combined with historical research can lead to innovation. Alison Gill and Abby Mellick Lopes research how students can develop experiences that enable them to sustain product lives and values. Jody Boehnert is also concerned with sustainable design education and provides a theoretical basis of transformative learning including a short case study.

Strand four focuses on experience through movement and performance. Anne Douglas and Kathleen Coessens explore improvisation as a way of experiential knowing. Todd Robinson discusses skilled practice as encompassing both somatic awareness and artefactual engagement. Karin Søndergaard and Kjell Yngve Petersen use multi modal research methods to investigate performance art and to extract expert practices.

Strand six extends the theme of the previous strand into architecture. Liselotte Vroman, Thierry Lagrange and Luiz Naveda research the embodied experience of space in design with the goal of implementation within architecture. Marjan Michels, Wil Meeus and Johan De Walsche provide a theoretical framework for the transfer of experiential knowledge in architectural education. Finally, Clive Holtham, Angela Dove and Allan Owens explore an intuitive approach to knowledge sharing and creation for business and management education. They propose that arts-based physical environment can augment and enhance management learning.

In Summary

The conference aimed to share different views and developments on the multi sensory and multi modal communication of knowledge in research and in creative and professional practice. The excellent response to the call for papers has brought together theoretical perspectives and case studies as well as emerging models and practices regarding the conference theme in a number of discipline areas, including design and engineering, fine and performing arts, craft and knowledge management.

The papers demonstrate a strong interest, development and consolidation in the understanding and acceptance of knowledge, and in its various modes of appearance and ways of communication. This may be seen both as an indicator of a maturing field as well as of current recognitions of the inter-disciplinary nature of most research. Hand in hand with this recognition, which breaks down traditional boundaries, comes an opening up of knowledge frameworks and beliefs that have to be negotiated in order to allow joint ways forward.

The EKSIG conference 2011

EKSIG 2011: SkinDeep, International Conference 2011 of the DRS Special Interest Group on Experiential Knowledge (EKSIG) was hosted by the University for the Creative Arts and held at Farnham Castle and co-organised by the University of Wolbverhampton.

EKSIG is part of a program of Special Interest Groups set up by the Design Research Society (DRS) to facilitate international exchange and advance in relevant areas of design. EKSIG is concerned with the understanding and management of knowledge in research and professional practice in design and design related disciplines in order to clarify fundamental principles and practices of using practice within research, both with regard to research regulations and requirements, and research methodology.

The EKSIG conferences are part of a regular programme of the EKSIG group. They serve to bring together researchers and practitioners from different disciplines and to promote understanding and best practice concerning the integration of different forms of knowledge within design research and practice. EKSIG promotes a multidisciplinary approach to engender multi-vocal debates and cross-fertilisation between the creative disciplines and other

practice-led disciplines, including contributions from the design disciplines (design, engineering, craft, media etc), philosophy, education, health and knowledge management that are concerned with methods and methodology in research and in creative and professional practice; with the nature, role, and management of knowledge within research; and with the role and use of creative practice (both as process and outcome) as a means by which to develop and manage experiential/tacit knowledge within research.

EKSIG 2011

S k i n D e e p - experiential knowledge & multi sensory communication

Keynote Speakers

❖ **Prof Richard Shusterman**

❖ **Prof Magdalene Odundo**

❖ **Prof Christoph Zellweger**

❖ **Antonia Taddei and Ludovic Nobileau**

EKSIG 2011: Keynote Speakers

Prof Richard Shusterman

Florida Atlantic University, USA

Richard Shusterman is the Dorothy F. Schmidt Eminent Scholar in the Humanities at Florida Atlantic University. Author of Body Consciousness (Cambridge, 2008), he has also written Surface and Depth (2002); Performing Live (2000); Practicing Philosophy (1997); and Pragmatist Aesthetics (1992, 2000, and translated into thirteen languages). A graduate of Hebrew University of Jerusalem (B.A. and M.A. in Philosophy) and Oxford University (D. Phil), he has held academic appointments in France, Germany, Israel, and Japan, and has been awarded research grants from the NEH, Fulbright, ACLS, Humboldt Foundation, and UNESCO. His exploratory research in somaesthetics is nourished by his professional practice as a somatic educator/therapist in the Feldenkrais Method.

Web: http://www.fau.edu/humanitieschair/bio.php

Somatic Style

Abstract

Style is very often contrasted to substance and thus regarded as superficial manner rather than substantive matter. My lecture challenges this view of style as mere surface dressing or external technique by exploring style's deep-rooted expression of both self and society. I focus particularly on somatic style because such style is regarded as especially superficial, as the body is essentially construed in terms of representational surface. To develop my argument, I first focus on somatic style's role in transmitting philosophical ideas and expressing ethical character. I then examine five logical ambiguities that inhabit and complicate the notion of style (including somatic style), before proceeding to explore the different ways that the body's various elements contribute to creating and expressing somatic style and also the different ways that our multiple somatic senses perceive and critically appreciate it. I conclude by examining the connection between such style and spirit.

EKSIG 2011: Keynote Speakers

Prof Magdalene Odundo

University for the Creative Arts, UK

Magdalene Odundo is Professor of Ceramics and an internationally-distinguished potter whose work brings sculptural elements to bear on the vessel form. Born in Nairobi in 1950 and educated in India as well as Kenya, Odundo studied at West Surrey College of Art & Design in Farnham with Henry Hammond, and in 1979 took her Master's degree at the Royal College of Art, London.

Her hallmark pots are imbued with a ceremonial grace, a timeless sense of the past and place and a deep feeling for cultural traditions. In her own words, she started 'a quest for perfect simplicity, for natural forms'. These works, in burnished and carbonised or oxidised terracotta, have been collected by major art museums and private collectors across the world, and have been internationally exhibited, most recently in the important exhibition the Global Africa project at the Museum of Art & Design, New York. Amongst her awards are the Order of the British Empire (OBE) and the African Art Recognition Award by the Detroit Art Institute's Friends of African and African-American Art.

Forms, Objects and Material Culture: Ceramic Gestures

Abstract

The vessel is the main focus in my own work, I am consumed and preoccupied by the body and its embellished glory. The human body is my muse. The preoccupation of the altered body fascinates me. I am often reminded of the elegant, young, very pregnant woman I once saw stepping out of a train, delicately negotiating steps on her way towards the station exit. The stance and pose struck by this young girl was captivating. She had the most sumptuous, voluptuous and perfect body form, her hair was pulled back in a bun just like a ballerina. She wore the tallest high-heeled shoes and her hips swinging left to right created an electrifying movement. The sight was sensational and exciting. This was both an object and a vessel with a sense of power. It contained within it both life and beauty. A perfect pot, vessel and form of art! A perfect object I wanted to inspire me. It was the enlightenment I had needed at the time. I felt the experience was a transformation. This lady who I will never know had unwittingly become my muse. In my work I have thus tried to contain and at the same time un-contain the potency contained in the vessels, the gestures, the movement and stillness, the music and the silence with the aspiration that each piece affects, delights and astonishes.

EKSIG 2011: Keynote Speakers

Prof Christoph Zellweger

Sheffield Hallam University, UK

Christoph Zellweger started as a trained craftsman and maker of fine jewellery and metalwork for the high-end market in Germany and Switzerland. After going through a rigorous phase of questioning his role as an artist-maker he developed a 'critical edge', which was manifested in his degree work at the Royal College of Art, where he qualified with distinction. In addition to exhibiting internationally and running his studio, he holds a professorial research post at Sheffield Hallam University, is a visiting professor at the University of Ulster and lectures at Europe's leading design and art colleges and in America. In 2007 he published Foreign Bodies, a monograph, which aims to extend the definition of body adornment today.

Web: http://www.christophzellweger.com

Incredibles: an artistic investigation into the 'embodiment' of material culture

Abstract

In the collective search for self-realisation and improvement, societies around the globe engage in experimenting with medical technologies and procedures, supported by expanding industries. With the help of scientists, surgeons, psychologists and personal advisors the human body has become the subject of design, a luxury item and a commodity to be optimised and aestheticised. This paper reports on an ongoing practice-led enquiry into the constructed world of objects, bodies and identities. It critically reflects on body modification through plastic surgery and other forms of body customisation. The paper poses questions about how these developments may affect people's perceptions of identity and how the experience of the sensible world is altered or extended. The paper does not aim to provide answers to these questions but it describes tangible, body-related objects responding to factual, fictional and ethical dimensions of the subject. The works of three recent exhibitions are presented, where artistic strategies with an affinity to Critical Design have been combined with surgical techniques in order to create discursive objects. The investigation suggests a possible "Corporal Design"-practice and sees the emerging field as the ultimate 'embodiment' of material culture. Through the making of critical, artistic objects and fictional products it assesses relevant cultural, social and political metamorphosis happening skin deep.

EKSIG 2011: Keynote Speakers

Antonia Taddei and Ludovic Nobileau

X-TNT and Paris-Montagne, France.

Antonia Taddei lives and works in Paris. Educated at the Sorbonne and at Oxford University, since 1997, Antonia is a Co-director and Multimedia Author at X-tnt, and Art Director and Project Manager at Paris-Montagne since 2005. In the 90s, Antonia worked as Script Writer and Project Manager in the multimedia industry. Since 2000, she has dedicated herself entirely to the Performing Arts. Her work includes theatre plays (performed in Avignon Festival, La Cartoucherie in Paris…); librettos for Musicals (Abbaye de Royaumont, Opéra de Lille, Auditorium de Pigna) as well as the use of new media in Performing Arts and Art interventions in public space.

At Paris-Montagne, Ecole Normale Supérieure, she worked to foster an art and science alliance for young audiences with poor access to education, which was chosen by the French Ministry of Research for the National Opening of the Fête de la Science in 2007. Antonia's latest project STRESS FREE is a transmedia project that aims to release stress from cities to foster an urban ecology in which art should play a central role. The project is supported by the Direction of Innovation and Direction of Culture of Paris City Hall, and received two grants from the French Ministry of Culture: one for research and one for production.

XTNT / STRESS FREE

Abstract

Intention: Reality is ideal

Every thing around us has been designed: the tables the chairs, the building, even this conference is ideal!
The distinction between real and ideal is a waste of time; it gives the feeling that the ideal is difficult to reach.
Inversely, to experience that the world is ideal, makes it feel malleable, soft, almost tender…

Proposition: Stress Free

Is a tool to give to the audience a sense that reality is malleable.
The performing arts play a central role in our method since they give us the chance to act on reality.
In Surrey, we will experience the first reproduction of a Stress Free factory with the participation of students from UCA. In collaboration with UBI (researcher and designer) they will create the first offspring of a Stress Free Factory.
For the performance we will have designed objects that aim to open up imagination in daily life (at work, in the street…) while the students will create their own Stress Free objects.
In and out of the castle, from the corridors to the dining room, we will slightly transform perceptions to make people feel that they can reshape the world to their taste!
To keep our offspring alive we will organise online stress free events in the future.

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❖ **The Experience of the Amateur Maker**

Andrew Jackson, Canterbury Christ Church University, UK

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Phil Sams, Whitespace Stories, Ludlow, UK

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Vincent Rieuf, Arts et Métiers ParisTech, FRANCE
Carole Bouchard, Arts et Métiers ParisTech, FRANCE
Améziane Aoussat, Arts et Métiers ParisTech, FRANCE

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Prof Anne Douglas (PhD), Robert Gordon University, UK and Orpheus Research Center in Music, Ghent, Belgium

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Clive Holtham, City University London, UK

Angela Dove, City University London, UK

Allan Owens, University of Chester, UK

EKSIG 2011: Organisation

EKSIG 2011 is organised by members of the DRS **Special Interest Group on Experiential Knowledge,** and supported by the **Design Research Society**. The conference is hosted by the **University for the Creative Arts** and co-organised by the **University of Wolverhampton**. The conference is further supported by the **DART** AHRC-funded collaborative doctoral training scheme, and by the Journal of **Art, Design & Communication in Higher Education.**

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Drawing and Intellectualism: Contested Paradigms of Knowledge

Tom McGuirk, University of Chester, UK.

Abstract

This paper analyses the philosophical backdrop to the exclusion from academic exchange of situated, embodied and tacit modes of knowing, whereby conceptual/propositional knowledge is presented as the gold standard against which these other types of knowledge are measured and found wanting.

By way of counterbalance this paper questions the premise that these forms of knowledge are best understood as belonging to a completely separate epistemological category to that of conceptual/propositional knowledge. The lack of parity of esteem afforded multi-modal formats of dissemination is, it is argued, ultimately rooted in these disparities. Disparities, which moreover underpin what James Elkins has described as "the incommensurability of studio art production and university life" (Elkins, 2009: 128).

The paper presents a number of theories that posit a sub-structural relationship of practical and tacit knowledge to conceptual/propositional knowledge. These include the work of Michael Polanyi as well as recent work by Alva Noë, Mark Johnson and George Lakoff and Vittorio Gallese. The paper focuses on the legitimacy of descriptive drawing as a knowledge producing activity with particular reference to Noë's work.

Keywords

Tacit Knowing, Situated Cognition, Drawing, Perception, Epistemology.

Drawing and Intellectualism: Contested Paradigms of Knowledge

> By itself, reality isn't worth a damn. It's perception that promotes reality to meaning. And there is a hierarchy among perceptions (and accordingly among meanings), with the ones acquired through the most refined and sensitive prisms sitting at the top.
>
> Joseph Brodsky (1986: 145).

Introduction

This paper reflects on a number of challenges to the premise that tacit knowledge is best understood as a separate epistemological category to conceptual/propositional knowledge. It argues moreover that this attitude ultimately constitutes the basis for a distrust of embodied, situated and tacit knowledge as other and necessarily inferior. This dualistic stance finds particular traction in mainstream academia due to the persistence of its indebtedness to the scholastic tradition (Bourdieu, 2000). This, in turn promotes a number of the phenomena referred to in our call for papers, including the problematic lack of purchase that "procedural or process knowledge … commonly known as skill" has in the realm of existing academic structures of dissemination, as well as the lack of parity in the esteem afforded to "multi-modal" formats of presentation and dissemination, and a valorisation of "textual dissemination". All are symptomatic of an exclusion from the mechanisms of academic exchange of situated, embodied and tacit modes of knowledge.

Early Modern Art Education

It is instructive to look to the origin of these conflicts in the early history of our fields. In the course of his critique of the "scholastic disposition", Pierre Bourdieu (2000) draws our attention to certain characteristics of these "early moments of the autonomization of the artistic field" – a long moment indeed from the *Quattrocento* to the High Renaissance – a period that gave us, amongst other things, perspective, various theories of *disegno* and more momentously the founding of the *Accademia del Disegno* (Florence, 1563). Bourdieu recognises as integral to these developments "a repression of the material determinations of symbolic practices", a trait he associates with the broader academy, both then and now (Bourdieu, 2000, p. 20). The naming of the *Accademia* reflected the primary motivation of its founders, which was the social advancement of its members, achieved through a necessary disassociation of the fine arts from the manual crafts. As Goldstein explains:

> That the academy viewed itself as an agent for professional advancement is made clear, then, by its name and deeds: the whole concept of an academy of *disegno* is inimical to a guild or workshop" (Goldstein, 1996: p. 19).

This reflects a social tension at the heart of the enterprise, which is still reflected in present day art and design education. In uniting the arts of painting, sculpture and architecture under the common banner of *disegno* and in elevating *disegno* to the level of an overarching epistemic principle worthy of its academic context – the founding academicians walked a precarious line. Even as their theories and actions lent a nascent recognition to the epistemic claims of the embodied aspects of drawing, they paradoxically sought to distance their arts not merely from association with the 'menial' crafts, but more tellingly, from the inherent embodied, situated and tacit aspects of their own practices. Dewey sketches a picture of the prevailing

intellectual milieu: "the aristocratic tradition which looked down upon material things and upon the senses and the hands was still mighty" (Dewey, 1930: 329). Bourdieu too recognises that this exclusion from "scholastic universes" of métier is the product of a species of "academic aristocratism" (Bourdieu, 2000, p. 25).

In the guise of *disegno*, drawing's epistemic claim was founded in Neo-Platonic rhetoric. Drawing was presented as "the intellectual component" of the plastic arts. Beyond the rhetoric however, drawing remained, as it still remains, an inescapably situated and embodied practice. This however was something that necessitated downplaying.

This dualism is particularly palpable in tensions that arose regarding conflicting definitions of the term *disegno.* Vasari's (1511-1574) conception of *disegno* was relatively holistic in that it integrated, to a degree, *disegno's* intellectual and embodied aspects. However Federico Zuccaro (1542-1609) later criticised Vasari for this very conflation of what he termed *disegno interno* – drawing's conceptual aspect presented in idealist, Neo-Platonic terms – with *disegno esterno. Disegno esterno* encompassed the cognitive aspects of drawing which were associated negatively with representation and mimesis, but also the physical, practical, embodied and situated aspects of drawing. All were considered by Zuccaro to be "secondary and necessarily inferior" (Goldstein, 1996: 31-32). He regarded these as entirely separate and independent intelligences, *disegno interno* being universal and *disegno esterno* being particular (Goldstein, 1996: 32). In hindsight however Vasari's conflated view appears in a positive light, as integrated and holistic, when viewed, as we shall see, from the point of view of more recent understandings that emerge within the field of 'situated cognition' in particular. Rosand summarises the complexities of this legacy for art and design education:

> For all the philosophical rhetoric brought to the discussion by intellectually ambitious academics like Zuccaro … a basic truth remains; *disegno* is fraught with contradiction and ambivalence, located as it is at the very boundary between mind, hand, idea and form. (Rosand, 2002: 60).

It is clear then that drawing conceived of as *disegno* sits precisely on a fault line, a site of tension between experiential knowing and a more traditionally 'academic' conceptual/propositional paradigm.

Dewey ultimately locates the origin of this phenomenon in a Greek distrust of custom and practice (Dewey, 1930: 306). Dewey suggests that our inheritance in this regard is manifest in "the magnification in higher education of all the methods and topics, which involved the least use of sense-observation and bodily activity" (Dewey, 1930: 314). He characterises the dualistic stance in terms of:

> The contempt for physical as compared with mathematical and logical science, for the senses and sense observation; the feeling that knowledge is high and worthy in the degree in which it deals with ideal symbols instead of with the concrete; the scorn of particulars except as they are deductively brought under a universal; the disregard for the body; the depreciation of arts and crafts as intellectual instrumentalities, all sought shelter and found sanction under this estimate of the respective values of experience and reason - or, what came to the same thing, of the practical and the intellectual. (Dewey, 1930: 310)

If we imagine that this attitude is extinct, a number of more recent commentators on the emerging research disciplines of art and design in the context (particularly of the

development of the PhD degree) disabuse us of that conceit (Candlin, 2000, Elkins, 2009). The issue of 'knowledge' is foregrounded in this context, due to the normative requirement that PhD research produce 'new' knowledge.

James Elkins has criticised the application of terminology like 'research' and 'new knowledge', to "studio work", as being "artificial" and "problematic" (Elkins, 2009: 111-133). He provocatively suggests that the impetus for this imposition of "administrative jargon" stems from the "immensely difficult" problem of securing the place of art production within the university (Elkins, 2009: 128). He contrasts the "problem" of the place within the university of "the experience of making – its exact pedagogy, its methods, knacks, and skills, its feel", with the broad acceptance of the work of "conceptualising" artworks "that [are] finished". It is this that is at the root of "the incommensurability of studio art production and university life" (Elkins, 2009: 128).   This "incommensurability", is ultimately founded on artificial restrictions within our prevailing epistemological paradigm, which sees conceptual/propositional knowledge as the gold standard within the academy.

The Valorisation of Theory

Heidegger however provides an ontological explanation of the phenomenon described by Elkins, in terms of a distinction between two key Heideggerian categories; "presence-at-hand" (*vorhandenheit) and* "readiness-to-hand" (*zuhandenheit*). He associates *'*presence-at-hand' with the 'theoretical attitude'. It is an approach to "Things" that encounters them exclusively in an objectivist, analytical mode, regarding them as both perpetually available as well as precisely quantifiable and measurable. This is the stance of the objective Cartesian observer, concerned solely with the facts of the thing or concept (to take Elkins' example; the "conceptualising" of art "that is finished"). It is moreover a stance that fits comfortably into our current academic structures. The production of art on the other hand is understood by Heidegger as belonging to "readiness-to-hand" which he identifies with the situated, engaged, indeed transparent way we encounter things through their use. His example is the hammer. We can never know what is essential about a hammer through objective analysis.   As Heidegger explains "the less we just stare at the hammer-Thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become" (Heidegger, 1962: 98).

Heidegger constantly emphasises this kind of engagement in his analysis of the "*work* of art". He wants to say that we may come to knowledge in a particular way through such *work* – the kind of engagement we find in application (Heidegger, 1993: 143-212). He insists that, "the kind of concern which manipulates things and puts them to use ... has its own kind of 'knowledge'" (Heidegger, 1962, p. 95)*.* He associates this knowledge with care and circumspection, which he distinguishes from theoretical knowledge (Gallagher, 2009: 7).

The "incommensurability" of art making with "university life" is founded, then, not in any mere institutional qualm or orthodoxy but in what Heidegger characterises as a more universal "unjustified absolutisation of the theoretical" (Heidegger in Safranski, 1997: 97). He contrasts this with the kind of knowing that belongs to *Dasein* or "being-in-the-world" which is a situated, engaged, concerned, and thereby more authentic, mode of knowing (Heidegger, 1962, p. 88-89).   Indeed Heidegger's core concept, *Dasein,* implies just such a stance. Human beings, understood as *Dasein* are, as Feenberg puts it "always already involved in a world" because the "things of the world are revealed to *Dasein* as they are encountered in use" (Feenberg, 2005: 2).

The disjuncture identified by Elkins is explained in Heideggerian terms by the fact that, despite having its own kind of "knowledge" the ready-to-hand "is not grasped theoretically *at all*" (my emphasis) (Heidegger, 1962: 99). George Steiner provides some insight into the hostility of the theoretical attitude towards experiential knowledge:

> Appropriate use, performance, manual action, *possess their own kind of sight.* Heidegger names it "circumspection." Any artist, any craftsman, any sportsman ... will know exactly what Heidegger means and will know how often the trained hand "sees" quicker and more delicately than eye and brain. Theoretical vision [Heidegger says] ...constructs a canon for itself in the form of *method.* ... Here methodological abstraction replaces the immediate authority of "readiness-to-hand." Heidegger's differentiation is not only eloquent in itself; it brilliantly inverts the Platonic order of values which sets the theoretical contemplator high above the artist, the craftsman, the manual worker (my emphasis) (Steiner, 1987, p. 90).

This description cuts to the heart of the tension between the theoretical, objectivist knowledge embodied in Cartesian method (the traditional methodological research paradigm) and the kind of embodied, situated, and tacit knowing common to art and design production.

This has obvious relevance for the theme of this conference. The 'Call for Papers' echoes Elkins in identifying a certain incommensurability, between the production of art and design, and the traditions of the University with regard to both its conception of knowledge and the avenues and conventions of its dissemination. Indeed our 'Call' specifically identifies a lack of fit between what it terms "procedural or process knowledge … more commonly known as skill" within an academic context characterised by "the dominance of verbal and textual articulation [and a] tradition of dissemination, mainly in written formats, such as peer reviewed conferences and journals".

It is however doubtful that we can address the "problem" of the 'fit' of art and design production within the university without first addressing in a radical way the deep-seated dualism outlined earlier. And this requires nothing less than a thoroughgoing revision of our understanding of what 'knowledge' encompasses. `The two traditions referred to here, Dewey's Pragmatism and Heidegger's Phenomenology provide it will be argued below the basis within contemporary theories of 'situated cognition', for just such a revision.

Disciplining and Theory

Howard Singerman (1999) suggests that in order to have purchase within the university, fine art must assume a disciplinary mantle, and he cites Levine's insistence that "it is through the development of theoretical issues that a medium becomes a discipline", and that "theoretical questions … extend and enlarge the medium" by providing a "metacritical viewpoint" (Singerman, 1999: 199).   This reflects a well-established 'conceptual turn' within higher education in fine art since as far back as the 1960's. Taking a lead from Thierry de Duve, Singerman suggests furthermore, that, "in contemporary art and art schools, the frame and the field of work have become precisely the métier, the craft skills with which work is made, as well as the site where it is produced" (Singerman, 1999: 212).   In other words, where once technical and craft-like situated and embodied skills, essential to métier and the

practicalities of art production, were taught, now what is taught is "consciousness of the field" and the specifically theoretical skills required to find and maintain a *position* within that field (Singerman, 1999: 212). Indeed Singerman taking his lead form Bourdieu suggests that this is the condition of academic disciplines in general.

Commenting on the evolution of the PhD degree and the hegemony of theory in fine art, Richard Woodfield suggests that since the late 1960's, the valorisation of theory over and above métier, was partly the result of an enforced "radicalism", and because "ideology has to be articulated verbally" consequently "grunt practice garnered no respect" (Woodfield, 2004: 105).

The persistence of this differentiation is evidenced in Fiona Candlin's (2000) critique of the UK Council for Graduate Education's report (Frayling et al. 1997). Candlin's analysis casts some light on the "the predominance of verbal and textual articulation" and the valorisation of "textual dissemination" identified in our call for papers. Candlin suggests that despite the report's assertion that "doctoral characteristics of originality, mastery and contribution to the field are held to be demonstrated *through the original creative work*" (my emphasis) (Candlin, 2000: 5), the report effectively presumes that "art practice, no matter how cognitively sophisticated and theoretically rich ... cannot be deemed research without the supporting apparatus of conventionally presented academic study" (Candlin, 2000: 6).

She suggests moreover – and this is a significant point with regard to our conference's theme – that rather than "open[ing] out the boundaries of academia to acknowledge different ways of thinking and working", the report actually "reduces art practice to the conventions of academia" (Candlin, 2000: 12).

As we have seen, Dewey sees these epistemic disjunctions and distinctions as ultimately false. Heidegger objects, from an ontological viewpoint, to the elevation of conventional modes of knowing above artistic knowing (Heidegger: 1993: 163). Recent work in the area of 'situated cognition' – indebted to the work of both thinkers – tends to support the broadening of epistemic credit to encompass embodied, situated and tacit knowledge. Discussing the contribution of both Gallagher describes Dewey's attitude:

> The separation of mental experience from hands-on physical manipulation of the environment was … both a philosophical and a social problem. For him, cognition is a form of action and not a relation between a thinking that goes on in the mind and a behavior that goes on in the world (Gallagher, 2009: 39-40).

In fact Dewey's emphasis on action is something that links his pragmatist philosophy to Heidegger's phenomenology. And the social dimension emphasised by Dewey is also captured in Bourdieu's remarks that in "oppositions like that between theory and practice, the whole social order is present in the very way that we think about that order (Bourdieu, 2000: 83).

Dewey and Heidegger share then an opposition to the knowledge-as-dominion epistemological paradigm. Both support an approach to knowledge that foregrounds an attitude of application and action. Heidegger points out that "the perceiving of what is known is not a process of returning with one's booty to the "cabinet" of consciousness after one has gone out and grasped it" (Heidegger 1962: 89). He sees the dominance in Western thought of the "presence-at-hand" stance as limiting, because there is a "*deficiency"* in knowledge when it is removed from the world – when it is divorced from, or "holds back" from "producing and manipulating and the

like" (Heidegger, 1962: 88). In this view, human beings as *dasein* are already 'thrown' into a world of 'Things' and their manipulation. As Gallagher puts it, "the possibilities of such dealings shape our perceptions and actions" (Gallagher, 2009: 6-7). Cognition is, then, not merely "situated" in our environment. Crucially this embeddedness both governs and directs our knowing. It quite literally decides indeed dictates *what* and *how* we think.

This represents a lynchpin of 'situated cognition' theory. However 'situated cognition" theory takes a step further in regarding thinking as not confined to an isolated entity called the "mind". Thinking in this view is rather "an activity or event *in* the world" (my emphasis) (Gallagher, 2009: 38-39). Cognition is in fact *decided* by the sensory-motor responses we have to the physical world of 'affordances' into which we are in a Heideggerian sense 'Thrown'. Because of this situated cognition theory calls for a stretching of our conception of knowledge. Robbins and Aydede give a useful description of the three principal component theses of the theory:

> First, cognition depends not just on the brain but also on the body (the embodiment thesis). Second, cognitive activity routinely exploits structure in the natural and social environment (the embedding thesis). Third, the boundaries of cognition extend beyond the boundaries of individual organisms (the extension thesis) (Robbins and Aydede, 2009: 3).

Drawing as Thinking

Let us here reintroduce the question of the epistemic claims of drawing, because all three of the above theses are germane to a re-conceptualising of such claims. In lending one's embodied and situated self to the process of drawing there is a sense of absorption in a situation that transcends the objectivist analytical stance framed by Heidegger as "presence-at-hand" (*vorhandenheit)*. By ceasing to be a mere observer and, through the process of feedback, the draftsman/woman in a holistic sense becomes a part of an interaction. In the 'situated cognition' view, the person/environment relationship is radically altered from the Cartesian epistemological model's emphasis on the separation of subject and object, to one of a holistic integration. The individual as embodied actor is an *active part of the environment* as opposed to being merely a passive occupant. Bredo captures this idea: "put simply the inside outside relationship between person and environment is replaced by a part/whole relationship" (Bredo, 1994). Bredo focuses on the activity of drawing to illustrate this active model of knowledge.

> Drawing for example, is a drawn out affair … one draws, responds to what one has drawn, draws more, and so on. The goals for the continuation of the drawing change as it evolves and different effects become possible. Acting with the environment in this way contrasts with acting on it, because it presupposes that it will turn round and alter oneself in return. The production of a well-coordinated performance then involves a kind of dance between person and environment rather than the one-way action of one on the other. (Bredo, 1994).

Gallagher tells us that, Dewey recognised the mistake of regarding cognition merely in terms of the "relation between a thinking that goes on in the mind and a behaviour that goes on in the world" (Gallagher, 2009: 38-39). Drawing's epistemic significance might then best be understood in the context of what is termed "enactive cognition," the notion that "perception and thinking are fully integrated with motor action" (Gallagher, 2009: 39). This takes us a long way from the passivity of the Cartesian

subject/object relationship. In this view not only is perception active, it is in fact indistinguishable from the sensory-motor action of which it is composed and moreover (and this is a radical insight) it is indistinguishable from thought itself. This approach rehabilitates the claim of many embodied and situated making activities to be considered ways of thinking. In light of this descriptive drawing, given its particular integration of perception with sensory-motor action, might be regarded as a knowledge forging activity par excellence.

Perceiving as Thinking

Johnson points to "Dewey's continuity principle" which viewed the operations of "mind" as having evolved through the development of increasingly complex "sensorimotor" activity. In Noë's "enactive" view, perception is indistinguishable from action at a fundamental level, this is because perception is not merely *dependent on*, but is in fact "constituted by", our possession of "sensorimotor knowledge" (Noë, 2004: 2). Johnson's view concurs with Noë's, and furthermore Johnson extrapolates from Dewey's argument that there is in fact "no radical ontological or epistemological gap separating perceiving from thinking" (Johnson, 2007a: 228).   In this he cites Arnheim that "the cognitive operations called thinking are not the privilege of mental processes above and beyond perception but the essential ingredients of perception itself" (Johnson, 2007a: 227-228). Arnheim lists the cognitive operations that comprise thinking as: "active exploration, selection, grasping of essentials, simplification, abstraction, analysis and synthesis, completion, correction, comparison, problem solving, as well as combining, separating, [and] putting in context" (Johnson, 2007a: 227-228). What is striking for any practitioner of drawing about Arnheim's list is how closely it would parallel any list of the cognitive operations inherent within the act of descriptive drawing.

This argument lends weight to the view, commonly held among practitioners, that drawing represents for them a way of thinking. It also counters the negative dualistic stance outlined earlier that sees the kind of "procedural or process knowledge" associated with skill as somehow inferior.

Significantly Noë's "enactive" theory of perception presents vision itself as an explorative interaction with the environment more analogous to the active way a blind person uses their stick than to conventional understandings that appeal to "*internal representation*"; the passive "pictures in the mind" paradigm.   As he explains:

> According to this [enactive] approach to perceptual experience, the content of an experience is not given all at once, as is the content of a picture given all at once. Rather, the content is given only thanks to the perceiver's exercise of knowledge, of sensorimotor contingencies. The content of experience isn't really given at all – it is enacted. Perceptual experience, according to this enactive approach, is itself a temporally extended activity, an activity of skill-based exploration of the environment (Noë 2008).

This radical approach is, as Noë recognises, highly amenable to accommodating the epistemic claims of the kind of embodied, situated and experiential knowledge native to art-making practices like sculpture and dance (Noë, 2008). Moreover, there is a correlation between what Noë understands as the dynamics of perception and the dynamics of descriptive drawing, because descriptive drawing demands the same kind of active searching, reaching, probing and testing that Noë recognises in ordinary looking. Drawing's epistemological status as a heightened mode of perceptually based thinking finds support therefore in Noë's theory, especially if we

envisage such drawing in terms of "a temporally extended … skill-based exploration of the environment". It is in this regard also significant that Noë asserts that "all perception is intrinsically thoughtful" and indeed that "perception and perceptual consciousness are types of thoughtful, knowledgeable activity" (Noë, 2004: 3).

This view has obvious implications for our understanding of art production activities in general and descriptive drawing in particular, in terms of the extension of "epistemic credit" to heightened modes of perception such as descriptive drawing, a view supported by Clark and Chalmers (1998: 11).

Challenges to 'Intellectualism'

Noë radically challenges what he terms "intellectualism", the idea, as he puts it, that all practical knowledge or "know-how [is] a species of propositional knowledge". He maintains the contrary position that all propositional knowledge or "knowledge that" is in fact dependent upon and "must be analysed in terms of a more basic and essentially active knowledge how" (Noë, 2005: 287). This assertion casts light on practical knowledge's substructural relationship to propositional knowledge. The "key" to his theory, Noë insists, is that perception "depends on the possession and exercise of a certain kind of practical knowledge" (Noë, 2005, p. 287). This leads him to question common assumptions regarding the singularity of conceptual/propositional knowledge, assumptions that tend to sustain its position of epistemological privilege within the University. Noë's argument effectively dissolves the dualistic distinction between conceptual/propositional knowledge on the one hand, and perceptually based embodied, experiential, and tacit knowledge on the other. He does this by suggesting that those practical "sensorimotor skills" he identifies with perception actually constitute "primitive conceptual skills" (Noë, 2004, p. 31).

This view is supported by the work of Vittorio Gallese and George Lakoff (2005), at the interface of philosophy and cognitive science (building on Galleise's own work in the field of neuroscience). Their findings refute the notion that conceptual thought ought to be assigned special epistemological status. They reject the "common philosophical position" which suggests that "that all concepts – even concepts about action and perception – are symbolic and abstract, and therefore must be implemented outside the brain's sensory-motor system" (Gallese and Lakoff, 2005: 445). Their findings support the contrary view that at least in the case of "action concepts", the "concept of grasping" for example, these not only *rely on,* but are in fact "embodied in the sensory-motor system". They argue moreover that all concepts from "object concepts" right through to wholly "abstract concepts", are likewise embodied. More importantly they further argue that conceptual and propositional thought as expressed in language "makes direct use of the same brain structures used in perception and action" (Gallese and Lakoff, 2005: 473).

Tacit Knowing, Indwelling and "Readiness-to-hand"

Michael Polanyi (1962) presents insights that seem to foreshadow Noë's understanding of the substructural relationship of practical knowledge to conceptual/propositional knowledge. For Polanyi tacit knowing – which involves a reliance on something while attending to something else – differs from attending to something "focally". One thinks immediately of Heidegger's hammer, in using a

hammer, we do so tacitly – it constitutes what Umberto Eco describes as an extensive/magnifying prosthesis (Eco, 2000: 362).   The hammer is thus "subsidiarily known" and as Polanyi points out, "what is subsidiarily known is tacitly known" (Polanyi, 1962: 602). Polanyi goes a step further to develop a holistic viewpoint:

> …it seems appropriate to extend the meaning of "tacit knowing" to include the integration of subsidiary, to focal knowing. The structure of tacit knowing is then the structure of this integrative process, and knowing is tacit to the extent to which it has such a structure. So if … all knowing ultimately relies on a tacit process of knowing, … ultimately, all knowledge has the structure of tacit knowledge (Polanyi, 1962: 602).

As Margitay points out the implications of this are that the structure of tacit knowledge is a characteristic of all knowledge both "propositional and nonpropositional", such that "… perception, observation, acquisition of skills, language use, learning, use of tools and instruments, craftsmanship, theorizing and verification of theories etc. … [all] have this same structure" (Margitay, 2010: 18-19).

Polanyi goes further down this road. His argument passes from the tacit knowledge evident in the use of probes and pointers, to the drawing of an analogy with language, wherein words are understood as used tacitly, as pointers as it were. From this position he advocates the extension of the "scope" of tacit knowledge to language by arguing that "a *tacit coefficient* [is] integral to all explicit statements… no statement can carry conviction unless it is understood, and all understanding is tacit" (Polanyi, 1962: 605). Through this line of reasoning he introduces the gestalt concept of *indwelling*

> "When we use a tool or a probe and, above all, when we use language in speech, reading, or writing, we extend our bodily equipment and become more effective and more intelligent beings… Tacit knowing now appears as an act of *indwelling* by which we gain access to a new meaning… When exercising a skill we literally dwell in the innumerable muscular acts which contribute to its purpose, a purpose which constitutes their joint meaning. Therefore, since all understanding is tacit knowing, all understanding is achieved by an act indwelling' (Polanyi, 1962: 605-06).

Polanyi insists that "all understanding [tacit or otherwise] is based on our dwelling in the particulars of that which we comprehend" and he identifies such "indwelling" with Heidegger's "being in the world" or *dasein* (Polanyi, 1964: *x*).

The closeness of his conception of tacit knowing to Heidegger's "readiness-to-hand" is apparent, (not least in its encompassing of language). Stepanich points out that "since our primary experience with entities is as things of use" readiness-to-hand is "a foundational ontological state" (Stepanich, 1991: 21). Therefore, just as for Polanyi, tacit knowledge has a foundational relationship to conceptual/propositional knowledge, "presence-at-hand" (which Heidegger sees as the foundation to the theoretical stance and which he associates with conceptual-propositional knowledge) is in fact in this view "ontologically founded on readiness-to-hand" (Stepanich, 1991: 26).

Heidegger too saw the relationship between thought founded in language and the work of the hands:

Perhaps thinking, too, is just something like building a cabinet. … it is a craft, a "handicraft." … The hand is infinitely different from all grasping organs paws, claws, or fangs, different by an abyss of essence. Only a being who can speak, that is, think, can have hands and can … achiev[e] works of handicraft … The hand designs and signs, presumably because man is a sign. … Everything is rooted here that is commonly known as handicraft, … But the hand's gestures run everywhere through language, … Every motion of the hand in every one of its works carries itself through the element of thinking, every bearing of the hand bears itself in that element. All the work of the hand is rooted in thinking. Therefore, thinking itself is man's simplest, and for that reason hardest, handiwork… (Heidegger, 1993: 380-81).

As we have seen this view resonates in the work of Polanyi but also in the work of Noë, Johnson and Gallese and Lakoff.   It presents an epistemological paradigm that challenges many of the default settings in the university's view of what constitutes knowledge. It does this by extending 'epistemic credit' to tacit, embodied and situated knowledge. This in turn calls for nothing less than a radical stretching of academic conventions and structures including the structures, processes and conventions of knowledge dissemination, in order that they encompass and facilitate *all* modes of knowledge whether propositional or nonpropositional.

Conclusion
Johnson proposes an epistemology influenced by Dewey's (and Heidegger's) insights, one modelled specifically on Dewey's "principle of continuity" which he suggests asserts that there are "no ontological ruptures or gaps between different levels of complexity within an organism" – no higher or lower ways of knowing (Johnson, 2007a: 145). He argues furthermore that "mainstream philosophy of mind and language" fails to recognise this and therefore represents an "impoverished view of meaning" which tends to "over-intellectualize many aspects of human meaning making and thinking" (Johnson, 2007a: 8). He challenges what he describes as "[t]he seriously mistaken claims that meaning and thought are exclusively conceptual and propositional in nature and that the apparatus of meaning, conceptualization, and reasoning is not intrinsically shaped by the body" (Johnson, 2007a: 8).

Johnson suggests moreover that maintaining the hegemony of the propositional/conceptual epistemological paradigm necessitates that we erect and sustain a dualism that separates doing and thinking and elevates, in Steiner's words encountered earlier, "the theoretical contemplator high above the artist, the craftsman, the manual worker".   An insidious unbridgeable fissure is thereby established at the heart of epistemology. As Johnson's explains:

If you start by assuming a radical difference in kind between the higher and lower forms of cognition, you will never bridge the gap between [the mental and the physical]. … once you break Humpty-Dumpty apart, you'll never put him back together again. Once you separate mind from body, inner from outer, conception from perception, reason from emotion, you will never find an ontological hermaphrodite in which these allegedly separate and distinct metaphysical kinds can be united (Johnson, 2007a, p. 145).

What the thinkers referred to in this paper have in common is that their work tends to overthrow, or at the very to least to bracket, dualism and to assert the epistemological validity of neglected aspects of knowledge; its relationship to

perception and its embodied, situated and tacit dimensions. They seek moreover to establish or re-establish an epistemological stance that might integrate rather than disperse and dissipate these significant aspects of knowing and consolidate them within a more holistic epistemological paradigm.

Johnson's "embodied cognition view" for example begins with the premise that "Humpty-Dumpty was never broken" to begin with, (Johnson, 2007a: 145). That conception and the conceptual are not and cannot be separated from perception and action, and that these varied aspects of cognition are both integrated and interdependent, and that each of these modes and aspects of knowledge should be valued within our education and research cultures (Johnson, 2007b: 102) and facilitated within our mechanisms of academic exchange and dissemination.

References

Bourdieu, P. (2000) *Pascalian Meditations*, London and Cambridge: Polity Press.

Bredo, E. (1994). Cognitivism, Situated Cognition and Deweyian Pragmatism. *The Philosophy of Education Society Yearbook 1994.* As accessed: July 26th, 2008 – 13.20 GMT. http://www.ed.uiuc.edu/EPS/PES-Yearbook/94_docs/BREDO.HTM

Brodsky J. (1986), *Less Than One: Selected Essays,* New York: Collins.

Candlin, F. (2000) "Practice-based doctorates and questions of academic legitimacy". *London: Birkbeck ePrints.* Available at: http://eprints.bbk.ac.uk/737/ Originally published in the International Journal of Art and Design Education 19 (1): 96-101.

Clark, A. and Chalmers, D. (1998) "The Extended Mind", *Analysis* 58: 10-23.

Dewey, J. (1930) Democracy and Education: an introduction to the philosophy of education, New York: Macmillan (first published 1916).

Eco U. (2000) *Kant and the Platypus: Essays on Language and Cognition,* McEwen A. (Trans.), London: Vintage.

Elkins, J. (2009) "On Beyond Research and New Knowledge" in Elkins J. (Ed.) (2009) *Artists with PhDs: On the New Doctoral Degree in Studio Art,* Washington DC.: New Academy Publishing.

Feenberg, A. (2005) *Heidegger and Marcuse: The Catastrophe and Redemption of History*. New York and Abingdon Oxon: Routledge.

Frayling, C. et al. (1997) United Kingdom Council for Graduate Education, report: *Practice-Based Doctorates in the Creative and Performing Arts and Design,* Also available online, as accessed on June 4th 2010 – 2.40 pm.: www.ukcge.ac.uk/Resources/.../PracticebaseddoctoratesArts%201997.pdf

Gallagher, S. (2009) "Philosophical antecedents to situated cognition", in Robbins P. and
Aydede M. (eds.), (2009) *Cambridge Handbook of Situated Cognition*, Cambridge: Cambridge University Press. pp 35-52

Gallese, V. and Lakoff, G. (2005) "The Brain's Concepts: The Role of The Sensory-Motor System in Conceptual Knowledge", *Cognitive Neuropsychology*, Vol. 22 (3/4). Psychology Press – Taylor and Francis, pp. 455–479.

Goldstein, C. (1996) *Teaching Art: Academies and Schools From Vasari to Albers.* Cambridge: Cambridge University Press.

Heidegger M. (1962). *Being and Time*. (Macguarrie J. and Robinson E. Trans.), Oxford: Blackwell. (Original published in the German as *Sein und Zeit*, 1927).

Heidegger, M. (1993). *Basic Writings: Martin Heidegger* (Farrell Krell, D. Ed.) London: Routledge.

Johnson M. (2007a), *The Meaning of the Body* Chicago & London: Chicago University Press.

Johnson M. (2007b), "'The Stone That Was Cast Out Shall Become the Cornerstone': the Bodily Aesthetics of Human Meaning", Journal of Visual Art Practice Vol. 6 No. 2.

Langmuir, E. and Lynton, N. (2000) *The Yale Dictionary of Art and Artists* New Haven and London: Yale Nota Bene - Yale University Press.

Margitay, T (2010) "Understanding and being-in-the-world in Polanyi's philosophy of knowing". *Appraisal The Journal of the Society for Post-Critical and Personalist Studies,* Vol. 8. pp. 18-24. As accessed 5/2/2011 16.00 GMT at: http://www.thefreelibrary.com/Understanding+and+being-in-the-world+in+Polanyi's+philosophy+of...-a0227196683

MacLeod, K. (2000) The functions of the written text in practice-based PhD submissions *Working Papers in Art and Design* Vol. 1. Retrieved 28th December 2010 12.35 pm. http://sitem.herts.ac.uk/artdes_research/papers/wpades/vol1/macleod2.html

Noë, A. (2004) Action in Perception, Cambridge MA and London: The MIT Press.

Noë A. 2005 "Against intellectualism", *Analysis*, Vol. 65, Issue 288 (Oct 2005), Oxford: Blackwell.

Noë, A. (2008) Art as Enaction, in *Intredisciplines*. Online, accessed 21st Dec 2010 – 19.08 GMT: http://www.interdisciplines.org/artcog/papers/8

Polanyi, M. (1964) *Personal Knowledge*. New York: Harper & Row.

Polanyi M. (1962) "Tacit Knowing: Its Bearing on Some Problems of Philosophy", *Reviews of Modern Physics*, 34 (4) Oct. 1962, 601-616.

Robbins, P. and Aydede, M. (eds). (2009) *Cambridge Handbook of Situated Cognition*, Cambridge: Cambridge University Press.

Rosand, D. (2002) *Drawing* Acts: *Studies in Graphic Expression and Representation* Cambridge, Cambridge University Press.

Safranski, R. (1998) *Martin Heidegger: Between Good and Evil*. Osers, E. (Trans.)
Cambridge MA: Harvard University Press.

Singerman, H. (1999) *Art Subjects: Making Artists in the American University.*
Berkely, Los Angeles, London: University of California Press

Steiner, G. (1987). *Martin Heidegger.* Chicago: University of Chicago Press.

Stepanich, L. V. (1991) "Heidegger: Between Idealism and Realism", *The Harvard
Review of Philosophy,* Cambridge, MA: Harvard University.

Woodfield R. 'The UK Fine Art PhD And Research in Art & Design' in Lier en Boog,
Volume 18, Amsterdam, Rodopi, p. 105. Also on line at:
http://www.ingentaconnect.com/content/rodopi/leb/2004/00000018/00000001

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Doing and Talking: articulating craft

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Abstract

This paper is based on PhD research, which identifies a problem with researching and theorizing craft, and explores a method, which draws on ethnographic video oral history approaches for gathering data relating to practice. The purpose of the method is to advance understanding of practice and to develop theory that is grounded in the experience of practice. The method involves filming craftspeople working, then interviewing them whilst they watch the film of themselves.

The paper outlines the critical context for the research, drawing on the model of Becker's *Art Worlds* to assert that a legitimizing infrastructure has evolved to support a professionalized art/craft World. A principal concern of this infrastructure has been to recontextualize the crafts and establish a definition of Craft as a singular thing within the sphere of its influence.

A critical convention of the art/craft World has been the idea of a canon of key figures and objects. This supports a mode of enquiry that is suited to interpreting aesthetic objects rather than to understanding craft as a human activity set within a dynamic totality, in which the object may be regarded as one element. By narrowly defining the object of critical interest the totality and continuity of reality is disrupted. This study suggests a model for craft discourse, which shifts the focus away from key figures, exemplary objects etc. and employs an approach that seeks to understand craft within a continuum.

The research method will be described and framed within an academic context. Related studies are identified and it is argued that, whilst these studies demonstrate the usefulness of the approach, there is a further need for material that is concerned specifically with understanding craft practice and with finding meaning that is located in the subjective experience of practice, from which theory that is grounded in practice can be developed.

Keywords

Craft; Ethnography; Knowledge/practice interface; Video oral history

Doing and Talking: articulating craft

Introduction

This paper is based on PhD research, which identifies a problem with researching and theorizing craft, and explores a method, which draws on ethnographic video oral history approaches for gathering data relating to craft practice. The purpose of the method is to advance understanding of craft practice and to develop theory that is grounded in the experience of craft practice. The method involves filming craft practitioners whilst they work and then interviewing them whilst they watch the film of themselves.

The study has at it's core an assertion that traditional epistemologies and academic conventions have not given sufficient recognition or value to the epistemologies and lived experiences of craft practitioners, and indeed that they may have served to obscure the nature of craft practice. Following on from this, there is an assertion that research tools and strategies are needed in order to produce data about practice.

Peter Dormer described the crafts as we see them and practice them today as a twentieth century invention (1988, p. 73). It could be said more accurately that crafts are practiced within an ideological and intellectual tradition, rooted in the theoretical writing of the late 19th and early 20th century Arts and Crafts Movement. In this writing craft is seen as both the subject and object of a critical discourse. Much of that writing was concerned with the organisation and ownership of labour, with the moral and social purpose of art and with creativity, which is given expression through the making process. Central to Arts and Crafts thinking was the subjectivity of the practitioner, and the effect of the making experience on the maker, as an individual and as a citizen. Whilst the Movement became fragmented, the subsequent divergence of craft as a descriptor is regarded as an extension of the concept, which remains consistent with the core or foundation described.

However, my thesis asserts that, since the 1970's, we have seen the emergence of a legitimizing infrastructure for an avant-garde craftworld. The model for this infrastructure is Howard Becker's Artworlds, which he describes as - 'the network of people whose cooperative activity, organised via their joint knowledge of conventional means of doing things, produces the kind of artworks that the art world is known for' (1982, p. *x*). I argue that this infrastructure, which includes the institutions such as the Crafts Council, universities, museums and galleries, as well as writers, critics and curators, has sought to reposition the crafts as a vital part of a contemporary art world. Whilst the crafts as a broad concept have been best understood within wider cultural contexts, this was an attempt to distance the crafts from ideological positions and from it's associations with the rural and the traditional, and to recontextualize the crafts within a much narrower framework.

The New Crafts

After the relative absence of public critical discourse during most of the 20th century, a new wave of critical and theoretical discourse emerged out of this process. There has been a particular resurgence since the mid 1990's, when a series of academic conferences and related publications, supported by the Crafts Council gave new

momentum to debates about craft. A key feature of this new writing has been attempts to establish a definition of Craft as a singular thing within the sphere of influence of the infrastructure described above.

Becker calls this process a 'typical sequence' (1978, p. 863) in which a new organisational setting is developing, in which 'organizational forms subordinate the artist increasingly to partially or entirely extraneous sources of control.' (1978, p. 877)

This represents a disjunction with crafts ideological and intellectual tradition, which was more social than aesthetic.

Tanya Harrod observes this process in her history of the crafts in Britain

> The general view was that craft needed to be defined and then theorised in order to take its place alongside video, time based art and film as an appropriate subject for cultural studies departments in universities. In pragmatic terms this was probably true – theorise or die! But in fact craft objects reified or embodied theory – commenting profoundly on the world of things and on consumption, on fine art, design, mass production and the nature of materials – visually rather than verbally.

> …the contest between object and word, between textile and text *is* often an unequal one. At one conference I heard a paper in which a complementary studies tutor demonstrated (with slides) how he had rescued one student from a career making handsome earthenware pots. The students practice was 'liberated' by a course of reading… In no time the student was making tented 'performance landscapes' out of rip-stop nylon, PVC tube, carbon fibre and rubberized cord which commented on the 'constructedness' of nature. It was a curious occasion – a well received paper at a Crafts Council funded conference that seemed to indicate that craft practice was inappropriate in the late twentieth century. (1999, p. 464)

As the crafts re-engaged with theory, without a continuous tradition of critical discourse, anxious about identity and status, separated from a strictly functional purpose, and ambivalent about ideological positions, they sought alignment with fine art discourse. Conventions of critical writing from fine art were adopted, an approach that conforms to Becker's conventional means of doing things.

It may not be surprising therefore that a new wave of writing on the crafts has suffered from inherited perceptions of what criticism/theory should be and what sort of language it should use. We have an essentially literary approach that is interested in the craft object as something to be 'read'. Or at worst a blank page on which to project theories.

> Art today is expected to have meaning that can be articulated verbally as well as visually. Sometimes an artist doesn't do that so well and it is a critic who fleshes out a concept and furnishes the artist with a vocabulary to use in discussing the work… or the critic who sees everything in terms of their preconceived ideas (Koplos, 2002, p. 84)

One legitimizing convention that has been vigorously pursued since the 1970's has been the idea of a canon of key figures and significant objects. A standard assumption at this

time was that a work of art is it's content, and the principal interest in the art object is as signifier, a carrier of literary meaning. This is a mode of critical enquiry that is suited to interpreting aesthetic objects of contemplation rather than to understanding craft as a human activity set within a dynamic totality, where the object may be regarded as an element of that totality.

As the potter Carla Needleman has said that

> A craft is not its objects; a craft is how I am when I am making them (and eventually, one would dearly hope, how I am the rest of the time, as a result of what has been transformed in me through craftsmanship). The objects of the craft are by-products, very essential by-products, of the way I work. (1979, p.123)

In his very useful book, *Design History and the History of Design*, John A. Walker presents a systematic analysis of the theoretical and methodological problems faced by another relatively new (though, at this time, far more developed) field as it has evolved. He asserts that most of the literature on design amounts to 'partial' studies (1989, p68) that focus on designers, products, styles, design education etc. He evokes Marx's analysis in *Grundisse* (1993), in which he describes production and consumption, distribution and exchange as simply separate moments within a totality. Walker suggests that in narrowly defining the object of study we disrupt 'the totality and continuity of reality' (1989, p. 68). His critique suggests a model for design history which shifts the focus away from key designers, exemplary designs etc. and employs a multi-disciplinary approach that seeks to understand design as a practice, set within a continuum.

A similar critique needs to be applied to craft theory. Recent literature, such as Richard Sennett's *The Craftsman* (2008) and Matthew Crawford's *The Case for Working With Your Hands* (2009) have fed a new interest in craft philosophy; there is a growing debate around craft in relation to late capitalism, globalisation and sustainability and new technologies are suggesting the possibility for new models of industrial production that are based on autonomous workers in small workshops serving local markets. All of which necessitates a reassessment of craft's intellectual and ideological traditions. However, the examination of non-aesthetic values in our culture challenges central assumptions of the contemporary institutional artworld.   An enormous amount has been invested in the institutional art-craft world and there will be some institutional resistance to relinquishing the hard won, precarious, perch that has been secured on the edge of the institutionalised artworld.

A New Epistemology of Making

As we seek to develop a new epistemology of making, in which knowledge is dynamic (though not simply localized – but generalizable), we need to understand the interface between knowledge and practice. It would be useful to rethink this interface, replacing notions of a hard divide between practice and knowledge. This challenges the traditional hierarchical (knowledge privileging) relationship, which is inherent in the academic tradition with a recognition that knowledge is not separate from practice. Knowledge arises from and within practice, and practice is the purpose of craft knowledge. As Paul Carter wrote in his book *Material Thinking*

Critics and theorists interested in communicating ideas about things cannot emulate it. They remain outsiders, interpreters on the sidelines, usually trying to make sense of a creative process afterwards, purely on the basis of its outcome. They lack access to the process and, more fundamentally, they lack the vocabulary to explicate it's intellectual character. (2004, p.xi)

In order to develop more convincing and useful critical theory for craft there is a need to encourage practitioners, as those most likely to possess the vocabulary to explicate it's intellectual character, to contribute to the discourse. There is also a need for research tools and strategies which facilitate such an enriched discourse, and which make accessible the contexts and processes of practice and reveal the way in which those things contribute to meaning.

My study is concerned with supporting the latter need: to describe a method, using filmed material, for researching craft practice and to test the usefulness and validity of that method.

The method uses an ethnographic approach to studying the phenomenon of craft, and draws on the traditions of oral history and video history research.

An ethnographic research strategy fits with the research goals, as ethnography is concerned with providing detailed, rich descriptions of human phenomena (Denscombe, 2003). It usually involves immersion in the field of study, as in the classical anthropological studies such as Margaret Mead's *Coming of Age in Samoa* (1943) and Bronislaw Malinowski's *Argonauts of the Western Pacific* (1922). There is an acknowledgement in the ethnographic tradition of the role of the researcher in the construction of accounts, that the construction of the account will inevitably reflect something of the researchers own experiences. Ethnography could be described as a *holistic* approach (Denscombe, 2003), in that it tries to observe the interconnectedness and interdependency of different aspects of the culture that it is observing, rather than isolating particular elements for detailed scrutiny outside of their wider context. Very importantly, it pays special attention to the subject's own understanding of their reality (Malinowski, 1922). The ethnographic approach is particularly suited to understanding how makers conceptualize their work. As James Spradley notes in *The Ethnographic Interview,* 'The essential core of ethnography is this concern with the meaning of actions and events to the people we seek to understand.' Furthermore 'some of these meanings are directly expressed in language; many are taken for granted and only indirectly through word and action.'(1979: p.5). Ethnographic research can be useful for developing theory from deep and detailed data.

Oral history was originally considered as an appropriate research tool for examining the crafts. Oral history is an ethnographic approach, being 'grounded in a commitment to the first-hand experience and exploration of a particular social or cultural setting on the basis of (though not exclusively by) participant observation.' (Atkinson et al, 2001: p.4) Oral history is a qualitative research method, using interviews, which is suited to understanding meanings, interpretations, relationships, and subjective experience. Oral history interviews have the potential to reveal interactions, relationships, dynamics, and contexts. The documentation of the interview represents an original artefact that becomes a primary source for further research.

Oral history has developed as a contemporary practice in historical research alongside the development of recording technologies, as well as reflecting a shift in historian's interest towards the experience of 'ordinary people' (Perks & Thomson, 2006).

There is now a considerable body of theory relating to the collection and interpretation of oral histories (See, for instance, Perks and Thomson et al). Much of this writing gives serious authority to a reflexive and dialogical approach to ethnographic study. Critical reflection on practice has led to recognition of the socially constructed nature of the interview and the role of the interviewer in the joint production of accounts, challenging positivist assumptions of objectivity.

Oral history is something constructed out of experience, and in social interaction:

> Discrepancies between facts and remembered, retold stories are interesting because they reflect the way in which we attempt to make sense of our experience, to order and select, re-interpreting. (Samuel and Thompson, 1990, p2)

The interview is seen as a collaborative process in which meaning is constructed dialogically. Feminist ethnographer Marianne Paget has described the interview as a conversation, and has analysed the way that the interview is shaped by both parties. (1983, pp. 67-90)

The use of interviews in researching artist's practice is an established method for art historians. Rebecca Fortnum, in the introduction to her book *Contemporary British Women Artists: in their own words* (Fortnum, 2007), makes a case for the value of having access to artist's own accounts of their practice:

> ...once we have acknowledged the fact that works of art can never be fully translated into words, a range of multivalent narratives quite happily attach themselves to visual production. And, whilst the artists are here, and willing to answer questions, we have the opportunity to add their voices to any discussion about their work. If it is clear that they do not hold the 'meaning' of their work as a privileged author, then their accounts can often extend our thoughts about their own artworks, often creating different levels of understanding. (2007, p.viii)

Similarly, oral history interviews have been widely used by design and craft historians (see Sandino, 2006) and have facilitated value insight. The ongoing Craft Lives project, part of the British Library's National Life Stories project records in-depth life stories of Britain's craftspeople, exploring both their personal and their working lives. This represents an extremely useful resource for researching craft history, and for locating that history in the life stories of practitioners.

For the purposes of this research, initial experiments with audio interviews using a digital mini-disc recorder quickly revealed the limitations of the method. It was apparent that audio interviews could elicit rich description of practice and thoughtful reflections on individual contexts. Nevertheless, the limits of the purely audio interview become apparent immediately. The interview remains, essentially, a literary form, concerned with narratives, constructed in language, transcribed into text.   Clearly, there is a great deal that is missing from such data. No matter how attentive we are to the nuances of meaning that are communicated through tone or inflection, how evocative the language

is, how rich the description is, phenomena that are embedded in lived experience will remain elusive. As Frisch points out:

> Meaning inheres in context and setting, in gesture, in tone, in body language, in expression, in pauses, in performed skills and movements. To the extent we are restricted to text and transcription, we will never locate such moments and meaning, much less have the chance to study, reflect on, learn from, and share them. (2006, p. 103)

Aural recordings cannot capture the physical presence of the subject, the richness of the surroundings, the vital role of gesture in articulating meaning.

> People speak with body language, expression and tone. They respond to and refer to their settings and to objects. Many people learn to communicate not with the precision or brilliance of their words but with energy and effect – as interviewers often learn when they discover a vibrant interview reduced, in the transcript, to a series of leaden, banal sentences.
> (Sipe, 1998, p. 382)

Most crucially, audio recording cannot capture the richness of practice itself. We might hear the eloquent practitioner reflecting in illuminating ways on practice, but we cannot witness reflection in practice, the matrix of thinking and action, we cannot share the complexity of practice.

The context of the recordings might help to partially address this and to bring a particular focus to the narrative. For instance, an interview conducted in the workshop might facilitate a deeper discussion of tools and techniques and it might encourage the subject to locate themselves in their practice. However, the interview will inevitably be at one remove from the complexity of practice and both subject and interviewer will tend to draw on conventions of conversation, or intellectual discourse, and narrative construction.

Since a key issue for this project was to give the researcher access to practice and facilitate greater understanding of practice it was felt that film offered a more natural and satisfying medium.

Technological developments since the 1960's have made the use of visual methods of recording oral histories viable. As the technology has become increasingly available, inexpensive and simple to use, video has been used in various ways for researching and documenting craft.

Principal amongst the precedents for using video to document craft is the work of the National Electronic and Video Archive of Craft (NEVAC), which was founded in 1992 by Mike Hughes and Wally Keeler at the University of the West of England, Bristol (UWE). NEVAC was founded in response to a perceived lack of resources for teaching about the history of crafts in the twentieth century. This intention was initially compounded and given a particular impetus by the need to record an older generation of makers before their testimonies were lost.

The range of interview set-ups is broad, however, the emphasis of the recordings produced and archived by NEVAC has been art historical, with a focus on "key figures".

Whilst there is some footage of making, and revealing discussion of making, the emphasis has not been on examining the making process per se. This was highlighted as a criticism in a usability study carried out by the University for the Arts and Humanities Research Board (Partington, 2001). However, the criticism in this case was aimed at addressing the needs of students interested in technique who want more information about methods of making.

A number of studies have demonstrated the value of the medium of film in researching craft. They point to the performative nature of the interview and to the importance of gesture, body language and expression to communication. They draw attention to the interaction with the environment and the information that might be gleaned from the domestic or work contexts in which the subjects locate themselves. They give value to these things alongside more conventional academic sources. They place particular importance on the subjective experience of the individual. However, there has been little critical writing contributing to the literature regarding methodology, the underpinning theory behind film as a research tool for the crafts. The exception is NEVAC, which is the only large-scale, on-going, study of the crafts using videoed interviews. NEVAC have applied a systematic approach to collecting subjective accounts of craftspeople's experience and have given methodical consideration to the interrogation and analysis of that data. NEVAC represents a significant resource for researching craft. However there is further need for material which does not focus on the life-stories of eminent individuals, and which gives particular attention to making practice, in itself, accessible to the researcher. Material that looks at craft beyond the idea of key-figures, that gives accounts of and explores what craftspeople do when they are making.

In trying to understand craft making this study recognizes that it involves processes that are frequently tacit and subconscious. In addition, craft is contextually defined (i.e. in terms of individuals involved, the social situation, the physical environment in which it occurs). It cannot be regarded in terms of specific, a-contextual processes without regard to the complexity of practice. The filmed interviews are a collaborative process in which meaning is constructed through a dialogue, in which I am an active participant. My experience as a maker places me within a community of shared interest with the subjects, in which I am regarded as an empathetic 'fellow traveller' so that the subject has confidence in my capacity to understand and read the data.

The method for collecting data is in three parts:

- In the first instance subjects will be interviewed in their home or workplace. This interview will be unstructured and discursive but will explore the craftsperson's personal history, their motivations; the formal ideas that they feel have shaped their making and the context within which they work.
- In the second stage the subject will be filmed working. This material will form the starting point for the third part but will also represent original material for research in itself.
- The final part will take the form of a further interview with the subject whilst they watch the second stage film. The focus of this second interview will be on the making processes and those ideas which are articulated through, or are present in, the making, though again this will be discursive and will allow for broader discussion of any matters which arise.

Conclusion

The presentation concludes with the showing of extracts from 3 case studies in order to demonstrate the development of the method and to show it's usefulness.

The films show makers reflecting critically on their work, and working in a mode that is critical, reflective and responsive. Each stage of the method described, taken separately, can be seen to present useful material for researching craft. Taken together, they interrelate to create a rounded and convincing account of practice. Written or spoken descriptions of the making process would tend to be mechanistic. No matter how closely analyzed, practice is reduced to a series of steps. In the videos we see these steps animated and made expressive by a complex matrix of tacit knowledge, understanding and experience. The interview further illuminates this material and gives insights that are accessible to language. We are able to get a sense of how a particular action *feels*. How the maker *knows* that something is right. But it not only offers a portrait of a mode of practice, it sets it in a continuum: in the context of the maker's life; within a tradition of making; within the broader social and economic context. Starting with this combination of material we can work outwards to draw on other source material to substantiate and enrich our insights and to advance our understanding of practice.

References

Atkinson P., Coffey A., Delmont S., Lofland J., Lofland L. (Eds.) (2001) *Handbook of Ethnography* (London, Sage Publications)

Becker, H.S., *Arts and Crafts*, American Journal of Sociology, Vol. 83, No. 4, January 1978, pp 862-889.

Becker, H. (1982) *Art Worlds* (London, University of California Press)

Carter, P. (2004) *Material Thinking: the theory and practice of creative research* (Carlton, Melbourne University Press)

Crawford, M. (2009) *The Case For Working With Your Hands* (London, Penguin Group)

Denscombe M (2003) *The Good Research Guide* (second ed.) (Maidenhead, Philadelphia, Open University Press)

Dormer, P. (1988) The Appearance of Craft, Craft History, No. 1, 1988, pp 73-81.

Fortnum R. (2007) *Contemporary British Women Artists: in their own words* (London and New York, I. B. Taurus)

Frisch M (2006) *Oral History and the Digital Revolution: towards a post-documentary sensibility*, in Perks R & Thomson A, op. cit.

Harrod, T. (1999) *The Crafts in Britain in the Twentieth Century* (London: Yale University Press)

Kaplos J. (2002) *What is Craft Criticism Anyway?* in Johnson J. (Ed.) (2002) Exploring Contemporary Craft. (Toronto, Coach House Books/Harbourfront Centre)

Malinowsky, B. (1922) *Argonauts of the Western Pacific* (London, Routledge and Kegan Paul)

Marx (1993) *Grundisse* (London, Penguin)

Mead, M. (1943) *Coming of Age in Samoa* (Harmondsworth, Penguin Books)

Needleman, C. (1986) *The Work of Craft: an inquiry into craft and the nature of craftsmanship* (London, Arkana)

Paget M. (1983) *Experience and Knowledge*, in Human Studies, 6: pp67-90).

Partington, M. (2001) Report on an AHRB funded two day usability study of NEVAC: http://www.media.uwe.ac.uk/nevac/report - retrieved 30.01.2011

Perks R. & Thomson A. (eds.) (2006 2nd edition) The Oral History Reader (London and New York, Routledge)

Samuel R. and Thompson P. (eds.) (1990) *The Myths We Live By* (London and New York, Routledge)

Sandino L (ed.) (2006) *Oral Histories and Design*, Journal of Design History (Oxford: Oxford University Press) Vol. 19, No. 4.

Sennett, R. (2008) *The Craftsman* (London, Allan Lane)

Sipe D. (1998) *The Future of Oral History and Moving Images* in Perks R. & Thomson A. (eds.) 2006 (2nd edition) op. cit.

Spradley J. (1979) *The Ethnographic Interview* (Orlando, F., Harcourt Brace Jovanovich)

Walker, J. A. (1989) *Design History and the History of Design* (London, Pluto Press)

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Understanding the Experience of the Amateur Maker

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Abstract

This paper reports the findings of a doctoral research project that aims to generate a deeper understanding of the experience of people who design and make things at home as a form of leisure. People considered in this research make furniture, jewellery, model engineering projects, canoes and cars. The fallacy that the sensations of the embodied practitioner are derived entirely from the moment of the act of making is avoided by understanding making as a 'practice'. This allows us to consider actions of the maker not as autonomous, but temporally and spatially situated within a dispersed network of people, artefacts and environments. Drawing upon Flow Theory (Csikszentmihalyi, 1991) and Self-Determination Theory (Ryan & Deci, 1985), the paper concludes that it is the careful control and mastery of these elements that allows the amateur maker to achieve the feelings of competence and autonomy that makes their engagement with materials intrinsically rewarding and psychologically fulfilling, and sustains their enthusiasm for practices with few external rewards.

Keywords

Making, Amateur, Embodiment, Practice, Motivation.

Introduction and methodology

This paper outlines part of the findings of a doctoral research project that ran between 2006 and 2011, and that set out to investigate the practices of amateur makers – people who make things in a home workshop that are not part of financially remunerated work. Rather than focusing on results and outcomes, the research sets out to develop an account of the *experience* of making, asking how we can better understand the motivations of people voluntarily embarking on sustained 'careers' as makers outside of, and in addition to, their conventionally paid work.

An interpretive, qualitative methodology was used, based on site visits and photography, and long, semi-structured depth interviews. This data gathering was supplemented by primary text-based sources such as specialist magazines, publications and archive material, together with secondary research sources where the findings offer insights into the empirical case study material. A total of twelve case studies were carried out, including nine men and three women who made furniture, jewellery, cars, quilts, canoes and turned objects. These people are amateurs in the sense that their main income comes from some form of paid employment that is separate to their making activity; they are deeply involved in activities that require much time, effort, and skill, yet produce little, or no financial or status compensation. The sampling process aimed to include amateur makers who engage in projects that require sustained periods of activity, probably over a period of months, or even years. Their projects have a clearly identifiable outcome, normally in the form of a discrete self-contained artefact, and contain varying levels of design input, from adaption and modification of existing patterns, through to the completely original conception of new objects. The complexity of the tasks undertaken, the extended periods of time necessary in order to bring a project to completion, and the range of tools and materials involved, means that many of the informants chosen for the sample maintain a dedicated workspace, either within their home or its grounds, or at another location away from the their home. These workshops often have strong resemblance to the spaces used by the professional equivalents to their amateur enthusiasms, but the activity remains amateur because the practitioners do not depend on it for their livelihood – they could it give up at any time. This raises interesting questions about motivation that have significance in fields wider than amateur making, and it these that are discussed in this paper. Although this paper includes a limited selection of the empirical data gathered as part of the study, it is primarily a reflection on the theoretical significance of the findings.

A gap in the literature

A review of published research into do-it-yourself, home crafts, and other amateur making activity, reveals a gap in the way area has been considered. In their discussion of the incentives for amateur making, existing studies have tended to concentrate on the instrumental benefits offered by the outcomes of the activity. There are discussions of the rational utilitarian and economic benefits associated with do-it-yourself, including the saving of money that would otherwise be spent on hiring trades-people, the opportunity to implement home improvement schemes that would otherwise be out of the economic reach of the householder, and growing the resale value of a house (Atkinson, 2006; Dent, 1997; Edwards, 2006; Goldstein, 1998; Hackney, 2006; Jackson, 2006). Other studies focus on the rewarding social qualities of the experience, such as the material expression and

objectification of cultural identity, gender and class (Gelber, 1997, 1999; Miller, 1990; Moorhouse, 1991; Putnam & Newton, 1990; Triggs, 2006). Finally, a number of studies consider the representational and symbolic qualities of the outcomes of the activity, for example through conspicuous displays of wealth and cultural capital (Attfield, 2000; Clarke, 2001; Featherstone, 1991; Turney, 2004).

This research departs from these precedents by considering those activities for which the extrinsic rewards are minimal, and are therefore largely motivated by rewards that are intrinsic to the practice. Although utilising many of the same aptitudes and material resources that are enabling factors in house maintenance and home improvement, the subjects chosen for this study have deliberately moved on from these activities to the making of discrete objects – many of which have value only to the makers themselves. Their pursuits are unlikely to save money for them or their family, or to contribute to an improvement in their living conditions. The generally private nature of their activity and limited wish to publically disseminate their work, tends to discount display as a motivating factor. This is not to say that these activities did not contribute to the self-identity of the makers, or that they were unhappy to show the results of their achievements, but that the over-riding motivation can be found in rewards that are intrinsic to the practice, and which are largely internal to the makers themselves. Whilst Shove and Watson et al (2006; 2008; 2007) go some way to addressing this question in their study of the practice of do-it-yourself, their work does not fully address what it *feels* like to make things, and why this experience can be a powerful motivating factor in itself.

Practice theory

The case studies revealed activities that drew together particular individuals, as well as distributed networks of people with common interests, attitudes and competencies. The activities also reflected talk about ambitions and aspirations, and were aligned with shared conceptions about what it means to do certain kinds of things in certain kinds of ways. As well as encompassing people and representations, the case studies drew in artefacts, equipment and spaces, and told us something about the intimate relationship between people and the material world that furnished their time with creative possibilities. Amateur making can be thought of as a nexus – temporally unfolding and spatially dispersed, existing across time and across individual elements, actions and sayings, each of which is linked. This complex conceptualisation of the constituent parts of amateur making can be drawn together by the using theories of practice (Cetina, Schatzki, & Savigny, 2000; Warde, 2005; Warnier, 2001). In their study of do-it-yourself activity, Shove, Watson, et al, note that:

> … theories of practice emphasise tacit and unconscious forms of knowledge and experience through which shared ways of understanding and being in the world are established, through which purposes emerge as desirable, and norms as legitimate (Shove, Watson, Hand, & Ingram, 2007: 12).

The concept of practice as an analytical model, which has been developed since the 1970's, and is strongly influenced by the work of Pierre Bourdieu (1977) and Anthony Giddens (1984), is used to denote acts that carry within themselves their own rules, limitations and structures. The term originated as an attempt to move beyond the dualism of structure and agency that creates divisions between social theories that develop from structurally oriented, collectivistic studies of human behaviour, and theories that are more individual and process oriented.

The idea of practice as originating in shared understanding, often below the level of consciousness, is exemplified by the way in which the sampling evolved in this study. The makers who took part in the study, and the people who nominated them as potential participants, were effectively self-defining. They either saw themselves, or saw others, as being part of category of practice based upon their pre-existing notions of what it meant to be a 'maker'. Snowball sampling meant that each participant was nominated, or nominated themselves based on the limited amount of information that I gave to them – often in passing conversation, or in accounts passed on by a third party. It could therefore be assumed that the 'idea' of being someone who makes things in home workshops circulates within discourse as a shared, culturally constructed representation. Reckwitz describes this shared knowledge as a collection of:

> ... conventionalised mental activities of understanding, knowing how and desiring [that] are necessary elements and qualities of a practice in which the single individual participates, not qualities of the individual. Moreover, the practice as a 'nexus of doings and sayings' is not only understandable to the agent or the agents who carry it out, it is likewise understandable to potential observers (at least within the same culture) (Reckwitz, 2002: 250).

Human social activities are not brought into being by social actors but continually recreated by them via the very means whereby they express themselves as actors (Giddens, 1984, quoted in Warde, 2005: 135). Practices are co-ordinated entities, but require *performance* for their existence. Common understanding comes about through the body acting in similar ways, through undertaking common activity in the 'practical business of life' (Ingold, 1996). Amateur makers become amateur makers because they act out, and recreate a practice of making that precedes them, but which they are, nevertheless able to modify and adapt to

their individual circumstances. Practices are constituted by routine, plus emotion, embodiment and desire – they require obedience to rules and standards of excellence.

Practices also involve a shared – yet differentiated – understanding of procedures and engagement. Thus, within practices, there are hierarchies of activities. The maker of reproduction furniture may be perceived by those within the practice of amateur woodworking as having a higher status within the practice than a person who turns simple objects on a lathe. However, wherever a practice fits in a hierarchy of esteem, individual practitioners are still able to derive internal goods, and anyone who has the opportunity of engaging in a practice as a competent or excellent participant, is likely derive the psychic rewards that psychologists attribute to the process of self-development (Warde, 2005: 148). It is the understanding of these internal rewards which is the key to comprehending the motivation for amateur making. Two of the theoretical models that help us to grasp these rewards are the theory of Flow (Csikszentmihalyi, 2000 [1975]) and Self-Determination Theory (Deci & Ryan, 1985). Both attribute human self-development to participation in intrinsically motivating activity. For these theorists, internal goods would be interpreted as intrinsic rewards, and external goods as extrinsic rewards. In any practice there are ways of achieving the contingent external goods with which it is associated (such as money, prestige and status) in ways other than engaging in that practice, but the internal goods associated with the practice can be had *only* by engaging with that particular kind of practice; they are not a separable outcome. Activities which are intrinsically motivating are defined as being driven by inherent satisfactions, rather than a set of resulting, separable consequences. They tend to be exploratory, playful and curiosity driven, and are carried out not for instrumental reasons, but for the positive experiences related to the extending and exercising of one's capabilities.

The fieldwork indicates that for the participants in this study, the experience of making tends to be more important to them than the outcomes of the activity. Working in workshops with tools and materials, amateur makers are intertwined in simultaneous interactions between themselves and their environment, Merleau-Ponty has argued that perception cannot be regarded as a straightforward objective relationship between the separate entities of the object and the environment, As Haworth notes, drawing upon Merleau-Ponty's *Phenomenology of Perception* ([1945] 1992):

> The body does not find meaning pre-existent in the world but calls such meaning into existence by its own activity and by virtue of it being combined with time and space, as opposed to it being in and conceiving time and space. The body has its world or understands its world without having to use its symbolic identifying function (Haworth, 1997: 110).

Rejecting the Cartesian duality that insists on separating mind and body, this view takes the human as intimately connected to its surroundings and making sense of existence through action and interaction with the material world. This inherence in the material work, this acting on the world and simultaneous acting of the world on us, becomes not just a means of life, but a source of satisfaction and enjoyment, which transcends the instrumental outcomes of our actions – it is part of the internal goods associated with practice.

Flow and SDT

Elsewhere I have argued that makers are motivated by achieving flow experiences (Jackson, 2010; 2011). In brief, Csikszentmihalyi's extensive research finds that intrinsically motivating activities allow participants to experience pleasurable and fulfilling experiences when the level of challenge in a task matches their competence (Csikszentmihalyi, 2000 [1975]). Csikszentmihalyi and his fellow researchers have also observed a set of three clear *experiences* that are reported by respondents when giving an account of being in flow. These are the merging of action and awareness; a sense of control; and an altered sense of time. (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005: 600-602). Research suggests that there are three *conditions* which tend to lead to the experience of flow. Firstly activities that contain a clear set of goals, secondly activities that balance perceived challenges and perceived skills (the optimal challenge discussed above), and thirdly the presence of clear and immediate feedback.

In addition to Csikszentmihalyi's flow theory, Edward Deci and Richard Ryan's closely related Self-Determination Theory (SDT) also explores the idea of intrinsic motivation. SDT proposes that "an understanding of human motivation requires a consideration of innate psychological needs for *competence*, *autonomy*, and *relatedness*" (Deci & Ryan, 2000; Ryan & Deci, 1985) and it is the parsimonious identification of these three core needs that forms the basis of the theory. The need for competence is the need for people to need to feel effective in their actions; the need for *autonomy* is the need to feel that their actions are self-determined, and the *relatedness* is the need to feel close to other people. SDT posits that humans have a natural propensity toward growth and development, but argues that this tendency is influenced by the extent to which external factors allow the fulfilment of the three core needs. In other words the defined needs are phenotypical – they are the observable characteristics of an organism, as determined by both genetic makeup and environmental influences. SDT, therefore, maintains that these needs are innate, but can be developed in a social context, and some people will develop stronger needs than others, creating differences between individuals.

I want to argue that amateur making, by the very nature of the activity, is sustained by the incorporation of intrinsically rewarding practices identified in Flow and SDT, and that it can offer us an insight into the ways that we can achieve well-being through an active engagement with the material world. Intrinsic motivation will occur only for activities that hold intrinsic interest. This may result from novelty, challenge or aesthetic appeal. Aesthetic is used here in the original scientific sense, the conditions of sensuous perception; hence the appeal may arise from physical sensation, or another perceptual sense apart from the visual, which is conventionally associated with the term.

It is possible to see how the kinds of activity Csikszentmihalyi describes also fit in with definitions of practice, and I will argue that flow experience comes from an engagement with particular kinds of practice. This allows us to think of flow not as a purely internal psychic reward achieved by autonomous individuals, but as an experience that is also connected wider social contexts and patterns of behaviour – between structure and agency – thus avoiding a view of the completely self-determined individual operating outside the bounds of the social structures that give meaning to experience. I now want to show how the field work in this study illustrates the ways in which people's engagement with the practice of making allows them find flow, and feel self-determined.

Competent spaces

Deci argues that intrinsic motivation is a natural psychological process inherent in the nature of human life and, unless people are not prevented from doing so, they will attempt to master the world by engaging in their physical and social environments, and doing the things that they enjoy and that interest them (Deci & Moller, 2005: 583). All of the makers interviewed have done this by setting up complex workspaces, with clearly organised storage and display of tools and materials (figs. 1-3). The space envelopes the maker in an immersive environment which acts as an extension of his or her body and capabilities. For the maker, the workshop is effectively a form of distributed competence – each element enhances and extends their capabilities. One of the ways in which this behaviour succeeds is by the individual using the immediate physical environment as an external memory store. This can accommodate short term creative acts where a trial and error or iterative approach is used in problem solving. The cognitive scientist Andy Clark, describes this as an action loop, where 'pure thought' leads to external practical actions, which in turn help to simplify the problems confronting 'pure thought' (1997: 36).
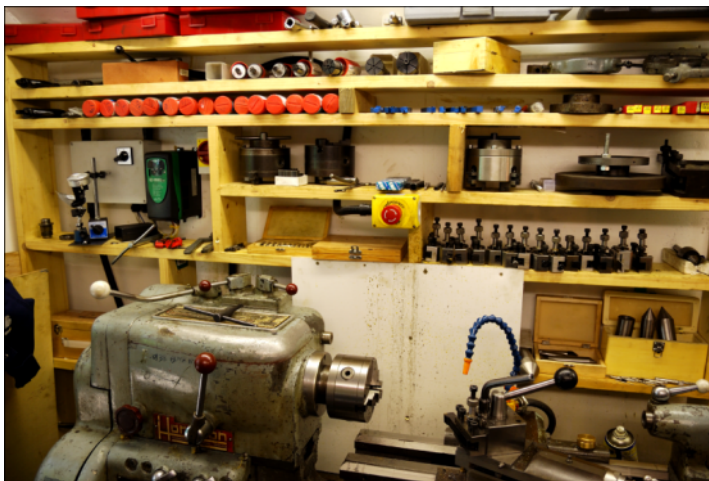
Figures 1-3: The makers all organised their spaces so that tools and equipment were 'ready-to-hand'.

The work space progressively matches the capability of the individual as it grows, allowing the participant to find flow by matching challenge with competence. Although framed in a different context, Clarke also explores this idea arguing that in order to carry out complex practical tasks we need to create external 'scaffolding' which moulds and orchestrates our behaviour:

> The rational deliberator turns out to be a well-camouflaged adaptive responder. Brain, body, world and artefact are discovered locked together in the most complex of conspiracies. And mind and action are revealed in an intimate embrace (Clark, 1997: 33).

So tools are an extension of the body (fig. 4). They literally extend the body, making arms longer, offering leverage and momentum, increasing gripping and holding power, and offering datum for accurate shaping and cutting. They are also an extension of the mind allowing calculation to be carried out in the external world, freeing the brain from overwhelming abstract calculations, and allowing empirical speculation, measuring and testing to take place separately from the internal world of pure abstract thought. Whole environments can act as aids to memory and calculation by externalising process and materialising abstract systems. In this sense, the material world of the workshop and the associated tools and machinery is not simply a crutch to help the brain do its work, but is actually constitutes part of the mental processes required in order to carry out complex tasks.

Figure 4: Simon[1], one of the participants in the study working on his wood lathe.

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[1] The names of all participants in this project have been changed to preserve their anonymity. Interviews were carried out between May 2007 and June 2010 in the maker's homes and workshops, and photographs were taken throughout the visits (unless otherwise stated, all images are by the author). All the participants have consented to their anonymised comments, and images of themselves and their workshops being used in this PhD project, and in any subsequent publications which may result from the research.

Embodied activities are a body's way of supporting what we conceive and talk of as practice. They are acquired, often over a long period of time and are habitually available. If all goes well, our body lends us support to do what we talk of doing. The individual's subjectivity is altered by material experience in a way that it is not by abstract reflection.

Warnier uses the term motor-algorithms to describe the kind of motor habit we use in situations which combine practiced skill with levels of uncertainty or unpredictability (2001: 9). In sport this would the difference between events that require the precise and practised repetition of given actions, such as throwing events, and those that require interaction with other people (such as team events) or with a changing and unpredictable environment, such as sailing or skiing. In the context of making this would draw a distinction between some needlecrafts, such as cross stitch or knitting, which requires the accurate and continued repetition of movements and techniques, and the more open ended iterative techniques of making observed in this research.

Greg talks about fitting a piece of timber to a kayak (fig.5):

> *I thought the way I made the strips was going to be ideal, then when I got to a certain point, I couldn't have known it till I got there, the angle, the way the boat went, the strips just would not go, and every time I tried to get a strip to go it snapped, and I just couldn't, I tried steaming it, and messing around with it, and all sorts of things and I just could not get it to work (…) so then I was ranting and raving and finding a solution, and fixing it.*

Figure 5: Greg fitting the strips to his canoe.

The amateur status of the makers means that they are free to develop their work in these unconventional and experimental ways without the fear of running over budgets, missing deadlines or earning the disapproval of colleagues or managers. This freedom to innovate in an open ended unconstrained fashion gives the activity many of the qualities of play, further

reinforcing and enhancing the rewards associated with accomplishment, and achievement against the odds.

During flow experiences, participants typically experience a sense of control – or rather they feel that they are able to control the situation they are and in, and reduce the risk of feeling a *loss* of control, thus avoiding the anxiety that comes along with this state. Although Csikszentmihalyi interviewed some people who took part in very dangerous pursuits such rock climbing and hang gliding, they claimed to have a greater sense of control over their environment during their sport than in everyday life. Whilst taking part in dangerous pursuits, participants are compelled to precisely evaluate the risks involved, minimising and controlling them wherever possible.

Amateur making offers another kind of control, a control over the materials that are being worked. Donald, a woodworker who took part in the study, had told me how he found '*quite a lot of satisfaction in squaring wood*'. 'Squaring' wood involves taking roughly machined timber and preparing it for jointing. This is done by smoothing two adjacent faces along the length of the piece so that they are straight and at 90 degrees to one another. These two faces then act as a datum for all future measurements and operations on the piece of wood. If this procedure is not carried out correctly, every other subsequent measurement will be compromised, and it is unlikely that the job will proceed as planned. Satisfying this need for control enhance the maker's feelings of competence. Deci and Moller draw upon the work of White (1959) to develop the idea of competence as:

> …people's capacity to interact effectively with the environment – to understand the effects they can have on the environment and the effects the environment has on them (Deci & Moller, 2005: 581).

According to White competence is attained over time and requires directed selective and persistent activity, including exploration and manipulation. The subjective side of competence is the feeling of efficacy it generates for the individual, and it is this feeling provides the 'reward' for activities. This enhances the intrinsic motivation for the action by allowing the satisfaction of the basic psychological need for capability. However it is important to note that this is not a deficit motivation in the sense of Hullian drives, but instead 'satisfies an intrinsic need to deal with the environment' (White, 1959: 318, cited in Deci and Moller, 2005: 581), and that although people build their competencies as result of their interaction with the environment, their *goal* is not to become more competent – it is simply to enjoy themselves and have fun, with competence building being a by-product of their intentions.

Brian, one of the participants in the research, told me how he would not like to sell one of his finished models, a scale model of a traction engine (fig. 6), it stood for him as a demonstration of his competence: '*I just like to look at it occasionally and think did I really make that*'.

Figure 6: Brian's traction engine that he only ran once.

Donald spoke about how he wanted to cut 'proper dovetails' as this would give him more satisfaction: '*I think if I had a machine that would make dovetails I wouldn't use it. I would cut them out by hand because I think there is much more satisfaction in that*', whilst Jenny a wood worker who had inherited her workshop from her father-in-law, remembered him taking '*great pleasure in doing it the proper way, and using all these various techniques…*'

Autonomy

However, according to SDT, competence and the need to feel effective, will not lead to self-worth if it is not accompanied by a sense of *autonomy*; in other words people need their feelings of competence to be experienced as self-determined. You can be effective on an assembly line, but you won't satisfy your competence need, because the activity is not autonomous: '...for a high level of intrinsic motivation people must experience satisfaction of the need both for competence and autonomy' (Deci & Ryan, 2000: 227).

Choice, and the opportunity for self-direction enhance intrinsic motivation by affording a greater sense of autonomy. Play-like activity offers one of the best opportunities for autonomy; the rewards found in play are intrinsic to the activity itself, and the level of challenge can be regulated by the participant, offering an opportunity for them to reach a balance between skill and difficulty in the task at hand. When activities are self-chosen, there is a sense of self-determination and freedom, which brings gratification.

The respondents who took part in this study frequently referred to the ways in which their pursuit offered them a sense of individual control and autonomy. Cherry, the jewellery maker, told me how she thought she had inherited this from her father:

> *I have always done like decorating and things like, that so there is a whole satisfaction of knowing that you have done it all yourself, and I like the fact that I'm really bad at delegating things. (…) My Dad's like me; if he wants a job done properly he does it himself. My Dad won't pay somebody else to do something that he can do.*

Tim, a furniture maker, concurred with Cherry:

> *I think there's something deeply satisfying about doing something under your own steam… and I suppose it's just, it's constant reaffirmation that you exist and that that you're a part of this world, and that you are not just simply kind of existing in it, but you're also making it.*

Conclusion

The research has shown that in order to understand amateur making it is necessary look beyond the immediate moment in the workshop. Understanding making as a practice helps us to avoid the fallacy that the sensations of the embodied practitioner are derived entirely from the act of making, and allows us to consider their actions as temporally situated, and part of a dispersed network of people with common interests and conceptions. Their experience also depends on artefacts and materials that are distributed, but which enable the maker to operate in sophisticated ways by creating external scaffolding that helps them to think and problem solve. Above all, it is the careful control and mastery of these elements that allows the amateur maker to achieve the feelings of competence and autonomy that makes their engagement with the material reward intrinsically rewarding and psychologically fulfilling, and sustains their enthusiasm for practices with few external rewards.

The outcomes of this research offer insights into the nature of rewarding social and cultural environments and experiences, both within the realm of work and in the context of leisure pursuits. As well as this wider significance, the work also contributes to the growing body of craft theory that addresses the experience of making, and the ways in which this can be understood.

References

Atkinson, P. (2006). Do It Yourself: Democracy and Design. *Journal of Design History, 19*(1), 1-10.

Attfield, J. (2000). *Wild Things: The Material Culture of Everyday Life*. Oxford and New York: Berg.

Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.

Cetina, K. K., Schatzki, T. R., & Savigny, E. v. (Eds.). (2000). *The Practice Turn in Contemporary Theory*. London: Routledge.

Clark, A. (1997). *Being There: Putting Brain, Body and World Together Again*. Cambridge Mass: MIT Press.

Clarke, A. J. (2001). The Aesthetics of Social Aspiration. In D. Miller (Ed.), *Home Possessions: Material Culture Behind Closed Doors* (pp. 23-45). Oxford: Berg.

Csikszentmihalyi, M. (2000 [1975]). *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play*. San Francisco: Jossey-Bass Publishers.

Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J. (2005). Flow. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of Competence and Motivation*. New York: Guilford Press.

Deci, E. L., & Moller, A. C. (2005). The Concept of Competence: A Starting Place for Understanding Intrinsic Motivation and Self-Determined Extrinsic Motivation. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of Competence and Motivation* (pp. 579-597). New York: Guilford Press.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behaviour*. New York: Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behaviour. *Psychological Enquiry, 11*(4), 227-268.

Dent, J. (Writer) (1997). The DIY Pioneers [Television]. In Wall to Wall Television Limited (Producer), *All Mod Cons*. UK: BBC.

Edwards, C. (2006). Home is Where the Art is: Women Handicrafts and Home Improvements 1750-1900. *Journal of Design History, 19*(1), 11-21.

Featherstone, M. (1991). *Consumer Culture and Postmodernism*. London: Sage Publications.

Gelber, S. (1997). Do-It-Yourself: Constructing, Repairing and Maintaining Domestic Masculinity. *American Quarterly, 49*(1), 66-112.

Gelber, S. (1999). *Hobbies: Leisure and the Culture of Work in America*. New York: Columbia University Press.

Giddens, A. (1984). *The Constitution of Society*. Cambridge: Polity.

Goldstein, C. M. (1998). *Do It Yourself: Home Improvement in 20th Century America*. New York: Princeton Architectural Press.

Hackney, F. (2006). Use Your Hands for Happiness: Home Craft and Make-do-and-Mend in British Women's Magazines in the 1920s and 1930s. *Journal of Design History, 19*(1), 23-38.

Haworth, J. (Ed.). (1997). *Work, Leisure and Well-being*. London: Routledge.

Ingold, T. (1996). Culture, Perception and Cognition. In J. Haworth (Ed.), *Psychological Research: Innovative Methods and Strategies* (pp. 99-119). London: Routledge.

Jackson, A. (2006). Labour as Leisure - The Mirror Dinghy and DIY Sailors. *Journal of Design History, 19*(1), 57-67.

Jackson, A. (2010). Constructing at Home: The Experience of the Amateur Maker. *Design and Culture, 2*(1), 5-26.

Jackson, A. (2011). Men Who Make: The 'Flow' of the Amateur Designer/Maker. In M. E. Buszek (Ed.), *Extra/Ordinary; Craft and Contemporary Art* (pp. 260-275). Durham: Duke University Press.

Latour, B. (1993). *We Have Never Been Modern*. Hemel Hempstead: Harvester Wheatsheaf.

Merleau-Ponty, M. ([1945] 1992). *Phenomenology of Perception*. London: Routledge.

Miller, D. (1990). Appropriating the State on the Council Estate. In T. Putnam & C. Newton (Eds.), *Household Choices* (pp. 43-55). London: Futures Publications.

Moorhouse, H. F. (1991). *Driving Ambitions: An Analysis of the American Hot Rod Enthusiasm*. Manchester: Manchester University Press.

Putnam, T., & Newton, C. (Eds.). (1990). *Household Choices*. London: Futures Publications.

Reckwitz, A. (2002). Toward a Theory of Social Practices: A Development in Culturalist Theorizing. *European Journal of Social Theory, 5*(2), 243-263.

Shove, E., & Watson, M. (2006). Designing and Consuming: Objects, Practices and Processes, AHRC/ESRC Project Report, http://www.dur.ac.uk/designing.consuming/, accessed: 10/06/10

Shove, E., & Watson, M. (2008). Product, Competence, Project and Practice. *Journal of Consumer Culture, 8*(1), 69-89.

Shove, E., Watson, M., Hand, M., & Ingram, J. (2007). *The Design of Everday Life*. Oxford: Berg.

Triggs, T. (2006). Scissors and Glue: Punk Fanzines and the Creation of a DIY Aesthetic. *Journal of Design History, 19*(1), 69-83.

Turney, J. (2004). Here's One I Made Earlier: Making and Living with Home Craft in Contemporary Britain. *Journal of Design History, 17*(3), 267-281.

Warde, A. (2005). Consumption and Theories of Practice. *Journal of Consumer Culture, 5*(2), 131-153.

Warnier, J.-P. (2001). A Praxeological Approach to Subjectivation in a Material World. *Journal of Material Culture, 6*(1), 5-24.

White, R. W. (1959). Motivation Reconsidered: The Concept of Competence. *Psychological Review*(66), 297-333.

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Touch Stories: engaging with the intimacy of materials through touch

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Abstract

The authors argue that TOUCH is an essential ingredient for intimate engagement with the materials. Touch is about direct contact, close and personal. Through this intimacy, the designer can fully understand the potential sensory impact on their customers and can share their knowledge of this intimacy with the customers. This is a way to better, more sustainable products.

How to ensure that entrepreneurs use the full potential of Touch? The paper describes first experiments with a multidisciplinary, multinational fashion student community - the designers and business professionals of the future. In general, this community embraced touch as a vehicle to inspire and stimulate our senses that could in principle lead to the creation of touch concepts and new products.

This is the start of a journey that is using sequential projects and storytelling as tools, a research journey we intend to take well beyond fashion**.**

Keywords

Sensory; touch; tactile; design; fashion; retail; consumer; craftsmanship.

Introduction

In today's retail led world consumers are suffocating through an excess of soulless products. It is time we paused to breathe.

"Touch has a memory" (Keats 1816)

It is often assumed that product designers, especially in the fashion industry, will have a deep understanding of the tactile properties of materials that they use. This tacit knowledge is also assumed to be an essential ingredient for intimate engagement with the materials. As will be described below, touch is about direct contact, close and personal; it is not sensation at a distance in the way of sound and vision. Through this intimacy, the designer can fully understand the potential sensory impact on their customers and can share their knowledge of this intimacy with the customers.

However the rise of fast, offshore manufacture has led to a virtual design approach where cad-cam rules and the first direct contact that the designer has with their material is often when they receive the finished goods. The approach has become embedded in teaching, where virtual-oriented design is cheap and simple as well as effective.

We presented our first thoughts towards a return to intimacy with materials at Northumbria University's annual Reveal (Montgomery 2010). In discussion, a contemporary fashion designer with London Fashion Week experience (Taylor 2009) described her design experiences in relation to touch, forcefully pointing out that her design process would not be possible without tactile experiences and knowledge accumulated from that intimate process. This debate marked the start of the Touch Stories journey reported here.

The work described is our first experiment in this touch context, and engages a fashion student community of young business and design professionals as our research engine. In recognition of our multidisciplinary ambition, we report in the style of a science experiment - which also reflects the background of the second author.

A Touch Polemic

"Touch" has design potential: through design narrative, experimental design, media design, health and well-being, craft - and all cross-linked by science, technology, engineering, maths, the STEM subjects. It can impact and can contribute to world issues, and the design problems we face. Right now we are ignoring our sensory skills, and this is having a detrimental impact on creative practise. The long-term result will be a totally artificial world if we do not utilise 'TOUCH'. The Future is about design that reflects a person, about individual expression; looking for something precious, personal and intellectual. Technology has become such a dominant part of communication that it can stifle creativity. Tactile skills and hand-made goods still have a part to play. Touch leads to interaction with the consumer and the environment, if you touch something, memory records it in a way that virtual or visual design cannot. The Craftsman (Sennett 2009) expresses the idea well: *'who we are arises directly from what our bodies can do'.*

Experimental Method

The sense "touch" is developing as a theme for research at the Northumbria University Design School, especially for fashion and craftsmanship applications.

There are always many old voices that decry the lack of materials knowledge in the "designers of today", and we do not wish simply to join them. To avoid this yet to achieve new thinking in the territory we intend to take a tangential approach that does not get stuck into stuff too early. Accordingly, we are seeking to apply a method of research and teaching based on storytelling in multidisciplinary teams (Smith 2009 and 2010. This reflects on the role of designer-storytellers (Erikson 1996, Seah 2006). Thus, perhaps counter-intuitively, we seek to stimulate conceptual and language-based approaches to a physical effect.

The process described by Smith: *grew out of a 4+ year collaboration between an industrial R&D research community and Northumbria University's School of Design.... It is a loosely connected suite of projects.... The freedom ... encouraged thinking beyond conventional design lines.... The ambition was to*

create non-confrontational entry points for both design and science research teams. These allow a common language to be developed between disciplines to open up new design spaces and opportunities. What emerged ... was that even the most complex of ideas generated by the students were the best resolved and communicated to the audience when time based narrative techniques were applied.

The current research intention is to interrogate the touch ambition described in the Touch Polemic above through a series of student projects. This reflects on the key learning from the work of Smith is that, where "one project ... leads to another" and broad concepts are put before fine design, new thinking gets the space to flourish.

The starting point, our first project vehicle, "Touch Stories" was a briefed project run over 2 months. A group of postgraduate students studying innovation in the fashion industry were invited to participate. The project was not assessed as part of their Masters course - the reward to the students is a learning experience that is part of live research. This student community are the "raw material" for Touch Stories . For this first experiment, 37 students from a range of professional backgrounds and nationality as outlined below were available to form the community: There was deliberately no criteria for selecting the students other than them being part of a design community. The natural imbalance in what the students had studied before added to the process, as we were not dealing with a group that had too many pre-conceived ideas.

Student Profiles

Business management - 20; Design - 13; Manufacture – 2; Languages -1; Law -1

Asia - 22; Americas - 1; Europe -8; India 4; Africa 1; New Zealand 1

Add to this spread the researchers (authors) and a good mix of discipline and culture is available

Researcher Profiles

Fashion Design and management - BM

Science research - PJS

Europe - both

The students were asked to research and communicate as what could loosely be called a "story" a fashion future that will inspire and teach about the use of Touch. Communication could be in any sort of medium, e.g. words, graphics, music, colour, images, texture and possibly product ideas.   The students were guided away from finished product as output. Touch Stories builds on earlier design projects "Touch Gourmet" (Torres 2007) that were inspired by the observations of experimental psychologists (Gallace, Tan and Spence

2008), that people have difficulty in detecting and remembering touch, but at least to some extent can be taught touch skills. The key difference is that Torres sought design outcomes directly, whereas with the current work we are starting a sequential process that uses.

The process started with a short formal brief for the students followed by interventions from the researchers that exposed their viewpoints - see below

The Brief to Students

Touch is for a new design world where the sense "Touch" is the essential fashion heart of design emotion, tactile sensibility, intrigue and sustainability through fashion. The concept explores valuing products for longer, a sense of re-engagement. New materials, feelings, precious. memories, senses and touch, preconception are all words to consider.

1. Research and communicate a fashion future classified into a palette that will inspire us and teach us about the use of Touch. Communication could be in any sort of medium, e.g. words, graphics, music, colour, images, texture and product.

Output: Verbal ideas and concepts, mood board/presentation.

Decision: go/no go to phase 2

2. Bring selected themes to professional level for a presentation where the ideas   communicate the new touch-centered world. The presentation should include a Business proposal, initial product ideas and a design brief, which could be given to designers to develop touch concepts into product.

Guidance and mentor help will be given through the lectures and tutorials.

Intervention 1: TOUCH - THE DESIGN CONTEXT

We are moving into a period of major social, economic and cultural issues driven in particular by the quest for sustainable lifestyles for a still growing and developing global population.   In this period design could and hopefully will play a key role in transforming the way we think.

The design creative process can be defined as the production of aesthetically pleasing, yet functional products. Traditionally this would have involved designing first by sketching, then prototyping, manually moulding the materials in a form. However much of the design process has now been replaced by Computer Aided Design and virtual prototyping which is then applied and turned into product through offshore manufacture. This means that designers, and most importantly design entrepreneurs are missing out on the intimate experience of interaction with materials that adds both tactile experience and human emotion.

This intimacy and the value it encapsulates is thus not being passed onto the consumer through retail experience or in the end product. The result is too many bland lifeless products being marketed purely on cost. Thus is fuelled what has been described as "The Fashion Paradox" (Black 2007), i.e. the tension between an industry which has become dependent on the

overconsumption of the consumer society made possible by low cost design and manufacture processes with emerging imperatives of environmental and ethical issues. It has become easy to make and sell a lot of goods, but perhaps a new approach to adding value is needed before we drown in an ocean of stuff.

We hypothesise that a business strategy to introduce a new intimacy with materials to consumers through goods and experiences that celebrate "the joy of touch" will a) spawn better, higher value goods with cutting-edge appeal and b) provide a positive piece in the jigsaw necessary to address the Fashion Paradox, following the approach that touch is relevant to the production of "super-satisfiers ... which begin to break the chain of consumption and dissatisfaction" described in the 5-Ways sustainable fashion collection (Fletcher 2008).

The Touch theme can, we believe, help shape concept and technical research that will influence the way we design, make and retail products. It can also aid human well-being and provide solutions to social problems - in the case of fashion from dress and self-presentation experience through the wearing of clothing for identity, function and comfort.

If we can investigate ways to absorb data through touch that then aids design then the relationship between touch and non-touch in our design experiences becomes greater and sensory information from touch leading to comfort make us feel better in our everyday lives. We intend to look at whether it would be advisable if digital design were balanced with a more tactile design skills education in the future. Have we allowed design to depend too much on technology to the degree that design entrepreneurs are missing out on developing their own knowledge? They are often briefing designers to design products without considering the sensory aspect to either themselves or the end product. This is occurring both in Industry and in education and is stepwise. Each generation is allowed to move even further away from Sennett's great vision of the path: novice to practitioner and then expert; as he says, *'Skill is a trained practice, modern technology is abused when it deprives its users of that repetitive, hands on training.'*

Intervention 2: - THE INNER WORKINGS OF TOUCH

This intervention is given a} to expose the concept of story, in this case about the intimacy of touch and b) to expose briefly a broader science context for touch than might be normal for product entrepreneurs.

Science loves scale; from astro to nano, each scalar block of length/distance has its own peculiar properties and appeal.

The scale of touch, i.e. the distance from the subject over which it operates, is the smallest of the key external senses. Touch is absolutely close and personal. Touch requires actual physical contact with skin.

Consider a simple story - Gretel is trying to find Hans. He's been to town on a shopping expedition, enjoying himself as usual while she has been working away at home and in the office. Now she really needs a break. She is sure he must be on his way home. Even though he's across the valley, over the hill

and far away – hey, she can hear his yodel call in the distance... Suddenly, across the valley Gretel sees movement – a tiny speck on the hillside; she is sure it's him, no one else would wear such a loud jacket. An hour later, here he is running down the path towards her. Oh my god, what a smell, all that Bier and Leberwurst - she can even taste it! But finally she forgives him, they meet and have a hug – now touch comes into action and gives depth to the sensory connection that started such a long time and distance ago.

The skin does far more than " keep our insides in". As is well known, it is the largest sense organ that we have. That is to say, it contains sensors, detectors of physical stimuli.

The message from sensors in the skin goes to the spinal cord and brain. This is the role of nerves and there are several types. Some are found connected to all skin, some only in hairy. They differ in the way they detect, e.g. through static sensation or through dynamic/stroking; they differ in the speed in which messages get to the brain – all depending on the properties of fatty sheaths round them. The research literature of the somesthetic senses - senses that are activated by hot, cold, pressure, pain, itch and are generally grouped together as "touch" - is wide, but can be accessed through a recent review (Hollins 2010). The result of this sensing and messaging begins with cognition - the mental acquisition of knowledge, in this case through the sense of touch. From this come rewards, e.g. emotions and ultimately behaviour.

Bringing this link between cognition - reward - emotion - behaviour back into the design arena, consider the following. One of the ways, in which people can feel comfort, stress relief and relaxation, is through touch as it gives rise to pleasant sensations. Indeed, recent research (papers of McGlone, eg 2007) indicates that there are even specific sensors and nerve pathways to pleasure. Perhaps this is the science platform to build on and develop the 5-Ways "Supersatisfiers" alluded to in the first researcher input.

Results and Discussion

In general, the multidisciplinary, multinational student community embraced touch as a vehicle to inspire and stimulate our senses that could in principle lead to the creation of touch concepts and new products.

In the first stages of the project, each member of the community was asked to develop a personal idea. Using these initial thoughts for guidance, the researchers split the community into groups of maximum four people based around contrast, avoiding placement of too many like-minded thinkers together. While this at first created some doubt and confusion as to how all their ideas could work together, a series of brainstorming sessions amongst started to produce excellent results. The moment the students realised that it was a question of taking the essence of their own ideas and not enforcing them too literally then the barrier was broken and progress in new group ideas was rapid. The results gave a platform for the groups on which to verbalise and visualise the ideas and so ultimately create new positive associations leading to product ranges and services with touch sensations. So from temperature, pressure; pain; itch came grip, illusion. association and play.

Territories entered include a touch playground, touch museum, stress free clothing, sweat dream products, touch soft products [marshmallow inspired] touch luxury bespoke service, tender touch stress relief and a touch mechanical framework.

The output could be grouped as follows:

Retail experience themes - 3

Retail analysis methods and tools - 2

Product families - 3

Technology-based products – 2

The more conceptual and - from the researchers point of view - interesting outcomes tended to be in the experience and analysis territories. These are the outcomes that are very open-ended, and look like signposts into further work. For example, a concept for a retail analysis tool was presented as a store for a set of emotions generated through touch and defined through body responses like temperature, heart rate and similar (or as yet unknown!) metrics. Through this it would be possible to gain consumer knowledge, as these would be activated when the consumer touches a specifically designed product. This could be taken further to providing sensory attraction to products through materials.

An observation during the project was that the concept base really started to broaden when business-orientated students began to see the benefits of creative thinking assisting entrepreneurial potential. They then worked with the design creative's in the group to provide results that were interesting and advanced.

Thus from a starting point of the single word " touch" the project showed how a diverse group of designers and non-designers had inspired themselves and each other to create a series a fresh concepts which could then be taken up by a design team and lead to a better product and environment. It had stimulated thought management while contributing to concepts that could also aid health and well being.

Future Directions

An immediate follow-up project will invite further individual developments to grow from 3 chosen Touch Story concepts. For example, we have invited exploration of the space opened by the retail analysis tool commented on above as part of a new student project brief to create a sustainable set of packaging approaches based on touch. We wait to see if the end result will be significantly progressive from a design perspective. We also intend to use Touch Stories as a non-threatening vehicle to engage with wider academic and industry community into the intimacy of materials debate.

We are at the very start of a journey which we intend to take well beyond fashion (for the challenge of new materials and "too much stuff" spreads well

beyond Fashion and its Paradox), thus to stretch and develop the territory, through the processes described by Smith. This is a journey the design world needs.

References

Black, S. (2007) *Eco-chic the Fashion Paradox*, Black Dog.

Fletcher, K. (2008). *Sustainable Fashion and Textiles*. Earthscan.

Erickson, T. (1996). Design as Storytelling, *Interactions*, Vol 3 (4), July/August.

Gallace, A., Tan, H. Z., and Spence, C. (2008). Can tactile stimuli be subitised? An unresolved controversy within the literature on numerosity judgments. *Perception*, **37**(5), pp. 782 – 800.

Hollins, M. (2010). Somesthetic senses. *Annu. Rev. Psychol*. 61:243–71.

Keats, J. (1816, published 1871) in The political works of John Keats, James Miller. Poem,' What can I do to drive away', L4.

McGlone, F. P. et al (2007). Discriminative touch and emotional touch. *Can. J. Exp. Psychol.* 61:173–83.

Montgomery, B. and Sams, P. (2010). *Touch Breakout*. URL: www.northumbria.ac.uk/reveal

Sennet, R. (2009). *The Craftsman.* Penguin Books.

Smith, N. and Sams, P. (2007). Friendly. *International Conference on Engineering and Product Design Education 2007.*

Smith, N. and Sams, P. (2010). Storytelling stimulates science. *International Conference on Engineering and Product Design Education 2010.*

Taylor N (2009). Olanic at London Fashion Week. *www.olanic.co.uk*

Torres M, Sams P (2007). Touch Gourmet exhibition at Istituto Marangoni. reported by Sarah Dennis for *www.wgsn.com*

Bruce Montgomery

Montgomery is Professor in Design Craftsmanship at the University of Northumbria. and a Menswear Design Consultant with International experience. Bruce obtained a BA (Hons) degree in fashion from the University of Northumbria and started his working life in 1984 for Nigel Cabourn and Katherine Hamnett. In 1987 he worked as a menswear designer for Italian fashion houses Luciano Soprani and Moschino. Returning to London in 1993 Bruce became Menswear Design Director for the DAKS brand worldwide, a position he held for 12 years. Showing his collections for "Daks Luxury Line" during five consecutive seasons on the catwalk at "Milan Menswear Fashion Week". Rewarded as Emeritus Chairman of the British Menswear Guild committee, Bruce has been Chairman of a mentoring panel for Graduate Fashion Week, an external examiner for the BA (Hons) Menswear for Central St Martins College and a board member of Skillfast-UK.

Phil Sams

Phil Sams, Whitespace Stories, Ludlow, Visiting Professor at University of the Arts London and Fellow at Northumbria University Design School. Phil's background is industrial chemistry. Now research consultant, he believes in the power of New Generation designer/commentators to shape the future. Work on radical textiles and products has crystallised long-term collaboration with fashion and product design practitioners. Credits include many fashion/science projects, papers, and 30+ patents on textile treatments.

Olfact – On A Pedagogy of Curiosity ©

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Abstract

A Pedagogy of Curiosity invites cross-disciplinary initiatives and collaboration to look at sensory possibilities in relation to urban planning, to learning in formal and informal situations, and to the ways we explore and understand our environment and ourselves and how we interact with each other. The project crosses disciplines, sectors, ages, cultures and geographical borders to test the nature, potential and performance of the embodied sense of smell as a means to immerse ourselves in the world more fully, to navigate the present and 'sniff out' the future. A Pedagogy of Curiosity encourages a new body of 21st sensory skills and competencies to emerge from that research. Building on previous experience in cross-disciplinary exchange and collaboration with international artists, scientists, educationalists, urban planers and policy makers, we will contextualise and discuss a proposal to create an experimental, participatory public laboratory for sensory, and olfactory perception in particular, in everyday life: *The Olfact Lab.* It forms part of a series of a Street of the Senses.

Keywords

olfaction, sense perception, embodied experience, cross-disciplinarity, practice-based research,

Introduction

A Pedagogy of Curiosity offers a platform to explore the undervalued embodied knowledge of our senses. From cross-disciplinary perspectives we look at olfactory and other sensory possibilities in 21st century in relation to urban planning, learning in formal and informal situations and public pedagogies. The project encourages a new body of 21st sensory skills and competencies to emerge from such research. In the following we will offer a reflection on the multi-dimensionality of the sense of smell and its conceptualisation in different contexts. This approach provides the basis for a discussion of a proposal for an Olfact Lab. The Olfact Lab forms part of an overarching project: the Street of the Senses, which aims to create an experimental, participatory public space for sensory perception in location specific settings. The design and development of a particular street laboratory in central London will serve as a unique environment for discovery and exchange of scientific, aesthetic and humanist knowledge between, scientists, scholars, artists and an ambient general public.

Embodied senses – lived experience

We are in the world; we connect to it and grasp it, literally as well as metaphorically, through our senses. Artists, philosophers and scientists have taken issue with notions of perception, thinking and understanding that build on the traditional Cartesian body–mind dichotomy. Instead, they point to the corporeal nature of our being in the world and accordingly have put forward concepts of embodied thinking and perception.

However, our individual world does not begin or end on the surface of the skin that marks a physical if permeable boundary between inside and outside of the body. Our existence in space and in time provides coordinates that reach beyond the visible and touchable body. Being present in the world means that we can sense and feel ourselves, and our environment beyond the material confines of the flesh. This space-time opening also enables us to sense something at a distance from the physical body. We literally follow our nose (Baier 1998, 510).

Under the concept of *sensibilité* a close link was assumed between a person's moral disposition and their reaction to and interaction with the world as an 'organically sensitive being' In 18th century France (Vila 1998, 279). If we were to re/activate such perspective, does this mean that we, in order to act as responsible global citizens, are morally obliged to become more sensorially aware? Do we need to be perceptually educated formally and informally to develop greater sensitivities to human and environmental needs, especially in complex urban environments?

Merleau-Ponty's conception of sense as sensually incarnate blurs the boundaries between embodied subject and environment, between self and non-self. It undermines the traditional subject–object dichotomy and proposes instead a reciprocal experience of embodiment, a chiasm, a fluid and hybrid state of being. From a contemporary perspective this approach does not only place an emphasis on mediation, but, in view of the technological potential of digitisation, on mediatisation, our experience of reality is highly mediated through images, texts and other resources of meaning-making. In thinking about the sense of the senses, it asks us to acknowledge mediality as an existential condition of those objects which 'sensually embody sense', as for example Sybille Krämer stresses (Krämer 1998, 33–34).

Grenouille and Mnemosyne: fragrants as 'aide-mémoire'

It remains doubtful that the human nose can distinguish around 10,000 odours, a scientific myths that Avery Gilbert in his recent publication 'What the Nose Knows' (2008) has traced back to a smell classification attempt by Ernest C Crocker and Lloyd F Henderson in 1927 (Avery 2008, 3–4). However, not just since Marcel Proust's *The Remembrance of Things Past* (1908-1922) has a connection between smell and memory become the subject of fiction and scientific investigation. Smell is one of the most ephemeral sensory perceptions, and yet we all have experienced the capacity of the olfactory sense to trigger vivid recollections of individuals, spaces and events past. In fact, it is more often our nose than our eyes that builds tacit as well as overt connection between the present and earlier periods in our lives. How, then, can we remember transient odours and reconnect them to the emotional responses those triggered in the first place?

And if we were to follow Gaston Bachelard's assertion that 'memory and imagination remain associated', can we then say that smell may play a prominent role in assisting or in hindering the stimulation of the imagination through its capacity to 'excite' recollection (Bachelard 1994)? If there is a supportive role for smell or more, how can this be made productive in fostering our imagination in everyday life situations?

Furthermore, are there connections between the inferred and often pre-linguistic knowledge generated by our so called second(ary) or 'lower' senses, like smell, taste or touch, and our intuition? And if so, how does such fragrant assistance influence how we think, behave and interact from childhood through old age?

Language, metaphors and the classification of odours

When Humberto Maturana's (1980) observes provocatively that 'we see with our legs', he invokes at least two fundamental insights: [a] The etymology of words and the use of language in the West reveal that occidental culture has been permeated by a hierarchy of the senses under the hegemonic rule of the eye. The imagery of sight – insight, reflection, the mind's eye, and the etymologies of words like idea and theory – have long moved into the terminology of cognition. Smell, on the other hand has been pushed into the background of our grasp of the world, not for the poverty of language, but for the lack in olfactory percepts perhaps, i.e. the cognitive difficulty to get to words that name a smell we may recognise. To compensate we have become accustomed to employ active metaphorical associations and the comparisons between different sensory modalities of the order 'smell is taste' or 'smell is haptic', for instance a spicy fragrance of perfume, a sharp stench of urine or the smooth aroma of coffee.

Does the scarcity of categorisations of smell indicate sensual deprivation or a lack of ability to translate external stimuli into perceived, meaningful form? How do subconscious and conscious awareness of smell relate to each other in the process of accounting of and understanding our being in and of the world?

[b] As Maturana poetically asserts, we can only perceive the rich material diversity of the world we inhabit through motion, through those changes in the perceived that re/affect the stimulation of the senses (Maturana 1980, 67). This applies in particular but not exclusively to smell. We register an odour even when just a few volatile molecules hit the receptors in our nose, and we quickly adapt to a specific scent – whether pleasant or repugnant – and only continue to notice it over a longer period of time through (intermittent/temporary) changes in the smell-scape surrounding us. Likewise, we can educate and refine our nose within physiological givens and constrains, as much as our taste, tactile sense or vision and hearing by exposing it to a great(er) variety and nuances of odours. Yet, the re/cognition of smells, their distinction and sub/classification depends on our development of correspondingly sophisticated percepts.

Vilém Flusser contends that we connect in/to the world through gestures. Building on the insights of phenomenology, he determines gestures as movements of the body or an instrument connected to it that expresses an intention and that exists without satisfactory causal explanations (Flusser 1994, 7–8). What are the gestures through which we take in and explore the olfactory make-up of our environment? We have very few verbs that express these ways of sensing, perception and re/cognition: smelling, sniffing, snuffling, snivelling, and/or to simply breathe and to inhale? Does that mean we are less likely to immerse ourselves into the world by following our nose; despite the fact that smell, alongside touch and taste, are considered to be our most immediate forms of sensual contact with the physical environment? What, then, are the consequences for such a diminished and impoverished existence in the world, and how can this imbalance be redressed?

Scents and the human habitat

Juhani Pallasmaa too argues that 'the most persistent memory of any space is often its smell. ... The nose makes the eye remember'. He goes on to observe that 'the retinal images of contemporary architecture certainly appear sterile and lifeless when compared with the emotional and associative power of the poet's olfactory imagery...' He continues: 'the timeless task of architecture is to create embodied and lived existential metaphors that concretise and structure our being in the world' (Pallasmaa 2005, 55–56). Following Pallasmaa's train of thought, this means that sensually hegemonic architecture impedes a holistic sense of place (and time). Architecture like all art, needs to begin with an understanding of a sensory vocabulary. We need to re/consider how architecture can stimulate the entire human sensorium including our sense of smell. We also have to develop better ways of literally smelling out a genus loci and of appreciating 'a sense of place'. Such demands bear serious consequences on the education of future generation and the up-skilling of current architects, developers, planners and political decision makers. Moreover, such a sensory reorientation can only happen through a radical reassessment of the hierarchies of value, models of practice and respective interrelationship between science, technology and aesthetics upon which contemporary architecture and its appreciation is based. Centre stage of a revised approach would be taken by the sensual and located/locational properties of materials whether wo/man made or natural.

Led or let down by the nose: on education and sense perception

In Western tradition a distinction between sense perception and knowing has become de rigueur. We differentiate for instance between 'smelling' as an awareness of either naïve sensations or incomprehensible fragrant traces or impressions; whereas knowing refers to the recognition of an odorant quality as a product of 'experience-based perception.' Recognition understood as an acknowledgement of validity inevitably points to the domains of socialisation and education and the value concepts and hierarchies mediated and affirmed through practices of learning. Going by the current UK education curricula at all levels, experience and observation feature little and if so, such practices follow the general trend and orientate towards a visual and at best acoustic awareness. Matters of smell – like touch and taste – remain marginalised in providing generic and subject-specific skills, knowledge and experience. Rationality, certainty and intention are favoured over imagination, doubt and intuition. We determine, analyse, assert and substantiate our being in the here and now rather than being encouraged to learn experientially, to sense, to perceive and feel ourselves and to fully immerse into our environments. Knowing what dominates over knowing how to. How, then, can the development of mainstream programmes of learning include holistic approaches that will enhance our sensory contact with the world and our sensory imagination inspire future possibilities? Such approaches would build upon the capacity of our senses, expand our perceptual repertoire and synaesthetic sensitivity. They would shape the ways we order the world and form our relationship with an increasingly precarious natural and wo/man-made environment and with each other. Is it not time to reconsider how the poetic and the scientific, how curiosity and rationality, imagination and analysis, theory and application can become reintegrated through innovative pedagogies and thematically oriented learning?

Furthermore, our social and cultural conditioning in terms of what and how we smell and how these sensations are interpreted and reacted to, poses also the question as to whether or not such cultural conditioning of responses to olfactory stimuli could be unlearned or be re-conditioned. If so, what would be needed to change or 'rewire' percepts of smell? Is it possible to intervene into the 'circularity', the interlinking between action and experience, i.e. the inseparability between specific ways of existence (in time and space) from the ways in which we perceive, recognise and take account of (our) reality/ies?

Sniffing the future

How will we as humans perceive in and of the future in the 'age of technology', which produces multiple and simultaneous 'elsewhere' environments; where relativity and viral assemblages form the materiality of our age; where grand narratives and representations give way to algorithmic encodings; where genetic engineering, wormhole aesthetics, and intelligent robotics put into question the very primacy of what is real, what is possible, and what is of value? What means, media and events will inspire us? Through which veils will we translate reality/ies? We only have to consider that there are creatures with differently attuned senses to appreciate that the constitution of our cognitive faculties is shaped by the way we inhabit the world and our sensory make-up determines which sections of a potential reality stimulate our awareness. Moreover, in a situation of increased human mobility (precarious labour relations, war, conflicts and tourism), mass migration and the globalised flow of information, capital and consumer goods, services, experiences (eating, body and ambient fragrances, health and well-being therapies, gardening, etc.) and environments that are imported or re/constructed in their entirety, how differently or similarly will we individually perceive compared to other humans? Despite the individual make-up of our noses with variations of sensors and sensory capacity – like the different whisky copper pot stills that impact on the bouquet and taste of this drink – will we become more similar sniffers or move further apart? 'What is our olfactory destiny', to take up a question put by Avery (Avery 2008, 226)?

In light of the complexity and dynamics, the (counter) currents of increased fragmentation, media(tisa)tion and homogenisation of the present it has become clear that we cannot grasp reality any longer through the linearity of logic. Reason and rationality do not suffice to anticipate the future of how we communicate, live, work, interact and consume. What is needed is a holistic, embodied approach that cuts through the inside and outside of the body, and converges the left and the right of the brain, an inter-faculty and cross-disciplinary approach. As stated earlier, such an approach requires new paradigms for both the production and acquisition of knowledge, skills and experience at all levels including Higher Education. To safeguard the development of a workforce adequately equipped to master the global and existential challenges of the 21st century a new set of articulated and accentuated sensory qualities, aptitudes, skills and intuitive competencies are required.

We assert that the arts as a catalyst have a particular role to play to encourage and foster the development and appreciation of these new sensibilities. In recent times, Higher Education Institutions and UK Research Councils, as well as international research bodies, have placed an increasing emphasis on interdisciplinary knowledge generation agendas and strategies to tackle the complex issues humankind faces.

The Street (of the Senses) in London seeks to embody and exemplify such an advanced interdisciplinary approach. To realise a fruitful exchange and interactions between scientists, scholars, artists and the general public this unique venture

requires the joint initiatives and coordinated support from agencies and funders across the spectrum of research on the sensorium: from neuroscience to philosophy, visual arts to psychology, physiology and chemistry to design and architecture. The Street offers an opportunity for a re/consideration of the role of intuition in the processes of sensing, knowing and understanding. Whether we call it 'gut feelings', 'sixth sense' or 'instinct', we all experience the phenomenon of intuition at one time or another. Psychologists note that we subconsciously and subcutaneously pick up information about the world around and within us, leading us to seemingly sense or obtain information without understanding exactly how or why we know something. Experience also teaches us that intuition and creativity, and hence innovation, are closely connected. However, cases of intuition are difficult to prove or study, and psychology may only be part of the answer.

The front of the Wellcome Trust building, Euston Road, London, © photograph: Susan Benn

A Pedagogy of Curiosity: The Street

A Pedagogy of Curiosity[1] is an emerging body of cross disciplinary sensory research which brings together small international groups of leading neuro-scientists engaged in sensory research, with artists who are using the senses as their medium, psychologists and educators whose particular understanding of sensory perception enhances learning and teaching in formal and informal learning environments throughout life.

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[1] *A Pedagogy of Curiosity* is the work of PAL, a not-for-profit arts organisation founded in the UK in 1989 (www.pallabs.org). The company is a crucible for cross-fertilization of ideas and collaborative experimental practice with international talents in film, media and technology, the visual and performing arts and architecture, the sciences, and in education, research and policy. PAL, based in London, creates its own as well as commissioned annual Lab programmes across the UK and overseas. The company is an Arts Council England regularly funded organisation. PAL experience over the past 20 years in designing and producing 135 PAL laboratories (to date as of the summer of 2009) brings with it some of the international talent who will be engaged in this research.

To begin this research, two international colloquia of leading scientists, artists and educators were created by Susan Benn, in her capacity as the Founder Artistic Director of Performing Arts Labs (PAL), in England in 2006 and 2007, to explore the following question:

> *If our senses constitute/form an inherent and essential basis for learning, how can the role of these senses be more widely understood, valued and used to stimulate the imagination in everyday living?*

> *Might a robust* Pedagogy of Curiosity *be derived from such research?*

> *And if so…what might it look, feel, sound, taste and smell like?*

The two residential experimental colloquia took place over three days each, led by scientific, aesthetic and pedagogic enquiry, approached on an equal basis. Our investigations inspired imaginative sensory experiments designed as experiences that need not be defined by a limited set of conditions or focused on any predetermined cause and effect. This process and its results are to be further explored in selected site-specific locations with small groups of sensory researchers. Some experiments will be conceived for larger public gatherings. Results and benefits will be rigorously evaluated. For the evaluation scientific, artistic and pedagogic criteria, methods and instruments determined by experienced researchers in each field will be applied.

Learning in the broadest sense

A Pedagogy of Curiosity research draws upon extensive evidence of sensory experimentation across the arts, sciences, interactive media, humanities, in education and urban planning and policy development. Several examples of proposed sensory experimentation are offered here. These emerged as a result of the ideas from participants in the PAL colloquia. The first example focuses on sustainable sensory design in urban planning.

SUSTAINABLE SENSORY DESIGN: Sensory Approaches to Cultural Urban Planning

Experiments in cultural and urban planning through the senses*:* This is a proposed practice-based investigation in partnership with the Arup Sustainable Design Team to devise a methodology for sensory design and cultural planning for sustainable cities. The experimentation focuses on one of the nine new eco-cities in China and the proposed development of twin eco-city institutes to be sited in China and the Thames Gateway in London.

Groups of local people living in and around the site of one of the new Chinese eco-cities and a similar group in the Thames Gateway will be invited to work together with engineers, architects, artists, and a range of scientists and others concerned with the sensory quality of the built environment in this context. A PAL 'Lab' will bring these people together initially to address key questions, including the following:

- What is culture in the sustainable city?

- Who has the responsibility for consumption?

- How might sensory experiments begin to create harmony between human existence and nature in new and old cities?

- Can sensory experiments inform a cultural planning process in a Chinese eco-city and in 21st century community development in London?
- How might comparative sensory experiments address short, medium and long-term cultural planning issues in China and in the UK?

Participants: 50% Chinese and 50% British; creative teams of citizens, neuroscientists, artists and educators in the UK and in one of the new Chinese eco-cities; members of the Arup Sustainable Cities Design Team; engineers, architects, landscape architects, environmental artists, designers, teachers and students of architecture and engineering.

Outcome(s): Integrated resource models and methodologies for a sensory approach to cultural urban planning

Site + Partners: China/London; Arup Sustainable Cities Design Team; PAL; the British Council in Shanghai; Chinese partners .

Possible Researcher(s): The Arup Sustainable Cities Design Team, led by Peter Head, and their network of Chinese associates; the PAL Architecture Lab team; Jason King, architect formerly from Arup's Sustainable Cities Design Team who attended the PAL colloquium in February 2007, now working at Llewellyn Davies Yeang[2]. Leading researchers and curators from The University of Applied Arts and the ZOOM-Kindermuseum in Vienna.[3]

The second proposed experiment explores what it might be like if we could imagine the world through the senses of other creatures. What can we learn from animals around us that perceive the world through sensory systems that are completely alien to our own, but that allow them to survive extremely well within their own ecological niche?

Collaborators and sites: Sam Woolf and his team of science advisors at London's Natural History Museum and London Zoo. Outcomes: *Prototype and specifications for installations and specific technologies to be used in public spaces and/or an online interactive experience delivered via the broadband internet.*

The third example reveals the importance of embodied knowledge and intuitive sensory understanding for our well-being. We explore the experience of people who in their own ways are experts in movement and action (choreographers, dancers and sports wo/men) and its resulting sensations. Encounters and conversations occur between a small group of dancers, with enhanced expressive and artistic motor skills and heightened sensory and affective experience, and those not conventionally considered body experts. These will include subjects with neurological impairments, and those with loss of vestibular sense or proprioception, as well as young children and elderly people.[4]

Collaborators and sites: Choreographer, Siobhan Davies, Neuroscientist, Doctor and Author, Jonathan Cole and Dance Artist and Teacher, Gill Clarke and Filmmaker, Deborah Mey; Siobhan Davies Studios, Independent Dance.

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[2] **Llewellyn Davies Yeang** is a multidisciplinary firm of urban designers, architects and landscape architects based in London and Kuala Lumpur. Ken Yeang, the Malaysian architect who pioneered passive low-energy design of skyscrapers, (what he has called 'bioclimatic' design).

[3] **Olfactory and Haptic Design Research in Vienna:**

Madelina Diaconu, Professor of Philosophy at the University of Vienna, was one of the participants in PAL's Colloquium in February 2007. Through her collaborative research on olfactory and haptic qaulities of the city of Vienna, PAL has been introduced to the work of the University of Applied Arts and ZOOM-Kindermuseum in Vienna in this field which offers further opportunities with sensitizing designers, architects, urban planners and citizens of all ages including children. Sensitizing small children, the education of the senses and awakening curiosity and responsibility for the sensual exploration of the world represent essential aspects of the philosophy of the Viennese Kindermuseum.

[4] This proposed experiment was made in an application to the Wellcome Trust in May 2007.

Outcomes: *A series of encounters and conversations will be published along with a series of short films about the experimental process and the results of each of the experiments.*

The Olfact Lab

The idea for an *Olfact Lab* in Vienna was conceived to form part of a series of a number of site-specific *Labs of the Senses*. We sought to explore the possibilities of our embodied senses as a means of immersing ourselves in the world more fully in the heart of this major European city from the premise that a navigation of the olfactory urban landscape in the present offers opportunities to 'sniff out the future'. The development of site-specific Olfact Labs served as a 'test bed' for the creation of a sensory design brief for a real street in central London as outlined in the following.

Gower Place is a small unassuming pedestrian street centrally located behind the public collections, exhibition spaces and offices of The Wellcome Trust, the UK's largest charity. The Wellcome Trust supports leading edge biomedical scientific research across the UK and overseas. On the other side of this quiet street the University College London (UCL) campus is situated. UCL is London's leading multidisciplinary university, with 8,000 staff and 22,000 students with 140 nationalities represented among the student population. UCL was the first university in England to welcome students of any class, race or religion, and the first to admit women on equal terms with men. This same radical spirit thrives today across all academic disciplines; from one of Europe's largest and most productive centres for biomedical science interacting with eleven leading London hospitals, to world-renowned centres for architecture (UCL Bartlett) and fine art (UCL Slade School). UCL's multidisciplinary research strength produces outstanding results achieved across subjects, ranging from Biomedicine, Science and Engineering, and the Built Environment to Laws, Social Sciences, Arts and Humanities. Students are 'global citizens' undertaking an international curriculum, local volunteering opportunities and cross-disciplinary research-led teaching. UCL works with partners all over the world prioritising areas in which new interdisciplinary partnerships can thrive; including global health, human wellbeing, intercultural interaction and sustainable cities.

The Street: Gower Place, London

> Man only plays when he is in the fullest sense of the word a human being, and he is only fully a human being when he plays.
>
> (Schiller 1967, 107).

Gower Place offers a unique opportunity for UCL and Wellcome science communication and curatorial teams to engage researchers, students and ambient members of the public in discovering unexpected ways to sensitise society. Embodied experiences will be offered there on an ad hoc basis. We are considering this 'empty' street in London as the visible expression of curiosity that stimulates scientific, scholarly and artistic imagination and playful exploration. For us it constitutes a potential body of knowledge to be 'grown', shared, understood, appreciated and enjoyed.

A Design Brief for The Street in London

For the olfaction and the city conference we wanted to involve the presenters and the audience in the thinking behind A Pedagogy of Curiosity research and to take part in creating a specific design brief for a street of the senses in London. We therefore put together a set of questions and an ordinance survey map of Gower Place to provide a framework for this brief to be completed in 30 minutes. We ask our readers to take part by email.

Our focus is on the olfactory possibilities of a particular London street, but please feel free to liberate your imaginations and engage in all your senses in what you are about to do and begin by asking yourselves these questions….

1 How can we stimulate the development of percepts for smell and other sense perceptions that enable us to become more acutely and experientially aware of our lived environment?

2 How can a wider discussion about the role of the senses in the experience and prediction of an increasingly complex, fluid and fragmented reality be stimulated through Public Art policy and commissioning, and the communication of contemporary scientific research?

3 Do you have any creative, experiential experiments you would like to bring to this street for passers by to learn from in an experiential way? How can you imagine we might exchange knowledge of new forms of scientific and aesthetic sensory research and practice? What role do you think intuition plays in this wider sensorium of hard science and aesthetic discovery? Could we begin to articulate a definition of intuition through a greater understanding of our senses in such a context?

4 From your perspective: what social, architectural, environmental, political and educational issues should be addressed in a sensory street based on the metaphor of the body?

Crown Copyright: Ordinance Survey
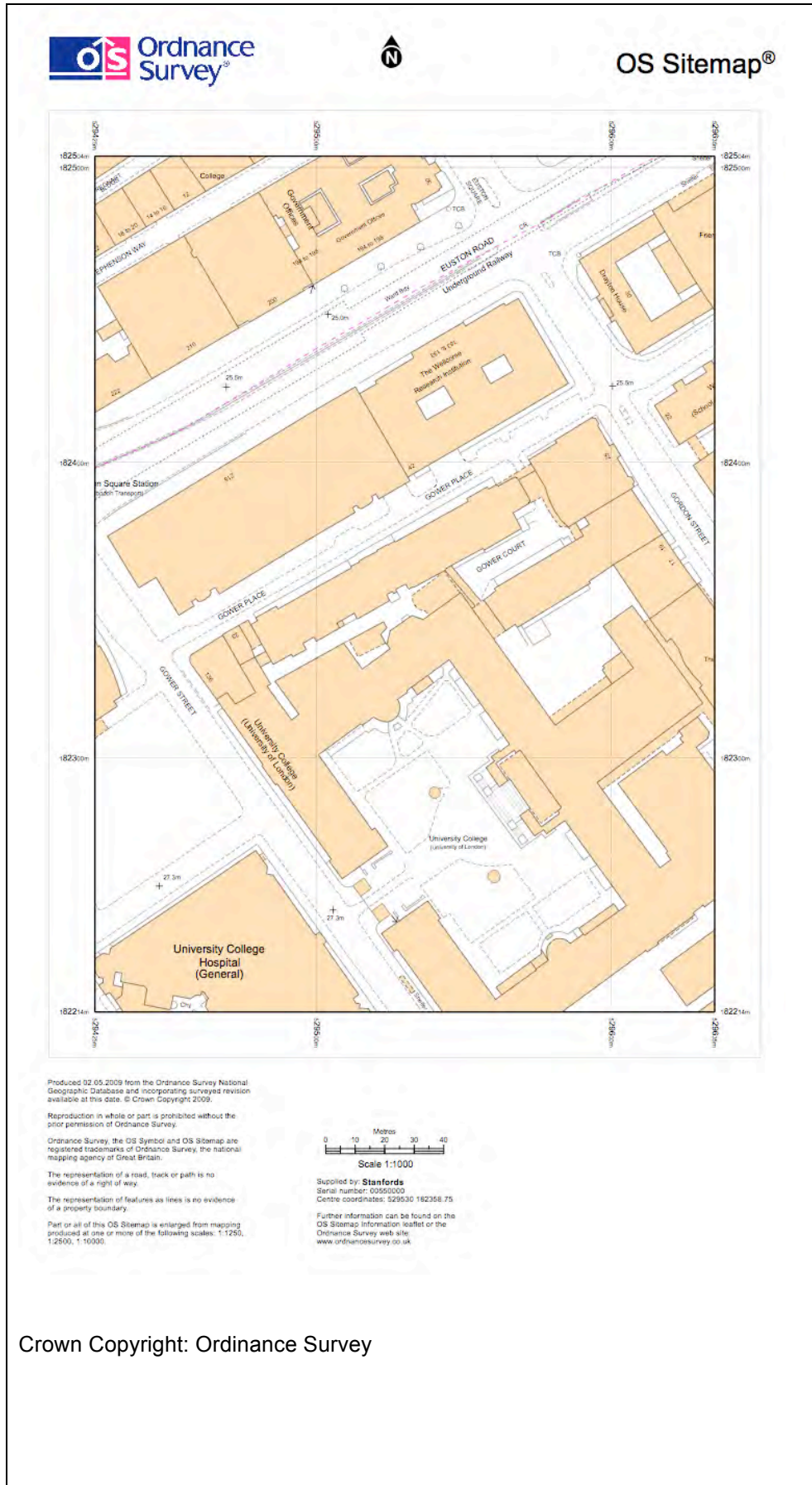
View of Gower Place, London, © photograph: Susan Benn

View of Gower Place, London, © photograph: Susan Benn

Façade of The Wellcome Trust, Gower Place, © photograph: Susan Benn

View of University College London, Gower Street, © photograph: Susan Benn

Conclusion

The above questionnaire only solicited a limited range of responses during our presentation in Vienna in 2009, partly due to the complexity of dialogue and exchange across disciplinary boundaries, which often requires, as we have become aware, acts of cultural translation, trust and empathy. However, we remain convinced that it offers a productive starting point for the collective exploration of experiential, design and experimental possibilities for THE STREET. Since 2009, the preparatory work has been continued by further involving a growing range of scientists, artists, curators, scholars and science communicators in the exchange. We have attracted partners in France, Italy and Mexico to develop a European-Mexican collaboration to celebrate science and the traditional embodied knowledge of Mexican people as a shared culture that can be communicated and transmitted across cultures through sensory perception and the arts. In addition, PAL is developing current work with the

choreographer Gill Clarke MBE on movement and meaning: a cross-disciplinary exploration of our embodied nature – bringing together the physical and sensory intelligence of dance artist with scientists social scientists and influential opinion formers in culture and education. Our sense of ourselves is being realized in being present moment by moment and yet our embodied knowledge r remains largely absent from our personal and cultural awareness, dominated as we are by ur visual perception and verbal conceptualising of experience.

In parallel, fundraising initiatives targeting a diverse range of sources in correspondence to the cross-disciplinary make-up of the project and sitting alongside publicity campaigns are in the process of being generated to realise this ambitious dimension of a Pedagogy of Curiosity. This project is seen to serve as catalyst for impacting significantly on the development of the formal education curricula at all levels. We are aware that a sustained heightened sensory awareness can only be achieved through a concerted effort of many like-minded sensory researchers and activists. It requires an environment that fosters trust, encourages openness and a preparedness to leave once own disciplinary and cultural comfort zones, and harnesses the powers of curiosity, intuition, imagination and improvisation.

References

Avery, G. (2008). *What the Nose Knows. The Science of Scent in Everyday Life*. New York: Crown Publishers.

Bachelard, G. (1994). *The Poetics of Space*. Boston MA: Beacon Press.

Baier, F. X. (1998). 'Bewegung der Sinne' In *Der Sinn der Sinne*, ed. Kunst- und Auststellungshalle der Bundesrepublik Deutschland GmbH, 510–519. Bonn and Göttingen: Kunst- und Ausstellungshalle der Bundesrepublik Deutschland GmbH/Steidl.

Benjamin, W. (2002). *The Arcade Project*. Cambridge MA: Belknap Press of Harvard University Press.

Baudelaire, C. (1995). *The Painter of Modern Life and Other Essays*. London: Phaidon Press.

Davies, S., Choreographer. (12/12/2008). *Mind Symposium,* London, (unpublished presentation).

Diaconou, M.; Heuberger, E. & Vosicky, L. M. (2011). *Senses and the City. An Interdisciplinary View of Urban Sensescapes,* Vienna and Berlin: LIT

Flusser, V. (1994). *Gesten. Versuch einer Phänomenologie*. Frankfurt am Main: Fischer Taschenbuch Verlag GmbH.

Krämer, S. (1998). 'Sinnlichkeit, Denken, Medien: Von der "Sinnlichkeit als Erkentnisform" zur "Sinnlichkeit als Performanz" In *Der Sinn der Sinne*, ed. Kunst- und Ausstellungshalle der Bundesrepublik Deutschland, (pp. 24-39). Bonn and Göttingen: Ausstellungshalle der Bundesrepublik Deutschland GmbH/Steidl.

Maturana, H.R. & Varela, F.J. (1980). 'Autopoiesis: The Organisation of the Living', In *Autopoiesis and Cognition: The Realisation of the Living*, (pp. 63-138). Dordrecht, Holland: D. Reidel.

Pallasmaa, J. (2005). *The Eyes of the Skin. Architecture and the Senses*. Chichester: John Wiley & Sons Ltd.

Schiller, F. (1967). *On the Aesthetic Education of Man*. Oxford: Clarendon Press.

Spence, C. (2009). Retrieved June 9, 2011 from

http://www.neuroscience.ox.ac.uk/directory/charles-spence; and
http://psyweb.psy.ox.ac.uk/xmodal/members.htm

Vila, A. (1998). 'Sensibilité' In *Encyclopedia of Aesthetics*, ed. Michael Kelly, Vol. 4, (pp. 278- 282). New York and Oxford: Oxford University Press.

Susan Benn

Susan Benn is the founder Director of Performing Arts Labs Ltd. (PAL). She received her American undergraduate degree from the University of Michigan, School of Architecture and Design, followed by two MA degrees from the Royal College of Art and the Courtauld Institute in London (under the supervision of Sir Anthony Blunt) and studied textile design at the Cranbrook Academy in Michigan. She subsequently worked as a textile designer in Scotland and Paris in the 60's. With six children, she became a publisher of children's and illustrated books in London, forming a joint imprint with Doubleday & Co. in New York in the '70s and early '80s. She developed an interest in photography in the 80's and spent four years as publishing consultant to the Hulton Getty photographic archive in London followed by a decade as a reportage photographer travelling around the world on assignments. In 1989 Susan established Performing Arts Labs to offer talented artists the chance to explore new experimental work and ways of collaborative working between from a wide range of disciplines. PAL's unique interdisciplinary research process has evolved and grown steadily over twenty-one years. The company has a reputation for consistently producing radical thinking, tangible outcomes and international acclaim for practitioners in the performing and visual arts and architecture, film, television, interactive media and technology, and in education, science and postgraduate research. Since 1989, PAL has produced 145 experimental international laboratories, for over 4,000 talented people. In 2000, in recognition of PAL's achievements, Susan received a major four-year education award of over £1m from the National Endowment for Science Technology and the Arts (NESTA). (www.pallabs.org)

Kerstin Mey

Kerstin Mey studied Art and German Language and Literature in Berlin, Germany. After completing a PhD in art theory/aesthetics she held academic positions in universities in Germany and the UK before she joined the University for the Creative Arts as Director of Research and Enterprise in 2009. There she also holds a Professorship in Fine Art. Her own research is concerned with the situatedness and models of contemporary cultural practices, and the interface between arts and sciences. Publications include the authored book *Art and Obscenity* (2007); and edited volumes: with Smite and Smits, *Artistic Research* (2011); with Kroenke and Spielmann: *Kulturelle Umbrüche: Identitäten, Räume, Repräsentationen* (2007); *On-Site/In-Sight*, special issue Journal of Visual Art Practice, Vols. 4.1/2 (2005); *Art in the Making. Aesthetics Historicity and Practice* (2004). As Artistic Director she headed up ISEA 2009, the 15th International Symposium on Electronic Art, held on the island of Ireland.

The Role of the Textile Materials Library: Providing Access to Multimodal Knowledge in Design Research

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Tom Barker, Professor of Architecture Design + Innovation, UTS, Australia

Abstract

This paper considers the role of the textile materials library as an effective research tool through its provision of tactile, visual samples, technical data and project application information. The abundance of new materials and the increasing complexity of materials and processes that are used by designers requires a comprehensive rethink of the traditional 'samples in a box' approach. The physical handling of fabrics samples allows for a haptic learning tool to isolate and combine the senses in information gathering. Written data in the form of books, papers, and specification sheets can communicate information about the composition, origin, designer/manufacturer, production process, visual reference and applications very effectively. The research described in the paper includes consultation with industry and academia, along with a review of four contemporary textile material libraries to explore the formats that future textile libraries may best take. In considering a future textile library, the authors also examine answers to the question: as the number of textiles available continues to expand, how can physical material, image and text-based library techniques best be combined with the web and digital information to make it possible for colleges, public institutions and companies to keep a textile library resource up to date?

Keywords

Introduction

The number of new developments in textiles and the availability of increasingly detailed and complex data and fabric samples has led the authors to undertake a reassessment of the nature, role, usage and format of the textile material library. Although the research literature on textile libraries is sparse, there is a body of research into relevant attributes of these libraries and the paper discusses these. Examples of attributes include: haptics, human engagement, and the nature of libraries.

In considering the role of the textile library, this paper looks specifically at the material library as a research tool. The textile library typically achieves this through its provision of hands on and visual samples, as well as information on technical data, end use and certification. Hands-on samples and text or web-based libraries have much to offer and there is much to be gained by this combination of haptic and digital knowledge formats.The multisensory experience is a feature in the understanding of materials in industry, museum curation and research locations. The textile industry uses samples alongside specification data. Museums typically combine written data in the form of catalogues and exhibition text with examples of textiles. In a more advanced experiential format, the Exploratorium in San Francisco's Tactile Dome sees visitors moving through a blacked out space using touch alone to heighten their experience by excluding others (Oppenheimer, 1972). This haptic approach is also supported by Jones (Jones, 2005), who notes the benefits of the haptic experience in acquiring tacit knowledge:

> 'Teachers often talk about the advantages of hands-on experiences in learning, yet the underlying mechanisms for hands-on experiences have not been fully researched. One aspect of haptic experience is active manipulation (as opposed to passive touch) that adds the elements of choice, control, and conscious movement that makes learning tasks more engaging and motivating to students.'

The importance of text and images for library documentation is clear if we consider the nature of textiles that are highly technical, advanced or smart (i.e.: responsive or interactive). In many of these cases, a physical sample alone does not reveal the complex nature of the textile: technological material advances emerging from research laboratories can be invisible to the eye. An example is with nanotechnology, in which materials and coatings are manipulated at a molecular level. The current early usage of

nanotechnology for textiles is primarily as applied coatings to fabrics that are invisible to the eye. The growing significance of such developments for textiles is highlighted by the institute of nanotechnology (NANO, 2010):

> 'As nanotechnology techniques and applications become more sophisticated, we are likely to see a whole new variety of textiles with integrated electronics, special self-cleaning abilities, resistance to fire, protection from ultraviolet light, and a range of other features. There is currently a huge amount of research and development being conducted across the globe from universities to global corporations to design and create the next generation textiles. Venture Development Corporation (VDC) estimates that consumption in the smart and interactive textiles market is today worth about US$720 million.'

In the future it is anticipated that nanotechnology will be used to create and replicate whole new textile structures. For this reason it is the subject of much speculation and hypothesis, and can relate to advanced processes in addition to actual product, as described by Forrest (Forrest, 1995):

> 'One envisioned result of the technology is a portable manufacturing system able to build a wide range of useful products to atomic specification, including a copy of itself. A system capable of building a copy of itself to atomic specification—as well as a wide range of other products from clothing to food to computers—would have important economic consequences.'

A textile library allows for knowledge to be acquired through multimodal learning and this draws on the dual coding principle where information is gathered and retained more effectively when accompanied by a visual image (Paivio, 1971). In dual coding verbal, or logogens and non-verbal, or imagens, units are used to provide alternative representation. The latter contains data that viewers can use to generate mental images and associations. The layering and connecting of these processes by the library user greatly extends their comprehension of the materials and their ability to utilize the information more effectively. One note of caution on the types of information and relationship between them is highlighted in the redundancy principle which 'suggests that redundant material interferes with rather than facilitates learning….occurs when the same information is presented in multiple forms or is unnecessarily elaborated' (Sweller,

2001).

Another aspect is the historical and contextual nature of a library itself. In his introduction to Treasures of the Library (Trinity College Library), Fox states that the library must perform two important functions. The first is to develop the institution and the second to ensure that once established, the collection should continue to grow (Fox, 1986). Libraries are dynamic and can have their 'golden period' through times of launch, better funding, inspirational management, etc., but can also have fallow periods. New textiles are being developed very quickly and the constant introduction of new materials encourages a 'living laboratory' approach to library management, in which materials may be tried out with users, or made available for experimentation and projects. Some may also be withdrawn as manufacturers upgrade their products to new ranges. The value afforded in bringing together a physical library of fabric samples with a digital database that includes multimedia components is of clear benefit for a comprehensive understanding of contemporary textiles, particularly those with a significant technical aspect.

Following a review of existing textile libraries, this paper looks at how a future textile library should be positioned – considering how physical material, image and text- based library techniques can best be combined with the web and digital information makes it possible for colleges, public institutions and companies to keep a textile library resource up to date economically.

Research Approach

The research framework used by the authors had three stages. Firstly, a literature review of library attributes, multimodal knowledge in design research, and new directions for textiles. Secondly, case studies of significant textile materials libraries. And thirdly, using the first two stages in combination with personal experience and peer discussion to consider the requirements for a future textile library.

The authors undertook an examination of case studies to explore the critical duality and epistemology of user 'knowledge by acquaintance' and 'knowledge by description' (Russell, 1918) for a textile library. Within the textile library formats, acquaintance is very much through the haptic element, and description through written information; images,

digital interaction and film media are able to occupy either territory. The authors considered the effectiveness of the libraries' structures, users, and the user experience.

Four textile materials libraries were reviewed by the authors: three were commercial and one was at an academic institution. These were selected to explore and discuss the range of approaches and the rationale behind them. Issues such as commercial versus academic, the user needs, aims and objectives, geographical location all factor in the nature of each library in the case studies. The libraries are: Material ConneXion in New York; Materia in The Netherlands; Materials Library in London; TechnoTextiles at the University of Technology Sydney (UTS). A period of critical reflection on these case studies, personal experience, and international peer discussion was used to inform the authors consideration of a future textile library and to ask the epistemological questions such as: what is the library's knowledge? How is the knowledge acquired? How do users then know what they know?

Case Studies

Through the examination of four case studies, the challenges of providing multimodal information were explored, noting that the written text retains its strength in communicating data that cannot be seen or felt accurately by handling the textile – for example: provenance; textile composition; production methods; environmental

and ethical criteria are provided by text. The difficulties inherent in an over-reliance on the internet are highlighted, where accuracy is questionable and verification necessary, although smart data links such as RSS (Rich Site Summary) feeds are very useful in allowing users to receive regular updates on new web content for specific sites. And in printed books, such as Technotextiles 2, the problem is keeping up with the pace of textile development. In the revised text Braddock Clarke explains how the intervening seven years have seen a profound change as many of the materials originally included were at prototype or research stage but have subsequently been developed to full production (Braddock Clarke, 2005).

While each library employs a multisensory experience, they do so in very different ways and to different effects. These case studies are covered below.

Case Study 1: Material ConneXion

Material ConneXion (http://www.materialconnexion.com/) is the best known commercial materials library with a head office in New York and smaller libraries in Milan, Cologne, Bangkok and Daegu. While the library collects a wide range of materials, textiles feature strongly. It is the brainchild of George M. Beylerian and is designed for ".. busy design professionals and companies seeking to better their products could benefit from learning about the latest material innovations". It began modestly but has expanded in structure and scope to meet the needs of its users.

Structure:

The library began with a physical office and database where visitors joining the library for a fee could log in remotely or on site. Staff and consultants around the world researched and gathered information and materials, with material manufacturers invited to submit samples and data to the library. Each month these materials are put before a panel of experts with selected materials included in the library. This was and remains an important part of the process to maintain a high standard and wide range of materials. The library also provides a consulting service for users, a quarterly publication and a series of books with worldwide distribution. The remote user access to the materials database has now been extended so that lectures in the form of webinars (web-based seminar) are now routinely delivered.

User:

The library set out to attract professional users and they remain in the majority. The reason is twofold. First, they are most able to afford the annual fee and secondly, they are of greatest interest to the designers and manufacturers donating information and data to the library. The library has now added a different business and access model for researchers in education, one that allows multiple and remote access to the library. The intention at the outset was that users would access information about materials and

then contact the manufacturers direct to place orders (G. Baylerian, personal communication, September 19th, 2002). The concern of some companies was that their close competitors were also members and viewing exactly the same materials. This resulted in the use of the library by these companies predominantly for styling, trend and inspirational purposes (Anon. Reebok employee, March 7th, 2003). The consulting services offered by the library allows for a 'bespoke' research service that is tailored to the needs of the particular client and exclusive to them.

User Experience:

The user experience is multimodal, in some instances by choice and in others (where dictated by geography) by necessity. Of Material ConneXion's distinguished client list, less than half are based in New York city, necessitating the need for remote access in addition to the physical library. The library must decide whether they will try to provide an online version of what is available on site, or to provide a different type of user experience. Moving images of material samples cannot directly replicate the sensory experience of handling, but what the online webcast can do is create a more interactive environment although it does have to be treated in a different way to live a lectures or seminar with wider implications for live presentations: "Video and live performances differ, not unlike spoken and written language. The video is on your permanent record, the lecture is here only for today. Might we see lecturing styles change to look better on the video, possibly to the detriment of the live performance?"

(Wolff, 2011).

Case Study 2: Materia

Materia (http://www.materia.nl/) describes itself as "an organization of, for and by architects". Based in The Netherlands, the commercial materials library collects, records, analyses and disseminates information about materials for architecture, interiors and design. Each month a jury selects twenty new materials for its collection. It was set up by architect Els Zijlstra who is also the Creative Director. The library includes a wide range of materials with textiles and hybrid materials featuring strongly. The fact that it started with an architecture bias has given the collection a distinctive identity.

Structure:

The Inspiration Centre is the hub of the organization where its materials collection is stored and can be handled by visitors. The library also offers consultancy, newsletters, publications and presentations as well as having an online presence. The web site offers its material database free of charge to its 60,000 registered users worldwide. The library and online presence is supplemented with an annual Material Xperience themed exhibition and keynote lecture series with expected visitor numbers of 9,500 (E. Zijlstra personal communication, February 10th, 2011).

User:

Architects, interior designers and other design professionals are the primary users of the Materia Materials Library. They acknowledge the need to provide useful information to researchers in these areas in order to continue to update their collection. Manufacturers supplying samples and data are provided with statistics on the visitor profile and numbers to their material page. The themed Material Xperience allows the manufacturers and researchers in architecture and design to meet. This is especially important for the area of technical textiles where many of the materials are made to order according to the user's technical and aesthetic specification. In this instance, it can be said that both the manufacturer supplying the materials and the architect/design professional are both users.

User Experience:

The haptic experience for the user is given less emphasis than the optic in the form of the online written database and accompanying images. The difference afforded by haptic versus optic perception is that "While touch yields knowledge about impenetrability and depth, the eye rapidly yields a sense of extension, through height and width" (Hubert, 2011). For the online user, the image quality is extremely high to provide not just aesthetic qualities but also technical data that is reinforced by the reading of the accompanying specification text or caption. Barthes disputes the notion of a civilisation of image and believes it more accurate to refer to a civilisation of the written

word. His reasoning for this is that speech and the written word are in fact a civilisation of writing, which in the form of the caption can be present in the image (Barthes, 1986).

Case Study 3: The Materials Library

The Materials Library (http://www.materialslibrary.org.uk/) houses several thousand material specimens that include textiles as a resource, laboratory, studio and experiment area. It is based at Kings College London and is in the process of relocating to Somerset House where it will be incorporated into the Institute of Making. It was established and is run by a multidisciplinary group of three people: Martin Conreen, Zoe Laughlin and Mark Miodownik. Their backgrounds are in sculpture, materials and art/design, engineering and material science. The member organization engages in both "scientific research and artistic practices that explore the senso-aesthetics of materials".

Structure:

The Materials Library is physically located in the heart of London as well as having an online presence. Interaction, collaboration, projects and workshops are largely dependent on live contact with results further disseminated online. It is geographically close to other organizations that it works with such as the Tate Modern and Victoria and Albert Museum. The approach to the materials themselves goes beyond the provision of visual, tactile ("senso-aesthetics"), composition and performance, and is driven by an innate curiosity as to how each material works and can be manipulated. The broadening of the area to the retitled Institute of Making reflects this philosophy.

User:

The users of The Materials Library are very broad, as their activities are directed to art and design audiences as well as to scientists, students and schoolchildren. Events in the form of workshops and lectures show a desire to encourage a deeper more sensory and intimate level of engagement with what are often highly scientific materials and processes. Titles for events run by the library include for example, 'The Materials Science of Pleasure' (2007),

User Experience:

Although the library has a physical and online location, much of its public engagement is outside of the conventional library setting. One example is the 'Essence of Fluorescence' exhibit, which is a "cabinet of curiosities" exploring the nature of fluorescent and phosphorescent materials. It was shown at the Hayward Gallery, London to accompany a major retrospective exhibition of artist Dan Flavin's work that focuses on fluorescent light. Visitors were not allowed to touch the artist's sculpture but the cabinet allowed them to handle and experience the material, affording visitors a chance both to understand the technology and appreciate at a deeper level the visual and tactile aesthetics of both artwork and the material itself. Reviewing the exhibition, art critic Adrian Searle notes how "..the reflected light gets soft and scented" (Searle, 2006) in Flavin's work. This affords the material a synaesthetic affect where one sensory and/or cognitive perceptions trigger a second sensory and/or cognitive perception.

Case Study 4: The TechnoTextiles Library

The TechnoTextiles Library is at the University of Technology Sydney (UTS). This is an experimental resource specifically aimed at tertiary researchers through user generated content.. It was set up by one of the paper's authors (O'Mahony) and is based on her own textile library built up over a period of fifteen years while she worked as a consultant in London. There are around one thousand advanced textiles in the library. The aim of the library is to provide first clients, and subsequently students, with materials that they could handle and gain a better understanding of weight, tactility, drape and visual characteristics. Specification sheets on the materials and other literature is available in the library with an online wiki site restricted to recording exhibitions and other events held at the library.

Structure:

The TechnoTextile Library (http://technotextilelibrary.wikispaces.com/) is designed to encourage an interactive experience for students alongside the collation and

assessment of data on the materials. A database is located on site with discussion currently under way as to whether to make this available online. One concern is that it might discourage students from coming to the library to handle the actual materials if they feel they can get the data online. A rotating exhibition schedule is curated and includes both professional and student work to reflect some of the most innovative developments in advanced textiles. Where manufacturers are showing work they are invited to give a lecture or run a one-day seminar. The emphasis is on multi-disciplinary practice so that fabrics in the collection are used in applications such as medicine, clothing, architecture, sports and product design.

User:

The users are from within the university and include staff, research and undergraduate students. Much of the use is project driven and for Fashion and Textile students it forms part of a course module in Year Three. Here the students use it as part of their lecture series on fibre, fabric and coating technologies in design before going on to set up their own materials database that inputs to the textile library. PhD and Design Masters students are based in the library using it as the centre for their own research.

User Experience:

The multimodal approach allows users to experience the textiles at a number of levels, from a basic introduction to more in-depth self-directed research. Smart and responsive materials can be demonstrated and discussed and experience first hand, for instance the lightness of metal fabrics and the fact that banana fibres do not smell of the fruit. These facts can be communicated verbally or in writing but it is in experiencing them that engagement grows exponentially.

Discussion

The users of the libraries differ greatly and the case studies have been specifically chosen to reflect this and allow for discussion on the differing challenges this brings. The term 'researcher' covers undergraduate and postgraduate students as well as

professional designers, engineers, manufacturers, authors and the textile manufacturers themselves. Each of these researchers will have different demands and expectations of the library. The user can be geographically remote from the library, which raises issues relating to the acquisition of tacit knowledge. In addition, the library must also have value for those who contribute to it. Unlike conventional book libraries, the material library does rely on the knowledge and generosity of those who produce the fabric to provide much of the content. While books and journals undergo an independent review and editing process, much of the information received from designers and manufacturers has not been verified in this way unless it has been issued with specific certification. The consequence of this is that it then falls to the librarian to perform the additional role of editor in the textile library.

All of these libraries are 'tethered' in the real world to a physical location, or to several locations for franchised libraries. They all make use of the web to complement the physicality, but not to replace it. This digital-physical relationship is, in the view of the authors, a pivot point with respect to examining the desirable attributes of future textile libraries.

Towards a future library

The case studies collectively provide an insight into how current practice tackles the options available when creating a textile library. The authors extended the knowledge of 'best practice' into a consideration as to how a future library might be. This returned the research to the question: as the number of textiles available continues to expand, how can physical material, image and text-based library techniques best be combined with the web and digital information to make it possible for colleges, public institutions and companies to keep a textile library resource up to date, economically?

A hint at a possible direction for digitized textile libraries is given by Dillon, Moody, Bartlett, Scully, Morgan and James (Dillion, et al, 2001), in their investigation of the Logitech Wingman mouse with FEELit® technology, in which a Feedback Mouse allows you "feel" items shown on the screen as the cursor moves over them, who have explored:

> "The interactive possibilities of fabrics within a virtual environment using a simple haptic device, a commercially viable computer [with].. the facility to set up some simple mechanical variables to represent some of the more obvious tactile impressions in fabrics, e.g. denim for its overall roughness, and corduroy for its repetitive bumps."

Although the Wingman Mouse is impressive, it is limited to a 1-dimensional tactile experience. This is mitigated to an extent by the possible integration with a 3D computermodel, but the full range of tacit knowledge transfer is restricted.

In considering a future textile library, the authors returned again to the epistemological questions: what is the library's knowledge? How is the knowledge acquired? How do users then know what they know? The authors considered that existing libraries and websites were already effective at communicating explicit knowledge: facts, figures and examples of use. Tacit knowledge also resides within physical samples that impact on all human senses – for a remote web library this is a substantial technical hurdle. But also challengingly, tacit knowledge resides among users' experiences and expertise as well as in the library that is browsed. So the acquisition and sharing of knowledge between users becomes critical. In a remote context, the web is well suited to fostering communities where this can happen by using social networking, blog or wiki systems to set up dialogue, narrative, rhetoric, etc. This works better in many cases, or at least more continuously, than a physical context where users are less likely to 'bump' into each other except during organised events. Critical to the users knowing what they know is the use of feedback to test, challenge and reinforce their knowledge. Feedback may be by posting up their thoughts, or ideally through a dialogue with others to assist in self-awareness of new knowledge. There are already some specialist web-orientated libraries that are useful, such as Earth Pledge consulting's embryonic sustainable library (www.earthpledge.org).

Bearing in mind the epistemology, to address both tacit and explicit knowledge transfer in the context of digital-physical hybridization of content, and on the basis of web-access, the authors of this paper consider the following attributes to be essential in the future: remote material 'presence'; user contribution, authorship and editing; a

knowledge pool or creative commons; and facilitation of project collaborations. These are outlined below.

Remote material 'presence'

The ability for users to fully explore physical materials without being present. It raises intriguing questions such as how users can 'file share' a physical object, and whether there is potential in combining with local rapid prototyping such as offered by Freedom of Creation (www.freedomofcreation.com) to 'magic up' the material, or to make use of virtual reality other advanced technological means of engaging with the senses.

User contribution, authorship and editing

The ability of users to contribute, edit and shape the library. Adding their projects, editing entries, personal and project experience. Effectively a Wiki, blog or social network type approach.

Knowledge pool or creative commons

Tapscott and Williams (Tapscott & Williams, 2010) see the wiki and open source software models as being the future in this area. They argue that this can work even in a commercial context, citing MIT's free availability of all course documentation online and IBM's open source project, where most information is free and some can be traded for other knowledge.

Facilitation of project collaborations

Project collaboration is an excellent way of facilitating tacit and explicit knowledge exchanges. Web tools are making this possible now on a remote basis, and even involving very large numbers of contributors. Examples include IBM's Smarter Cities Program (www.ibm.com/smarterplanet/us/en/smarter_cities/cities/index.html) and car design by local-motors (www.local-motors.com).

The net effect of these additions is to steer a future library in the direction of remote, large scale collaborative working for research and applied projects. It offers the possibility of pooling knowledge across multiple locations with a creative commons (flexible copyright model where some elements are shared and others restricted).

Conclusion

Experimental/hands on multimodal information approaches already exist that allow textile materials libraries to be comprehensive and accurate resources for researchers to draw upon. Innovative physical design and remote digital websites further enhance such libraries.

A multimodal library will offer the qualitative advantages of 'crosstalk' when the user is engaged with the content. In other words, the user's cognition will be complex when several sources of information are present. For example, tactility is not purely restricted to the haptic and it can be induced in a synaesthetic way, or otherwise achieve a cognitive understanding. For example, with painting; in his book "The senses of touch", Paterson (Patterson, 2007) refers to Bernhard Berenson's Florentine Painters of the Renaissance of 1896:

   "The essential in the art of painting.. is somehow to stimulate our consciousness
   of tactile values, so that the picture shall have at least as much power as the object
   represented, to appeal to our tactile imagination."

Through reflection on their research, the authors' criteria for a future textile library emerged from seeking to answer epistemological questions, leading to the authors' derivation of the essential attributes that have been described in this paper for a future textile library, namely: remote material 'presence'; user contribution, authorship and editing; a knowledge pool or creative commons; and facilitation of project collaborations.

A subsequent stage in this research will be to take the findings and apply them to a textile library, studying the benefits to users through observation and feedback questionnaires. The results of this will be used to modify and rank the attributes put forward in this paper.

Whatever technology and methods are embraced, the main challenge for textile libraries is to work successfully in an 'untethered' format that harnesses the contributions of the users and works well remotely even if there is still a physical base.

References

Barthes, R. (1986). *The Responsibility of Forms – critical essays on music, art and representation*. New York, Hill and Wang.

Braddock Clarke, S.E. & O'Mahony, M. (2005). *TechnoTextiles2: Revolutionary Fabrics for Fashion and Design.* London, Thames and Hudson.

Brand R. (1964). *Measurement of Fabric Aesthetics: Analysis of Aesthetic Components.* London, Textile Research Journal, (34) (791).

Dillon P., Moody W., Bartlett R., Scully P., Morgan R. & James C (2001). *Sensing the fabric: to simulate sensation through sensory evaluation and in response to standard acceptable properties of specific materials when viewed as a digital image. Haptic Human-Computer Interaction*. Lecture Notes in Computer Science, Volume 2058/2001, 205-218, DOI: 10.1007/3-540-44589-7_23.

Forrest, D.R. (1995). *The Future Impact of Molecular Nanotechnology on Textile Technology and on the Textile Industry*. Discover Expo '95, Industrial Fabric & Equipment Exposition. Charlotte; North Carolina. (17-18).

Fox, P. (ed), (1986). *Treasures of the Library*. Dublin, Trinity College Dublin & the Royal Irish Academy.

Hubert, C. (2010). Studio website. Retrieved, 30th January 2011. http://christianhubert.com/writings/index.htm

Jones, M.G. (2005). *A Comparison of Learning with Haptic and Visual Modalities*. Haptics-e. The Electronic Journal of Haptics Research, Volume 3, 2003 – 2005 (2).

NANO (2010). Nanotechnology and textiles. Institute of nanotechnology; 05 January 2010 NANO Magazine - Issue 9. http://www.nano.org.uk/articles/28/ ; last accessed 6th April 2011.

Oppenheimer, F. (1972). *The Palace of Arts and Science: An Exploratorium at San Francisco*. San Francisco, Leonardo.

Paivio, A. (1971). *Imagery and verbal processes*. New York, Holt, Rinehart, & Winston.

Patterson, M. (2007). *The senses of touch*. Oxford, Berg (85).

Russell, B. (1918). *Knowledge by Acquaintance and Knowledge by Description. Mysticism and Logic and Other Essays*. London, George Allen & Unwin, (209–232).

Searle, A. (2006). *Strip Tease.* Exhibition review in The Guardian, 24th January 2006. http://www.guardian.co.uk/culture/2006/jan/24/3 Retrieved, 30th January 2011.

Sweller, J. (2001). *The Redundancy Principle in Multimedia Learning. The Cambridge handbook of multimedia learning*. Richard E. Mayer (ed.), Cambridge (UK), Cambridge University Press.

Tapscott, D., Williams, A.D. (2010). *Macrowikinomics: rebooting business and the world*. Portfolio, New York, Penguin.

Wolff, J. (2011). *Will video kill the lecturing star?* The Guardian. 18th January 2011. Retrieved, 18th January 2011 http://www.guardian.co.uk/education/2011/jan/18/lectures-higher-education-jonathan-wolff

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Social Tagging as a Knowledge Collecting Strategy in the Engineering Design Change Process

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Abstract

The paper's focus is on the analysis of the feasibility of using social tagging as a tool for knowledge collecting and retrieval, in the context of the Product Development Process. This process is a social activity which involves groups of individuals that share a common goal: "to design a product". Traditional Knowledge Base Systems are not very well suited to capture the tacit knowledge that embeds this process. Social tagging is proposed in this paper as the mechanism to externalize the tacit knowledge about the best CAD modeling strategies between the design team members. This knowledge is especially relevant for the management of "Engineering Change Orders" because this process is very related to the modeling methodology used to create the 3D CAD models, that have to be adapted to accomplish a specific design modification. In order to analyze the feasibility of this approach, an experimental study has been conducted to understand the tagging process in this context and the benefit of using this information in the modification procedure of 3D CAD models. Preliminary experimental results show that tagging represents a feasible approach to support knowledge collecting about best CAD modeling practices.

Keywords

Social tagging process; Tacit knowledge; Product development process; Engineering change order; Folksonomy;

Introduction

The paper's focus is on the analysis of the feasibility of using social tagging as a tool for collecting and retrieval of design knowledge, in the context of the Product Development Process (PDP). It is based on a social tagging approach where design engineers play a role as taggers. This work is part of more general research, oriented to create the infrastructure needed to integrate elements from Product Life-cycle Management (PLM) systems, Knowledge-Based Engineering (KBE) systems and social computing applications.

We have being specifically analyzing the tagging procedures when the 3D CAD model of a product is modified due to an Engineering Change Order. In this context, we formulate three main specific questions: Is it possible to use "the social tagging process" as an engineering knowledge collector tool? How could this kind of technology be used by design engineers in a real PLM environment? Could unstructured metadata (tags) help to find relevant knowledge to support design decision-making?

In the remainder of this paper, we look for answers to the previous questions, proposing at the end of the paper an outline of the conceptual design of an information model to support Product Life-cycle Management and Knowledge-Based Engineering systems and social computing applications. This model extends the previous work by Titus, Subrahmanian, & Ramani (2007) that is based on three elements: the tagged object, the identity (person that tagged the object) and the metadata (tags or comments about the object). We consider it important to add the "product information" to this model as a complementary component that is relative to the tagged object (CAD model or modelling procedure) to perform the knowledge retrieval process. This means that the implicit knowledge content in the tag/commentary is only understandable under certain product information context. Additionally, a new attribute with the explicit time when a tag is created or used provides an operational framework for the integration of the tagging process in a PLM system.

An experimental study has been conducted to obtain data about some tagging issues: For example, how often the polysemy or synonymy appears? What different kinds of tag-to-resource association are there? (Marchetti, Tesconi, & Ronzano, 2007).In this experience, graduate and postgraduate engineer design students have participated through a series of CAD modeling exercises.

The Product Development Process can be considered a social activity because it involves groups of individuals that share a common goal: "to design a product" (Bucciarelli, 1996), and where they take decisions together involving negotiation (Sosa & Gero, 2004). Collaborative tagging describes the process by which many users add metadata in the form of keywords to shared content and knowledge. This work considers that it is possible to use this technology as a dynamic knowledge collector, providing an interesting alternative to the conventional Knowledge Based Systems (KBS). Dijoux (2010) notes in his blog that in the social technologies systems "there is no intimidating corporate template to follow, no complicated knowledge management system to master or network share drive taxonomy to remember. Folksonomy and social bookmarking have offered a new way to categorize the information. It helped in making the information easy to index and find afterwards".

In order to make the "social tagging process" interoperable with traditional Knowledge-Based Engineering is necessary to use some standard based on a Resource Description Framework (RDF) such as Annotea (Kahan, 2002). With this aim we outline a new information model to use social bookmarking as an engineering knowledge collector in the Product Development Process. In this way it is possible to integrate a tagging process in a structured procedure.

In conclusion, the main goal of the present work is to clarify the possibility to create a new friendly, dynamic and cheap way to capture relevant knowledge in the complex environment of engineering design based on a social tagging approach.

In the next point related work about this topic is presented. Then the Product Development Process is analyzed from different points of view. The experimental work for analyzing the tagging creation process and its later use is detailed, providing the corresponding results and discussion. Finally future work and conclusions are presented.

Related Work

Knowledge-based organizations such as engineering design firms have to exploit all their resources to maintain a sustainable competitive advantage. One of their assets is the tacit knowledge, always present in any kind of organization. Tacit knowledge in this paper refers to the joint reasoning behind tradeoff decisions in product design processes, such as in computer aided design and the design intent implicit in it. However, managing this kind of knowledge in an efficient and simple way, in the context of the Product Development Process, is a great challenge.

Semantic annotation has emerged in recent years as an important research area. Semantic annotation of textual and multimedia contents enables a better analysis, retrieval and exchange of digital contents globally. Research studies on the application of semantic annotation in design engineering have recently started to capture the attention of researchers.

There are some research works about using annotations in 3D environments. For example Ding, Ball, Matthews, McMahon, & Patel (2009) talk about 3D annotations in light weight CAD formats to transfer knowledge but they did not use standard models for data interchange on the Web such as Resource Description Framework (RDF) or the Web Ontology Language (OWL) for authoring ontologies. Hunter & Gerber (2010) use annotations to capture knowledge about 3D representations of museum pieces. Shape Annotator, developed by Attene, Robbiano, Spagnuolo, & Falcidieno (2009) used Web Ontology Language to create annotations in surface models and proposed that is possible to use this technology in Product Design. Catalano, Falcidieno, Attene, Robbiano, & Spagnuolo (2008) performed annotations about geometric properties on a three dimensional car model using a car aesthetic ontology.

There are some examples of the application of semantic technology in the engineering design process. For example, Szykman, Sriram, Bochenek, Racz, & Senfaute (2000) propose the need to use a functional taxonomy to aim the management of knowledge into product design repositories. Au & Yuen (2000) proposed a linguistic approach to create sculptured models, and showed taxonomic relations between three levels of extractions at object level, feature level and geometry level. Fu (2003) attempted to extract features from a data exchange product model using a taxonomy, which defines relationships between design features and manufacturing features for feature identification in CAD models.

Traditional Knowledge Capture

Static Knowledge Capture: Knowledge Based Systems

In recent years Knowledge Based Systems (KBS), which are based on ontologies, have been used in the product development process to support manufacturing and design decisions. In general the capture of a company's Product Development Process knowledge is based on the collection of design rules and engineering expertise (e.g. best practices), which will serve as the corporate knowledge base or design rules database portion of the KBS. For example, the design rules can be applied in any combination of: if-then-else, regression, look up tables, database or web links. The end result is a simple-to-use interface that provides endless product combinations that do not have to be designed from scratch. The end user (e.g. CAD engineer designer) has the ability to add or delete rules and component parts from the database in accordance with corporate engineering changes. Once the rules are part of the KBS content, they become static knowledge. In conclusion, the structured approaches of ontologies, taxonomies, and databases are rigid and suitable for representing the static objects of a domain in a design scenario.

Dynamic Knowledge Capture: Practitioners Point of View

However, there are alternatives to conventional Knowledge Based Systems. Shilovitsky (2009) supports the idea of incorporating the concept of folksonomy by CAD/PLM vendors. Vander Wal (2004) defined folksonomy as the result of personal free tagging of information and objects (anything with a URL) for one's own retrieval. The tagging is done in a social environment (usually shared and open to others). Folksonomy is created from the act of tagging by the person consuming the information. This approach is potentially very interesting because lost knowledge inside the organization still is as an important issue due precisely to the rigidity of conventional Knowledge Based Systems. As Dijoux (2010) notes it is easier and less intimidating for knowledge workers to capture knowledge on collaborative platforms (wiki, blogs, forums etc...) than using text documents and knowledge management systems. These simple tools can break one of the biggest barriers to successful knowledge management that is staff members' complaints that they do not have enough time to do knowledge management (Lugger & Kraus, 2001). Besides, these tools are well adapted to the fact that knowledge transfer is in essence is a social activity (du Plessis, 2008), where one person shares knowledge with one or more individuals through one or more channels. Precisely, opening simple and effective new channels of knowledge transfer is one of the goals of this research work.

Social Product Development Process

PDP as Social Activity

The product design process is a creative social process involving teamwork in which each individual with varied and shared expertise contributes to the common goal of designing a product (Bucciarelli, 1996). This procedure involves negotiations and interactions between different stakeholders. In addition, language and representations used and generated (e.g. 3D CAD Model) during the product development process themselves evolve over time (Subrahmanian et al., 2003) . Effective computer based support of the product design process (e.g. PLM systems) requires a robust product design representation schema, facilitation of collaboration and communication, design retrieval and re-use, and knowledge sharing. Knowledge sharing requires a shared design representation schema and a shared design language as enablers.

The design decisions are made, as individual or as teamwork tasks; but the ability to change the product becomes increasingly limited. At the beginning the designer has great freedom because few decisions have been made and limited financial resources have been committed. But by the time the product is in production, any change requires great expense, which limits freedom to make changes. Thus, the goal during the design process is to learn as much as possible, as early as possible about the evolving product in such a way that majority of changes are performed during the early phases of the product design lifecycle.

Organizational design knowledge and its sources are spread across the organization. Creating an infrastructure to build and maintain this knowledge should be a process that not only identifies important sources of information, but one that also collects, indexes, organizes, makes accessible for mutual participation and understanding this knowledge in organizational memory. It should also store how individuals arrive at a shared understanding of the problem and how they make decisions (Monarch et al., 1997).

Other Web Examples

The main CAD and PLM industry software providers are progressively integrating the social web technologies paradigm in their commercial platforms, in order to capture

and transfer data and knowledge during the product development cycle process. Some examples are: Dassault Systems and blueKiwi Software are collaborating to develop a platform that helps manage secure social networks with partners, customers and colleagues. Their software integrates familiar Web 2.0 services, such as wikis, blogs, forums, RSS and tagging (Dassault Systems, 2010). Other important CAD provider such as Autodesk, has developed a web portal where it provides access to different Web 2.0 tools such as blogs, forums, wikis, users communities (social networks) and so on. The main idea is to give the Autodesk Software users the opportunity to exchange ideas and knowledge about the most common issues to improve the CAD learning process (Autodesk, 2011). Social Product Development is a project of PTC (Parametric Technology Corporation, 2011) that includes tools such as content tagging, filtering, and activity feeds that will automatically disseminate relevant knowledge, instantly, to product communities and "communities of practices" (self-forming groups united by shared professional interests).

The tagging process in the context of the Product Development Process

Information Model Proposal: High Level Model

The annotation (folksonomy) representation proposed in this research, is a flat namespace consisting of four entities: the identity of the user doing the tagging, the information object being tagged, and the tags or metadata used for labeling the object (i.e. the namespace is <identity, object, metadata>). These three elements of the representation are based on Titus et al. (2007). We added in our model a new element named "Product Information", associated to the CAD model. A diagrammatic representation of the folksonomy is shown in Figure 1.
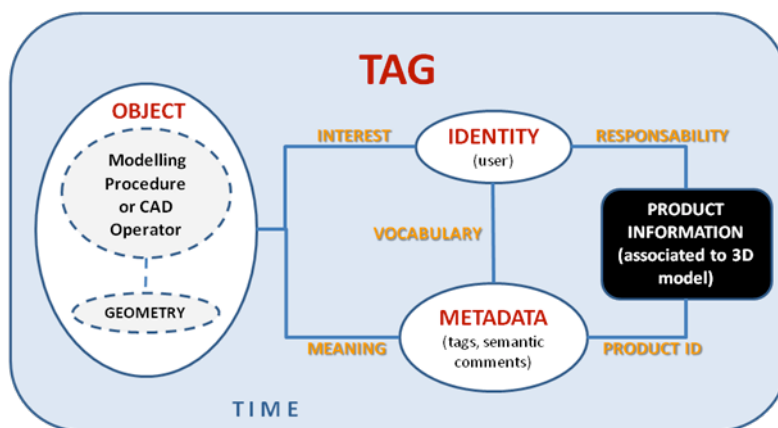
Fig 1. High Level Information Model for tag in a PLM Environment

This tag model is designed to support its integration on a Product Lifecycle Management (PLM) system. It requires including a time stamp in order to associate tags with the corresponding developmental stage (Titus et al., 2007). Tags are used to categorize the information about the design intent that many times is not made explicit. This categorization is related specifically to the context of a product defined by the product information element of the model.

Experimental Stage

Social Tagging/Annotations in 3D CAD Models

This experiment was designed to investigate how design annotations are made during the engineering change process by design engineers. Our research focus is expressed through the main hypothesis statement:

H1.- When an information resource is tagged (by engineering designers) during the engineering design change process, it is possible to find the most common tagging patterns (human behavior) inherent in the Social Tagging Systems.

The features considered in this study are described in Mathes (2004) and Titus et al. (2007). In this experiment, a group of postgraduate students from Universitat Politècnica de València (Spain) was involved. Most of them had real experience modelling products in CAD software. The students received the descriptions of two similar design problems in order to reduce the manufacturing cost of the piece through the modification of the 3D model. After they received this information, they were asked to describe the solution of both problems by using only five keywords.

With this experiment we tried to identify some tagging behavior from a group of engineers that share the same idea about a specific design problem. In the same way, we tried to limit the participants' possible vocabulary by using a reduced set of keywords. For this experiment the "solution-process" was the metadata resource that was tagged by the users (students). Afterwards we analyzed some tagging-process features described in Mathes (2004) and Titus et al. (2007). The summary of the tagging procedure features that were found in the data collected from the experiment are shown in tables 1, 2, 3 and 4.
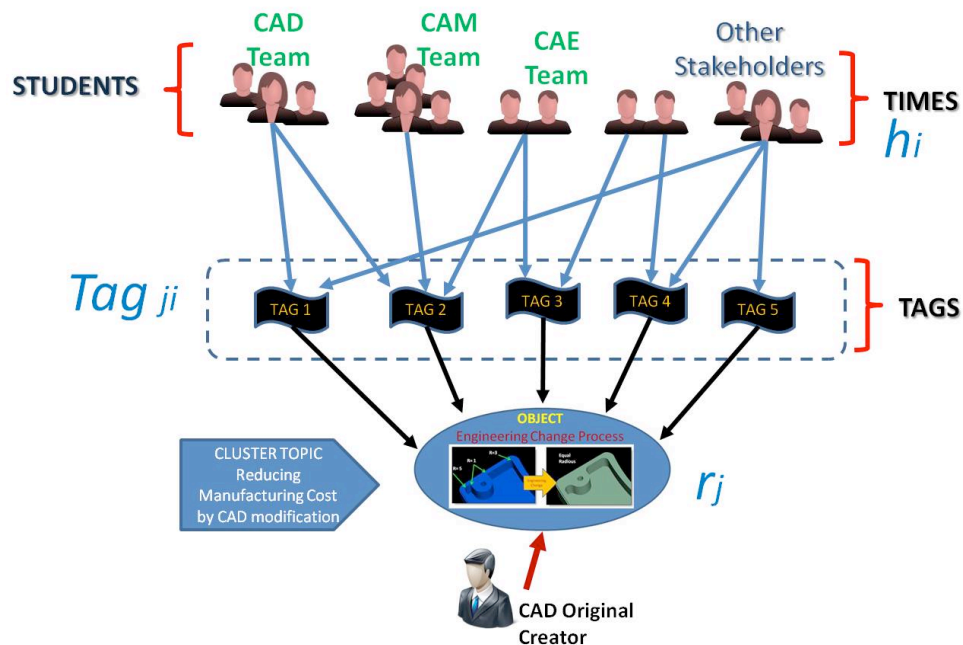
Fig 2. Experimental Tagging Process

Experiment: Productivity Improvement by Using Social-Annotations Experience.

The objective of this second experiment was to investigate how design annotations influence the user performance during the engineering change process. This was performed before analyzing the dynamics of the social annotation process, because we had to assure that the availability of these annotations provides an added value to the CAD models.

Our research focus is expressed through the following hypothesis:

H2: CAD operators, using annotated models where original design intent is made explicit, are more efficient dealing with CAD model modifications.

In this context, efficiency is related to the time used by CAD users, when they have to perform a change in the 3D geometric model to accomplish an engineering change order.

From our perspective, if the design intent information is made explicit by means of these annotations, the corresponding CAD models will be created with better semantic quality, following the product data quality model by Contero et al. (2002). Our vision is that this annotation process can be performed following the behavior of social networks, where knowledge associated to the CAD modeling process is made explicit by the collaborative annotations performed by design engineers.

For the experiment, an undergraduate level class from a CAD course of La Laguna University (Spain) was split into two groups, one experimental and one control group. The experimental group received a CAD file with additional comments (equivalent to tags). This comments were implemented using the engineering notes functionality of Autodesk Inventor, that was the CAD system used in the CAD course. The control group received the same CAD without any comments. Students were given a maximum of 50 minutes to complete the required modifications. They had to write down the initial time and the final time for each model modification. In this experiment, the time was considered as the dependent variable.

The sample size used in this experimental study follows the Polkinghorne (1989) and Meyer and Booker (1991) recommendation to include between five and twenty designers for an exploratory phenomenological study. It is important to note that participants showed a homogenous level of knowledge of the CAD system (basic training) and they followed the instructions correctly. So this group could be considered as a homogeneous sample to apply statistical analysis.

Experimental Results

Tagging Process Analysis

In the experiment data collection, we recorded the most common features that were present during the tagging/annotation process. An attribute set is composed by the most frequent combination of tags related to the same concept. The summary of the findings are shown in the following tables.

Attribute and its frequency			Attribute description
ATT1	same, equal	12,90%	The problem/solution is a process that is relative to geometric unification/standardization/homogenization.
	standard, standardize	4,70%	
	standardized-measures	1,20%	
	homogenize	3,50%	
	unify	8,20%	
ATT2	radius	10,60%	The problem/solution is relative to the part's rounds
	rounds	3,50%	
ATT3	tools, tooling	9,40%	The problem/solution is relative to something about the tools used in the manufacturing process
ATT4	machining	3,50%	
	manufacturing	1,20%	
ATT5	reduce	1,20%	The problem/solution is relative to reduce something in the process
	decrease	3,50%	
	minimize	1,20%	
	number of words: 14	64,60%	14 words represent 64.6% of total words (34) used by the participants

Table 1 Topic Clustering and Attributes First Experiment-Exercise 1

Attribute and its frequency			Attribute Description
ATT1	reduce, reduction	12%	The problem/solution is relative to reduce parameter's value of the geometry
	decrease	3%	
ATT2	radius, radii	9%	The problem/solution is depends on the rounds of the geometry
	rounds	7,50%	
ATT3	overlap, overlaps	7,50%	The problem/solution is relative to geometry/tooling interferences
ATT4	standardize	6%	The problem/solution is relative to the tool dimensions must use a standard diameter
	standard	1,50%	
ATT5	tool, tools	9%	The problem/solution is relative to the manufacturing process
	number of words: 12	56%	14 words represent 56% of total words (34) used by the participants

Table 2 Topic Clustering and Attributes First Experiment Exercise 2

Analyzing the results summarized on the previous tables, we see that in an engineering change problem context, the users (designers) tagged the information resources in the same way as for example metadata tagged in the Web. For instance: from our experiment we can say that a "manufacturing cost reduction by CAD modification" issue (cluster topic), could be identified (knowledge retrieval) by using five attributes defined by using only 14 words under the design-problem context (tables 1 and 2). In addition, we observed that the patterns like polysemy or synonymy (definitions and examples on table 3) are present. Thus for potential developments of Social Tagging Systems in a CAD environment, it is necessary to consider including (as part of the system) elements that check these two patterns and others shown in the tables, in order to avoid inconsistencies during the knowledge capture and retrieval.

General Features of Collaborative Tagging System		
Feature Description	Present in the Experiment?	Examples
Polysemy: the same word can refer to different concepts	Exercise 1 = YES Exercise 2 = YES	Exercise 1 = unify Exercise 2 = standardize
Synonymy: different words that refer to the same concept	Exercise 1 = YES Exercise 2 = YES	Exercise 1 = radii = rounds Exercise 2 = reduce = decrease
Different kinds of tag-to-resource association: Implicit kinds of relations that link a tag to a specific resource ("interesting" expresses an opinion on the resource, "car" expresses the topic of the resource and so on)	Exercise 1 = NO Exercise 2 = NO	Exercise 1 = n/a Exercise 2 = n/a
Different levels of precision: the specificity of the word chosen to tag a resource ("jazz" is more specific than "music")	Exercise 1 = YES Exercise 2 = YES	Exercise 1 = "reduce" is more specific than "minimize" Exercise 2 = "diameter" is more specific than "rounds"
Different lexical forms : the same concept can be referred to by different noun forms, for instance plural nouns ('car'/'cars')	Exercise 1 = YES Exercise 2 = YES	Exercise 1 =tool, tools Exercise 2 = standard, standardize
Tag convergence. After a certain amount of time the number of tags given to a resource stabilizes as the relevant categorizations are made and the most common words for those categorizations become the majority.	Exercise 1 = YES Exercise 2 = YES	Exercise 1 =same, equal, radii, tools and tooling, are keywords that represents the tag converge of 33% of the keywords used. Exercise 2 = reduce, reduction, radii, rounds, overlap, overlaps, standardize, tools, are the keywords that represent the tag converge of 51% of the keywords used.

Table 3 Tagging Process Analysis Results (General Features)

Keywords	Times	Keywords	Times	Keywords	Times
geometry	1	modification	2	part	1
radii	9	no-changes	1	minimize	1
single-tool	1	reduce	1	one	1
equal	11	tools	7	commercial	1
standard	4	interior	1	facilitate	1
standardized-measures	1	manufacturing	1	economy	1
unify	7	decrease	3	time	2
optimization	3	selection	1	unique	1
simplification	5	operations	1	symmetry	1
homogenize	3	normalize	1	machining	2
saving	2	diameter	1	Participants	21
rounds	3	use-same-tool	1	Total Keywords	34

Table 4 Resource Representation Exercise 1

Productivity improvement

The results with the second experiment showed that there is a significant difference between control and experimental groups. The results of those statistical tests are shown in table 5. While the control group completion time was greater than of the experimental group, in this case the results were statistically significantly different. Results support that the use of annotations can help to improve the CAD designer performance during engineering change process.

Second Experiment	Time (minutes)					t	Significance
	Control Group	SD	Experimental Group	SD	Time Difference Minutes (%)		
Exercise A	37	8.2	28	7.3	9 (37%)	-2.243	0.045
Exercise B	8	3.5	5	2.8	3 (24%)	-2.165	0.046

Table 5 Statistical t analysis for second experiment

Future Work

One of the most important limitations of this research work relates to the sample size of the CAD users that participated in the experiments. The sample size was small as this pilot study, being exploratory in nature, was intended to give us suggestions for more extensive studies in the future. More studies are to be conducted with larger groups of participants (experiment 2) and with multicultural groups of designers that are spread over different countries (experiment 1). Another factor that could be a limitation is the users' expertise. The undergraduate group cannot be considered to be composed of expert CAD engineers, but it offers a homogenous composition. In the future, it is expected that participants in the experiments will be post graduate students or CAD instructors. We think that working with more advanced CAD users will allow us to propose more complex modifications in the 3D CAD models that will make more evident a different behavior with respect to modifications completion time, when users work with tagged or annotated CAD models.

Future work will be focused on mitigating some of these limitations mentioned above. The first stage is expected to be carried out during the first semester of 2011, in collaboration with Instituto Tecnológico y de Estudios Superiores de Monterrey (México). The second stage will consist of redesigning the experiments applying all the expertise obtained during the previous work. The goal of these actions is to obtain more conclusive results during the next experimental round.

Another future work will be to design an experimental stage in order to test the tags-based information retrieval process.

Conclusions

In this paper we have explained the main findings when social annotations/tagging are used to collect the design intent during an engineering change process (experiment 1). The results show that this tagging process behaves in a similar way to other tagging processes performed by Internet users. This means that is necessary to include filtering units to eliminate issues like synonymy, polisemy or others when a CAD model is tagged. The results in experiment 2 show that annotations have a positive impact on the required time to complete an engineering change order (ECO) procedure. This means an increased productivity. The observed time reductions are about 10-20%. These preliminary results support the idea that social tagging/annotations could be used as a knowledge collector tool, well adapted to the dynamic environment of the Product Development Process.

References

Attene, M., Robbiano, F., Spagnuolo, M., & Falcidieno, B. (2009). Characterization of 3D shape parts for semantic annotation. *CAD Computer Aided Design*, *41*(10), 756-763.

Au, C. K., & Yuen, M. M. F. (2000). A semantic feature language for sculptured object modelling. *Computer Aided Design*, *32*(1), 63-74.

Autodesk-community. (n.d.). Retrieved January 31, 2011, from http://usa.autodesk.com/adsk/servlet/index?id=7460177&siteID=123112

Bucciarelli, L. (1994). *Designing engineers*. Design Studies, The MIT Press: Cambridge, MA.

Catalano, C. E., Falcidieno, B., Attene, M., Robbiano, F., & Spagnuolo, M. (2008). Shape knowledge annotation for virtual product sharing and reuse. *Proceedings of the 9th Biennial ASME Conference on Engineering Systems Design and Analysis*. Haifa: ASME.

Cochrane, S. D., Case, K., Young, R. I., Harding, J. A., & Dani, S. (2005). Knowledge-Based Intelligent Information and Engineering Systems. In R. Khosla, R. Howlett, & L. Jain (Eds). *Knowledge sharing between design and manufacture*. (pp.221-227). Berlin: Springer.

Contero, M., Company, P. (2002). Product data quality and collaborative engineering. *IEEE Computer Graphics and Applications*, *22*(3), 32-42.

Dassault Systèmes. (2009, June 22). Dassault systèmes and blueKiwi software: A joint vision of social innovation. *Dassault Systemes Press Releases*. Retrieved December 22, 2010, from http://www.3ds.com/company/news-media/press-releases-detail/release//single/2156/?no_cache=1

Dijoux, C. (2010, January 11). *How enterprise 2.0 fosters knowledge capture hypertextual*. Retrieved August 29, 2010, from http://ceciiil.wordpress.com/2010/01/11/knowledge-capture-enterprise-2-0/

Ding, L., Ball, A., Matthews, J., McMahon, C., & Patel, M. (2009). Annotation of lightweight formats for long-term product representations. *International Journal of Computer Integrated Manufacturing*, *22*(11), 1037-1053.

du Plessis, M.(2008).What bars organisations from managing knowledge successfully? *International Journal of Information Management*, *28* (4), 285-292.

Fu, M. W. (2003). An approach to identify design and manufacturing features from a data exchanged part model. *Computer-Aided Design*, *35*(11), 979-993.

Hunter, J., & Gerber, A. (2010). Harvesting community annotations on 3D models of museum artefacts to enhance knowledge, discovery and re-use. *Journal of Cultural Heritage*, *11*(1), 81-90.

Kahan, J. (2002). Annotea: An open RDF infrastructure for shared web annotations. *Computer Networks*, *39*(5), 589-608.

Lugger, K.M., Kraus, H. (2001). Mastering the human barriers in knowledge management. *Journal of Universal Computer Science*, *7*(6), 488-497.

Marchetti, A., Tesconi, M., & Ronzano, F. (2007). SemKey: A semantic collaborative tagging system. *Proceedings of the WWW 2007 Tagging and Metadata for Social Information Organization* (pp. 8-12), Banff.

Mathes, A. (2004). *Folksonomies - cooperative classification and communication through shared metadata.* Retrieved June 25, 2010, from University of Illinois Urbana-Champaign, Graduate School of Library and Information Science Web site: http://www.adammathes.com/academic/computer-mediated-communication/folksonomies.html .

Meyer, M. A., & Booker, J. M. (1991). Eliciting and analyzing expert judgment: A practical guide. San Diego: Academic Press.

Monarch, I., Konda, S. L., Levy, S., Reich, Y., Subrahmanian, E., & Ulrich, C. (1997). In Bowker G., Star S. L., Turner W. and Gasser L. (Eds.), Mapping sociotechnical networks in the making, social science. *Technical Systems and Co-operative Work: Beyond the Great Divide* (pp. 332-350). Mahwah: Lawrence Erlbaum.

Parametric Technology Corporation. (n.d.). PTC – collaborative product development – online project management Retrieved January 1, 2011, from http://www.ptc.com/solutions/processes/social-product-development

Polkinghorne, D. E. (1989). Phenomenological research methods. In R. S. Valle, & S. Halling (Eds.), *Existential-phenomenological perspectives in psychology* (pp. 41-60). New York: Plenum.

Shilovitsky, O. (2009, March 3). Does folksonomy work for PLM? « daily PLM think tank blog. Retrieved January 1, 2011, from http://plmtwine.com/2009/03/03/does-folksonomy-work-for-plm/

Szykman, S., Sriram, R. D., Bochenek, C., Racz, J. W., & Senfaute, J. (2000). Design repositories: Engineering Design's new knowledge base. *Intelligent Systems and their Applications,* 15(3), 48-55.

Sosa, R., & Sosa, R. (2004). A Computational Framework for the Study of Creativity and Innovation in Design: Effects of Social Ties. In J. Gero (Eds.), *Design Computing and Cognition* (pp. 499-517). Kluwer Academic Publishers. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.94.8725&rep=rep1&type=pdf

Subrahmanian, E., Monarch, I., Konda, S., Granger, H., Milliken, R., & Westerberg, A. (2003). Boundary objects and prototypes at the interfaces of engineering design. *Computer Supported Cooperative Work (CSCW)*, 12(2), 185-203.

Titus, N., Subrahmanian, E., & Ramani, K. (2007). Folksonomy and designing: An exploration. Proceedings of the ASME 2007 International Design Engineering Technical Conferences & Computer in Engineering Conference IDETC/CIE 2007 (pp. 821-829), Las Vegas: ASME.

Vander Wal, T. (2004) Folksonomy Coinage and Definition. Retrieved March 15, 2011 from http://vanderwal.net/folksonomy.html

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Innovation in Knowledge Exchange: An approach to the dissemination of research findings in support of design practice

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Abstract

The ability to embody design intentions is critical to an industrial designer's studio practice. These design embodiments support both the exploration of the design problem and the emergence and communication of solution ideas. From the ever present design sketch through to 3D computer aided design and rapid prototyping technologies, an increasing variety of digital, analogue and hybrid design tools are employed in the embodiment of design proposals during practice. A literature review identified existing studies of the implicit characteristics of tool use during design activity. These characteristics where employed in the design of a survey study. The survey took samples from two distinct groups, industrial design practitioners and students. A total of 244 designers; 138 practitioners and 106 students, were surveyed. Findings indicated a tendency for student design activity to be characterised by strong convergence and less exploration, leading to early fixation and attachment to concept. This was in contrast to practitioner responses suggesting a more open, divergent and iterative approach. A concern for conventional research dissemination, articulated through conference papers and academic journals, to engage a practice orientated audience lead to the development of a digital resource (IDsite) to disseminate the survey findings. Work on the digital resource is ongoing; however the paper describes an interim pilot of the resource with a small sample of design practitioners. Findings suggest that, although the resource requires further development in terms of the presentation of information, practitioners consider the approach to be of relevance to the profession.

Key Words

Industrial Design; Design Activity, Design Tools, Research Dissemination

Introduction

Industrial design, as part of a process of new product development, is characterised by a responsibility for the form and aesthetic of the final design solution (Dormer, 1993). Industrial designers must also be aware of and sensitive to the processes of engineering and manufacture through which the final design solution is realised (Cross, 2000). In this way industrial design may be described as located between the creative stylist, sensitive to the expectations of end users; their needs and requirements; and the pragmatic constraints of the materials and engineering processes employed in the realisation of the designed artifact. Sitting between these two principles, the industrial designer must address an often ill-defined

design problem, generating and reflecting upon solution ideas in an attempt to better define these problems (Cross, 2007). To support the generation of proposals, the practitioner employs a variety of analog, digital and hybrid tools that embody design intentions through drawings, sketches, digital models, prototypes and handmade concept models (Goldschmidt, 1997; Purcell and Gero, 1998). It is through this process of embodiment and reflection-on-action (Schon, 1983) that the industrial designer continually works design solution ideas towards the final specification of design intent prior to manufacture.

1. Industrial Design Process

Figure 1 illustrates a model of the industrial design process based upon Cross' (Cross, 2000) description of convergent and divergent design activity. Although the model is a simplification of what is in reality a complex activity influenced by many factors (stakeholder requirements, working practices within individual consultancies, the designer's own idiosyncratic working methods) it is useful as a means of making explicit some of the universal characteristics of industrial design activity.
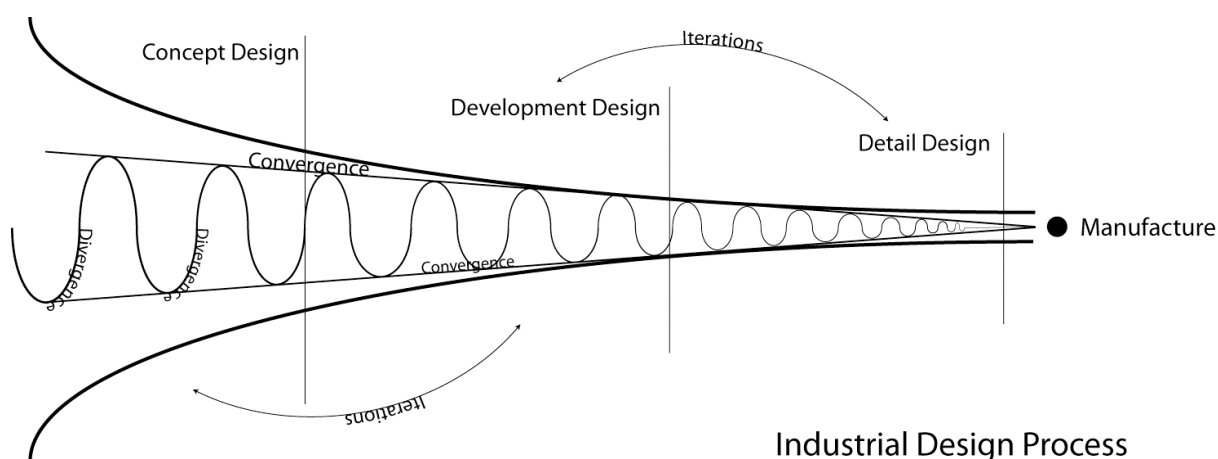
Fig 1. Generic model of industrial design process

The model (Figure 1) describes design activity as converging towards the final specification of design intent prior to manufacture. This convergence is the culmination of activity, the end specification of intent, and the outcome of the design process. All design activity during studio practice is influenced by a requirement for the specification of a final design solution prior to manufacture (Powell, 2007). In order to achieve this, the industrial designer will move through stages in the design process, evolving solution ideas through increasing levels of detail (Pipes, 2007). These stages are illustrated in the model as concept, development and detail design. Concept design is an initial phase of design activity involving the generation of a variety of design solutions to be reduced and refined as design moves from concept to development design. During development design, solution proposals are considered in greater detail before a single design direction is agreed and activity progresses towards detail design and specification for manufacture.

The industrial design process is both convergent and divergent in that, although it is concerned with the final specification of intent (Cross, 2000), design activity is characterised by both periods of divergent iteration (returning arrows and looping vertical lines, Figure 1) and convergent specification (converging horizontal lines, Figure 1). The weighting of divergent/convergent design activity will differ from project to project dependent upon the requirements of individual design problems and the ways in which the designer or design team work in their exploration of solution ideas. However a constant in this is the need to evolve the solution towards a final specification of intent.

Throughout this process the industrial designer will use design tools to embody design intentions as sketches, drawings, digital models, visual renderings and prototypes of various kinds and degrees of fidelity (Goldschmidt, 1997; Pipes, 2007; Badke-Schaub and Frankenberger, 2004; Dahl, Chattopadhyay and Gorn, 2001; Johnson, 2005; Stolterman, 2008; Visser, 2006). These embodiments are critical to design activity. They are used to explore the design problem and generate solution proposals that may then be employed to both communicate design intent to others and as a way for the designer to reflect-in-action (Schon, 1983) upon the physical embodiment of design ideas. In this way there exists a relationship between the designer, the particular design tool used during activity and the kinds of embodiments made in support of the various requirements of practice. The character of an individual tool will influence the kinds of embodiments made (Tovey and Owen, 2000). The skills and experience of the designer have implications for the ways in which the design tool is used during design activity which in turn influences the character of the design embodiment (Lawson and Dorst, 2009). Finally, all design activity is tied to and influenced by the various requirements of the design process (simplified model, Figure 1), within which activity locates as solutions are progressed towards final specification (Cross, 2007).

2. Universal Characteristics of Design Activity

A literature review was conducted to identify existing work relating to design tool use for the embodiment of design intent during design activity. The outcome of this review was the identification and synthesis of a number of universal characteristics of design activity. These characteristics served as a means to investigate relationships between tool use, the character of activity and the various requirements of practice as activity progresses from conceptual design through development and into detailed specification (Figure 1). Table 1 illustrates the identified universal characteristics of design activity. The Table shows five characteristics of activity; a brief descriptor outlines each of the five characteristics; source literature and terms of reference used within the literature to describe the five characteristics.

Table 1: Universal characteristics of design activity

Characteristics	Description	Terms of Reference	
1. Modes of Communication	Design activity as communication to stakeholders and/or as reflection-on-action	(Dorta, Pérez and Lesage, 2008)	self-reflective mode
		(Schon, 1983)	representation, analysis, emergence
		(Goldschmidt, 1997)	dialogue with self
		(Jonson, 2005)	I-representations
2. Levels of Ambiguity	The extent to which the embodiment of design intent may be described as ambiguous (leaving room for interpretation and revision)	(Fish, 2004)	vagueness
		(Goldschmidt, 2004)	Unstructured nature
		(Goel, 1995)	Ambiguity/ Density
		(Visser, 2006)	unspecific
3. Transformational Ability	To what extent design activity is characterized by the movement from one design direction to another (lateral), or the evolution of a single design direction (vertical)	(Goel, 1995)	Transformation
		(Visser, 2006)	duplicate, add, detail, concretize, modify, revolutionize
4. Levels of Detail	The depth of detail considered during design activity and externalised through the embodiment of design intent	(Brereton, 2004)	kinds of information available
		(Visser, 2006)	precision
		(Goldschmidt, 1997)	Less/more specific
5. Levels of Commitment	The extent to which design embodiments appear to communicate commitment to design proposals	(Goel, 1995)	Early Crystallisation/ completeness
		(Pipes, 1990)	More Committed
		(Powell, 2007)	less committed
		(Tovey, Porter and Newman, 2003)	uncommitted/ more committed

The first characteristic, modes of communication, refers to the nature of design activity as it is used to support communication of solution ideas to others and/or the designers themselves as the embodiment of design intentions are reflected upon. All design embodiments, be they sketches or high-fidelity prototypes, may be used to a greater or lesser extent in both models of communication. However, it is the weighting of one over the other, and how the use of different tools influences this weighting, that was of interest to the study of design tools.

Levels of ambiguity refer to the extent to which design tools are used to embody intentions during design activity that appear to be more or less ambiguous. For example, a key characteristic of design sketching is often described as its ability to the support ambiguous embodiment of design intent. This ambiguity is described as aiding conceptual design activity; helping the designer to avoid early fixation or attachment to initial concept ideas.

Transformational ability is referred to within the literature as the movement from one design idea to another new idea (lateral transformations), or the evolution of a single design direction (vertical transformations). Again design activity is often characterised by these two characteristics working together within a given design project. However, it was the weighting of one over the other that was often discussed in the literature, with, for example, the activity of sketching being characterised by an ability to laterally move between concept proposals in contrast to computer aided design, tending towards vertical transformations.

Levels of detail refer to design activity as being characterised by a concern for the specification of more or less design detail. As design activity progresses through development and on towards detail design, levels of detail are often described as increasing in response to a requirement for final specification prior to manufacture.

Finally levels of commitment refer to design activity as it is characterised by the degree to which design embodiments may communicate weaker or stronger level of commitment to the design proposal.

Instead of representing a prescriptive or definitive description of design activity, the five characteristics were used as a means to engage designers on their attitudes towards design activity, tool use and design embodiment. The five universal characteristics where therefore used as a framework for analysing designer attitudes towards design tools and their support of various design activities. The aim of this investigation was to attempt to explore relationships between the practitioners' influence upon tool use, the character of individual design tools and the ways they may be used to embody design intent to support the various requirements of practice. The aim of the study was to provide a more holistic understanding of tool use during design activity, and in doing, support designers in their approach to and critical engagement with design tools.

3. Research Methods

To consider relationships between the design practitioner, the design tool and the character of design embodiments made during design activity, a survey of industrial designers was conducted. A total of 244 designers comprised of 138 practitioners and 106 students were surveyed. The practitioners had been active in professional practice for three years or more. The students were all graduating designers and third year undergraduates. All participants were drawn from the discipline of industrial design, including product and transportation design.

The survey questions were designed to analyse designer attitudes towards the character of design activity when using different tools to embody design intent. Designers were asked

about their attitudes towards a given design tool in terms of its ability to support the five universal characteristics of design activity described in Table 1. Survey questions are presented in table 2 below along with the characteristics of design activity each question was designed to measure.

Table 2: Survey questions and the characteristics of design activity measured

| Questions to measure 5 Universal Characteristics of Design Activity	Characteristics Measured
Q1.The design tools listed below are useful for: Representing the engineering detail of design ideas: Do you agree or disagree?	**Levels of Detail** To what extent the design tool affords a high or low level of specific detail.
Q2. The design tools listed below are useful for: Representing the artistic/creative form of design ideas: Do you agree or disagree?	**Levels of Detail** To what extent the design tool affords an overall or artistic impression of detail.
Q3. The design tools listed below are useful for: Representing design ideas in a more constrained, unambiguous way: Do you agree or disagree?	**Levels of Ambiguity** To what extent the design tool affords design ideas to be represented unambiguously
Q4 The design tools below are most useful for: Design work that can move easily between design ideas (Lateral Transformations): Do you agree or disagree?	**Transformational Ability** To what extent the design tool affords movement from one design idea to a new idea – horizontal transformations.
Q5 The design tools below are most useful for: Design work on variations of one or the same design idea (Vertical Transformations): Do you agree or disagree?	**Transformational Ability** To what extent the design tool affords movement from one idea to a variation of the same idea – vertical transformations
Q6 The design tools below: Communicate a high level of commitment to design ideas: Do you agree or disagree?	**Levels of Commitment** How the design tool communicates a high or low level of commitment to design ideas.
Q7 The design tools below are more useful for: Communicating design intentions to others: Do you agree or disagree?	**Modes of Communication** How the design tool affords communication of design ideas to others.
Q8 The design tools below: Aid self reflection and the dynamic generation and evolution of design ideas: Do you agree or disagree?	**Modes of Communication** How the design tool affords self-reflection and the emergence of design ideas

Responses to survey questions were registered using a five point Likert-scale (Bryman 2008), whereby the following response values were given: Strongly Agree (+2); Agree (+1); Neutral (0); Disagree (-1); Strongly Disagree (-2).

4. Research Results

In addition to presenting empirical research outcomes, this paper also describes the ongoing translation of research findings into an interactive digital resource to support industrial design practice. As such, the presentation of research findings is restricted to an overview. A more detailed account of the results can be found in Self, Dalke and Evans (2009).

A survey study of designers sampled two distinct groups: practicing industrial designers and design students. The Dreyfus model of skills acquisition was used as a means to identify difference within the skills and levels of expertise present within the two samples (Dreyfus and Dreyfus, 1986). Dreyfus (ibid) proposes a generic model of expertise consisting of six stages: 'novice', 'advanced beginner', 'competent', 'expert', 'master' and 'visionary'. Applying the Dreyfus model (ibid) to the skilled embodiment of design intentions through drawing and sketching, Lawson and Dorst (Lawson and Dorst, 2009) suggest the critical importance of the designer's level of expertise, describing the designer who is less able to represent ideas effectively as, 'severely handicapped and unlikely to be able to reach an advanced level of expertise' (ibid). In terms of the survey's two sample groups, student participants were classified as 'advanced beginners' (Dreyfus, Op cit), practitioners falling within the levels of 'expert' to 'master'.

Figure 2 illustrates the responses for students and practitioners to a survey question asking of attitudes towards the ability of hand sketching to support unambiguous design embodiment during design activity. The horizontal axis lists the five items of a Likert-scale question.
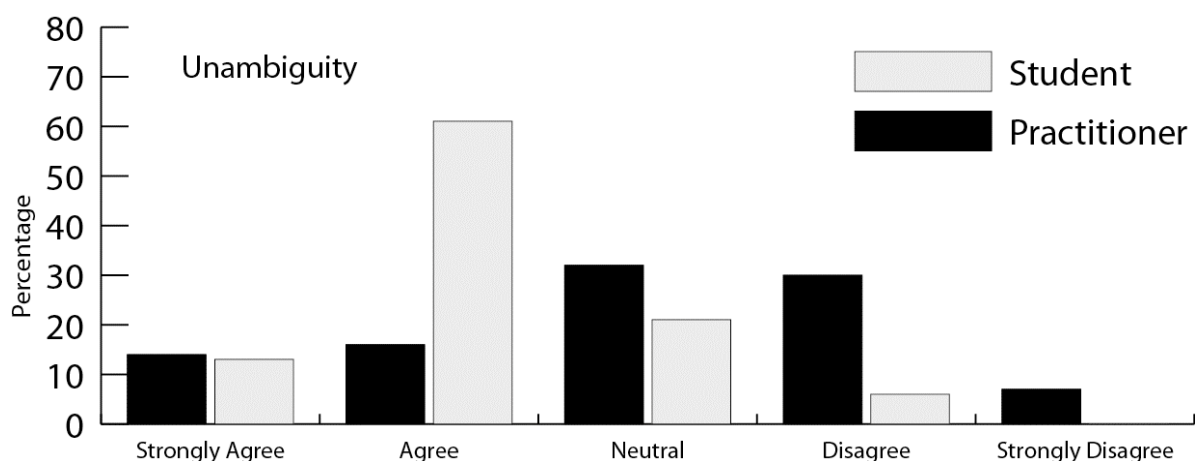
Fig 2. Hand sketching is useful for representing design ideas in a more constrained, unambiguous way. Do you agree or disagree?

In terms of ambiguity and sketching, responses suggested different attitudes towards the ability of design activity, through sketching, to be characterised by the unambiguous embodiment of design intent. This may suggest different approaches to design activity when using hand sketching to embody design proposals. The students tending towards unambiguous embodiment (indicated in a larger percentage of students registering agreement, Figure 2, 61%). The practitioners, on the other hand, may tend to be more inclined to use sketching in an activity that supports more ambiguous embodiments (indicated by a greater number of neutral or negative responses, neutral: 32%, disagree: 30%, strongly disagree: 7%).

Difference in response between sample groups was also seen in findings relating to the use of other design tools. Figure 3 illustrates results relating to sketch modelling (the use of foam, card and paper to quickly embody design intentions as physical models) and its ability to support the ambiguous embodiment of design intentions during design activity.
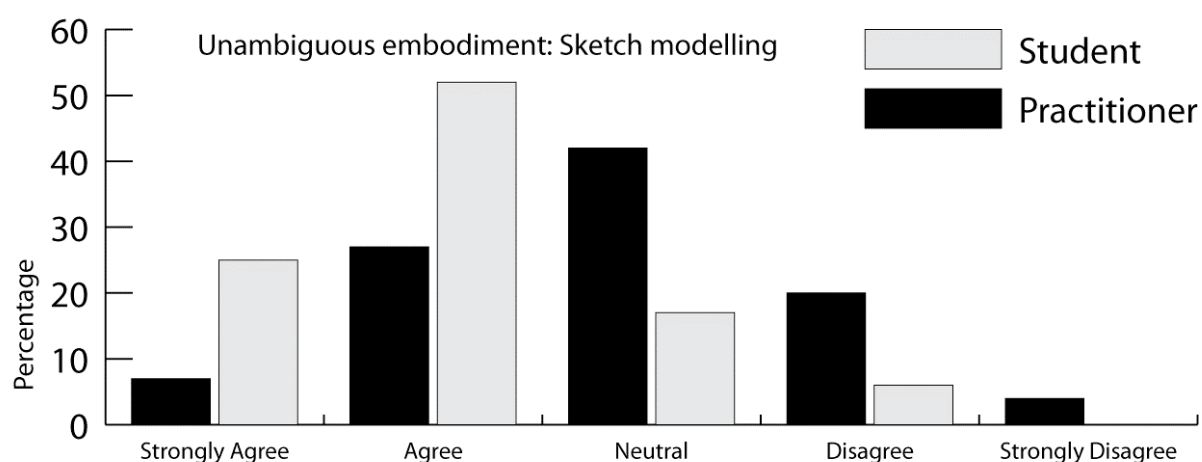
Fig 3. Sketch modelling is useful for representing design ideas in a more constrained, unambiguous way. Do you agree or disagree?

As was the case with results relating to hand sketching (Figure 2), findings suggested different attitudes towards the capacity of sketch modelling to support design activity that may be described as unambiguous in its embodiment of design intent. The more positive response from the student sample may suggest an approach to design activity when using sketch modelling that tends towards unambiguity and fixation of concept compared to the practitioners (seen in greater number of positive student response, Figure 3).

Figure 4 illustrates survey findings relating to a question asking of sketch modelling's ability to support reflection-on-action during design activity.
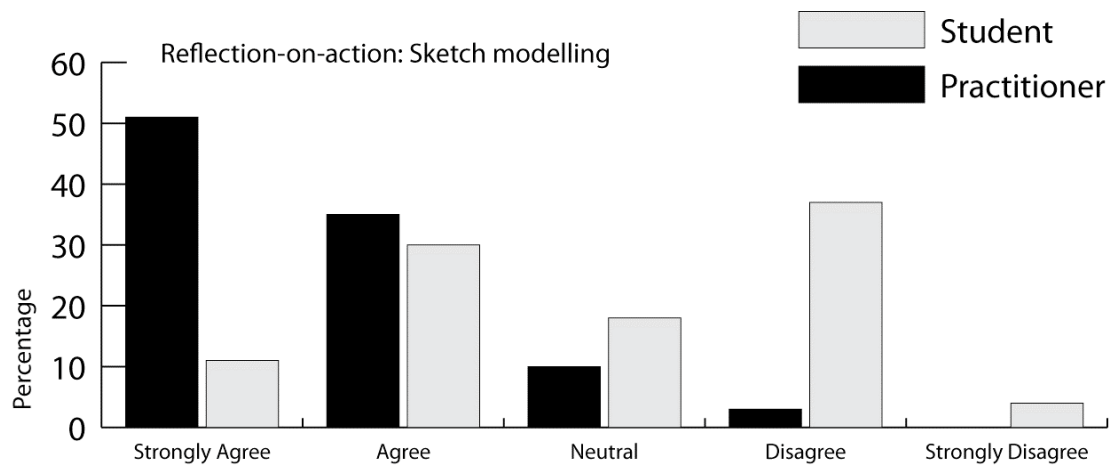
Fig 4. Sketch modelling aids self reflection and the dynamic generation and evolution of design ideas. Do you agree or disagree?

Again, the survey results suggested a contrast in attitudes towards design activity when using sketch modelling tools. The practitioners were more inclined to strongly agree (51%) or agree (36%) sketch modelling aids reflection-on-action (black bars, Figure 4). Student findings were mixed across the five items of the Likert-scale, some in agreement (30%) others in disagreement (37%). This may indicate different attitudes towards and approaches to design activity when engaged in design embodiment through sketch modelling, with practitioners employing greater reflection and students tending to reflect less and move design towards specification more quickly.

Responses towards the ability of sketch modelling to support design activity characterised by the lateral movement between design proposals, and so support divergent design activity, also indicated contrasting attitudes between the two sample groups (Figure 5).
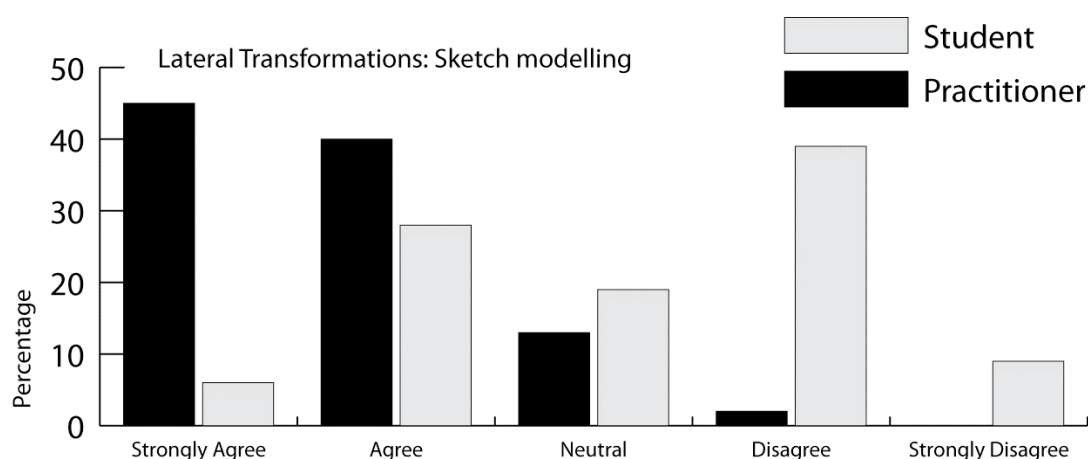
Fig 5. Sketch modelling is useful for design work that can move easily between design ideas (Lateral Transformations). Do you agree or disagree?

The design practitioners tended to register responses of strong agreement (45%) or agreement (40%) in contrast to the students' more mixed response across the five items of the Likert-scale (grey bars, Figure 5). This again suggested different approaches to design activity during design embodiment through sketch modelling tools; practitioners being more inclined to lateral transformations, divergence and iterations; students erring towards earlier fixation and attachment to a concept.

Emergent in survey findings was a tendency, across a variety of design tools, for less experienced designers (design students) to respond more negatively to questions relating to those characteristics associated with divergent design activity; ambiguity in embodiment; the lateral transformation between various design proposals; and reflection-on-action during design embodiment. This may suggest a significant difference in the students' approach to design activity and the ways tools are used to support studio practice. It may be that less experienced designers err towards design convergence during design activity. The ways in which they approach design embodiment, through the use of design tools, is a reflection of this. In contrast, and with experience of practice, design practitioners tend to remain more open to iterative divergence, and it is this open approach that influences more positive attitudes towards the characteristics of design activity associated with exploitive conceptual design; lateral transformations, ambiguity of embodiment and reflection-on-action.

5. Research Dissemination as Digital Resource (IDsite)

The following section discusses the ongoing development of a digital resource, branded IDsite. The aim of IDsite is to present research findings in a way that is both relevant to and accessible by an intended audience of industrial design students and practitioners. A pilot proposed as an initial test study at an interim stage of the site's development is presented.

The challenge of engaging practicing designers in design research is identified by Dorst (2007):

> We [design research] need to re-engage with practitioners, and get involved in experiments within the rapidly changing design arena. Design researchers should join design practitioners in co-creating the design expertise and design practices of the future.
>
> (Dorst, 2007: p.11)

The aim of the resource was to engage practitioners and design students through dissemination of research outcomes in a format and style that might be more relevant and accessible compared to more conventional forms of research dissemination (publication of findings through journal papers for example). The objective was to provide a platform to promote awareness of the role tools play within the wider contexts of studio practice, supporting a more critical engagement with tools during design embodiment during design activity.

The following objectives informed the design and realisation of the digital resource:

1. To illustrate and describe the industrial design process as a staged model, progressing towards the specification of deign intent prior to manufacture.

2. To describe the iterative nature of design activity between periods of convergent evolution and divergent exploration.

3. Illustrate where, typically, tools of various kinds are used to support practice.

4. Articulate tool effectiveness in support of the various requirements of practice through relating the character of tools to the requirements of practice.

5. Engage an audience of practicing and student designers through the presentation of knowledge in a way that is immediately accessible and clearly relevant to studio practice.

A review of existing attempts to engage practice through systems and tools for supporting design activity identified a card-based approach as a popular option (*Methods cards for IDEO.* 2010; Lockton, Harrison and Stanton, 2010; Pei 2009). However it was decided that a web-based, interactive resource would be advantageous when compared to an approach based upon the use of physical cards. The logistical and financial cost of web-based publication through hosting was seen as more economic in terms of time and cost compared to a printed publication. Importantly, for a study wishing to disseminate findings to the widest possible audience, web publication affords the opportunity to reach larger audiences. Given a requirement to include visual images as reference points to aid explanation and engage the audience, a web-based approach would provide an opportunity for the use of multimedia through the layering of information in the form of images and graphic animation. A web-based approach would also provide opportunity for continually revision and evolution of the resource in light of testing and validation studies.

6. Design & Realisation of Digital Resource

Figure 6 illustrates a screenshot of the resource's home page. The page presents a simplified model of industrial design practice as illustrated in Figure 1 above. Interactive buttons were embedded within the model. As the curser hovers over each of these buttons, information relating to the stage in practice is displayed.

Navigation of the site is achieved via a horizontal navigation bar consisting of four buttons: 'Home', 'Concept Design Tools', 'Development Design Tools' and 'Detail Design Tools' (Figure 6). Hovering over any of these brings down a panel of tool options. Clicking on these tool options navigates to the corresponding tool. Figure 7 illustrates the web page relating to the design tool sketch modelling. On the left two variants of sketch modelling, 'Explorative Sketch Models and 'Explorative 'Ad hoc' Sketch Models' are shown. Hovering over either one of these variants brings up a descriptor of the tool and its place of use during studio practice (red oval, Figure 7).
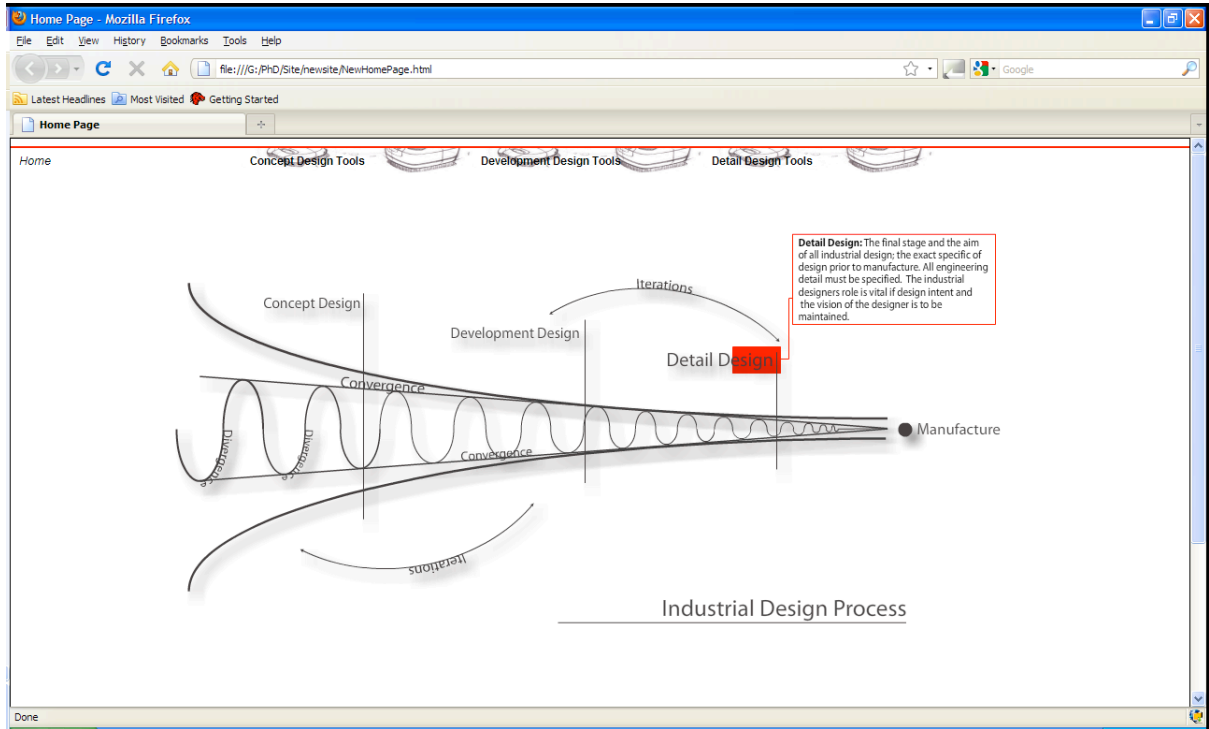
Fig 6. Home page of IDsite with curser hovering over Detail Design button
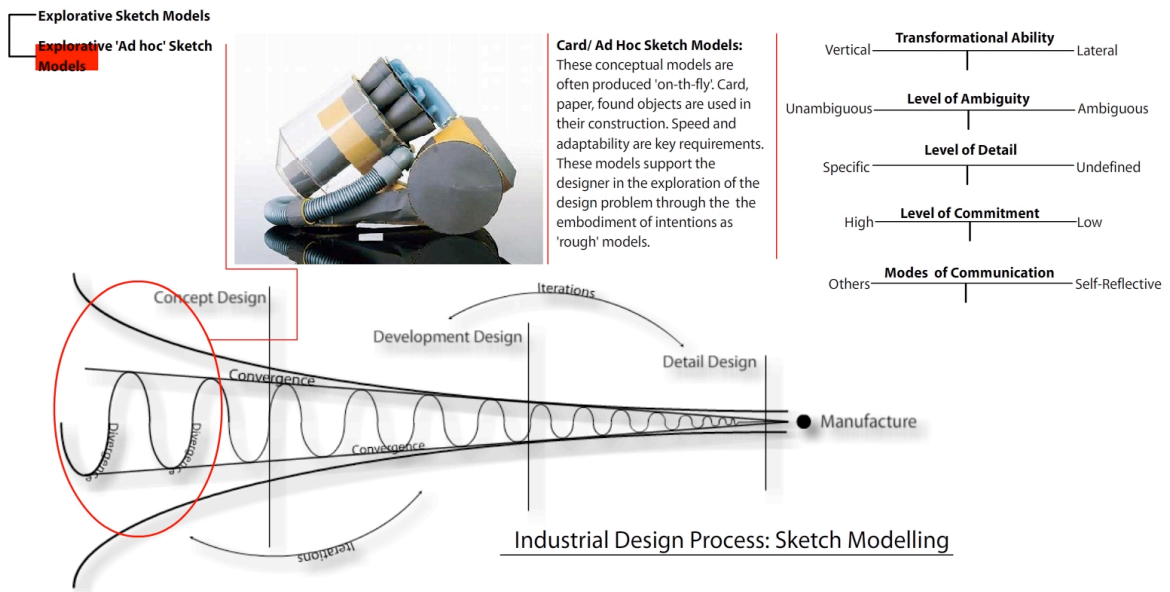
Fig 7. Page relating to the design tool sketch modelling

In addition to communicate information relating to the various design tools investigated during a period of empirical research, IDsite attempts to describe relationships between the character of various tools, the requirements of practice and the practitioner's own idiosyncratic use of tools during design activity. To achieve this, a second 'characteristics' menu, to the right, is included on each of the tool pages. This menu comprises of five buttons: 'transformational ability', 'levels of ambiguity', 'levels of detail', 'levels of commitment', and 'modes of communication' (Figure 8). Hovering over any of these five provides a description of the characteristic and explains how it may relate to the tool's ability to support design activity during concept, development and detail design. Figure 8 illustrates the curser hovering over 'Transformational Ability'. Information relating to the relationship between sketch modelling and design activity as it is characterised by lateral and vertical transformations is displayed.
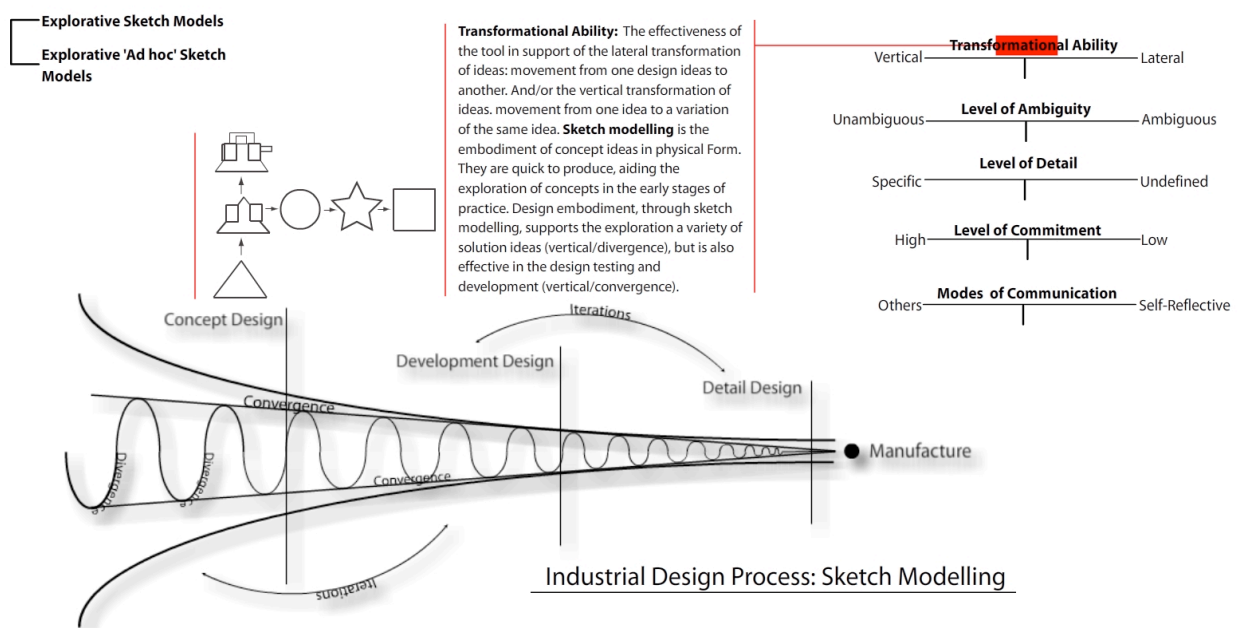
Fig 8. Sketch modelling page showing relationship between design tool and its ability to support transformative design activity

7. Pilot Survey of Site

An alpha version of IDsite was piloted as a means to initially test the resource at an interim point in its development. A sample of 50 design practitioners were contacted via email and invited to take part in a survey asking of their opinion of the resource; its ability to support understanding of design tool use during design activity. Attribute questions were first used to gather information on the designers' employment, education and experience. These consisted of four questions asking of the practitioners' place of work, job title, the discipline within which the designer worked and the length of time worked within the design industry. A further six questions asked of the practitioner's response to the digital resource. Rating scales were used to gather qualitative data on designer attitudes, with practitioners registering responses using a five item Likert-scale consisting of the following response values: Excellent, Very Good, Average, Below Average and Poor. A final survey question

provided the respondents with an opportunity to add comments and suggestions. Of the 50 designers contacted, 16 completed the online survey which represented a response rate of 32%.

8. Pilot Results

Figure 10 illustrates results relating to the attribute question asking respondents about their job title. As the figure suggests, the majority of practitioners described themselves as company directors. This may be related to findings from Question 1, indicating a majority of respondents worked in smaller sized consultancies. Together with findings from other attribute questions (length of time within industry); the findings suggest that a majority of respondents had four or more years experience of practice and held senior positions within the companies within which they worked.
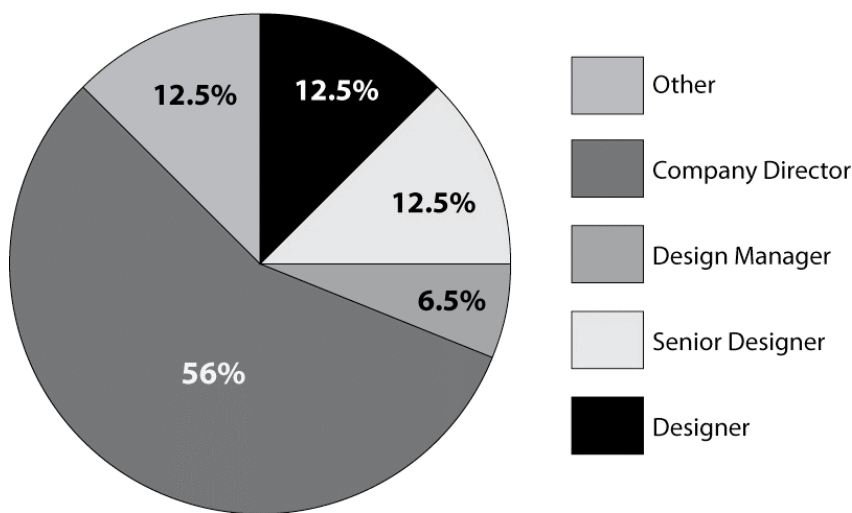
Figure 9: Q2.What is your job title?

Figure 10 illustrates findings for pilot survey question 5 which explored the ability of practitioners to navigate the site.
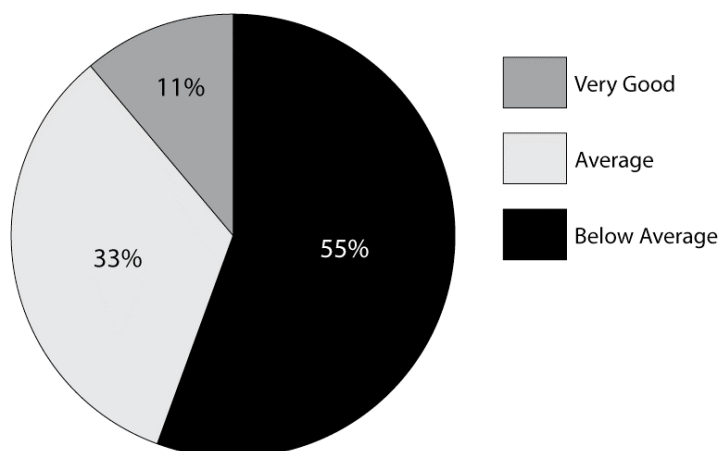
Fig 10. Q5. How do you fell about your ability to navigate the site?

The majority of practitioners registered a below average response to this question (black segment), suggesting respondents found the resource difficult to navigate. Problems with the speed and response of the drop-down menus and hover panels were identified as a possible reason for the designer's more negative responses. Moreover, some of the qualitative feedback suggested the navigation menu, and the overall presentation of information seemed difficult to understand. As I respondent suggested, 'The degree of complexity is off-putting.' Figure 11 illustrates results for Question 11 that explored the capacity of the resource to clearly communicate information relating to design tool use during design activity. Although a majority of respondents rated the site as average in its clarity of information, others registered below average or poor responses. Again, qualitative responses indicated concerns over clarity in terms of the complexity of the resource, as on respondent suggested, 'In fact I find the general graphics a bit 'unfinished'.
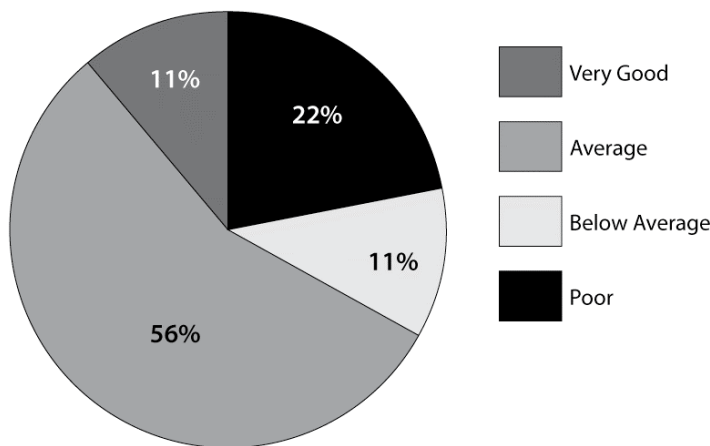
Figure 11: Q6.How would you rate the clarity and understandability of textual and pictorial content?

When asked about the ability of the digital resource to describe the design process (Figure 12), 45% registered an average response, with others rating the site as very good and, fewer, as below average. Responses suggested designers generally reacted positively to the description of the design process presented in the digital resource.
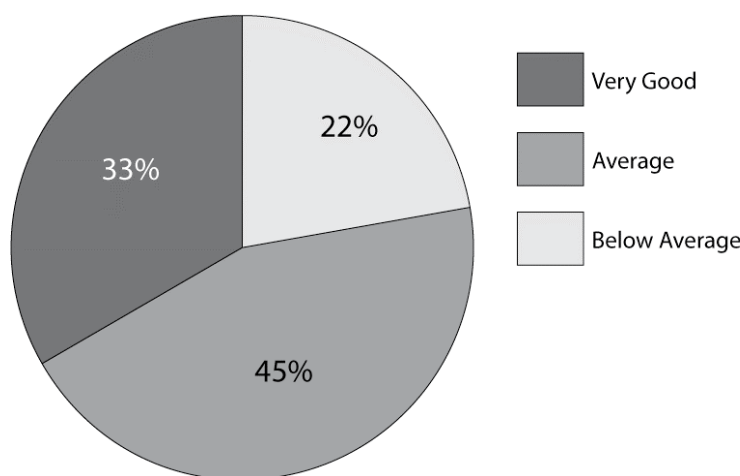
Figure 12: Q7.How would you rate the site's description of the design process?

Figure 13 illustrates results relating to practitioner responses to the ability of the resource to foster understanding of tool use within design activity. A majority of the pilot sample registered an average response, with the remainder indicating a negative attitude towards IDsite's ability to foster improved understanding. Of the 16 respondents, only half completed question 8, with all responses falling within two of the five items of the Likert-scale: poor and average, Figure 13).
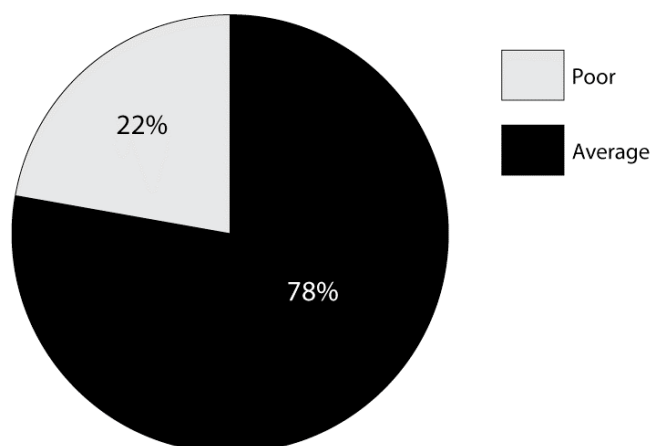
Figure 13: Q8.How would you rate the ability of the site to foster enhanced understanding of various design tools and their support of practice?

Findings from this initial pilot study, as part of the ongoing development of IDsite, highlighted problems in terms of the site's ability to communicate research outcomes clearly. However, as a pilot study, these findings were successful in indicating how IDsite might be revised and further developed before additional validation is undertaken. Encouragingly, although concern was voiced over the design and execution of the digital resource, practitioners considered the idea of a new approach to research dissemination interesting and relevant, 'A great idea for students.'; 'It seemed like a good idea but it misses the target in execution'.

The pilot was required to identify problems which could be addressed, at an interim stage of the site's development. At the time of writing, IDsite continues to be developed in light of the pilot's findings. Further testing and validation using larger samples of industrial design students, educators and practitioners are planned.

9. Conclusion

This paper has presented empirical findings from a survey study of two distinct groups of industrial designers; design students and design practitioners. The survey explored approaches to design activity through analysis of relationships between a designer's level of expertise and attitudes towards the use of design tools during studio practice. Findings were then considered in terms of the designers' approach to design activity during studio practice.

Existing work relating to the character of design activity was identified and synthesised in the design of the survey study (see Table 1). Instead of constituting a prescriptive or definitive set of principles through which design activity may be described, five characteristics acted as a framework for investigating designer attitudes towards design activity when using various design tools. The survey questions facilitated feedback on designer attitudes towards the ability of various design tools to support the five characteristics of design activity.

Empirical findings have suggested differences in attitudes between samples towards the ways various tools support the five characteristics. Significantly, findings may indicate student designers err towards an early fixation and attachment to concept. Evidence of this was seen in attitudes towards the ability of design tools to support those characteristics of activity often associated with divergent concept design: reflection-on-action, lateral transformations and ambiguity in the embodiment of design intent. Practitioner findings indicated a more positive response to questions on the tools' ability to support the same conceptual, explorative characteristics. This may be evidence of a tendency for experienced practitioners to take a more open, divergent and iterative approach to design activity during their studio practice.

The paper has also described the embodiment of these empirical findings within a digital resource (IDsite). The resource attempts to engage the audience and communicate research outcomes using a highly visual and interactive web-site, through which designers may explore relationships between design tools, the various requirements of studio practice and the character of design activity.

The survey study identified a relationship between designer expertise and approaches to practice that relates to the divergent/convergent model of the design (Figure 1). In response to this IDsite attempts to provide a platform for understanding the rich and complex activity of industrial design; how the use of tools and the designer's own idiosyncratic approach has influence upon design activity during studio practice; and the final specification of design intent.

A pilot of the site at an interim stage of its development has suggested, although the approach to research dissemination was seen as significant and relevant, challenges remain in the design of the resource and its ability to communicate research clearly. In the ongoing development of IDsite, the authors are working to address these concerns through a second iteration of the resource in response to the pilot study. A beta version of IDsite will undergo a period of further validation, helping to continue the evolution of the resource. Although the digital resource is clearly a work in progress, it represents an example of how innovation in research knowledge dissemination can be used to engage an audience of design practitioners.

This approach to research dissemination has the potential to facilitate improved engagement with a practice orientated audience. Whilst acknowledging the role of more conventional methods of dissemination, more relevant approaches to the articulation and exchange of design research knowledge are required. These approaches call for innovation in knowledge dissemination that exploits the highly visual language of design in order to best engage practice.

References

Methods cards for IDEO (2010) Available at: http://www.ideo.com/work/method-cards/. IDEO. (Accessed: 8/23 2010).

Badke-Schaub, P. and Frankenberger, E (2004) 'Design Representations in Critical Situations of Product Development', in Goldschmidt, G. &Porter, W. (eds.) *Design Representation.* pp. 105-126.

Brereton, M. (2004) 'Distributed Cognition in Engineering Design: Negotiating between Abstract and Material Representations', in Goldschmidt, G. & Porter, W. (eds.) *Design Representation.* London: Springer, pp. 83-103.

Bryman, A. (2008) *Social Research Methods.* 3rd edn. Oxford: Oxford University Press.

Cross, N. (2007) *Designerly Ways of Knowing.* Basel: Birkhauser.

Cross, N. (2000) *Engineering Design Methods: Strategies for product design.* 3rd edn. Chichester: John Wiley & Sons.

Dahl, D. W., Chattopadhyay, A. and Gorn, G. J. (2001) 'The importance of visualisation in concept design', *Design Studies,* 22 (1), pp. 5-26.

Dormer, P. (1993) *Design Since 1945.* London: Thames & Hudson.

Dorst, K. (2007) 'Design research: a revolution-waiting-to-happen', *Design Studies,* 29 (1), pp. 4-11.

Dorta, T., Pérez, E. and Lesage, A. (2008) 'The ideation gap:: hybrid tools, design flow and practice', *Design Studies,* 29 (2), pp. 121-141.

Dreyfus, H. L. and Dreyfus, S. E. (1986) *Mind over Machine: the power of human intuition and expertise in the age of the computer.* Oxford: Basil Blackwell.

Fish, J. (2004) 'Cognitive Catalysis: Sketches for a Time-lagged Brain', in Goldschmidt, G. & Porter, W. (eds.) *Design Representation.* London: Springer, pp. 151-184.

Goel, V. (1995) *Sketches of Thought.* London: The MIT Press.

Goldschmidt, G. (2004) 'Design Representation: Private Process, Public Image', in Goldschmidt, G. & Porter, W. (eds.) *Design Representation.* London: Springer, pp. 203-217.
Goldschmidt, G. (1997) 'Capturing indeterminism: representation in the design problem space', *Design Studies,* 18 (4), pp. 441-455.

Jonson, B. (2005) 'Design ideation: the conceptual sketch in the digital age', *Design Studies,* 26 (6), pp. 613-624.

Lawson, B. and Dorst, K. (2009) *Design Expertise.* Oxford: Architectural Press.

Lockton, D., Harrison, D. and stanton, N. (2010) 'The design with intent method: A design tool for influencing user behaviour', *Applied Ergonomics,* 41 (3), pp. 382-392.

Pei, E. (2009) *Building a common Language of design Representation for Industrial Designers & Engineering Designers.* PhD Thesis. Department of design and technology. Loughborough University. UK.

Pipes, A. (2007) *Drawing for Designers.* London: Laurance King Publishing.

Pipes, A. (1990) *Drawing for 3-Dimensional Design.* London: Thames & Hudson.

Powell, D. (2007) *Product Design: The essentials of Product Design.* Available at: http://www.designcouncil.org.uk/en/About-Design/Design-Disciplines/Product-design/ Design Resaerch Council. (First Accessed: 04.03.2007).

Purcell, A. T. and Gero, J. S. (1998) 'Drawings and the design process: A review of protocol studies in design and other disciplines and related research in cognitive psychology', *Design Studies,* 19 (4), pp. 389-430.

Schon, D. (1983) *The Reflective Practishioner.* London: Ashgate.

Self, J., Dalke, H. and Evans, M. (2009) Industrial Design Tools and Design Practice: An approach for understanding relationships between design tools and practice, *IASDR 2009 Proceedings, Design Rigor and Relevance*, Korea Society of Design Science.

Stolterman, E. (2008) *Designerly Tools. DRS2008 Conference.* Sheffield University. Sheffield. UK. 16-19 July 2008.

Tovey, M., Porter, S. and Newman, R. (2003) 'Sketching, concept development and automotive design', *Design Studies,* 24 (2), pp. 135-153.

Tovey, M. and Owen, J. (2000) 'Sketching and direct CAD modelling in automotive design', *Design Studies,* 21 (6), pp. 569-588.

Visser, W. (2006) *The Cognitive Artifacts of Designing.* New York: Routledge.

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Assisting Conjoint Trend Analysis with Virtual Reality

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Abstract

A recent trend in our industrial civilization has been the gradual emergence of digital tools in various fields of human activity. They aim to reduce development time, cost or to insure a low error, high quality process. Many fields have been improved thanks to this new computerized approach. This paper is centred on how industrial design could be assisted by virtual reality tools. More specifically it presents a state of the art on the use of immersive technologies in early stages of industrial design as well as the preliminaries of an experimentation plan aiming to observe and validate assessments made. This study is based on two theoretical pillars: Affective/Kansei engineering and virtual reality. The use of the word kansei has more than tripled during the last fifteen years and virtual reality techniques are being used at higher frequencies throughout the industrial landscape. This document aims to identify recent discoveries linking early stage Designing and Virtual Environments.

Keywords
Industrial Design, Virtual Reality, Immersive, Cognitive Psychology, Conjoint Trend Analysis, Multimodality

Introduction

The goal of this paper is to expose a synthesis on the state of the art concerning trend analysis enhancement via virtual technologies. This study aims to depict a vision on what has been found concerning immersive technologies in early industrial design. As these domains are mainly emerging, research papers have been scarce and illustrating a very innovative vision of product design. Historically the first digitized design process is attributed to W. Fetter (1960) closely followed by I.Sutherland "Sketchpad" (1963). Since then Computer Aided Design (CAD) hasn't stopped from building up. In 2007 Dassault certifies the first airplane entirely designed under CAD environments. This digital evolution has recently included industrial design and is shifting from detailed design to early design process such as creativity, idea management and trend analysis. Our specific objective in this paper is to show how Virtual Reality Aided Design (VRAD) tends to move towards industrial design and in which particular theoretical direction. The overwhelming objective of this research project is to develop a tool that enhances the early stages of industrial design. This paper is divided in three parts. The context points out circumstances motivating the redaction of this paper. The state of the art, which is the main chapter, details important facts concerning the integration of virtual reality in the fuzzy front end of design. The final chapter is a discussion on the perspective of this work.

Context

This chapter presents the spatiotemporal setting of my thesis. It gives an overview of the laboratory in which I work as well as an explanation on how we understand early industrial design. Next, we will depict a synopsis of the actual state of industrial design and virtual

reality. And finally we will deal with virtual reality aided design. This chapter comforts the fact that the more we focus on early design publication, the less numeric tools are present.

Product Design and Innovation Laboratory (LCPI)

This study takes place in the *Laboratoire de Conception de Produit et d'Innovation* in the *Arts et Métiers ParisTech*, in Paris. This laboratory is specialized in design methodologies and digital tools creation. It hosts many different professions raging from industrial design, Management, Problem Solving, Ergonomics, Computer science... all focused on the global design process optimization. The diversity of knowledge and expertise gathered in this laboratory makes it easier to retrospect one's work. It also has a feeding effect on general research work and feedbacks. This laboratory is also in close collaboration with industrial projects. Within the action/research laboratory strategy, strong partnerships are made with leading corporations to ensure the need for theoretical research in certain domain and to validate theories. This particular set up is favorable for my PhD work on the coupling of industrial design and virtual reality.

Industrial design needs early analysis

In 1970 supply exceeds demand. From then and onwards companies have not been answering a demand but supplying the user with diversity in their production and perpetual innovation. Since then the economic markets are competitive. To ensure their health, the companies are now required to produce faster, and at a lower price while ensuring client satisfaction and therefore good-quality (Ben-Mahmoud-Jouin, 1999). This paragraph exposes our vision of early industrial design and specificies this part of the new product developpement process.

The success of an industrial design product is not a coincidence. A well designed product has been thought of and carefully studied to correctly fit the market. Therefore the designer must gather information from his environment to inspire his creative act. (Caron, 2005). This gathering time is called the exploration phase and is followed by the generation phase in which the designers will construct formal representations of the product. Conjoint Trend Analysis is a strategic tool for trend identification. The current Conjoint Trend Analysis methodology (Bouchard, 2005) indicates that by gathering sociological data and contemporary graphical representations (fashion; architectural; design…) and by processing these pieces of information, the designer enables the identification of interesting trend and thus the generation of trend knowledge. He is now able to depict the trend on a moodboard and validate any project direction with his co-workers and his clients.

The general goal of this exploration phase is to discover trails and spot emerging trends. It also helps the industrial designing team to construct their product with additional information. Design briefs, given by clients, are too often insufficient to start an innovative product design (3P Project, 2011). At the end of Conjoint Trend Analysis the designer composes a moodboard for each trend. A moodboard is a graphical/semantic composition explaining the designers' take on the client requested universe, theme or ambiance. The moodboard has many inspirational functions, such as: the definition of a design context, the trigger of idea generation, the structuring of anchors for mental representations and constitute also a formal vocabulary basis for communicating innovating ideas. (Eckert, 2004) In other words, this process has a great impact on the success or fail of the designed product. The more the targeted trend is understood, the more the designer will benefit from the information and will be precise and creative in its work. As the decisions taken during such early design phases represent most of what the product will be, the tools used during these phases must be highly effective. As eighty percent of the design process are determined during the beginning, preliminary analysis and evaluations are the bottleneck of the design process.

Evolution tendencies of Industrial Design

As in engineering Design, we are presently encountering two major trends in industrial design. First of all the pleasure of acquiring and experiencing a product takes a larger part in Design process. Since the early 1980s' functionalism is gradually being replaced by a more sensorial, affective and hedonic view over product design (Childs, 2004). The new considerations are more of an abstract nature. Nowadays researchers have been developing methodologies on how to design a human/object interaction (Ludden, 2011), emotional impact (Norman, 2002)(Nagamachi, 2002), sensorial design. The other large trend is the computation of the design process in search of digital tool creation.

Evolution tendencies of Industrial Design

Throughout this paper the term "Virtual Reality" is to be understood in the Fuchs and al. way: *"Virtual reality enables one or more person to experience a sensor-motor and cognitive activity in a digitally created artificial world. This world can be imaginary, symbolic or a simulation of the real word."* (Fuchs, 2006). A certain virtual experience is qualified as immersive when a new motor and perceptual system is enabled to the user by a technical device. To be immerged into a certain space is simply to localize events and objects from a point of view belonging to this specific space.

It is now becoming common to encounter innovative products linked to virtual reality on daily basis. The Nintendo Wii, the 3D movie theatre experience via stereoscopic glasses, augmented reality on cellular phones… and many more application of virtual reality emerge in every day's life. The standard modern user is ready to accept immersive interactions, and is often fond of them. In recent researches combining designers with mixed reality, participants showed enthusiastic comportment towards the use of virtual tools (Lucero, 2005). This echoes in the virtual reality domain of Serious Gaming. Serious Gaming is a pedagogical tool using videogame strategies to teach or communicate a message (Alvarez, 2007). As the society evolves, virtuality takes a bigger part in our everyday life. Evolved man/machine interfaces such as affective computing or corporal engagement are more easily accepted. These are satisfying circumstances to propose a new vision of industrial design in which Designer and future products interact through digital worlds.

The ever-growing digital calculation capacity is giving the digital tools a growing realistic rendering power. In the last years Hybrid rendering technologies enable the user to experience 3D models in real time as well as a high graphical quality, hence a high sense of presence (Danas, 1995). From Nintendo Wii™ to Lumiscaphe Patchworck 3D™, the graphical and calculating power difference is huge and so is the difference between the levels of visual detail. Real time rendering supposes all 3D objects in the 3D scene are recalculated throughout time and interaction with 3D users view point and actions. (Huong Dinh, 2009) This technique usually permits great interaction power but poor graphical quality (textures and polygons) and level of detail. Pre-calculated 3D means the virtual scene has been calculated before use. It is time consuming to generate and enables a near low to inexistent interaction with the 3D world, due to recalculating time and a lack of possibilities to modify the virtual environment parameters. Hybrid 3D mixes pre-calculation and real-time rendering, therefore it gets a mid/high graphical and detail level with a mid/high interaction power and possibilities. The lag effect is the latency between V.R user's actions and their virtual feedback. It can engender an incoherent feeling or worst: simulation sickness. The lag is the embodiment of the compromise between rendering calculation time and interaction realism.

The arrival of such technologies has an impact on industrial design. Real-time quality wasn't high enough for the designer to evaluate their work with precision and the calculation time of high quality models (textures and polygon number) left the interaction level between product and Designer near to null. Digitalization of design process requires both the properties of Hybrid rendering: Visual quality and real-time interaction. Furthermore the designer seems ready to accept immersion in its daily activity.

V.R.A.D

Virtual reality aided design techniques are already used in industrially leading Corporation (PSA 2004). Nowadays the major function of V.R is to validate 1:1 scale products by real-time interaction and to replace physical models to reduce the projects time and cost. Further than validation, V.R is also used as a virtual support for product generation in engineering design. The more the activity encloses early stage design, like conceptual design, the less V.R tools are used. A few projects have been exploring three dimensional sketching or virtual kansei based conception (see§ 3.3 Kansei engineering): Sketch Furniture (Front Design, 2006), Tagged in motion (Jung von Matt, 2008), Housemall project (Shibata, 2003), Ilovesketch (Bae et al. 2009). These approaches tend to explore mechanisms resembling early stages of industrial design. Nevertheless we have observed that virtual reality is not very implied in the first steps of industrial design. Woelfel et al. (Woelfel, 2010) explain this absence in the fuzzy front end of the new product developpement by comparing the fuzziness of sketching and the géométrical strictness of virtual model datas (Buxton, 2007). The necessity of ambiguous non-restrictive representation techniques in the early phases can be the cause of the virtual technologies rejection. P. Fuchs reminds us that virtual reality techniques can be used to emulate aspects of the real world, but that it can also depict a symbolic unrealistic world. Aiming at a numeric design process can also create a dependency to computerized system and reduce abstraction capcacities. If simulation seems to be a cheap and quick way to evaluate a product design, it is fundamentaly different from reality. The perception of an object can therfore be distorted. For this reason virtual reality cannot be the only representation type used during the new product developpement (Kadri, 2007).

In conclusion the use of virtual reality techniques occurs scarcely in the early steps of the design process although it seems that the technological possibilities could enable preliminary studies. The rendering and sensorial interaction power necessary to an early industrial product evaluation are available. And the possibilities of keeping the fuzziness required in premature representation can be obtained in three-dimensional interactive environments.

State of the art

Our research is not constrained to both industrial design and V.R domains, but extends to a larger field of view. This state of the art is function of the corresponding domains: kansei engineering and information, Trend Analysis, Cognitive Psychology and Ergonomics, Digital art, Computer science, Virtual Reality, Industrial and Sensorial Design. By deploying an analysis over these different disciplines, we expect to gather information that will fertilize our problematic. The oncoming paragraphs expose by section the major scientific advances that are likely to enhance our vision of Conjoint Trend Analysis assistance with Virtual reality.

At first we will study the use of traditional intermediate representation, their impact on the industrial process and how they could be improved. For a better understanding of the design process, we will then present a synopsis on psychological, perceptual and emotional models. This model will have a great influence on our future research and assist us in positioning our work towards common paradigms. More specifically this model allows us to understand how a designer makes strategic choices to give his project a style orientation. Next this paper will deal with kansei Engineering. We will expose a definition of this original approach, list and explain the sub-methods, and point out the particular resemblance between kansei Engineering and Conjoint Trend Analysis. The next paragraph shows the incidence of sensorial modalities on kansei. The closing paragraph explains modern techniques used to measure kansei.

Limitations in Early Intermediate Representation

A short and inexpansive design process is majorly possible because of intermediate representation. They represent the product as the design process is executed. Intermediate representations are used for product evaluation, to identify any defects, find alternative solutions, estimate fabrication time/costs and stimulate designer/designer or designer/client dialogue (Göbel, 1994). They are here to simulate essential product properties and are used from the first ideas concerning the futur product to the final artifact rendering. During the design process hypothesis are made and evaluated by means of intermediate representation. Often these representation are hypercentered on visual evaluation.
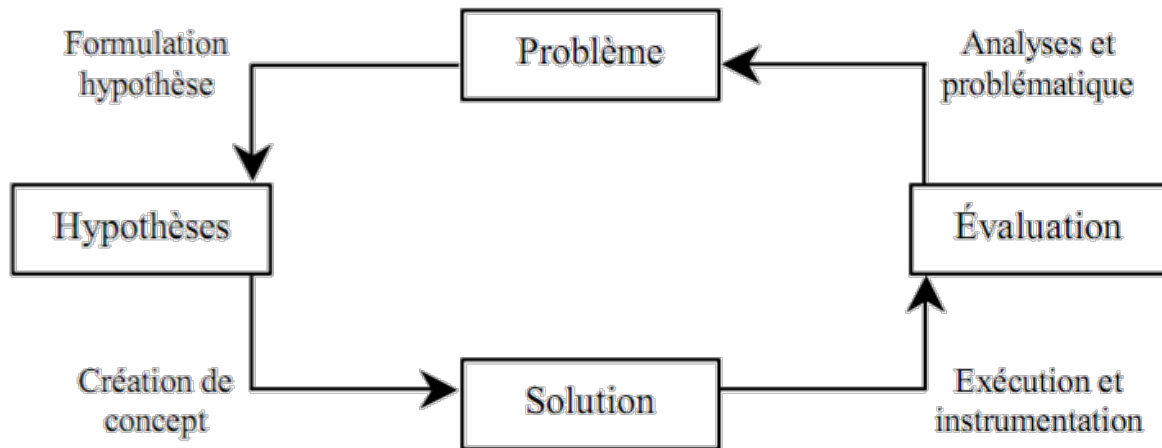
Figure.1 Hypothesis formulation and correction cycle (Christofol, 1995)

As the fuzzy front end of design goes, hypothesis made in this phase concern many of the sensorial modalities (Bassereau, 2001),(Guenand, 2008). It is difficult for a designer to evaluate future products properties when unable to appreciate them under their multimodal form (Kadri, 2007). A design defect can even only be detected once the final prototype is rendered and subsequently release additional funds or mobilize a design team for an undetermined time. Thus it is crucial to identify any possible defect or promising designs through intermediate representation as soon as possible to ensure a successful and competitive product. Traditionally and in an orderly fashion, the different intermediate representations are: Moodboard, Drawings, Physical Mockups and Digital Mockups.

The design process is dotted with intermediate representations to help decision making and evaluation. However these representations have limitations and embody only part of the design issues. The more the representation simulates the final product, the better the represented solution can be evaluated, the better the strategic decisions concerning the object design can be trusted (Kadri, 2007).

The designing personnel may rapidly experience the future product through 2D techniques such as moodboards or drawings (Won, 2001). And as said before, this medium gives the designer the possibility to think over the gaps of his fuzzy representation. On the other hand this medium gives no dynamic or interactive possibilities and gives only the option to explore the object or universe through a single point of view per representation. Numeric data and representation enables a certain liberty on parameter modulation. For instance a color parameter can easily be changed on a digital support. Another limitation to the 2D representation is the lack of sensorial modality allowed by this type of representation. The 2D means does not permit complex sensorial interaction. For example, the moodboard collages only simulates an atmosphere using the visual sensorial modality (Bassereau, 2001). Visuals

evaluation mode has a wide monopole over the early intermediate representations. Few are the haptic, olfactory, auditory... rapid representation made available to the designing team in order to evaluate what can emanate from the future product.

To summarize, intermediate representation is a formal hypothesis generation and evaluation tool. It enables the identification of defects and assets as well as the dialogue over these design attributes. In contemporary design process, the intermediate representations are highly visual. The more the design process advances the more precise design attributes are represented.

Psychology and Emotions

Our study on virtual reality and industrial design requires that we understand the connections between the designer and his environment. Here is a gathering of the information necessary to the depiction of a perceptual, cognitive and affective model of the designer.

For many years emotion has been evacuated from scientific research for a lack of direct observation possibilities. In the early 1950' emotion was intuitively described as preceding bodily response. Psychologist W.James then proposed a counter intuitive vision in which emotional body reaction to a stimulus was prior to emotion conscious awareness. Later, in 1970, neurosurgeon Paul D. MacLean develops a vision of the human brain. He claims that the brain is divided into three elements: Reptilian, limbic and neocortical. From stimulus to behavioral response, the information may travel through two different paths: the upper path (neocortical, slow path) which is described since Freud as the consciousness receptacle, and the lower path (limbic, quick path) where the emotion and personality center resides. Next emerged a cognitive view of emotion in which Lazarus and Alfert (1991) explained that the neocortex intervened before and after bodily response. In this way Mandler (1992) refers to emotion as a signal from the sympathetic nervous system to alert the consciousness and enable a reevaluation of the environment. A recent theory (Damasio, 1995) regards emotion and cognition as two simultaneous interelated processes which each take an important place in the decision process. For instance, the birth of an emotion is the superposition of limbic representation of an object and the neocortical representation the observer observing the object. Applied to industrial design this analysis strongly echoes into Donal Norman's work (Norman, 1988): the limbic path being robustly linked with viceral level and the neocortical with the reflexive level. From this study we have erected a psychological model of the designer. Our futur theorical developpement will mainly be based onto this model.
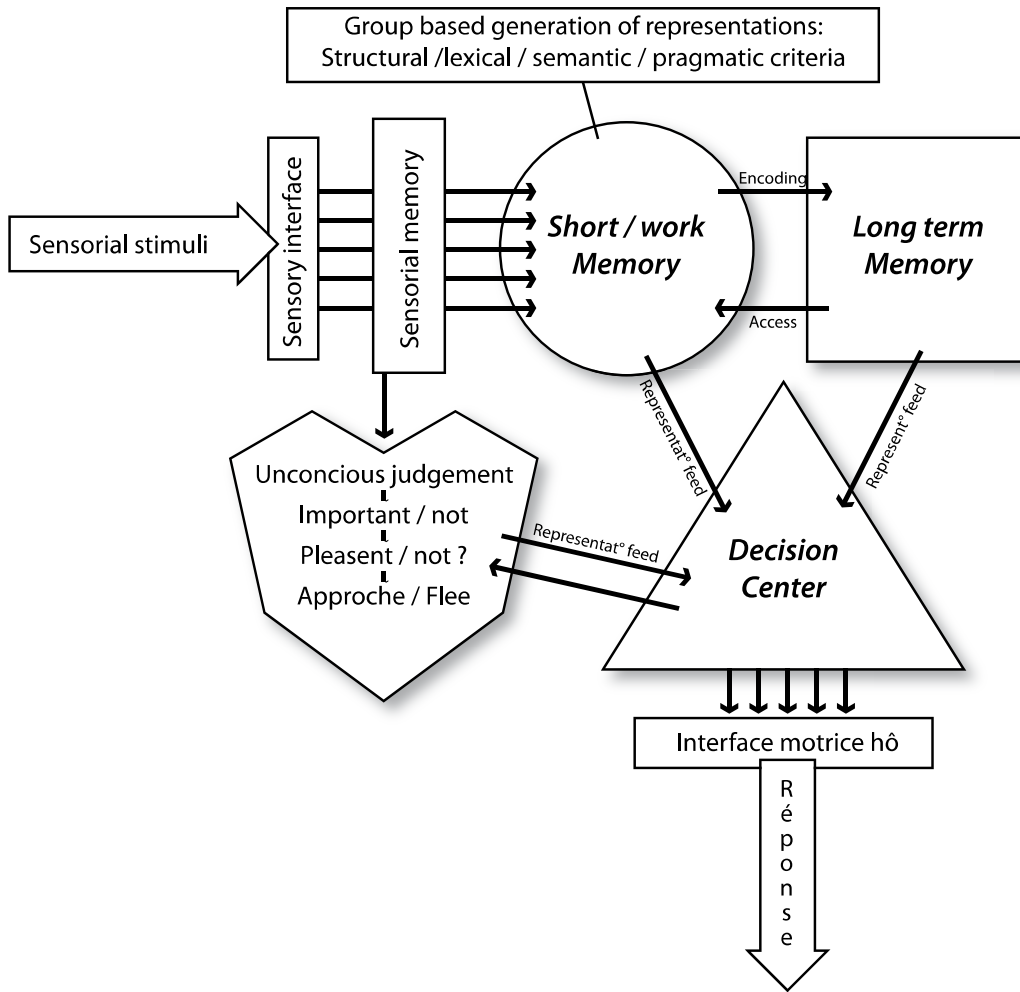
Figure.2 Perceptual, cognitive and affective model

The stimulus occurs when the environment changes from an initial state to another. The constant dual conscious and unconscious analysis of our environment constitutes the decision we make (Cuisinier, 2011). Throughout the industrial design process, the designer evaluates his work and his potential inspiration material. Subsequently this esthetic evaluation has a bipolar structure:

1. Evaluation of an input status with regard to **correctness** and **appeal** (bipolarity). This input usually is the output of the previous design action.

2. Mental anticipation of a new status based on the previous evaluation and of operations that could invoke this new status

3. Decision about the possible operations and anticipated result (Uhlmann, 2008)

Esthetic judgement in design is a objective and subjective process. Objective judgement relates to erected rules such as gelstat theory or the chromatic circle of Isaac Newton. It is a calculated logical reasoning to determine if an object representation or his design attributs are acceptable. Whereas subjective judgement is highly linked to the emotional brain and isn't always conscious (Woelfel, 2010). As suggested before and in reference to Damasio's studies, both parts of the judgement are quasi-simultaneous and condition of one another.

This psychological view over industrial design gives us the theoretical basis to understand how information is processed during the evaluation phases.

Kansei engineering

A promising methodology imported from Japan mentions an original way of seeing user centred design. This particular vision of an affective link between a human being and an object is advanced in terms of designing for emotional impact. This link is called kansei. We will explain this term; expose the different methodologies of kansei engineering and show how these methods could help us enhance the design exploration phases.

The term Kansei (or Kansai) has been introduced from Japanese culture. As it has no direct translation, contemporary researches have been made on the term signification itself. Here are a few of the most referred to definitions: *Kansei is to be understood as a global and immediate perception of a person and its psycho-physiological impact (emotion, sensation...). In other words Kansei is the global feeling one has once he/she has perceived an object or environment through his/her sensory system.* (Lévy, 2008)

> *Kansei is the sensory and cognitive effect of an object, environment or situation on a person.* (Schütte, 2005)

> *Kansei is sensibility, signification, feelings, esthetics, emotion, affect and intuition* (Nagamachi, 2002)

The duality between Chisei and Kansei evokes the description of the aesthetic judgment by Uhlmann. As correctness depends more of a Chisei matter, appeal is closer to the Kansei domain.
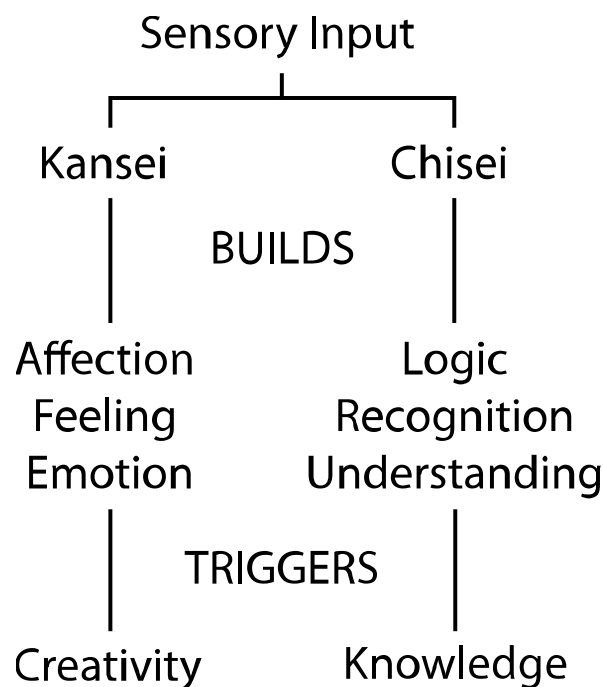
Figure .3 Kansei contexte (Lee et al. 2002)

Kansei engineering is a methodology that centers product design on Kansei analysis. Obviously if one understands the desired kansei relationship between the user and his product, one is able to define design specifications that will produce the desired emotions. Kansei engineering connects specific populations' affective needs with precise products

properties. Kansei can be analogical or digital depending on its type: I to VI (Nagamachi, 1997). At first the connection between needs and design properties was made manually by organizing affective needs into a tree form diagram and other similar mapping tools (type I). Evolution of Artificial Intelligence enabled to process the Kansei related information via mathematical statistical tools (type II). These digital tools enabled designers to predict the emotional impact of a given product on a given population (type III). Virtual kansei engineering replaces real products by virtual mock-ups and immersive environments combined with standard data collection methods (type V). Our researches in the LCPI are mainly based on this last kansei type. Recently Kansei has been used over the web 2.0 enabling distant collaboration and concurrent engineering. Kansei information databases are now connected to the web and are auto fed by their users. The more people use the database the more information is harvested from potential users (Assouly, 2007).

In a relationship of similar product to a similar population, kansei evolves. In fact, the temporal and material context of user and his product has a direct impact on kansei. As product perception has its subjective part: personal interests and competence; trends and fashions; interactive experience and temporal dependency are major factors capable of transforming an initial kansei (Schütte, 2005). Social factors also take an important part in the early design process. They are a crucial parameter for the determination of kansei (Bouchard, 2005). From a human perspective the product acceptation depends: on the context of evaluation, on the user psychological and physiological caracteristics, on his socio-economic category, his age but also his desires, motivations and ideals: his social values. (Damasio, 1986)(Erner, 2009).

The virtual kansei engeneering is used to rapidly evaluate the relationship between a person and a product and create a database discribing and compiling these reactions. Virtual product evaluation can also simulate the product in a given space. While evaluating a product itself, designer are able to evaluate how it fits its targeted environment. For example a pen would not be designed the same way if it is meant to be used by businessman working at its desk or by a schoolgirl drawing in her bedroom. By immerging a person in a specific fitted environment while evaluating a futur product, it is possible to give more information on the product itself and on the lifestyle, function and ambiance coresponding to the designed object. As virtual kansei Engeneering has mostly been executed through computers, it is also visually centered. A few promising attemps have been made to substitute audio stimulus to visual stimulus (Mougenot, 2010).

This method decripts the user/object affective link. We have been studying this approach in comparison with the Conjoint Trend analysis which also expresses the link between social factors and design attributes to extract trends. The emotional impact a project has on the user is the centerpoint of both methods. Although virtual kansei has approached virtual reality technics, such as environment simulation and digital interactivity, the crafted tools are also widely restricted to visual content.

Impact of Sensorial Modalities on Kansei

The internal sensation of kansei is in direct junction with the human sensory system. (Nagasawa, 2002) As I have explained before, kansei is generated via a sensory input. For instance, the noisy sound of a motor suggests that a vacuum cleaner is powerful and its metal finishing may suggest that it is a robust apparatus. In the appraisal of an object, some sensory modalities have a larger effect then others (Nagamachi, 1989). Recent researches have been trying to understand these multi-sensory hierarchies in order to facilitated and stress certain aspects in a given product. The more the modality participates in the users experience the more its effect can be qualified of large.

A hierarchy system based on physical distance between the user and the object enlightens the fact that from distance to proximity first comes the modality of sight, next comes auditory,

then olfactory, then tactile, then taste (Hall, 1996) (Hetzel, 2002). Others modality hierarchy models have been developped. In object experience, prior modality can depend of many criteria such as presence of a modality emitter, usefulness of sensory information during functional use and role of the stimulation in enjoying the product (Hendrik, 2010). Marketing techniques explore how these modalities vary through the product lifecycle or in relation with the users' task: identification, product roughness or esthetic evaluation. By creating a conflict between two modalities in a single product it is possible to indentify, in different environmental situations, which one is dominant. The three major hypotheses regarding the domination of a sensory modal input on another are: the preferred modality is the one that is the most precise regarding an event (Welch et al., 1979); the modality that mobilizes the direct attention is the dominant one (Canon, 1970); the overriding modality is chosen depending on its appropriateness to a certain task (Welch & Warren, 1980). None of these hypotheses have been significantly verified by experimental processes. However, sensorial design experts that depending on the effect the designers wants to produce, different strategies can be adopted. For example the touch design theory (Renault, 2001) links visual appeal to tactile pleasure: what has been conceived to be touched must be visually appealing. (Bonnamy, 2008)

Human perception gets even more complicated with perceptual substitution. With its adaptive qualities, the human brain is capable of using a sensorial modality instead of another, creating an illusory perception and thus sensation. (Lenay, 2008) For instance experiments have been lead on how visual information can be replaced by tactile stimuli (Bach y Rita, 1960) or proprioceptive senses such as balance can be replaced by tactile electric impulses. These techniques have been widely used in virtual reality interface techniques (Gapenne, 2005).

In 2005 emerged the concept of affective flow, with him came the affective chanel. This theory is linked to the information and communication theory transposed on affective information (Shannon, 1978). The affective chanel is the communication channel between an object (sender) and the user (receiver) transporting sensorial data. The more sensorymodal data is emmitted and sent through this chanel, the more this channel is wide, and the clearer the kansei can be felt by the user (Schutte 2005)(Picard 1997). The following paragraph details the measurement of this affective channel or emotion in general. This channel can be limited by two bottlenecks. The first one is the proximity of presentation which is strongly related to the second one, proximity of interaction. Proximity of presentation is the format and support in/on which an object is presented to a user. Proximity of interaction is the experiential access one has to an object (Schütte, 2005). These two proximity bottlenecks are closely linked with virtual reality problems. In virtual reality this problematic is named "Realisme". In order to create a sense of presence and as all object are digital, all presentation and interaction realisme are to be created (Burkhardt, 2003). Part of the virtual environment designers task is to develop and implement a coherent affective chanel.

Emotion is the result of a sensorial stimulus that trasforms a person's environment from one state to another. Different effects can be obtained by stimulating different sensorial modalities. An objects/human kansei can be radically modified by the emphasis of a sensorial modality instead of another. However the human brain is able to permutate sensorial modalities.

Kansei measurement

Kansei, just like emotion is not a directly observable object. Research has yet been led to evaluate and measure kansei and emotion. This paragraph presents the major techniques used to quantify kansei. Self measurement, physiological and behavioral analysis are the three known types of affective reaction measurement.

Self-measurement method is a common way of evaluating the human part of kansei (Rouveray, 2006). This method consist in assessing oneself subjective state when in contact with a product. There are different ways of leading a self-measurement analysis (Mehrabian, 1977), (Osgood, 1957), (Izard, 1977), (Padilla, 2001). In general during the self-measurement study the subject is asked to grade his subjective state through scales composed of semantic terms. Terms can be classed in major categories (pleasure/arousal/dominance), they can also be opposed like in semantic differential scales (strong/weak; delicate/bold…) or can be stand alone like found in semantic unipolar scales. These investigation methods have the advantage of transforming qualitative information into quantitative datas and thus apply statistic calculatory methods onto subjectivity. Data processessing time is rather long but the results are easily interpretable. Objection to these methods arose mainly because strict objective judgment cannot be obtained via arbitrary judgement (Nagasawa, 2002). (Desmet, 2002) pointed out that intercultural methods are impossible due to the evaluation via semantic terms. This problem was overstepped with the development of Iconographic Self-Mesurement. Instead of semantic term, iconographic material is used to assess affective feeling. The Premo tool is based on facial expression. Tested subjects are asked to indentify themselves to charcaters expressing different feelings. As (Ekman, 1994) explains, facial expression has the advantage of beeing easily indentifiable. The intercultural quality of facial expression reduces subjectivity in this kind of studies. The lack of ease in self judgment can reduce fidelity between felt affective states and expressed affective states.

A completely different method to determine a subject's affective state is to detect it by interpreting the physiological response to a stimulus. As explained earlier (cf. §3.2 Psychology and emotions) physiologic and motor response can help interpreting the indirectly observable affective status of a subject. In most cases physiological studies are not self-sufficient and act as complementary studies to refine global affective assessment. However data is directly collected in a quantitative state. The data is also completely objective due to the absence of control of the subject on measured parameters. This objectiveness renders the physiological affectivity independent of cultural affiliation. Here are the usual measured parameters:

System	Signals
Cardiovascular system	Electrocardiogram; blood pressure; blood flow and volume
Skin related	Skin electric potential; palm sweat level; electro dermal resistance
Muscular	Electro-muscular
Brain	Brain wave; IRM
Ocular	Pupils diameter
Sexual	Blood flow and volume
Endocrinien	Hormonal concentration
Respiratory	Chest movement
Immune	Immune Rx; health state

Figure.4 Emotion physiological measurement

Many of these techniques have been used in kansei based design process to identify reaction of a population to a product and modify the product parameter to optimize its emotional impact (Nagamachi, 1995). However the risk in using phisiological affective state measurement seems to be the over interpretation of the collected datas (Nagasawa, 2002) (Rouveray, 2006).

Facial expression, postural and eye tracking, hand gestures examination contribute to the formalisation implicite affective states. For instance (Ekman, 1978) developed a taxonomy linking facial muscular contraction with affective state. As some expressions or postures are difficult to simulate, these analysis can enables the acquisition of precise interpretations (Berthouse, 2006).

The preceeding paragraphs depicted methods which are used to evaluate existing products or intermediate representations of these products. The evaluation results are used to specify products design attributes and thus raise the products overall quality. Each type of measurement methods give different datas concerning the kansei. The ideal protocol crosses self-measurement, physiological and comportemental datas. The data processing time and complexity grows with each type added to the study. These methods enable the researcher to identify the emotional impact of a product or intermediate representation on a designer/user.

State of the art synthesis

Here is a synthesis and classification of the major elements identified through my readings: The next figure sums up the major assessments unveiled by this paper. It is divided in four categories centered on the evaluation of early industrial design hypotheses.
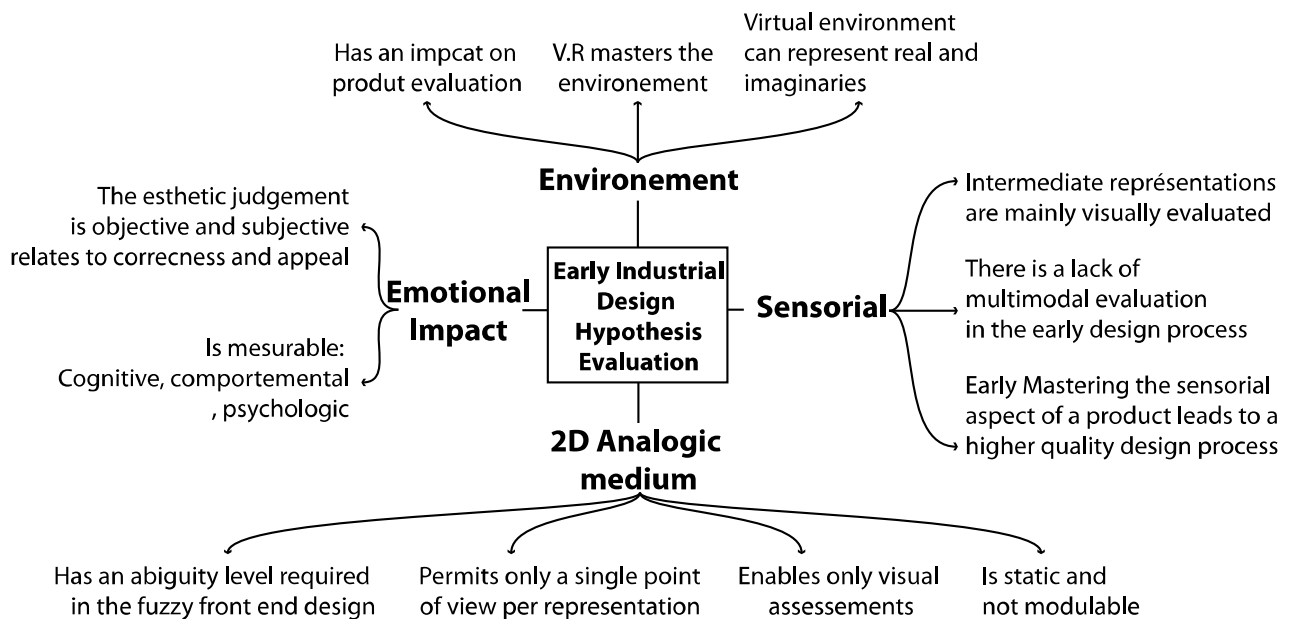
Figure.5 State of the art assessments classification

First of all, sensorial design researchers have criticized the late or lack of sensorial evaluation during the design process. Most of the assessed parameters in the beginning of the project are visual. Today, there are no tools capable of presenting and evaluating strategic early multimodal pieces of information concerning the future product. Secondly, in comparison to

digital support, the 2D analogical supports used are static, non-interactive and non modifiable. With the exclusion of perceptual substitution, the only sensorial modality concerned during the use of a 2D medium is visual. However the traditional way of early designing is centered on the simultaneous creation / evaluation of rapid intermediate representations. We also know that it is possible to measure emotional impact of a product on a person and that this impact is partially triggered by sensorial modalities. Finally the study of the atmosphere and style surrounding the product succeeding to the initial design brief, helps constructing a solid design issue. When evaluating a product, the environment modifies the perception of the product. Generating virtual environment signifies that the environment itself is mastered and modular. The previous assessments provide information on how to answer my initial problematic:

How can the virtual technologies assist conjoint trend analysis?

Discussion
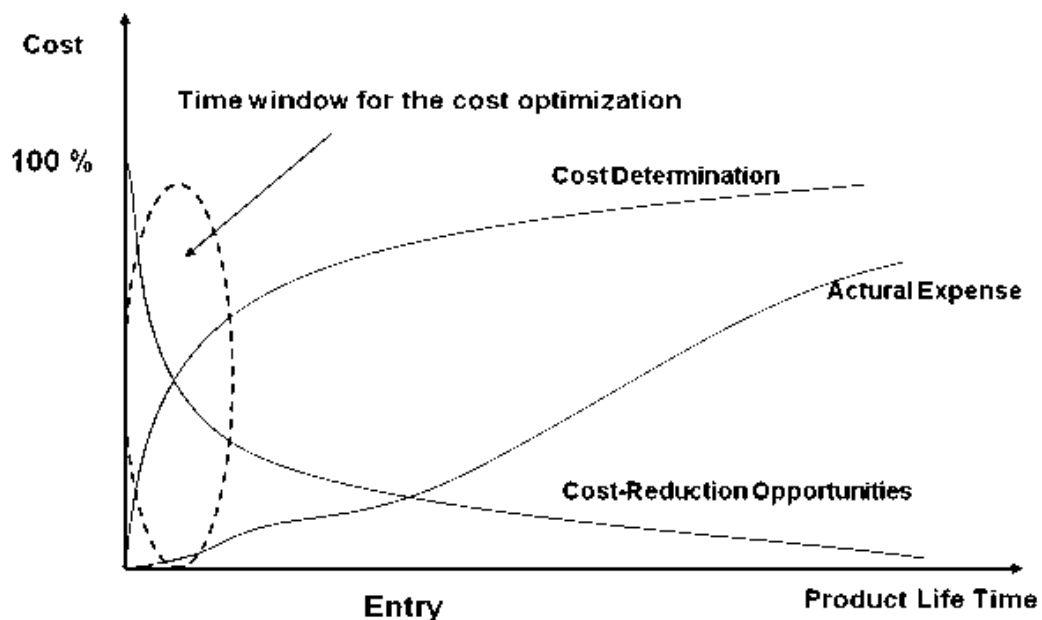
Figure.6 Forecasted costs / actual expenses

It is crucial for us to understand that the choices made during the design process will have a direct impact on the user's final emotional perception of the product. As choices made during the early phases of design give a direction to the overall project, it is essential to evaluate these decisions with the right tools. The later the defects or assets are detected, the higher the cost will be to correct or implement them.

It is my belief that a sensorial analysis of early decisions and collected data (CTA) via intermediate representation using virtual reality multisensory technologies can enable the anticipation of future industrial design problems and solutions.

In further studies I intent to explore how knowledge can be extracted from Conjoint Trend Analysis data through multisensory virtual reality technologies. The aim of my future work is to test whether the same trend information is easily integrated as knowledge data in the

exploration design process, if encoded in an analogical monomodal or virtual multimodal fashion. The upcoming experiments aim to confront two different approaches of trend perception and understanding. To do so, we are planning to compare multimodal and monomodal trend representation perception. This prospective work is part of a larger problematic: modeling and computation of a system for trends analysis based on technologies of virtual reality. In our early research we have identified Spring/Summer 2010 trends through the Conjoint Trend Analysis Method using only January/February 2010 publication (Design; lifestyle; architecture…). In result, we have obtained physical 2D trend representation (moodboards). By implanting the trend attributes into a 3D multisensory immersive environment and adding coherent multisensory feedback, we wish to transform and analyze the design exploration process. Our aim is to disrupt a classical practice while keeping standard results.

Here is the experimental approach we claim: as we know that a same data set presented via different support is perceived and experienced differently, we suppose that adding virtual reality will transform the Hypothesis / Evaluation cycle (Christofol, 1995). We suspect that a same design hypothesis represented on a different support cannot be perceived and experienced in the same way and thus will not be evaluated so (Bachimont, 2008). To synthetize this idea, different support generates different knowledge and vision of the initial problem. The scientific verification of this fact cannot exclude the study of practice.
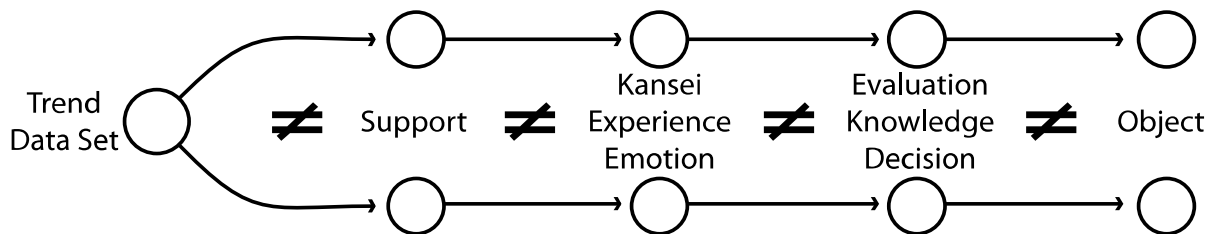
Figure 7: Early Data Support modification impact

Figure 8: Web page Moodboard example

When importing a data on a support, the message deciphering is modified as the access to the information is transformed (Shannon, 1978), thus the data itself is modified. Support is constitutive of the message (Sebbah, 2008). As pointed out before the Conjoint Trend Analysis, methodologies stipulate that the identified trends are synthesized by moodboards on which are sampled form, color and material textures.

As shown in figure 8, a moodboard is a coherent graphical composition that represents an ambiance / lifestyle. On this example the sampling is very clear, especially for the color factor. The trend data set exposed in figure.6 is visual and semantic. The preliminary work required to generate this intermediate representation is centred on the lifestyle of a socio-cultural segment. This preliminary work is knowledge gathering. In the moodboard particular representation, knowledge and ambiguity share the same support. It has been observed that industrial design practices alternate between conceptual space (non logical status) and knowledge space (logical status) (Hatchuel, 2009). This alternating movement, also discribed by Sachse (Sasche, 2002) as the thinking-visualizing process, is dependent on the support used to represent knowledge.

It is equally possible to gather multimodal data such as audio, video or tactile samples and compose "mood-environment" as it is to gather images with the Conjoint Trend Analysis. Here is a pre-model of oncoming experiments.
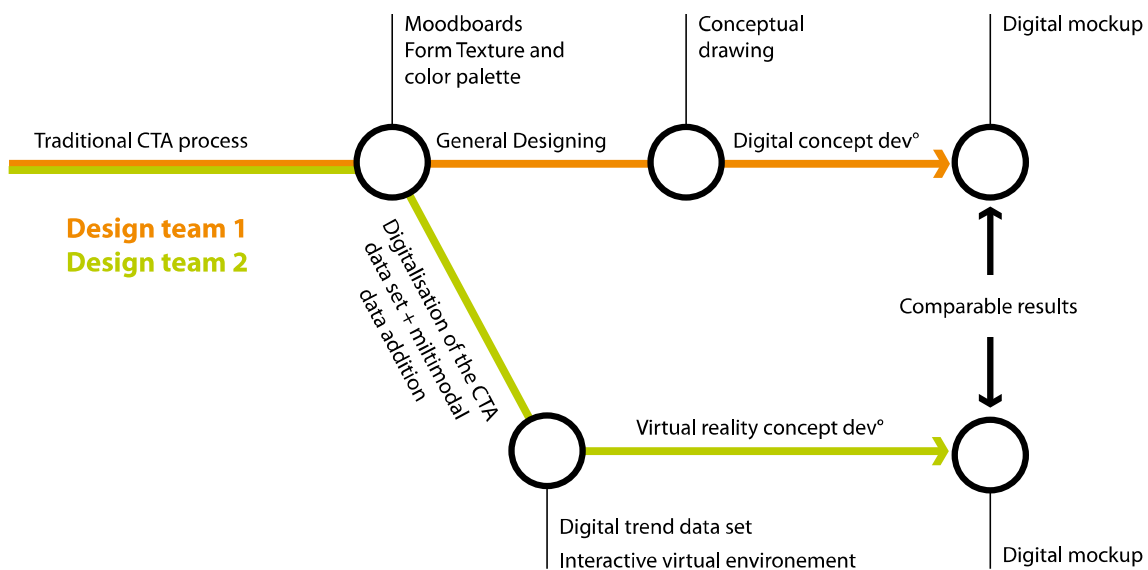
Figure.9 Parallel process exploration pre-model

This figure is a pre-model of the oncoming experiment. This experiment is designed to provide evidence that it is possible and advantageous to correctly anticipate future industrial design problems and solutions with immersive tools.

References

Alvarez, J. (2007). Du Jeu vidéo au Serious Game: approches culturelle, pragmatique et formelle. Unpublished doctoral thesis.
http://ja.games.free.fr/These_SeriousGames/TheseSeriousGames.pdf

B.Bachimont. (2008). Masters course. Technological University of Compiègne

Bach y Rita. (1960). *TVSS.*

Bae. (2009). *Ilovesketch SIGGRAPH 09.*

Bassereau, J.F (2001). De l'Ingénierie centrée sur la technique à l'Ingénierie. *Revue Arts et Métiers*, Paris, éditions Dunod

Berthouze, N. (2010). *Corpus-Based Models Of Multimodal Behaviors.* Reaserch presentation@Arts et Métiers ParisTech

Bonnamy. L (2008). Le design sensoriel comme moteur d'une approche anthropocentrée. *Proceedings of Les ateliers de la recherche en Design.* Paris

Bouchard, C. (2005). *CTA Methodologie*.

Burkhardt. (2003). Immersion, Réalisme et Présence dans la conception et l'évaluation des environements virtuels. *Psychologie Française* vol. 48, no2, pp. 35-42

Buxton, B. (2007). *Sketching user experience.* Morgan Kaufmann Publisher

C. Woelfel, J. K. (2010). Knowing, Reasoning and Visualizing in Industrial Design. *The Knowledge Engineering Review*, Vol. 00:0, 11–99. Cambridge University

Caron, G. (2005). Les modes d'achat d'un produit ...et de son packaging.
http://www.admirabledesign.com/Les-modes-d-achat-d-un-produit-et

Childs. (2004). *Cited in "Product Experience"* by Hendrik N. J. Schifferstein. Elsevier

Christofol, H. (1995). Modélisation systémique du processus de conception de la coloration . Unpublished doctoral thesis. Arts et Métiers ParisTech

Cuisinier, F. (2011). *Doctoriales du Design.*

Desmet. (2002). Designing Emotions. Unpublished doctoral thesis, *Technological University Delft.*

Eckert, C. (2004). Signs, symbols, and subjectivity: An alternative view of the visual. *Computers and Composition*
Volume 22, Issue 1 Pages 79-86

Ekman, F. (1978.). Facial Action Coding System: A technique for the measurement of facial movement. *Consulting Psychologists Press,*

Erner, G. (2009). *Sociologie* des tendances. Que sais-je ?

F.Sebbah. (2008). Master course. Technological University of Compiègne

Front Design. (2006). Sketch Furniture.

Göbel, F. D. (1994). Virtual prototyping - An approach Using VR-Techniques. *Proceedings of ASME Computers in Engineering Conference*

Guenand, A. (2008). Design d'anticipation et qualités sensorielles du produit. Master course. Technological University of Compiègne

Hall. (1996). The Hidden Dimension. New York: Doubleday & Co. Anchors book editions

Hatchuel, A .(2009). C-K design theory: An advanced formulation, Research in Engineering Design. vol. 19, no. 4, pp. 181-192

Hendrik, S. J. (2010). The experimental assessment of sensory dominance. J. of Design Research - Vol. 8, No.2 pp. 119 - 144

Huong Q. Dinh, N. W. (2009). Evaluating the impotance od multi-sensory input on memory and the sense of presence in virtual environement. *Proceedings of IEEE Virtual Reality Conference 1999 (VR '99)*

Izard. (1977). Differential Emotions Scale. *Human emotions.*

Von Matt, J (2008). Tagged in motion. Agency for interactive and innovative communication.

Kadri, A. (2007). Contribution de la réalité virtuelle à l'évaluation de produits, dans les phases amonts du processus de conception. Unpublished doctoral thesis. Université d'Angers

Lenay, C. (2008). Perception & Enaction. Masters course. Technological University of Compiègne

Lévy, P. (2008). L'ingenierie kansei ou comment lier affectivite et conception. *Techniques de l'ingénieur*. Retrieved @ http://www.techniques-ingenieur.fr/base-documentaire/genie-industriel-th6/conception-et-production-ti083/ingenierie-kansei-ou-comment-lier-affectivite-et-conception-ag2140/

Lucero, M. (2005). Mood Boards: Industrial Designers Perception of Using Mixed Reality. *Proceedings of Association for Comuting Machinery. SIGCHI*

Ludden, G. (2011). Beyond surprise: a longitudinal study on the experience of visual - tactual incongruities in products. ID-Studiolab.

http://studiolab.io.tudelft.nl/schifferstein/publications

Mehrabian, R. (1977). Scale for pleasure and arousal. *Journal of Research in Personality.* Volume 11, Issue 3, September 1977, Pages 273-294

Mougenot C., (2010). Comparing the effects of visual and auditory stimuli in design creativity. Third International Workshop on Kansei. *Third International Workshop on Kansei*

Nagamachi, (2002). *Kansei engineerin*. Industrial innovation series (v.18)

Nagasawa. (2002). Kansei and Business. Kansei Engineering International - *International Journal of Kansei Engineering,* 3, pp. 2-12.

Norman. D. (2002). *The design of every day things.* The MIT Press. London,England

O.Assouly. (2007). Internet et la synthèse collective des goûts. *Gouts a vendre.* IFM Paris

Olivier Gapenne, P. G. (2005). Suppléance perceptive et interface : une introduction. Arob@se Vol 1, pp. 1-7.

Osgood. (1964), Semantic Differential Technique in the Comparative Study of Cultures. American Anthropologist Vol 66, Iss 3, pp 171–200

P. Fuchs, G. M. (2006). *Traité de la réalité virtuelle.* Ecoles des Mines de Paris, Les Presses

Picard, R. (1997). Affective Computing. The MIT Press, Cambridge, MA.

Project, 3. (2011, 01). Designing team. (V.Rieuf, Intervieweur)

Rouveray, A.(2006). L'intergation des Preferences Emotionelles et Sensorielles dans la Cconception de Produite d'ameublement. Arts et Métiers ParisTech http://bib.rilk.com/2196/

Ben-Mahmoud-Jouin, S. (1999). Stratégie d'offres innovantes et processus de conception. *De l'idée au marché*. Vuibert

Sasche. (2002). Idea materialis Entwurfsdenken und Darstellungshandeln: cited in Knowing reasoning and Visualizing in Industrial Design. *The Knowledge Engineering Review*, Vol. 00:0, 11–99. Cambridge University

Schütte, E. (2005). Affective meaning: The Kansei Engineering approach. *Proceedings of IASDR 05*

Shannon, C. (1978). Information and Communication Theory. *Bell System Technical Journal*

Uhlmann, W. &. (2008). Two-Step-Method. cited in Knowing reasoning and Visualizing in Industrial Design. *The Knowledge Engineering Review*, Vol. 00:0, 11–99. Cambridge University

Won, P. (2001). Comparaison between visual thinking using computer and conventional media in the concept generation stages of design. *Automation in construction*
vol. 10, n° 3 pp. 319-325

Shibata, Y. (2003). Kansei Information Processing and Virtual Reality Techniques for Japanese Traditional Crafting Presentation. Shibata, Y. (2003). Kansei Information Processing and Virtual Reality Techniques for Japanese Traditional Crafting Presentation. *Proceeding of ICPADS Special Issue on Distributed Multimedia Systems for Virtual Society*

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Experiential knowledge and improvisation: Variations on movement, motion, emotion

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Abstract

In this paper we position improvisation as a way of knowing that is experiential, pivotal to the body's movement and growth in the world. Improvisation allows us to manage the constraints and freedoms of a world rich in possibilities, associations, and combinations. Improvisation, we argue, works across intuitive perception and intellectual analysis. We act and feel our way with whatever is to hand. The impetus is an urge to move from a point of stasis, to catalyse relationship: as we grasp the world, the world grasps us. Improvisation is a means of 'keeping going'. Where in life it may be unselfconscious, in art it leaves a trace, the means to repeat the process but not replicate its experience. Improvisation provides us with a means to create new experience and new knowledge. We draw on selected artists including the Harrisons, Klee, Kaprow, Kurtag, Cage. As authors we take their work into our creative experience of musical performance and the visual arts. This is a research method that is experiential and generative in nature, articulating knowledge from the perspective of the maker/performer rather than that of the spectator. The research approach itself is therefore improvisational in nature. We draw on perceptions of improvisation in other fields including anthropology and psychology examining how far these inform artistic experience and test its assumptions. The question remains: Is improvisation a quality of all art? Can we speak in a precise way of forms of art (therefore approaches to life) that are improvisational and others that are not? What are the implications of this question for our understanding of knowledge more broadly? (265 words)

Keywords

improvisation, experiential knowledge, artistic knowledge, artistic research

Improvisation and the Lagoon Cycle

Invited as artists by governments, organizations and individuals, Helen Mayer and Newton Harrison examine the eco culture of specific places under threat. In response they create work that traces the interconnectedness of living systems, of which the human is but a part, reimaging a place within a much larger 'field' of relations and interdependencies - a 'field of play'.

The Lagoon Cycle, begun in 1976 and continuously refined, is an account of their exploration of the indigenous habitat of a crab in Sri Lanka and the implications of attempting to breed the crab in a different environment. Through their research, the natural lagoon in which the crab is found in Sri Lanka becomes a series of artificial tanks in California. These tanks present significant economic potential but with

problematic ecological implications. The Harrisons displace and reconstruct step-by-step points of interdependence between the crab and its habitat, responding to each new question as it arises. They document their journey. Each development is represented as a 'lagoon', a discrete experience. Poetry, drawing, large scale maps and photographs configure crucial links to form a complex narrative. In these two mirroring texts above, the first positions improvisation in human culture and the second in natural systems. The two characters –the Witness and the Lagoon Maker - through their dialogue, raise questions, seek practical solutions and explore the implications of the success and failure of experimentation. The subject - the crab - becomes a metaphor of interdependence between living forms. Culture is part of a larger whole. Human beings intervene in that whole and, through intervention, they learn. Individuals improvise not simply in response to the outer world, to what is given, but also from their inner world and particular perception and understanding of need and survival at a particular moment in time. As human beings and as artists, the Harrisons emphasise the often unacknowledged ways of coping with the world. They give form to their explorations by creating the narrative, itself an improvisation on improvisational forms of life, constructing new layers of experience.

From The First Lagoon

The Lagoon at Upouveli

A culture is

And I thought
A culture is a cooperative adventure   a complex system of shared interrelated beliefs   about the nature of reality and causation   of values   codes of conduct and ethics by which people define themselves collectively   and niche themselves individually

It is a fragile form   not having the duration of oceans or lands with which it is in discourse   and upon which it depends for its survival   Its constancy is reproduction and change   Its stability is always at risk

Its boundaries increase   or decrease   by virtue of the energies available   the pressure of growth from within the pressures of change from without

Scarcity of food can reduce its population   while increasing its vulnerability from without   as can climate change   as can disease   as can an idea

Abundance can increase its population   while increasing its vulnerability to stress   as the resources available are consumed

Conquerors can debase a culture   denigrating its belief structures   and language   while destroying its relationship to the ecology

But people are tough   and resilient   and improvise their existence as best they can   very creatively   with the materials at hand   but the materials keep changing Only the improvisation remains constant.

The Witness p 37

From The Third Lagoon:

The House of Crabs

An estuarial lagoon is the place where fresh and salt waters meet and mix   It is a fragile meeting and mixing   not having the constancy of the oceans or the rivers   It is a collaborative adventure Its existence is always at risk

Heavy rains increase its size and its boundaries increasing nutrients   while decreasing salts

Forest fire   then rain   can set up the conditions for heavy silting   and a lagoon can turn first into a mud flat   then into a swamp

If the day is warm   the waters being shallow warm quickly   If the night is cold   the waters being shallow   cool quickly

Life in the rivers   the lakes   and the oceans where the properties of water are more constant is less stressful

But life in the lagoons is very special   it has evolved high tolerance to the stresses that come about from sudden changes   in salt and fresh water   and temperature   and available food for the life web

Life in the lagoons is tough   and very rich it breeds quickly   Life all of us it must improvise its existence   very creatively   with the materials at hand   but materials keep changing   Only the improvisation remains constant

The Lagoon Maker p 60

Fig 1 Two mirroring texts from the Lagoon Cycle (Harrison 1985)

This ecological and artistic research offers us a first account of the notion of improvisation from a poetic and inter-dialogical perspective. Hallam and Ingold, as anthropologists, echo this notion of human experience as continuously improvisational: *"There is no script for social and cultural life. People have to work it out as they go along. In a word, they have to improvise."* (Hallam & Ingold 2007, p1). There exists no script, no modus operandi for human life, just some advice, narratives and instructions of other people whose contexts, bodies and perspectives are inevitably different: it is to the son to become the father. Take as an example the construction of a house, and then of another similar house following the same plan: the material will never be exactly the same, the location will be different, the time and the weather differ and the workers will have to take other decisions at other moments, even if they 'redo' the same work. For Ingold and Hallam, improvisation means that each act continues culture and (re)creates it. Improvisation is dynamic, never static, never perfectly repeatable. It is also different from innovation, because improvisation just happens as a necessary and spontaneous way of coping with the world in which imagination, thought and action again and again meet in specific unforeseen situations. Innovation is only apparent when we look back and recognize a point of change. As the Harrisons mention, there is a continuous search for equilibrium due to a high 'tolerance' in living systems and human agency towards the unforeseen, the extreme, conditions of stress, combined with a great vulnerability and sensitivity towards changing parameters*.*

Hallam and Ingold attribute four characteristics to improvisation. In the first place it is generative, meaning that it always creates something different, even minimally. The active unfolding of actions, even imitative, always contains unexpected variations, depending upon time, context, growth, inner feelings — *Its (Culture's) boundaries increase / or decrease / by virtue of the energies available / the pressure of growth from within / the pressures of change from without* (Harrison 1985, p 37).

Secondly, improvisation is relational: it is continuously directed towards the other. In that sense it is socially generative: it brings new elements into our interactions with others. Improvisation is also materially generative — as an interaction between one's own body and the inner and outer world. Each act in the world contains a precision, an interrelatedness between the actor and the environment, a subtle 'com-prehension', a 'grasping' of the outer world, and by grasping the outer world, the outer world can 'grasp' us. Improvisation implies a relational interaction, exchanges which influence mutual identities, as the Harrisons remind us metaphorically with the estuarial lagoon: *the place where fresh and salt / waters meet and mix / It is a fragile meeting and / mixing (…) It is a collaborative adventure* (Harrison 1985, p 60)*.* Think about stepping on a wet rocky path: some stones will support the walk, others will offer too slippery a surface; think about the blanket that 'embraces' our skin and holds us warm; think about drawing and the springing back of the paper in response to the pressure we exert with a pencil. A continuous and improvisatory adjustment will need to be made again and again to achieve equilibrium, to create order.

Thirdly, improvisation is time-dependent: it is always part of a dynamic ongoing action, an event, experienced in and adding to the narrative of life. It does not participate in chronological time as different improvisations will relate differently to times, dependent on what came before and what comes after — *(Culture) is a fragile form / not having the duration of oceans / or lands with which it is in discourse / and upon which it / depends for its survival / Its constancy is reproduction /and change / Its stability is always at risk* (Harrison 1985, p37). In that sense improvisation is a movement, motion. Moment and movement have the same origins in the Latin word *movere* to move, stir, agitate.

Fourth and finally, it is 'the way we work': improvisation is an inherent part of our human condition. In life we continually write a provisional script that needs to be adjusted again and again. A human being has to find h/her own way in the world; no explanation, no explicit coded output, no total predictability.— *But people are tough / and resilient / and improvise / their existence as best they can / very creatively / with / the materials at hand / but the materials keep changing / Only the improvisation remains constant* (Harrison 1985, p 37).

What do the ecology artists add to the anthropologist's view of improvisation? The poetry gifts shared guiding metaphors that colour how we might think and act - the adventure and uncertainty of *niching* ourselves as individuals within certain codes of conduct. Culture is part of nature's processes. There is struggle involved and it is a struggle with the conditions of life and its mortality. Time is an ebb and flow. In this field of forces, we strive towards equilibrium. The world is not a ready-made gift delivered by courtesy of the physical environment, to be exploited. The fragility of the human moves to the foreground as a discourse within nature. Conceptually and emotionally man becomes an interlocutor, no longer singularly acting on the world to ensure his survival. As participants in the world we need to grasp the interrelatedness between events, objects, thoughts, subjects, to feel our way, to commit. As we engage in the adventure with the outer world, we perceive the outer world 'grasping' us.

This is experience: drawing a point in space

Hallam and Ingold's explanation and the Harrison's evocation of improvisation draw upon the primacy and specificity of the broader concept of human experience which *"occurs continuously, because the interaction of live creature and environing conditions is involved in the very process of living."* (Dewey 1958/34, p35). An individual's particular experience is shaped by forces (instinct, genes, learning) but these do not wholly account for the quality of encounter when we act in the world. In action, each experience is new, original, an encounter with mortality. It is through experience, through improvising that the playing child becomes the musician or painter.

Interestingly, the etymological roots of 'experience' reflect this complexity. The word 'experience' in European languages originates from the Latin verb ex-periri, 'to try out, attempt to'. 'Periri',meaning to 'perish'/ 'die', originated in the noun 'periculum', which also signifies 'risk' or 'danger'. The prefix 'ex' refers to a movement out of a location or place. Experience refers therefore to the struggle and interaction between the human being and h/her environment. For the individual, it is finite process. 'Being involved' is a fundamental necessity from a biological point of view: we can only survive by interacting with the world. Moreover, it is by doing so that we temporarily can overcome our mortal condition.

Our primary approach to the world is immediate, pre-noetic, embodied, vague and undefined. Dewey calls this the level of 'feelings', making possible a first discernment of the world as lived, intuitive. On the next level of 'sense', the world is accepted and reflected upon as meaningful. Thirdly, these experiences are articulated through signs and symbols, through 'signification' (Dewey 1958). As such, *"Experience is as much cognitive as sensory. It includes everything a bat or a new born baby can feel, and everything a great mathematician can experience in thinking."* (Strawson 1994, p4).

The primacy of experience as 'trying out', as 'moving out 'of the location of stasis/death is the starting point for Klee's *thinking* eye (Spiller 1973). The dot/or point in space fixes a moment. It represents the primordial, simultaneously suggesting the cosmos (macro) or the cell (micro). Making a spot, determining a beginning represented by a point in space, is an intervention, a breaking of chaos, simultaneously an improvisational and an organisational action. By making a dot, by placing something within something else unlike it, a black spot within white space, this act transcends the pre-noetic, undefined 'feeling' and makes 'sense' by 'differentiating', making a 'decision'. A dot on paper becomes a point in space from which to move off in any direction. It urges us on towards improvisational interaction and involvement in the world into which we are born 'unasked' (Klee 1954).
One dot can connect with a second, leading us to imagine a relationship, the yielding of a line between two entities. Both possibilities suggest the second level of experience in which the world is no longer simply embodied, but a situation of two interrelated states, the world of inner perception and understanding and the outer world of encounter. These are an interplay of seemingly different forces in dynamic tension. We feel the pull of gravity as a pull towards stasis, towards the centre of the earth. We also feel a compulsion to move. *"Motion is the root of all growth"* (Klee). In this push/pull Klee's world accrues meaning.

Moreover, a line leaves a trace, and as such can be revisited, shared, and through reflection, altered, improved upon, varied in some sense 'knowingly', transported towards another plane. In this way Klee takes one experience, walking, as a basis for another mode of experience, drawing. In so doing he extracts experiential knowledge of the world into his artistic domain of drawing. An ordinary experience that we may not notice becomes an experience of intuition 'at work'. This marks a transition from an intuitive and embodied coping with the world to a different level of awareness – one that is more explicitly cognitive and conceptual.

The art theorist and psychologist, Arnheim argues in favor of the coupling of perception and thinking, intuition and intellect: '*Thinking requires a sensory base'* (Arnheim 1986, p14). In a bid to free the sensory from the aura of poetic inspiration by giving it a name, Arnheim articulates intuition as *'a cognitive capacity reserved to the activity of the senses because it operates by means of field processes, and only sensory perception can supply knowledge by means of field processes'* (ibid, p16). In formulating a whole, creating a stable image out of the complexity within the field, all components depend upon each other, one colour depends upon the color of its neighbours. Interestingly Arnheim notes that in everday life, we limit ourselves to what is necessary to notice in order to move around. But in art, we engage in an improvisational dialogue with experiential knowledge that is constituted of more stable entities. The kinesthetic control of the bicycle rider repeats itself in the movements of the dancer. The dancer works intuitively with the language of dance, the shared signs, symbols and patterns of movement. The bicycle rider focuses to stay upright and in motion, a more primary level of experience.

Art as improvisation with experiential knowledge

The child enters a room and encounters a piano. The discovery depends on the child's being in the world and its curiosity to unfold the unknown. By touching a piano it makes a sound! By using hands, arms, dynamics change. By exploring the space of the piano, pitch varies. A world opens, a world that is also without a script. The improvising child nourished Gyorgy Kurtag's compositions: *"The idea of composing 'Games' was suggested by children playing spontaneously, children for whom the*

piano still means a toy. They experiment with it, caress it, attack it and run their fingers over it. They pile up seemingly disconnected sounds, and if this happens to arouse their musical instinct, they look consciously for some of the harmonies found by chance and keep repeating them." (Kurtag1976) Kurtag's musical composition *Games* embodies the transition from quotidian experience to artistic experience, but also from intuitive, prenoetic experience towards experiential knowledge. The intuitive experience and improvisational interaction of the child is rebuilt, reoriented towards a composition based on the awareness — and knowledge — of these experiences. The composer freely draws, like Klee, dots in space, lines referring to bodily movements and material interactions with the instrument. The performer embodies these dots and lines with motion and movement. The improvisational act of the child leaves traces in the improvisational act of the composer. Both leave traces and offer possible directions for the performer's act.

Fig 2a Detail of score of Kurtag's *Games* 1976

Fig 2b Kathleen Coessens and Catherine Laws performing *Games* Orpheus Institute, Sept 2010

The combination of the words 'experiential knowledge' is paradoxical in itself. The first term, experience, is rather subjective, partly implicit, difficult to express. The second, knowledge, is supposed to be objective, explainable, explicit. In the first place, experiential knowledge is a kind of relational knowledge: it originates in the relationships we establish on the basis of our experience of the outer world and which we then combine or readjust with our inner world. Secondly, it is the result of the interaction with and commitment towards its object/event which is not a 'gathering' but a 'comprehension', a 'grasping' of interrelatedness between events, objects, thoughts, subjects, implying an inner 'aha' feeling. As such it broadens our understanding of these interrelations. Thirdly, as Dewey mentioned, this grasping can be present at different levels of awareness, going from a rather intuitive, embodied (ineffable) coping with the world, towards explicit cognitive and conceptual expression and reflection.

To return to the example of Kurtag's *Games*, Arnheim might describe the first phase – the child's experience – as intuitive cognition. The child grapples with the immediacy of his experience, synthesizing and synchronizing interactions between forces to create a whole. Arnheim might describe the second, the composer's creation as intellectual cognition – a linear, diachronic process of making connections between 'standardised units': the note-to-note protocols of notation and composition. The resulting work is repeatable in its precise configuration. In other words both forms of cognition – intuitive and intellectual – are necessary and mutually dependent activities to make sense in the work of art in the same way as we make sense of the world. Being open to the uniqueness of the moment of interaction with the world in specific experience checks any tendency to view the world purely through generalized stable entities. Likewise unique and specific experience without generalization does not allow us to learn from experience, transfer knowledge from one situation to the next.

Merleau-Ponty evokes this interdependence as a delving *'into the thickness of the world by perceptual experience'* (Merleau-Ponty, p. 204). In contemplating the blue of the sky, *'I abandon myself and plunge into its mystery, it thinks itself within me'* (Merleau-Ponty, p. 214). Knowing the blue of the sky is therefore not about possessing some thought of 'blue' and 'spreading' that thought or idea into the world. It is a way of knowing that emerges from a living connection between me and the perceptible world, of my being part of the world in the same way that parts of my body are connected to each other: *"When I walk round my flat, the various aspects in which it presents itself to me could not possibly appear as views of one and the same thing if I did not know that each of them represents the flat seen from one spot or another and if I were not unaware of my own movements, and of my body as retaining its identity through stages of those movements"* (Merleau-Ponty, p 203).

However, Arnheim forgets an important aspect of artistic practice: the omnipresence of improvisational interaction needed to cope with the tensions between freedom and control and between intuition and experiential knowledge. This improvisational interaction nourishes the creative process. It encourages the situation of originality for which the artist strives. For example, in the case of Kurtag, there exists no standard notation addressing the embodied behavior of children's embodied improvisatory movements on the piano — which forces him to create one.
In the Kurtag performance the artist questions the primary relation the child has with a musical instrument. The child's playfulness is transposed to an artistic creation. The encounter, realized by way of the motions of the child, the interaction with the instrument, opens a new perceptual and possibly emotional experience: by touching the piano, I am touched. Artistic experiential knowledge therefore starts from questioning the relations between the inner and outer world and, through

questioning, reveals a heterogeneity of possible connections, associations and combinations.

Moreover the questioning originates from an engaged and consciously open position; artistic experiential knowledge is the result of an involvement, a committed action, a trans-action that happens on the border between what is actual and potential, between reality and imagination. As such it implies a creative search. Likewise, this openness implies taking a position in between freedom and control, chaos and decision-making.

If Klee offers us drawing as a method of moving from open, non-defined space to greater levels of control and determinacy by improvising with line, then Cage offers us another artistic method that increasingly articulates improvisation as a highly disciplined process of 'letting go'. In his visual artwork 1978- 1992 with Crown Point Press, Oakland, Cage transposed the conceptual domains of 'structure, method, form and materials' already developed in music, to the visual domain. He expanded these domains to include 'intention, discipline, notation, indeterminacy, interpenetration, imitation, devotion and circumstances'. He worked with scores that laid out a series of moves determined by chance operations using the I Ching. Compositional decisions do not emerge out of the 'ego' of the artist, of what looks good. Instead Cage rigorously followed the outcomes of chance procedures (such as throwing dice or letting string fall) through the values that had been preassigned to them. Chance procedures determined with great precision how the artist should work with the materials to hand.

Klee's control started from a first dot with its inherent freedom - the possibility for infinitesimal trajectories of lines. Cage's control started with the decision to use a certain chance operation and follow its consequences. Both are precise responses to creative freedom. A tension exists between control and freedom and is at the heart of improvisation as both a cultural/artistic concept and a cultural/artistic practice. Whereas most of human life is concerned with how to control, how to judge our way as an individual, Cage flips this norm to revealing an absence of control or serendipity. *"Chance operations are a way of silencing the ego so that the rest of the world has a chance to enter into the ego's own experience,"* he wrote. Chance was not a method to avoid making choices. Rather, he said, *" I use chance as a discipline...my choices consist [of] choosing what questions to ask"* (Brown, p64). Cage turns our attention to that aspect of the outer world that is perhaps the most challenging for us to grasp within our inner world - the inability to control life itself. Like Klee and the Harrisons, like Merleau -Ponty and the colour blue 'thinking itself within me', Cage's work becomes a process of 'letting the world in' to consciousness.

The relation between improvisation and experiential knowledge in art reveals itself through artistic method, engaging a sensible and sensitive reflection on a practice which circles between motion (action, transformation) and emotion (meaning, astonishment), between moving and being moved/touched. As a form of activity it is close to all human perception but as artistic experiential knowledge, searching actively and methodologically for the — aesthetic — relations between motion and emotion, also stands out as particular, as specific.

Our practice of artistic experiential knowledge: *Calendar Variations* 2010

Calendar Variations 2010 is a collaborative art research project that responds to Kaprow's *Calendar* score (1971). Developed by a group of artists researchers from the On the Edge research programme at Grays School of Art in Aberdeen, the project started as a response to an invitation by the Orpheus Institute of Research into Musical Practice to contribute an 'unexpected variation' to the Research Festival 2010, *Unexpected Variations*.

Kaprow felt that life is more artlike than art. He drew artists and participants into noticing and exploring life's spontaneous moments of sociability. Kaprow's method was to rely on scores to create a series of timebased events, to break with the tradition of the visual as priviledging objects and material. The quality of timelessness, of being outside of time, is frequently cited as a quality of the visual, whereas Kaprow framed time consciously in the work. Kaprow's score consists of words, while musical scores consist of musical notation; but both are embedded in performance and time. By working together with a score, Kaprow set out to create the potential for shared social experience. This would, he claimed, naturally occur when a group of individuals attempted to grapple with a score's meaning. The necessity to negotiate meaning and appropriate response would arise in a shared performance. In this way Kaprow transposed Cage's idea of experimental action, 'the outcome of which is unforeseen', into the visual arts by using scores to trigger awareness, to notice and value the moment in which one was working.

Calender

planting a square of turf
amid grass like it

planting another
amid grass a little less green

planting four more squares
in places progressively drier

planting a square of dry turf
amid grass like it

planting another
amid grass a little less dry

planting four more squares
in places progressively greener

 -Activity, A.K., California
Institute of the Arts, November 2, 1971
(Kaprow 2003 p 120)

We worked closely to what we felt was intended by the artist, in that sense treating the score as a 'set of actions to be performed'and filtering its meanings through our own cultural, geographical and ecological circumstances. The score resembled the drawn point on a sheet of paper of Klee: it offered constraints and freedom.

First of all, we performed this score through drawing. Each individual was invited to respond from within their own centre. We then came together and shared our productions, seeking agreement about how to perform together. We decided to 'walk the score'. meaning in our own experience, We also reveal difference. Chu takes the score into practices of negotiation in relational art practice, exposing tensions in 'implanting an idea' in minds that are 'friendly' or 'hostile'; Fremantle uses the score's structure to articulate the quality of a collaborative experience; Goto translates and thereby disseminates our shared processes of folding and tracing, of working singly and in pairs; McEwan explores quality of relationship through quality of space, of sound and silence; Barney creates a tactic for insinuating art back into everyday life.

How does *Calendar Variations* speak to improvisation in art as experiential knowledge? As mentioned earlier improvisation focuses in particular on how constraint and freedom is managed in any particular piece, who or what controls or is in control of the work and how and where control is relinquished. Constraint and freedom within form draw into play the structures of thought that Arnheim describes as 'intuitive perception' and 'intellectual analysis' (Arnheim 1984, p 29), as well as they draw into play a performative relation between motion and emotion. In nature as well as culture we find within each context ''petrified' elements, which act as constraints because they are not influenced by the structure of the whole (Arnheim 1984, p 28. This corresponds to Klee's idea that things on earth require impetus: *"What was in the beginning? (...)There was just one thing – mobility, the prerequisite for change from the primordial state."* (Klee in Spiller 1973, p 19). These non-negotiable elements are essential to a work's capacity to produce the experience of encounter as 'unexpected'.

As with the Kurtag, it is important to focus on the form producing properties of this project and how these might lend themselves to creating the unexpectedness that is implied in improvisation. By identifying and working within certain givens in the score: numbers of squares, conditions of turf, juxtapositions, sequences, repetitions and changes in rhythm, we established a set of constraints that provided an impetus to challenge habit. The sense of the project resonates with 'using the materials to hand', 'without preparing in advance' in the sense of relying on preformed modes of production or repertoire, seeking an encounter that is 'unexpected'. This work will undergo deeper analysis in the coming months.

Fig 2 a Drawing *Calendar Variations* 2010
Fig 2 b Walk *Calendar Variations* 2010, Woodend Barn, Banchory

Conclusion

In life there exists no script, no modus operandi. The primacy of experience is a form of 'trying out' or improvisation, a moving from an indefinable and undifferentiated state to feeling our way by creating a direction. By projecting into the world, we invite a response. Improvisation means that each act continues culture and (re) creates it. Improvisation is dynamic, never static, never perfectly repeatable.

In art the body becomes a medium of expression. Simple, everyday movements are transposed into more stable, choreographed elements thereby opening up the potential for almost infinite variability. The artist uses this potential knowingly.

In artistic research, by experimenting with new forms, by observing how other artists work, by drawing on understandings of improvisation from other fields (anthropology and psychology), we notice that art is a process of aesthetic questioning between the domains of our inner and outer selves. This questioning arises when we view the world as heterogeneous, as rich in possibilities, associations and combinations. Art goes further, however. Art produces new forms, experiences and thoughts. If we extend our definition of improvisation in everyday life into artistic practice, we see that in art, improvisation manages the constraints and freedoms of possibility as a dynamic. Improvisational forms and tactics in art leave traces. These can be repeated but never exactly, adding a new layer of consciousness.

Within this paper we have traced a trajectory from improvisation in life to improvisation in art. The next phase of work is distinctly different. By focusing on artists who work with improvisation in precise ways in the visual and music, we aim to explore how our current understanding of experiential knowledge and improvisation may be challenged and transformed by what the artist specifically offers.(Arnheim 1984, p 28.

References

Arnheim, R. (1986) The Double-Edged Mind in *New essays on the Psychology of Art* pp 13-29 University of California Press, London

Brown, K. (2000) *John Cage: Visual Art to Sober and Quiet the Mind* San Francisco Crown Point Press

Dewey, J. (1958/1934) *Art as Experience* Capricorn Books

Hallam, E. and Ingold, T. (2007) *Creativity and Cultural Improvisation* ASA Monographs Berg.

Harrison, H. & N. (1985) *The Lagoon Cycle*, Herbert F. Johnson Museum of Art, Cornell University, Ithaca, NY

Kaprow, A. (2003) *Essays on the Blurring of Art and Life*, edited Jeff Kelly, University of California Press, Berkeley

Klee, P. (1954) *On Modern Art* faber and faber

Kurtag, G. (2000) Jatekok (pianists Marta and György Kurtag) ECM Records (Audio CD)
 Kurtag, G. (1979/2004) Jatekok I (Jeux pour piano), Editio Musica Budapest / Editions Henry Lemoine, Paris. (score)

Kurtag, G. (1979/2004) Jatekok IV (zongorara), Editio Musica Budapest.

Merleau Ponty, M. (1962) *Phenomenology of Perception* trans. Colin Smith, Boston: Routledge and Kegan Paul

Spiller, J. (ed) (1973) *Paul Klee Notebooks Volume 1 The Thinking Eye* London: Lund Humphries

Pokorny, J. (1959-1969) *Indogermanisches etymologisches Worterbuch, 2v.,* Bern: Francke

Strawson, G. (1994) *Mental Reality* Cambridge: MIT Press

Images

Fig 1 Two mirroring texts from the Lagoon Cycle (Harrison 1985)

Fig 2a Detail of score of Kurtag's *Games* 1976

Fig 2b Kathleen Coessens and Catherine Laws performing *Games* Orpheus Institute, Sept 2010

Fig 3 a Drawing *Calendar Variations* 2010

Fig 3 b Walk *Calendar Variations* 2010, Woodend Barn, Banchory

Anne Douglas

Anne Douglas is a visual artist and research professor whose work has focused on the dynamic role of the artists in the public sphere. Her practice led doctorated (completed 1992) entitled *Structure and Improvisation* focussed on the artist's creative process. She developed parallel strands of inquiry: investigating her own practice of sculture and its process of change within a post industrial context alongside the potential of art practice to open up new trajectories and methodological approaches to research. Douglas has initiated and led On the Edge research programme at Grays School of Art, Robert Gordon University, Aberdeen working within a network of international artists on a range of issues including artistic leadership; contemporary art and remote and rural cultures; the aesthetics and ethics of working in public. The research increasingly draws out the philosophical and social implications of a practice-led approach, tracing its implications in new forms of practice as well as new forms of research. Recent publications include *the Artist as Leader* co-authored with Chris Fremantle and *The Artistic Turn*, co-authored with Kathleen Coessens and Darla Crispin. Douglas is a Senior Research fellow of the Orpheus Research Centre in Music, Ghent.

Kathleen Coessens

Kathleen Coessens is a philosopher and musician, whose research is situated at the crossings of science and art, human creativity and cultural representations, looked at from an embodied, epistemological and philosophical point of view. She graduated in piano and chamber music at the Conservatory of Brussels and ecole Cortot at paris; at the Vrije Universiteit Brussel, she studied philosophy, sociology and psychology. She was awarded her doctorate in 2003 with her thesis *The human being as cartographer- coping with the already epistemized world* to be published later this year*.* She is now professor and post - doctoral researcher at the Vrije Universiteit Brussel (VUB Centre for Logic and Philosophy of Science), a Senior Researcher at the Orpheus Research Centre in Music, Ghent and guest professor at the Conservatory (Aretsis Hogeschool), Antwerpen. She teaches semiotics, sociology of artistic practice and arts and performance culture. Coessens co-authored *The Artistic Turn*, with Darla Crispin and Anne Douglas.

A Case Study: Articulating Embodied Practice with Poise

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Abstract

In this paper I will examine the role artefacts play in the context of a practice-based research project. Alone artefacts would not constitute research but I will present a Case Study examining how a self-produced single artefact, named PULLEY SAC became a compelling artefact within my design practice. The study revolves around a first person account of the context in which the PULLEY SAC emerged within practice. I pay particular attention to the phenomena of *noticing,* whereby particular aspects of a current activity show up as significant against a background of ongoing creative practice and *articulation*, which draws out through reflective writing background aspects of the practice pertinent to the researcher. The study examines the way PULLEY SAC enabled me to articulate important aspects of creative practice by pointing to how the artefact is taken up in bodily engagement and how it emerged through practice. I will discuss practice as an embodied and receptive mode of experiencing that enabled me to be drawn into the contingencies of a making situation, extended it so to resolve it in a way that was consistent with my particular mode of creative practice. In the second part of the paper I extend the Case Study to examine creative practice in relation to the notion *Poise* developed by Samuel Todes. Here I argue the practitioner-researcher take up a location *within* practice rather than *without* in order to draw out significant aspects of skilled practice as a mode of receptivity encompassing both somatic awareness and artefactual engagement.

Keywords

Embodiment, Poise, Fashion Practice, Expertise, Articulation

Introduction

In ten years of professional fashion design practice I have come to understand fashion design as a somatic practice, wherein the garments we wear on our bodies actively participate in constituting our felt-sense of being in the world. [1] Despite this, the pervasive understanding of fashion involves fashion as the play of signs, symbols and images to be viewed, interpreted and de-coded. In short fashion is primarily a mode of visual communication. Reflecting this perspective the body of scholarship comprising 'Fashion Studies' adopt primarily semiotic and post-structuralist frameworks to interpret the dressed body's role in the construction of embodied identity (Barthes, 2006; Breward, 1995; Craik, 1994; Davis, 1992; Evans & Thornton, 1989; Gains & Herzog, 1990; Kroker & Kroker, 1987; Ash & Wilson, 1985). The living body is largely absent within these representational frameworks.[2]

Emergent practice based research in the field of fashion is beginning to counter this representationalist tendency (Bugg, 2009; Von Busch, 2007 & Jeon, 2009).These researchers employ their design practice as the primary vehicle to examine fashion practice. Despite utilising disparate methodologies and theoretical frameworks the fashion practitioner-researcher located within their practice suggests more immanent understandings of fashion practice may emerge. Bolt (2007) argues research within creative disciplines has the potential to produce understandings unavailable to other research approaches. She points to the embodied nature of knowledge within creative practice as derived from 'doing' and from sensory modalities. While knowledge, following Bordieu's logic of practice, is embodied within the context of practice, where, "strategies

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[1] I make two terminological distinctions in this paper. Following Merleua-Ponty's insight that the body is the generative locus of embodied experience, I use the term 'somatic' (Shusterman, 1990) to refer to a sentient and receptive body-mind rather than a mute physiological or matter-body. Similarly I employ the term 'felt-sense' or 'felt-experience' (Todes, 2001) to foreground the constitutive role of practical action encompassing object relations and movement in human life. These terms are employed in preference to 'perceptual' or 'sensory' experience, which are coloured by artificial divisions between the body with sensory experience against the world of matter and things on the other. Such a division also prioritises sight at the expense of other modalities, in particular tactile, proprioperceptive and kinaesthetic dimension of experience. These latter aspects of human experience are critical in understanding our ability to move and manipulate objects so characteristic of successful practical action. These aspects are examined in the second section of the paper, titled Poise.

[2] See (Gill, 2002) for a detailed analysis of this tendency.

are not pre-determined but emerge in response to the specific situational demands"
(Bolt, 2007 p. 4).

Within contemporary theory the body (and practice) has re-emerged serving to counter a
strong disembodied strain within the Western philosophical tradition deriving from
Platonic idealism, Cartesianism's focus on a rational thinking subject and an emphasis
on vision within philosophic thought (Jay, 1994: Vallega-Nue, 2005; Leder, 1990 &
Shusterman, 2008). Within this dominant tradition the body has tended to be viewed in
opposition to thought, while as the same time as material object available to scientific
enquiry and knowledge. Merleau-Ponty's (1962, 1969) phenomenology of embodiment
sought to insert the body within this tradition, making the body the generative locus of
embodied experience. For Merleau-Ponty the body is not a thing but a possibility, a
latency. In articulating the body-world relationship in terms of our active perceptual
modalities, our relationship with the world comes about in and through our artefactual
relations. This relationship is elaborated as constitutive of sentient being, where
Merleau-Ponty speaks of "the connective tissue between them as, not a thing, but a
possibility, a latency, a flesh of things" (1969, p. 136). Heidegger on the other hand did
not devote the same attention to embodied practice, his articulation of an in-order-to
structure places particular importance on our artefactual relations. The ontologies of both
thinkers foreground embodied human agency and highlight artefactual relationships as
constitutive of human experience and understanding.

Drawing on these perspectives my doctoral research aims to examine somatic
experience as a dimension of human life arching across studio-based physical making
and the distributed contexts of wearing. The study is concerned in the way the somatic
emerges through artefactual engagement. The study assumes artefacts need to be
understood within practice from which they emerge and draws on recent social theory,
namely Practice Theory to argue both bodies and artefacts are sites of materialised
understanding (Reckwitz 2002; Schatzki, 2004). At issue for practice based research is
the location of the artefact within the enquiry and the role it serves. Responding to this
Niedderer (2004) proposes a framework whereby creative practice can be used as a
method of inquiry that can potentially illuminate a process and provide data for
interpretation. Such an approach would duly recognise the specificity of the relationship

between a maker and their understanding, while not requiring the artefacts produced to speak alone, nor instantiate theory but rather could serve articulation of aspects of practice that are relevant to the researcher.

In the context of my ongoing doctoral research I will present a Case Study examining the context of making a self-produced single artefact, named PULLEY SAC. The aim of the study is to examine how an artefact emerges from within a context of practice and how it may serve a pivotal role in the framing of a practice based doctoral study. Employing a first person account of the context in which an artefact emerged as significant within practice, I highlight how artefacts can be viewed not as discrete or separate entities but only meaningful in relation to the practice context from which they emerge. This relies on a Heideggarian perspective that shared practices produce the background of human activity against which things become meaningful for us. These shared understandings coalesce as the situations, contexts and practices in which we find ourselves.

In the second part of the paper I examine the performance of creative practice, exemplified through PULLEY SAC in relation to the notion of *Poise*. The term introduced by Samuel Todes (2001) refers to the capacity to act effectively in any skilled activity. Viewing the notion of *Poise* in proximity to phenomenologies of embodiment and an ethnography of creative practice (O'Connor, 2005), I argue the knowing characteristic of creative practitioners encompasses both embodied practical knowledge and also an awareness of the emerging significance of artefacts within the practice. In doing so I attempt to show that knowledge in creative practical contexts has attributes of immediacy, responsiveness and receptivity. The study and conclusions suggest researchers seeking to understand creative practice direct their attention to the inter-relationships between the embodied temporally extended activity and the tools and materials of practical action.

A Case Study: Articulating Embodied Practice with Poise

It was produced sometime in 2002. I can no longer remember exactly. PULLEY SAC is a physical link to my time of pre-institutional research, fashion practice. The bag was significant for me then simply as an interesting if not amusing thing. It was made for no

specific purpose but was rather the result of exploratory and playful activity. I recall I had no specific idea for the bag at the beginning but I had found some small leather components that were used as chin straps for military hats. I discovered these in an army surplus store and wanted to incorporate them into a bag of some kind. I also incorporated the straps into a women's wrap dress. I was drawn to the straps for their delicacy and colour, and the tiny brass slides that were attached. And also their consistency, if I came up with something worthwhile I could reproduce the bags quite simply as the components were readily available.

Fig 1. PULLEY SAC

I recall I found the bag amusing because of its subtlety. It had a secret or hidden dimension. It looks like a conventional bag but operates quite differently. I also needed to explain how to use it. I was and still am really pleased with the bag. I recall that when making it at a certain point adding a whitish coloured hand strap made from cotton webbing. I had seen a kind of webbing strap employed in Australian Army World War II

satchel bags (at the same surplus store) where cotton webbing was folded at each end and sandwiched into a double sided leather strap to form a sort of improvised handle. I had incorporated this kind of handle so as to sit on the wearer's shoulder. The hand strap was an addition because the bag was a bit long because the components – leather straps, cotton webbing and nylon braid were too long in combination, so I added on the hand strap by knotting a length of webbing then looping it to form a hand strap at the end.
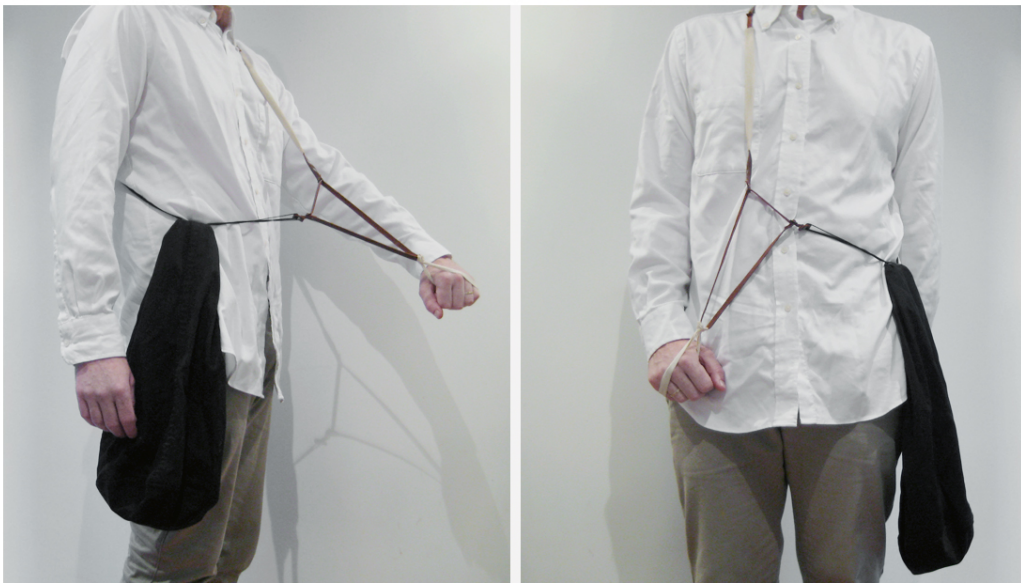
Fig 2. PULLEY SAC active

In order for you to use the bag effectively you have to physically pull on the hand strap which raises the level of the bag to hip height (Fig 2). Otherwise it is too long and depending on your height finishes somewhere towards your knee. In this way you feel the weight of the bag and its contents in your hand to a large extent, although there is a bit of sensation of weight across your shoulder as well. This was the aspect that set it apart from any conventional bag and pointed to for me anyway something not immediately apparent – you had to use your felt-sense to find a point that feels comfortable, that feels right.

This equilibrium is embodied in the bag artefact, where you need to find the best position for the bag to rest which you establish with 'feel' and move with your hand, arm and body to get right. At the end of this process you are sort of poised in position, it is a felt sense of balance and is experienced intimately. There are very little in the way of external visual cues to an outside observer apart from the wearer holding the strap with one hand. From the perspective of a wearer you become conscious of holding the bag through your hand. It feels quite pleasing to hold the strap in this way. It is a letting go of the weight that you carry as a tension in your hand. It brings you back to the bag, its presence, its weight.

From Noticing to Articulation

As explained above Pulley sac drew my attention to an aspect of experience. It wasn't something I passed over in the course of my design practice on that particular day on which I made it. I didn't for example return to the bag, re-cut shorter components and re-make it so it became an aesthetically pleasing but a nonetheless conventional bag. I became drawn into the contingencies of the making situation, dwelled in the situation, extended it so to resolve it in a way that was consistent with the way I worked within my practice. I held out the indeterminateness of the bag until it revealed something worthwhile. It would be too much to say my attention was drawn to the accidental discovery of an intimate relation. The noticing occurred against a background of creative practice that over time had become interested with exploring ways to facilitate felt experience. Along with this interest I had begun to articulate and develop a narrative based around the relationship between bodies, clothing and the cultivation of felt experience.

The significance of the bag is that it enabled me to articulate and share something that as a designer was a private concern. And the concern had become a motivating one. Very few garments I made at that time could instantiate this concern in communicable form. I produced LAYERED SUITS (Fig.3) made from three layers of cotton voile. Simple shapes but were all about feel. Feel is experienced in this way as a combination of weight (of fabric) and movement (across the skin). This form of experience is so subtle, mere sensation, and forms a continuous background in wearing of clothing. That

though, was still too background to share it as a phenomenon. The bag brings the felt dimension of experience forward enough to make it sharable, communicable, demonstrable.

Figure 3: LAYERED SUIT

Articulating the felt dimension of artefactual engagement was made possible by an extended interaction with PULLEY SAC. It enabled me to explicitly notice and point to the phenomenon, my felt sense. The artefact starts to make sense when I put it on. When I physically explored the bag as a wearable artefact the significance of it emerged. It solicits activity whereby conventional wearables solicit passivity. It is only through my physical engagement with PULLEY SAC that I am able to notice my own somatic awareness. My body folds back on itself. My interaction with PULLEY SAC enables me to point to my felt experience in such a way to make it isolable, to draw it out of the background of my undifferentiated kinaesthetic, proprioperceptive and tactile sensation. PULLEY SAC solicits my bodily sense of how to find an optimal wearing position. This position is not a single determinate point but a shifting zone that I can find, then lose, and return to.

When taken together these two artefacts, LAYERED SUITS and PULLEY SAC sit at each end of a continuum, background to foreground, transparent to more conscious awareness. The suit is experienced as all background sensation, a quiet somatic hum. While PULLEY SAC brings forward the somatic, lifts it out from the background to conscious awareness and recognition.

I will now discuss the notion of Poise, drawn from Samuel Todes's phenomenology of embodiment (2001). In relation to both PULLEY SAC and LAYERED SUITS discussed above, Poise suggests a mode of experiencing that encompasses somatic sensitivity and artefactual engagement. I consider Poise in relation to embodied knowing characteristic of creative practices.

Poise

Phenomenologies of expertise describe skilled action as refined situational responses within an ongoing flow of practical action. Accounts of skill acquisition suggest a practitioner at the beginning of their path to expertise or mastery will move through developmental stages beginning with novice, to advanced beginner, competence, proficient to expertise, finally becoming masters. (Dreyfus, 2002; Dreyfus & Dreyfus, 1982, Sudnow, 2001). For the expert, skills that were once applied in the form of rules or maxims, at the novice stage eventually become *incorporated* and disappear so that they do not consciously think but merely act (Leder, 1990; O'Connor, 2005).

Related to skilled action is Merleau-Ponty's concept of *Maximal Grip* – the tendency for the body to respond effectively to evolving situations, while Todes characterises the body's skilful coping with objects (and persons) around us as *Poise* (2001). Both of these concepts are structured as a kind of equilibrium or balance, whereby a practitioner in the performance of their practice makes micro-adjustments in response to the evolving specificities of a situation, always moving towards an 'optimum gestalt' (Dreyfus, 2002, p. 12). While the term Maximal Grip suggests something of an intentional stance in contrast Poise suggests a more passive mode of receptivity.

Craft practitioners provide accounts of finding a point of equilibrium with a particular material or object they are working with or making (Sennet, 2008). Csíkszentmihályi (1996) famously studied the experience of flow characteristic of expert practitioners. These accounts show a balance or equilibrium attained whereby a practitioner is able to respond effectively to an evolving and dynamic situation:

> " in our skilled activity we move to achieve a better and better grip on our situation. For this movement towards maximum grip to take place, one does not need a mental representation of one's goal. Rather, acting is experienced as a steady flow of skilful activity in response to one's sense of the situation. Part of that experience is a sense of when ones' situation deviates from some optimal body-environment relationship, one' activity takes one closer to that optimum and thereby relieves the "tension ' of the deviation. One does not need to know where the optimum is. One's body is simply solicited by the situation to get into equilibrium with it. " (Dreyfus, 2002, p.12)

This characterisation of skilled action is relevant for understanding creative practice and the material relationships that comprise it. Practitioners working directly on or with materials make explicit the embodied nature of making. Our bodies are coupled activity and receptivity. Our ability to self-sense gives us an immediacy to act but act in such a way as to be in touch with the situation, to be poised. Poise provides a special kind of knowledge characteristic of the creative practitioner. Todes characterises Poise as a kind of knowing spanning attunement to and determination of the objects of practical action we are engaged with:

> " As soon as I am poised in my circumstance, I know *what* I am doing. I know not merely what movements I am making. I know at once, by doing it, not merely what I, with my body am doing, but also *what* I am doing i.e. something about those objects to which I am doing something with my body. Poise it not merely a matter of internal bodily coordination, but a skill in handling things (and persons) about us… My poise is the way I make of my circumstantial objects – merely the circumstantial objects that they originally are viz. those of felt, active experience " (2001, p. 66).

Poised in knowing when

Creative practice often involves the use of tools and high levels of dexterity to manipulate material into the desired form a practitioner pursues at any one time. In the flow of physical action a practitioner will rely on finely made distinctions of both what to do and often more importantly when to do it in the carrying out of their task successfully. Practical knowledge within a practice will encompass a knowing how to do the task as well as a knowing when to do it. Embodied knowledge of the practitioner in this respect has a temporal as well as a technical dimension.

O'Conner's ethnography of proficient practice in glass blowing (2005; 2006) articulates a mode of experiencing encompassing equipmental and material relationships that are receptive and embodied. An ability to bring forth the desired object is due to a 'corporeal anticipation' characterised as non-reflective forward-going as distinct from a forward-looking (O'Connor, 2005 p.201). Todes echoes O'Connor's experientially derived claim writing, " poise is lost as soon as anticipations cease being met as rapidly as they are made. *There is no interval between the having and meeting the anticipation of poise.* Poise functions exactly at the threshold of response time " (2001, p. 72).

In practice I am engaged holistically with the task at hand, within situation, with tools and materials. Todes writes, " the success of poise is not in its *execution* but in its very *existence*, which the body is, to begin with, knowingly in touch with the objects around it" (2001 p.66). The condition of Poise brings our bodily directedness towards and into contact with the objects, but this is not merely physical sensation, it is awareness. We are poised within action. Poise relies on our sensory-motor abilities whereby we have the capability to act while we employ a sense of bodily awareness or 'feel' to know where we are within our action. Within practice, materials are worked over and transformed emerging at some point as a finished artefact. The development of the artefact is reliant on the practitioner's ability to know when to act. Forward-going success is also reliant on the responsiveness of the practitioner to the emerging situation. In this way the practitioner is receptive to how the artefact is shaping up, in a developmental arc spanning the entire making project, while also responsive to infinitesimal feedback of material and action through hands and body (Tallis, 2003).

Receptivity of Poise

Poise is a condition of experiencing the world that constitutes our receptivity to our material engagements. It is the way we make the objects we are dealing through felt experience. We can for example lose Poise or contact with the objects around us, momentarily, such that "to lose touch is to immediately to lose one's poise" (Todes, 2001 p. 72). We can though retain our poise when we return to contact with the situation we are engaged within. Poise in this instance is both a receptive and adaptive modality.

Heidegger denotes the receptive aspect of our being-in-the-world *Befindlichkeit*. This is interpreted as affectedness (Dreyfus, 1991) or attunement (King, 2001). For Heidegger this receptive aspect of our being-in-the-world is characterised by the way things show up for us. According to Heidegger attunement is made possible by our ability to ' let things near', to 'be open to whatever may approach ': " Da-sein is approachable, concernable, touchable, strikable, capable of being affected and moved by whatever may approach him from the world" (King, 2001, p. 57). Attunement though is not a pure passivity but actively works "to prescribe how the being of other beings is discoverable – as threatening or joyful, or whatever" (King, 2001 p.57). Within the specific context of our practical dealings things, objects, situations, persons, events, will show up to us as mattering, being important or significant. These are the specific contexts a part of which things will show up as mattering to us.

A significant aspect of PULLEY SAC is the emergent quality it had within my practice. PULLEY SAC emerged, rather than being the result of explicitly directed activity. This is pertinent to understanding the experience of research, and how for example a particular aspect or issue within practice may become the basis for a subsequent enquiry (Niedderer, 2004). Within the context of my research practice PULLEY SAC emergence enabled me to articulate aspects of practice central to developing a subsequent enquiry. An object in process is something we are merely open or receptive to. Cetina-Knorr (2001) identifies the emergent and indeterminate dimension of knowledge centred practical activity associated with experimental science. She characterises scientific research as focused around the definition of things, awareness of problems, that are " looped through objects and the reaction granted by them " (2001 p.176). These

'reactions' between researcher and object occur as moments of breakdown, interruption and reflection within the ongoing flow of activity. She draws attention to how this form of detachment makes possible a researcher-object relationship in which one can dwell, and, " which can be extended and unfolded "(2001p.181).

Spinoza, Flores and Dreyfus (2001) suggest receptive practice can respond most effectively to anomalies or disturbances. They describe receptivity as attending to solicitations in such a way that do not override what things offer a situation but seek to, "bring them out most fully' (2001, p.182) They provide an example of a receptive woodworker who in responding to imperfections in the wood adapt, making something that brings out the character of the wood based anomaly whereas a less receptive woodworker might make a small adjustment to the object following an earlier intention. The former is poised, open and responsive to the contingencies of the situation, the latter, less so, reluctant to staying in touch with the materials and the evolving situation. In the context PULLEY SAC I am sensitive to what emerges within the making situation, I am always noticing. I am sensitive to anomalies as well as to what is most promising. The initial unintended length of the bag was not resolved or corrected immediately. That anomaly was held onto sufficiently to be resolved in such a way that enabled further articulation of an aspect of my practice that up until that point had been largely unarticulated.

It is possible to speculate that resolving the bag in such a way has served an underlying consistency to emerge within my practice. Openness to the emergent articulatory potential of PULLEY SAC enabled me to understand felt experience as a continuum, whereby we move in and out of contact with somatic awareness. In articulating a continuum between the background sensation of LAYERED SUITS to the foreground awareness of PULLEY SAC, wearing can be understood as an affective expanse to which the designer, researcher or wearer may be attuned or not.

Holistic engagement

According to Leder (1990) our bodies are for much of the time absent from conscious awareness. While engaged in hugely varied human projects our bodies act as that from

which we act. Leder draws on Polyani's (1983) *from-to* structure to explain the ways our body in its anatomical structure and perceptual modalities is never entirely present but recedes in differing modes of disappearance. We become acutely aware of our bodies in illness, injury, fatigue, sexual expression, or in attempting to incorporate new skills or capacities. Shusterman (1990) develops a framework for body-based practices elaborated as 'Somaesthetics' that actively cultivate somatic awareness. Exemplars of these practices include Yoga or Feldenkrais.

Our perceptual modalities are also subject to what Leder terms a 'complemental series' where a focus on one perceptual modality means others will recede into background awareness (1990, p.27). For example while engaged in a primary mode of seeing our other perceptual modalities are subject to background disappearance: " Dwelling within the power of sight as my primary mode of world-disclosure, I relegate much of my body to the status of a neutral background " (1990 p. 25.) PULLEY SAC works against this tendency serving to bring about level of somatic awareness through interaction. Like riding a bike, threading a needle, or engaging in any skilful activity watching yourself doing it in a mirror will not aid you. It will impair you ability to undertake the task effectively. You need to engage with the task holistically in such a way to attend to the equipment you are engaged with. Merleau-Ponty refers to our, 'spatiality of situation' rather than one of position (1962 p. 100). Our body is experienced as an 'attitude' directed towards that which we are engaged, actually or potentially. Paradoxically our entire body is taken up in this task but in such a way that underemployed body regions are simply 'swallowed up' in the activity of our hands.

By considering Poise at the level of experience, successful creative practice can be said to involve unfolding situations reliant upon a practitioner's ability to be knowingly in touch with artefacts and materials. Understanding within this context encompasses both embodied practical knowledge and also an awareness of the emerging significance of the artefact within the practice. O'Conner points to the importance of understanding practice from within practice, in that the practitioner "understands the world's immanence in which she operates and is therefore able to act immediately" (2005, p.200). Successful practice is characterised by Poise as an embodied knowing encompassing attributes of immediacy, receptivity, and responsiveness. This points to the potential

value of approaching research *through* creative practice in order to access and understand the inter-relationships between the embodied, dynamic, materially engaged aspects of lived experience.

Conclusion

In this paper I have examined the emergence of an artefact, PULLEY SAC within my creative practice. With reference to a first person account of the making of PULLEY SAC I have discussed how the artefact has served a pivotal role in the context of an emerging research project. By considering how the artefact emerged as a compelling artefact object through practice, rather than being the result of conscious goal directed action I have been able to draw attention to the receptive modality of my practice encompassing somatic awareness and artefactual relations. Also by considering the relationship between PULLEY SAC and an earlier produced series titled LAYERED SUITS I have been able to articulate an affective range of somatic experience, resembling a continuum from silent background to more explicit foreground awareness. Importantly, this presents potential research foci to be further developed in the subsequent more focused doctoral study. Consideration of the artefact's context in which it emerged and consideration of the receptive aspect of practice as addressed within embodiment and Heidegger studies indicates the potential value in the enacting of first person methodologies to uncover aspects of concrete experience pertinent to researchers in the area creative practice.

References

Ash, J. & Wilson, E. (Eds), (1992). *Chic Thrills: A Fashion Reader*, Los Angeles: University of California Press,

Barret, B. & Bolt, B. (2007). *Practice as Research: Approaches to creative arts enquiry.* London: I.B. Taurus and Co.

Barthes, R. (2006). *The language of fashion*. (Trans. A. Stafford) New York: Berg.

Breward, C. (1995). *The Culture of Fashion.* Manchester: Manchester University Press.

Bugg, J. (2009). *Fashion at the Interface: Designer-Wearer-Viewer*. Fashion Practice,

(1) (1), 9-32

Craik, J. (1994) *The Face of Fashion: Cultural Studies in Fashion.* London and New York: Routledge.

Csikszentmihalyi, M. (1996) *Creativity: flow and the psychology of discovery and invention.* New York: HarperCollins Publishers,

Davis, F. (1992). *Fashion, Culture and Identity.* Chicago: Chicago University Press.

Dreyfus, H. (1991). *Being-in-the-world: A commentary on Heidegger's Being and Time.* Cambridge, MA: Mit Press.

Dreyfus, H. and Dreyfus, S. (1982). *Mind over machine: The power of human intuition and expertise in the era of the computer*. New York: Free Press.

Dreyfus, H. (2002). A phenomenology of skill acquisition as the basis for a MerleauPontian non-representationalist cognitive science. Unpublished manuscript, University of California, Berkeley, Department of Philosophy. Retrieved, 20th January, 2011 http://philpapers.org/s/Hubert%20L.%20Dreyfus

Evans, C & Thornton, M. (1989) *Women and Fashion: A New Look.* New York:

Quartet Books.

Gaines, J. & Herzog, C. (Eds.) (1990). *Fabrications: Costume and the Female Body.* New York and London: Routledge.

Gill, A. (2002). *Wearing Clothes*. Unpublished PhD Thesis, Sydney University, Sydney, Australia.

Jeon, E. (2009). Object Playing with Movement: A Source of Comfort and Enjoyment, October 18-22, 2009: *Design, Rigor and Relevance. Seoul, Korea: International Association of Societies of Design Research (IASDR).* Retrieved, 20th January,http://crash.curtin.edu.au/research/groups/body/eunjeongjeon.cfm

Jeon, E. (2009). Aesthetic Experience and Comfort: The relationship between semantic form and body movement of the design of wool clothing, October 18-22, 2009: *Design, Rigor and Relevance. Seoul, Korea: International Association of Societies of Design Research (IASDR)*. Retrieved, 20th January,
http://crash.curtin.edu.au/research/groups/body/eunjeongjeon.cfm

Kroker, A. & Kroker, M. (Eds.) (1987). *Body Invaders: Panic Sex in America.* New York: St Martin's Press.

King, M (2001). *A guide to Heidegger's Being and Time.* New York: Suny Press.

Knorr-Cetina, K. (2001). Objectual Practices. In Schatzki, T., K. Knorr-Cetina and E. von Savigny (Eds.) *The Practice Turn in Contemporary Theory*, London: Routledge.

Leder, D. (1990). *The Absent Body.* Chicago: University of Chicago Press.

Merleau-Ponty, M. (1962). *The Phenomenology of Perception*. (C. Smith Trans.) London: Routledge. (Original work published 1945)

Merleau-Ponty, M. (1969). *The Visible and the Invisible: Followed by working notes.* (A. Lingus Trans.) Evanston UL: Northwestern University Press. (Original work published 1964)

Niedderer, K. et al (2004). Why is there the need for explanation? – objects and their realities. *Working Papers in Art and Design 3* Retrieved 20th January, 2011 from URL http://sitem.herts.ac.uk/artdes_research/ papers/wpades/vol3/knfull.html ISSN 1466-4917

O'Connor, E. (2005). Embodied knowledge: The experience of meaning and the struggle towards proficiency in glass blowing. *Ethnography,* (1) 183-204.

O'Connor, E. (2005). Glass blowing tools. Extending the body towards practical knowledge and Informing a social world. *Qualitative Sociology*, (29) 177-193.

Polanyi, M. (1983) *The Tacit Dimension.* Gloucester, Mass. Peter Smith.

Reckwitz, A. (2002). The status of the material in theories of culture: From social structure to artefacts. *Journal for the Theory of Social Behaviour*. (32)(2) 195-217

Schatzki, T. R. (2002). *The site of the social: a philosophical account of the constitution of social life and change.* University Park: Pennsylvania State University Press

Sennet, R. (2008). *The Craftsman*. London: Penguin books.

Shusterman, R. (2008) *Body consciousness: a philosophy of mindfulness and somaesthetics.* Cambridge: Cambridge University Press.

Spinosa, C., Flores, F & Dreyfus, H. (1999) *Disclosing New Worlds Entrepreneurship, Democratic Action, and the Cultivation of Solidarity.* Cambridge M.A.: Massachusetts Institute of Technology.

Sudnow, D. (2001) *Ways of the Hand: a rewritten account.* Cambridge M.A.: Massachusetts Institute of Technology.

Tallis, R. (2003) *The hand: a philosophical inquiry into human being.* Edinburgh: University of Edinburgh Press.

Todes, S. (2001). *Body and World*. Cambridge M.A.: Massachusetts Institute of Technology.

Vallega-Neu, D. (2005), *The Bodily Dimension in Thinking*. Albany: State University of New York.

Von Busch, O. (2007). *FASHION-able: Hacktivism and Engaged Fashion Design*. PhD thesis, Göteborg University, Viewed 28 November 2010 < http://www.selfpassage.org/>

Wilson, E. (1985). *Adorned in Dreams: Fashion and Modernity*. Los Angeles: University of California Press.

Todd Robinson

Todd Robinson has a background as a fashion designer and artist. His practice traverses fashion, textiles, sculpture and installation. His work seeks to cultivate and provoke consideration of the embodied dimension of everyday experience and of the sensory relation we have with the world. His work often takes the form of novel strategies that draw our attention to bodily or felt-experience. He is a lecturer in Fashion & Textiles and a PhD researcher at the University of Technology, Sydney, Australia. His PhD research research is titled *Cultivating awareness: a focus on (extra-ordinary) somatic experience in fashion design*. The focus of the project is to investigate fashion design as a somatic practice that brings about conscious recognition of the embodied dimension of human experience.

Staging multi-modal explorative research using formalised techniques of performing arts

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Abstract

This paper presents methods of experiential research derived from formalised techniques of performing arts practice. Through a process of dedicated laboratories, expert practices are extracted and formalised into methods of situating analytic experientiality. The paper reports and reflects on the developed methods as a system for the design of research in situated experience.

The proposed methods of staged experientiality build on previous research in enabling participation as an analytic medium of research. Further, the insights in expert practices of performance arts derive from the authors' position as expert performance practitioners, and their long standing engagement in formalisation and transfer of knowledge within the field.

The use of staging techniques and expert practices of the performer is formed into research methods that facilitate knowledge transfer as systems of engagement. The suggested mode of engagement is designed to develop an enhanced capacity towards generating and analysing experiential situations. The methods also seek to bridge between the exploratory procedures of artistic practice and the demands for rigor in research inquiries, devising a method of staging experientiality in a way that can both accommodate the demands of artistic and research investigations.

The method has specific relevance when analysing or generating complex experiential situations, where the experience can only be accessed by actual participation, and which has experiential qualities only accessible by actual engagement. In this way, the method is a framework that can be applied and adapted to various knowledge enterprises that need to unpack experiential qualities that are situation specific and partly generated by the investigator in the process of investigation. This includes subjects of study that are embedded in experiential situation, and can only be experienced, interpreted and communicated from an experiential position and while the experience is unfolding; from within the moment of being experienced.

Keywords

Participation as medium; Performance-based emergent method; Staging experientiality; Narrativation as evidence.

This paper presents methods of experiential research derived from formalised techniques of performing arts practice. Through a process of dedicated laboratories, expert practices are extracted and formalised into a method of situating analytic experientiality. The paper reports and reflects on the developed methods as a system for the design of research in situated experientiality.

The method of staged experientiality

We propose a transfer of expert practices from performing arts to a broader field of inquiry, using the capacities of formalised performer technique both to analyse and to design experiential qualities. The developed method of staged experientiality proposes an approach to multi-sensory and multi-modal communication of knowledge in research and in creative practice which stages experiential situations, where participation is the medium of knowledge generation and transfer.

The proposed method of staged experientiality builds on previous research in enabling participation as an analytic medium of research. Further, the insights in expert practices of performance arts derive from the authors' position as professional performance practitioners, and their long standing engagement in formalisation and transfer of knowledge within the field.

The use of staging techniques and expert practices of the performer is formed into research methods that facilitate knowledge transfer as systems of engagement. The suggested mode of engagement is designed to develop an enhanced capacity towards generating and analysing experiential situations. The methods also seek to bridge between the exploratory procedures of artistic practice and the demands for rigor in research inquiries, devising a method of staging experientiality in a way that can both accommodate the demands of artistic and research investigations.

As a consequence of the experiential knowledge format, the method demands an advanced involvement by the artist/researcher in a process of systematic improvisation, in which the individual participant develops their own personal experiential account of the situation under investigation. The method has specific relevance when analysing or generating complex experiential situations, where the experience can only be accessed by actual participation, and which has experiential qualities only accessible by actual engagement.

In this way, the method is a framework that can be applied and adapted to various knowledge enterprises that need to unpack experiential qualities that are situation specific and partly generated by the investigator in the process. Subjects of study that are embedded in experiential situation, and can only be experienced, interpreted and communicated from an experiential position and while the experience is unfolding; from the moment of being experienced.

Later in this paper, the architectural concept and tool 'light-zones' is used to exemplify the potential of the system. The examples unpack how it could possibly be organised to communicate knowledge by staging a position for the artist/researcher to experience and communicate directly as the experience occurs, and at the same time enable an emergent process of critical contexts and operations of reflection. The method enables the participants to articulate and communicate tacit knowledge from within the process of deliberately evolving the mode of knowing referred to.

The method is developed from techniques of expert performer practice (Melrose, 2005a & 2005b). The performer, in her practice, engages in emergent situations that are embedded in a complex of cultural contexts, and the performer therefore develops specific capacities for negotiating experiential qualities as they evolve. The performer technique is viewed as prototypical for the participatory engagement that enables the artist/researcher to articulate from an experiential account within a staged situation.

Performer technique as prototypical for the participatory role

In theatre and performance, acting and training methods are developed according to the artistic style. The performer does not experience what the audience experiences. No matter what style is carried out, the performer generates for herself an experience of performing, and she forms her own emerging narratives. Opposite to her audience, the performer is directly psychophysically involved in a process of lived experience.

The situation of the participant is viewed from the perspective of the expert practice of the performer, that is, the particular techniques that the performer develops to achieve a capacity to perform. The expert practices of the performer situate her (the performer) in a particular self-reflective operation through a formal set of instructions and obstacles, and, according to the actor and theatre director Phillip Zarilli (2007, p. 57), facilitate methods "in order to cultivate … inner awareness toward a heightened … state of engagement in a particular practice". The performer's heightened state of readiness for action is a particular self-reflective mode of presence, enabling her the capacity to perform while simultaneously observing her own activities, and relating to the contexts of the situation. The performer's particular state of attention has formed the starting point for the development of the method that serves the concept of 'participation as medium of research'. This method proposes a way to compose participatory engagement, which draws from experiential techniques comparable with the expert performer's particular capacity to engage with a heightened awareness.

Pre-expressive techniques of sensing engagement

The expert performer's technique is a heightened mode of sensing engagement; a particular pre-expressive capacity developed as part of the performer's technique. The concept of pre-expressivity enables a discussion on the technique of the performer and her expert practice of expression through performing, identifying the performer's mode of articulation as distinctly different from how the spectator experiences the performer. According to Zarilli (2002, p. 89), the pre-expressive capacities are:

> characteristics shared by systems of training/exercise through which the actor works on oneself. … [E]xercises are not simply a means of toning the physical body, but creating an entire new awareness of the actor's internal life – not in a psychological or behavioural sense, but as a psychophysiological means of encountering the performative moment … a bodymind awakened, sensitized, made newly aware or fully concentrated.

The pre-expressive level is therefore "an operative level … a praxis … at the root of the various performing techniques", as the theatre director Eugenio Barba (2007, p. 256) argues. It is the formal reflective distance to the performed actions through technique that builds as a pre-expressive capacity, a capacity for formal articulate performability.

Self-reflectivity as systems of communication

Zarilli explains from the insight of the expert performer of psychophysical training practice, how the performer's embodiment of pre-expressivity is a condition of simultaneously being aware of the inner sensations, the outer relations and the performer's presence in the event. He argues that this condition constitutes a heightened state of attention, where the "practitioner's attention is directed simultaneously outward with the external eye, and inward … with the "inner eye"" (Zarilli, 2007, p. 56).

The individual performer develops and adjusts the techniques into her personalised configuration of pre-expressive capacities to support her unique expert practice. Each individual performer's practice is, in this way, designed to support a particular understanding of and relation to the introvert reference of the actor, the extrovert activity of the actor, and her relationship to the environment as a habitat for social relations.

The performer's self-referential and self-reflective techniques are thought of as operations of 'observation' within a system of communication activities. The specific modalities of the expert performer promote a self-reflective state by which the performer is enabled to observe her own observations. In this thinking, the performer is navigating within different orders of observation, which is situating her in self-reflective modes of observation. This mode of engagement is suggested to be used to stage situations of research, where the self-reflective engagement enables experiential processes as the medium of the research.

Staging situations for participatory engagement

The approach is to rethink theatre as a complex communicational system of reflective operations, and to recognise performer technique as several simultaneously working levels of self-referential communicative operations, that can be staged as a participatory condition. From a compositional perspective, the question is how to purposefully integrate these experiential qualities, generated by way of performer technique, into a staging instruction? How is it possible to externalise the performer's technique as abstracted mediating structures, and use them as a method for staging investigation?

Participation as an artistic strategy is closely linked to installation art, happenings, and theatre. The theorist and curator Frank Popper (1975) identifies a variety of participatory art forms based on explorative engagement, which, with an enhanced focus on action, or 'activities' as the theatre director and theorist Michael Kirby (1987) terms it, make up the artist's material. Early investigations by the sculptor Robert Morris (for instance the installation: *Bodyspacemotionthings,* 1971 & 2009 at Tate Gallery, London) arrange behavioural sites for visitors to play in, where he uses what he identifies as the staging effect of minimalist sculptural objects, to situate the visitor in a self-reflective relation toward the objects. Artistic strategies that focus on inter-dependency between the experiencer and the environment surrounding that experience, produce situations where, as the installation artist Olafur Eliasson (2004, p. 50, author's translation) argues, "the participant in her engagement with the work-machines generates the situation, while she simultaneously is being shaped by the situation".

Staging of experiential situations generated by the participants

The art historian Chrissie Iles (2000) argues that the staging of the visitor in installation art in self-referential situations has become "a central formal and spatial strategy … [that is] intimately connected with performance … [making a] radical shift of meaning from the object to the viewer in space" (2000, p. 254). She points at a broader tendency towards self-reflectivity of the participant as the core intention of artistic strategies, which suggests that the site of experiencing develops an "antispectacular, analytic experience of space" (2000, p. 254) and becomes phenomenal in how it confronts us with ourselves. The artist Les Levine (1970, p. 337) similarly remarks, in a discussion on the emergent artistic strategies in the 1970s to situate phenomenal occurrences in mediated art-installations:

> The self-feeding, self-imaging, and environmental surveillance capabilities of closed-circuit television provide … , for some artists, the means of engaging in a phenomenon of communication and perception in a truly empirical fashion similar to scientific investigation.

The use of formal strategies, and the engagement of the experiencer in executing these strategies, represent attempts to adapt scientific concerns and methods of inquiry in artistic strategies concerned with participation and experientiality.

Viewpoints as a performance-based emergent method

Within the performing arts, the influence of generative compositional strategies has developed 'performance-based emergent methods' (Leavy, 2008). Viewpoints is such a system, developed from neo-avant-garde work strategies using scores, rules of engagement, and abstract behavioural concepts. The Viewpoints system structures the process of identifying and generating a set of formal parameters that allow for systematic investigation and composition of human activity in space. The Viewpoints system is based on a simple set of activity parameters, i.e. space, shape, time, emotion, movement, and story. The system works with no pre-defined hierarchy of the parameters. In practice, the relevant system parameters are adapted and developed in relation to each specific project.

The concrete elements, as well as the compositional contexts, are under constant negotiation, and often transform during and as a part of the process. Human relations and responses, scenarios of states of presence and activity qualities, mappings of spatial and movement characteristics, and scores of temporal and narrative features, are all in a state of emergent transformative development.

Often, the resulting performance event has a large component of improvisation, framed by the mappings and structural/temporal characteristics defined in the developed score. The concept of an adaptive and evolving compositional structure is a core quality of this type of compositional strategy, and deliberately allows for personal interpretation and situation specific adaption. This performance-based emergent method opens for the staging of a 'reverse function', that is, to facilitate certain activities promoted by staging conditions for particular actions, and thereby promote certain attentions to be dominant and format the experiential situation for participatory self-reflective and analytic investigations.

Participation as medium

The participatory processes produce a sense of inclusion in a social site, where the specifics of the social network depend upon the way in which the engagement is composed. In a discussion on participatory installation art, the curator and theorist Nicolas Bourriaud (1998, p. 169-170) suggests the participants "negotiate open relations that are not pre-established", and where the experience of participatory activities evolve a relational condition, which proposes "the sphere of human relations as a site for the artwork" (1998, p. 165). The act of participation evokes a sense of involvement, which, as the art historian Chrissie Iles (2005, p. 178) argues, articulates "the dividing line between observation and engagement", expanding the engagement as a site of social encounter and self-reflective experience. The event, evoked through participation, in this conception generates a social site, which is both performative and experiential within the same act of engagement, bringing an extended focus on the act of participation itself as the medium.

Participation as an operation of self-reference

The artificially generated reference systems, enabled within the expert practice of performer technique, are here considered as operations of communication, either internally within one person, between the person and her environment, or in-between people, as a complex of relationships.

These dynamic and communicative relations are regarded as observer positions, that is, inter-related self-reflective positions of attention that continuously negotiate and situate the 'experientiality' of the event. The suggestion is that the participant's performative engagement unfolds as a system of communication, and that a process of research inquiry can be organised by staging specific reflective operations of communication, and thereby device analytic operations that facilitate reflectivity on particular experiential accounts.

The suggested method of staged experientiality involves and coordinates between the experiencer in a mode of introvert references of experiencing, the experiencer in a mode of extrovert reference towards outer appearances, and the social referencing activity, where several participants cooperate from a triangular set of observation positions.

The positions of cooperation comprise the three dynamic and interrelated tasks:
- The experiencer reporting on the experiential engagement.
- The external observer communicating with the experiencer.
- The external observer framing significant moments.

Fig 1. Performance Laboratories, Copenhagen 2005.

Examples of staged experientiality investigating Light-Zones

The method is intended to be useful in a broader range of research inquiries, and to facilitate different processes of knowledge generation and transfer. As examples of possible directions of application, three research situations are reported on, which all engage with architectural and experiential approach towards lightness and darkness as a spatial quality.

The lightness and darkness as a spatial quality are approached as 'light-zones' (Madsen 2004). The concept of 'light-zones' is an architectural approach used to identify the three-dimensional experience of spatial forms as shaped by light intensities. The light-zone concept simultaneously entails identifying the darkness as dark-zones, allowing for an understanding of spatial geographies as compositions of gradual intensifications of lightness and darkness.

The investigations use a design of light-zones with artificial light that explicitly stage comparative characteristics of light-zones relative to shape, sharpness and complexity of composition. Over the course of the investigations, the light-zones are challenged and tested with particular intent-driven activities, such as staying on the border of the light-zones, lying across the borders, moving in circular and continuous ways or in square and edgy ways. Further explorations are systematically conducted to investigate the effect of the characteristics of light-zones relative to the social

relations they stage, such as the experience of being a group in one light-zone, and the relative experience towards another group in another light-zone.

The notion of light-zones is an abstract construct, which derives from experiential accounts. From a combination of actual experience, a process of sense-adaption, and rules for methodological actions, an experiential knowledge of lightness and darkness as spatial form is built.

In the following examples, the method of staged experientiality is used respectively to communicate experiential research across fields of expertise (Performance Laboratories), to situate transfer of experiential research in light-zones (Architecture Research), and finally to stage an event for the exchange of research methods (Carpa).

Fig 2. Performance Laboratories, Copenhagen 2005.

Communication of experiential research across fields of expertise

Performance Laboratories, Copenhagen 2005. Fig 1, 2 & 3.

The laboratories investigated how the design of external structures can be used to influence how visitors experience their participation. In this thinking, the installation's structure contains behavioural implications, which situate the visitor in a particular process of self-reflective operations. Within the laboratory research process, a special event was organised to disseminate the research findings in a way that transferred the experiential qualities and communicated across fields of expertise.

The event staged a simple and clear sequence of 12 separate installations, which were arranged using light-zones, objects, mirrors and video transmissions. The event included the participation of 22 professionals from a diversity of fields of expertise in arts and human sciences. Through an iterative process of experiencing the installations, the participants developed an insight into the staged phenomenon, and developed concepts through discussions, correlated and enhanced by perspectives from across the diversity of expertise.

The individual installations formed simple comparative stagings, which promoted a particular pre-defined comparative phenomenon, for instance between sharp and diffuse forms of light-zones. The staging of experiential parameters is in this way established as relative experiences between different instantiations of a similar event, or slightly different experiences of a similar event, which is then repeatedly investigated to build an accumulated iterative experience and to develop a deeper and more detailed experiential relation.

The critical discussions and performative engagement among the participants are informed by a collaborative debate that involve each their particular fields of knowledge, and therefore their concepts, logics and larger contexts of insights and questions. The debate is realised firstly as performative engagements, as modes of discussing through experiential action, and only secondly through words, sharing experiential stories as well as confronting and correlating concepts, models and arguments across personalities and fields of expertise.

The systematic staging of experiences with well-defined focus is achieved with strategies from performing arts practice. The situations are staged as analytic situations using reflective scenographies and rules of engagement, which organise how the participants should engage to become involved in ways that enhance their attention towards the topic of investigation.

The systematic design of participants experience is not aiming for generalised understandings, but stages complex correlations between participants in conversation. Each participant brings their individual approach and context, and contributes to an emerging coordinated landscape of concepts across disciplines of the involved researchers. The gained insights are individually gained through concrete lived experience, and correlated with the other participants through discussions and assimilation of modes of performative engagement across participants.
The participants develop capacity to stage similar prototype situations where other people in other contexts can engage in similar investigations, and thereby generate experiential evidence specific to that staged situation and those individuals involved. The outcome is a method for staging processes of experiential knowledge.

Fig 3. Performance Laboratories, Copenhagen 2005.

Fig 4. Architecture Research, Copenhagen 2006.

Transfer of experiential research in architecture

Architecture Research, Copenhagen 2006. Fig 4 & 5.

The research event was organised as a master-class with architect students engaging in methods and concepts to be able to analyse and qualify light as an architectural element. In the first session the participants progressively experienced sets of light-zones arranged with simple designs of artificial light in a theatre laboratory. The iterative procedures of investigation enabled a calibration of the participants towards lightness and darkness as an architectural element, based on the characteristics of artificial light. The second part of the master-class was organised in a daylight laboratory, where daylight formations were analysed and qualified.

The master-class process introduced the participants to experiential account on light as an element of architectural practice, as something that exists with definable shapes and measures, so it can be part of a negotiation of the spatial qualities of a space. The participants are organised in teams, and each team is separated into the following three positions with the dynamic and interrelated tasks:
- To report from the position of experiential engagement.
- To communicate with the experiencer(s) on the experience and propose modes of engagement.
- To observe the experiencer(s) and photograph significant moments.

The teams change positions in a rotating schedule, progressively staging the situation again and again, and facilitating that all participants have engaged from all positions.

The experience of light is an everyday phenomenon, which is evident as an experiential quality, obviously connected to any visual experience. The concepts of light-zones (and dark-zones) is an established concept, which allows for a discussion of light in architecture as three dimensional shapes in space, independent of the light-sources, light-openings and reflective surface characteristics most commonly used to describe light properties. The light- and dark-zones are understood as shapes in space, existing independent of the experiencer and the performative contexts of the observation. The methods described in this paper stages investigatory situations that takes a starting point in the experiential situation of the performatively engaged observer, and in this way explicitly includes the individual and context specific as a main qualifier of the experiential evidence gained.

The suggested methods are a supplement to existing methods and analytic models, and are specific in the way they allow for a focused exploration of the experience of light as a consequence of individual engagement. The personal narration of that emergent experience is then brought into systematic conversation among peers in slightly different ways in the three examples.

In the first example, the performance laboratory, the investigations are staged and executed as collective performance events, spontaneously improvised in the moment of the situation. The evidence emerges from the participants personal stories, written down by themselves or through qualitative interview, and can be re-investigated by staging similar events and engaging in similar activities.

The second example involves a separation of the participants in to a team of three specialist roles, which coordinate a production of formalised evidence: texts and

photographs grabbed through the experiential process. The notes and snap-shots gained in the process are then composed into explanatory sketches, a type of visual-textual evidence generated by montage of selected text-snippets and images. The sentences and images are extraordinary, exposing ways of thinking and seeing specific to the gained sensibility to light, and works as evidence from within the experiential process and as references for further discussions on light as an experiential quality. The suggested method is a set of rules of engagement, which can be used to stage similar experiential situations, and thus enable investigation of similar qualities in other contexts and with another set of individuals.

Fig 5. Architecture Research, Copenhagen 2006.

Fig 6. CARPA - Colloquium on Artistic Research in Performing Arts, Helsinki 2011.

Exchange of experiential research methods in performing arts

CARPA - Colloquium on Artistic Research in Performing Arts, Helsinki 2011. Fig 6, 7 & 8.

The colloquium gathered researchers from across performing arts to present and discuss performance-based research strategies. In the workshop the participants explored the system from within an actual staged experience, investigating qualities of lightness and darkness as qualitative aspects of light-zones. The team of participants are guided through a process that includes element form both the first and second example. First they are asked to explore a set of four different light-zone settings, as a performance environment similar to the staging in the first example (performance laboratories). This allows the participants to develop an individual relation to the concept of light-zones and their spatial sensibilities to the sensation of light. Secondly they are asked to form groups and investigate the light-settings one by one, systematically and iteratively approaching the setting with teams of roles, as in the second example (architectural research).

In the second part of the workshop at the colloquium, the participants explored how the developed analytic capacity could purposefully be used outside the context of the theatrical staging, in the analysis of real-world locations with very complex lightness and darkness formations. They were asked to investigate a large hall-way space and a narrow area with changing cabinets, which both had very complex composites of daylight and artificial light from a variety of sources and reflective surfaces. The sensibilities gained trough the exercises guided the investigations, and the method of using analytic teams produced collections of images and texts.

The investigation uses a procedure of gradually preparing a team of investigators towards an enhanced state of analytic capacity towards light, and through this staged performance method enable the generation of experiential evidence. The research investigated the experience of light in complex everyday environments from within the activity of performing the experience. These experiential accounts can be re-enacted by other people in their particular contexts following a similar procedure of engagement.

The system of methods contribute to a broader inquiry within artistic creation, bridging between explorative performance practice and other contexts of research, and may also be applied within other fields of study, such as interaction design, architecture and social studies, enabling the staging of research on experiential accounts.

Fig 7. CARPA - Colloquium on Artistic Research in Performing Arts, Helsinki 2011.

Fig 8. CARPA - Colloquium on Artistic Research in Performing Arts, Helsinki 2011.

Performance-based Emergent Method

The suggested method of investigation is situated in a larger context of methods that use approaches of staged experiential situations to enable the emergence of appropriate methods and theories. Methods are techniques for gathering evidence, and exist in order to structure research inquiry. Changing contexts, approaches and theories open for new ways of posing questions and demand new formats of methods. The suggested method of staged experientiality could be defined as a performance-based emergent method, which combines creative and analytic operations within the same activity of performing experiential situations. The use of performance-based research methods can contribute to the understanding and communication of tacit knowledge, where the evidence gained is individual and experiential.

The suggested method of staged experientiality shares approaches with the larger area of Emergent Methods (Hesse-Biber & Leavy, 2008) and methods of Situational Analysis (Clarke, 2005), where situations are identified or constructed to set a context for the emergent analytic inquiry. Emergent Methods are often innovative approaches, which seeks to grasp possible theoretical and methodological frameworks in new fields of inquiry. Hesse-Biber and Leavy (2008, p. V) frames the concept of Emergent Methods in this way:

> Emergent methods arise as a means of accessing answers to complex research questions and revealing subjugated knowledge. These research techniques are particularly useful for discovering knowledge that lies hidden, that is, difficult to tap into because it has not been part of the dominant culture or discourse. Because they are techniques or tools, they can be applied to different methodologies and in different disciplines, making them highly pertinent to a range of researchers.

The enhanced reflectivity towards the investigator's own capacities relates to the approaches of Action Research methods, and the focus on emergent theorisation through the confrontation with concrete situated experience relates to Grounded Theory methods.

In the suggested method of staged experientiality, the observation, analysis and articulations happen simultaneously, and the participants progressively develop theoretical concepts, methods of engagement, and qualities of action and sensation. Contexts and discourses evolve through the research process and are mutually generative. The performative engagement produces a flow of experiential evidence, gained in a critical process of engagement, and structured by a combined procedure of several emergent methods.

Transformative research

The research participants gain an experience of the situated experiential structure and have the opportunity to reflect on their own engagement in generating that experience. This is an observer position that enables reflection on artistic processes while engaged in that same process. An important feature of the suggested research activity is that the research procedures are a 'transformative practice', as Sullivan terms it (2010, p. 110). Each experienced event contributes to the evolution of the

capacities of the experiencer, and each event will therefore as yet a lived experience transform the experiencer. The research engagement, to some extent, simultaneously transforms the experiencer, the research and the context of the research. Sullivan argues that "when seen within the framework of research … reflexivity is a form of critical constructivism that affects the researcher and the researched" (2010, p. 52). It is a reflexive practice structured into a system of 'transformative research' (2010, p. 110), integrating both artistic and research inquiries in the same activity.

The experience of the staged situation can be viewed as a form of evidence, in this case experiential evidence, which facilitates both a critical account on the experience qualities, and, as an enhanced tacit knowledge, forms the basis for further inquiries. This is similar to how knowledge traditionally is transferred in expert performer practice. The community of expert performers share a history of experiential accounts and insight, and thus they are able to engage in further research on the basis of a shared tacit knowledge. The suggestion is that the proposed formal procedures could enable non-expert performers to utilise similar strategies to produce experiential accounts within their contexts.

The person specific nature of the evidence "relies on the acceptance that outcomes can be interpreted as connections between the specific and the specific" (2010, p. 54), rather than inferred from the specific to the general. The researchers qualify their experiences with personal statements rather than referring to generalised categories that suggest commonalities across incidents.

In cases where the knowledge is embedded in experiential situations, the transfer of knowledge is linked to the generation of a mode of knowing. To situate the conditions for the exploration and transfer of particular experiential knowledge, a particular knowledge context is staged. The suggested method of staged experientiality is a framework that guides the communication of knowledge, staging situations for the reception and interpretation of experiential evidence.

Experientiality and narrativation as evidence

The experiential process could be said to evolve as a narrative, as an emergent account of the participatory engagement as the participant narrates the process of experiencing the participation over time. The narratologist Monika Fludernik (2009) suggests a post-structuralist conversational narrative, based on situations of communication, where the narrator is also the protagonist, the author and the first-person experiencer.

To address these momentary, individual and emergent situations, Fludernik reconstitutes narrativity on the basis of what she terms 'experientiality', human embodiness in the world, based on real-life experience in the process of narrativation, consequently suggesting "narrativity as mediated human experientiality" (1996, p. 36). She takes a starting point in the assumption that we narrate our life, that "we may … conceive of each of our lives as a journey constituted by narration" (2009, p. 1). She suggests that the flow of events we encounter in everyday life appears as experience through activities of narration.

The concept of experientiality places the narration in the human experiencer, and "reflects a cognitive schema of embodiness that relates to human existence and human concerns" (1996, p. 13), and approaches conversations and interactions of everyday life as events, where "actions, intentions and feelings are all part of the human experience which is reported and, at the same time, evaluated in narratives" (2009, p. 109). The suggested method of staged experientiality engages the research participant with all her faculties and capacities in the complex negotiation of her narrativation, and the narration within participation emerges from the navigation in the experiencing process.

The change from reporting from a first person experience, to reporting from a conversational experience while it unfolds, is, following Fludernik (1996, pp. 344-345), that "the narrator does not see the story … [she] produces the story … [which] is therefore the result of selection and not the result of perception". The narrativation generated in the activity of conversation is a process of experiential and creative selection, rather than receptional constructs of perception. The participant is consciously responsible for her own choices and experiences while performatively engaging in the conversational process.

The research method of staged experientiality discussed in this paper enables an observer position that is neither subjective nor objective, not fixed in either domain but evolving in the flow of performative engagement as an experiential, analytic and contextualising emergent position. The observer position exists and is staged as a potentiality in the underlying fabric of systematic methods and procedures. The suggestion is, that the performative engagement in the realisation of the staged research events produces an emergent form of personalised evidence as experiential narrativation.

References

Barba, Eugenio & Savarese Nicola. (2007). Pre-expressivity. In Keefe, John & Murray, Simon (eds.) (2007) Physical Theatres: A Critical Reader (pp. 255-258). London: Routledge.

Bogart, Anne. (2001). A Director Prepares: Seven Essays on Art and Theatre. London: Routledge.

Bogart, Anne. (2007). And Then, You Act: Making Art in an Unpredictable World. London: Routledge.

Bourriaud, Nicolas. (1998). Relational Aesthetics. In Bishop, Claire. (ed.) (2006). Participation (p. 160-171). Cambridge: Whitechapel and the MIT Press.

Clarke, Adele A. (2005). Situational Analysis: Grounded Theory After the Postmodern Turn. London: SAGE Publications.

Eliasson, Olafur & Engberg-Pedersen, Anna & Meyhoff, Karsten W. (2004). At se sig selv sanse: samtaler med Olafur Eliason. Copenhagen: Informations Forlag.

Fludernik, Monika. (1996). Towards a 'Natural' Narratology. London: Routledge.

Fludernik, Monika. (2009). An Introduction to Narratology. London: Routledge.

Hesse-Biber, Sharlene Nagy & Leavy, Patricia (eds.) (2008). Handbook of Emergent Methods. London: The Guilford Press.

Iles, Chrissie. (2000). Video and Film Space. In Erica Suderberg, (ed.) Space Site Intervention (pp. 252-262). Minneapolis: University of Minnesota Press.

Iles, Chrissie. (2005). Talk. In Hoffmann, Jens & Jonas, Joan. (eds.) (2005). Perform (pp. 176-188). London: Thames and Hudson.

Kirby, Michael. (1987). A formalist theatre. Philadelphia: University of Peensylvania Press.

Leavy, Patricia. (2008). Performance-Based Emergent Methods. In: Hesse-Biber, Sharlene Nagy & Leavy, Patricia. (eds.) (2008). Handbook of Emergent Methods (pp. 343-358). London: The Guilford Press.

Levine, Les. (1970). Closed-Circuit television and Teledynamic environments. In Gene Yongblood. (ed.) (1970). Expanded Cinema (pp. 337-34). New York: Dutton.

Madsen, Merete. (2004). Light Zones: as concept and tool. PhD dissertation, School of Architecture, Royal Academy of Fine Arts, Copenhagen.

Melrose, Susan. (2005a). Just Intuitive. Retrieved February 14, 2010 from http://www.sfmelrose.u-net.com/justintuitive/

Melrose, Susan. (2005b). Words fail me: dancing with the other's familiar. Retrieved February 14, 2010 from http://www.sfmelrose.u-net.com/wordsfailme/

Petersen, Kjell Yngve (2009) A dramaturgy of intermediality: composing with integrative design. Plymouth: University of Plymouth.

Popper, Frank. (1975). Art: action and participation. London: Studio Vista, Cassell & Collier Macmillan Pub. Ltd.

Sullivan, Graeme. (2010). Art Practice as Research: Inquiry in Visual Arts. (2nd ed.). London: SAGE Publications.

Søndergaard, Karin (2010) Participation as Media: a compositional system for staging participation with reflective scenography. Plymouth: University of Plymouth.

Zarilli, Phillip. (ed.) (2002). Acting Re-Considered. London: Routledge.

Zarilli, Philip. (2007). Senses and Silence in Actor Training and Performance. In Banes, Sally & Lepecki, Andrè (eds.) (2007). The Senses in Performance . New York: Routledge.

Photo credits

All photographs used in the illustrations are produced by the participants in the research events.

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Technical and Reflective Rationality and Craft Practice

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Abstract

This paper presents the research and development of pre-17th century kiln technology, which has led to the design of a new sustainable studio glass furnace with modern technology and materials. The aim of this research was to provide a breakthrough for sustainable studio glass technology. This way of working is far more labour-intensive, but this is not a negative. With the glassmaker more in control of the materials and the process, the skills that previously were thought beyond modern knowledge are retrievable again.

Underpinning this research is a deeper enquiry into the place and position of tacit knowledge. Comparing the technical rationality of today with pre-industrial revolution reflective rationality, I will suggest that our actual mode of thinking, the way we think as a society, actively undermines the importance and recognition of tacit skill.

There is a necessity for the re-evaluation of tacit skills. People who work with their hands and hearts can't act as they feel they should because that way of acting, that thing they know they should do, is not in the job description. In modern society with technical rationality as its dominant model of thinking, the working practitioner has very little credibility or voice. All my work is an attempt to square the circle – joining learning and making a living, history with the future, valuing the whole person – learning as much as writing – and the kiln design is an aspect of this determination to look to the past for what could be used in the future, just as I use a historical lens to view how tacit skills were valued in the past and how they could and should be valued again.

Keywords

Technical and Reflective Rationality and Craft Practice

The word tacit means implied, not stated. As such, whenever we try to articulate not just tacit skill, but tacit knowledge and understanding, we will inevitably find ourselves discussing implications. For this reason, the style of this paper is somewhat anecdotal as I am drawing from my 30 years experience as a craftsman in an attempt to articulate effectively how a 'feeling' informs my research. By 'feeling' I am not referring to a simple 'hunch', but a conclusion informed by many years of the acquisition of tacit skill, experience, knowledge and understanding which is not supported by written and explicit evidence.

I began my career at Pilkington Glass in St Helens 30 years ago. I served a craft engineering apprenticeship in the maintenance and installation of factory services. I later went on to go to art school, a BA in 3D Design and a Masters degree in glass at the RCA. Glass is in my blood. I worked for 8 years as technical instructor in hot glass at the RCA, have designed for Habitat, sold my own work to galleries and managed a medium size glassworks for 4 years before becoming a lecturer at Plymouth College of Art. I now teach glass, work based learning and professional practices and work on the design team for Caithness Glass.

It's interesting that I was drawn to glassmaking because of the use of hand tools that are needed for the production of studio glass. I'd spent 7 years as an engineering craftsman and felt at ease with any hand tools. When we consider compression joints in domestic or industrial plumbing, they need to be tightened up to produce a watertight or gas safe joint. If you don't tighten the joint enough, it will leak. If we tighten the joint too much, it will leak. You have to get it just right, you judge it by how it 'feels'. This is tacit skill, implied but not stated. I found that this skill is directly transferrable to glassmaking. It's not that I immediately understood the material, but rather that I knew that I had to understand the 'feel' of the glass. Another vital factor is that it's not just the particular tacit skill that is transferrable, but the concept of quality that goes along with it.

Perhaps because of my craft engineering background, I have always regarded the acquisition of practical skill to be of equal importance to the pursuit of conceptual artistic endeavour. It was while I was working at the RCA that I was first approached by Reino Liefkes of the V&A and Dr Sarah Fearn of Imperial College in the summer of 2002. Sarah was working in conjunction with the V&A researching glass conservation using advanced surface analysis techniques in order to find methods of arresting glass disease – the breaking down or corrosion of unstable glass. The particular glass that was analysed was a 17th C Facon de Venise goblet from the V&A collection (Fig 1). Dr Fearn had recreated the batch but had difficulty melting large amounts of glass at Imperial College. She had to pour the glass onto a metal plate which resulted in small round pellets that had to be ground and polished to produce the completely flat surface needed for the surface analysis techniques needed. Of course, a cold finished surface removes the 'skin' of the glass, which isn't comparable to a blown glass finish. Also, it is extremely difficult to refine glass in small crucibles even at temperatures reaching 1400 degrees C. What were needed were large thin blown plates. I successfully melted and worked the 17th C glass formula and was amazed at the working characteristics of this glass.
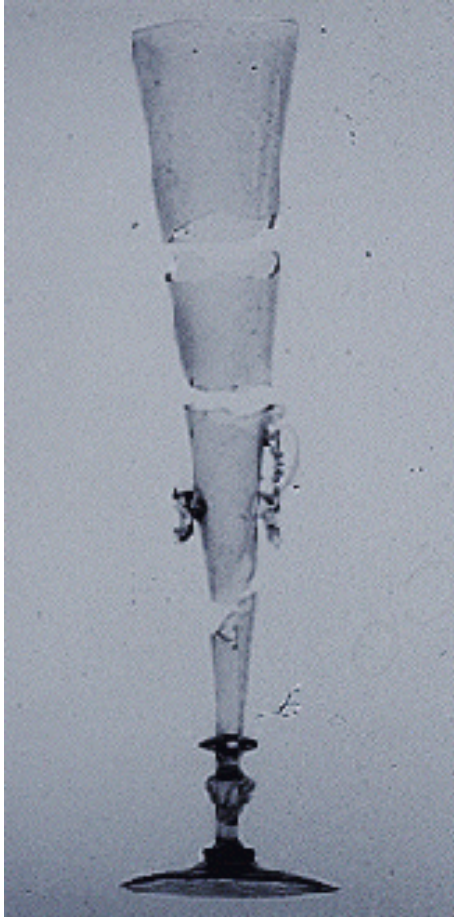
Fig 1. The 17th century Façon de Venise goblet on which the replica glass composition was based.

Substance	Weight %
SiO_2	70.60
Na_2O	20.25
CaO	2.61
MgO	1.07
K_2O	3.68
Al_2O_3	1.10
Fe_2O_3	0.31
MnO	0.37

In order to put the Venetian glass project in context I think I should very briefly describe how some of the different glass types I have worked with 'feel' to work with. Lead crystal is very soft and long working. If over 24% lead, it's an extremely forgiving glass, which is why it is favoured by many studio glassmakers. We can take more risks with a longer working glass. Its main disadvantage is that it's very heavy when working on large pieces; it can be a third heavier than a leadless glass depending on the lead content. Objects and rims tend to be rather thick as the

glass quickly melts back when it is re-heated. We have to re-heat the glass to stop it failing due to thermal shock. Also, lead glass is very soft in comparison to leadless glasses and so it is far easier to cut, grind and polish. Soda lime glasses tend to allow the glassmaker to blow thinner objects. It is much shorter than lead glass and so loses its heat and becomes unworkable very quickly. Again, the glass will fail due to thermal shock if it gets too cold so the 'window' of workability is reduced dramatically. One of the closest leadless glass formulas to lead crystal in terms of how it feels to work with is Gaffer glass. It looks very good in quality and feels rather like crystal but the window of workability is significantly smaller. Philips produces the composition under licence and I find this glass far easier to work with than other Philips glass compositions that I have tried over the years. Many glass studios and colleges, including Plymouth College of Art use Glasma. We use this glass because of the clarity and quality of the finished piece. It's much clearer than any leadless glass I've worked with. Again, like all leadless glasses, it's not as long working as a high lead crystal, and so the window of workability is again significantly smaller. Through my extremely varied glasswork at the Royal College of Art and in many glass studios, I have become expert in how different formulas of glass work, or perhaps more accurately, how they 'feel' to work with.

The replica 17th C glass was wonderful to work with, was long working like lead crystal but could be blown very thin. It was very resistant to thermal shock and seemed to have all the best working characteristics of modern glass formulas but without any of the negative aspects. I am positive that the 17 th century Venetian glassmakers were incredible glassmakers because they were working with an incredible glass, which explains the secrecy surrounding their formulas. Once we eliminate the risk of failure due to thermal shock, we are free to push risk to the extreme, and as I found when I went back to the Gaffer glass that I worked with at the time, the experience of working with this glass greatly enhanced my level of practical skill.

The 17th C glass had such tremendous working characteristics that I 'knew' instinctively that it would have had to have been developed by a glassmaker. I have published papers based on my observations for the Society of Glass Technology and, after developing my ideas further, have spoken at the V&A and more recently at Cambridge University on the subject of tacit skill and the diminishing credibility of the craftsperson. Dr David Martlew, a leading glass technologist has conducted viscosity tests which provides evidence that support my findings.

If we can replicate the 17th C glass formula, we can take more risk with a glass that is easier to work – it teaches more about blowing glass, about the properties of glass itself, than "normal" glass does. So our students will learn more, and more quickly. Inspired by the experience of working with this glass, I have developed a small furnace based on 17th C design using modern materials and technology. Early testing melting glass cullet indicates that the 25kg furnace can reach 1300 degrees C in only 4 hours without damage to the combustion chamber or crucible. As the furnace can be turned off just as quickly, the implications for the financial viability of small 'entry level' businesses are obvious, with tremendous potential for the reduction of energy costs and emissions. If we compare this with standard glass furnaces which can take 3 days to come up to temperature and then remain on for months or years at a time, we can see the tremendous potential for this kind of equipment.

I found it interesting and very relevant that when the abstract that I wrote for this paper was peer reviewed it was felt that the paper could be further strengthened by including some relevant references to substantiate the key assumptions and arguments. So here's my first reference, taken from that review process;-

> "Currently there are no references (apart from those to the authors own practice) and this tends to characterise some key sections as conjecture, albeit informed conjecture."
> (Anon 2011)

This is in fact, the heart of the matter. Tacit knowledge is easily recognised and evident in the creative work that we produce, but is very hard to articulate explicitly our tacit understanding. In this paper, I'd like to take my point further and suggest that our actual mode of thinking, the way we think as a society, actively undermines the importance and recognition of tacit skill.

I first came upon the subject of tacit knowledge during my Masters degree, through the work of Peter Dormer, whose book "The Art of the Maker" led me to the earlier work of Professor David Pye. In the 1990's, in order to find out more about the subject, I found on the internet a wealth of information within the scientific 'community', particularly in the area of research into artificial intelligence. The structure of tacit knowing was first introduced by Michael Polanyi in his book "Personal Knowledge: Towards a Post-Critical Philosophy" in1958.

The word tacit means 'implied-not stated'. As such, it cannot adequately be defined in words. It applies to glassmaking perfectly because it's very hard to describe in words what we actually do. A simple example of tacit skill is how we recognise the face of a friend or colleague in a crowd of people. We can all do it. It's easy. But try writing down factually just how we go about this recognition process, without falling back on vague comments like "well I recognise the face". The result will be a complex document. Now magnify that complexity by a thousand and you'll get some idea what it's like to adequately define a tacit skill such as glassmaking. In fact, David Hamilton, who used to be professor of Ceramics and Glass at the RCA, once commented that glassmaking only occurs when hundreds of things fail to go wrong. Tacit skill is gained through experience and repetition of practical processes. In the factories, where ceramic products were painted by hand, the workers would be talking about football or what was on television last night while at the same time, demonstrating a high level of practical skill.

Tacit skill-in-action, reflection-in-action and *reflection-on-action* are increasingly complex aspects of tacit skill.

There is an assumption that because the craftsperson or practitioner cannot easily articulate what they are doing, that they are somehow lacking in intelligence. If somebody came up to me while I was working and asked, "How are you doing that?" I wouldn't be able to answer. The thought processes involving the combination of memories of experiences that are needed to make a hypothesis, in order to implement a plan of action to deal with the task at hand, are far too complex to explain. The speed in which this thought process translates into action prevents such an explanation.

If, after I had finished the work, and the same person asked "How did you do that?" I still wouldn't be able to answer because the action and thought process happens so fast that I can't consciously remember accessing these memories of individual experiences.

While workmanship requires skill, craftsmanship, by definition requires tacit skill. A plumber is a craftsman. So too is a welder, fabricator or painter and decorator. My City and Guilds certificates refer to my *craft* apprenticeship. I also have a certificate of Engineering Craftsmanship. In fact, it can be argued that the performance of any practical skill can be described as craft. What elevates the intellectual thinking of the contemporary craftsperson working in the applied arts is the introduction of autonomy and reflection during the making process. A craftsperson in a factory is producing the same object each time during the making process. Any diversion from the norm is discarded and results in a loss of time. In contrast, the contemporary craftsperson is dealing with new situations, and a different form of intellectual thinking is required. It is relatively easy for a glassmaker to blow into a mould or produce lots of the same object because of the familiarity with the process. When I am asked to interpret a fine artists' or a sculptors' ideas, I have only a vague idea of how I'm going to make it. When I am working the glass, I am considering a range of problems that I have to solve. I use my past experiences in order to come up with a hypothesis to enable me to form a plan of action. I use my tacit skill to implement this plan and reflect on the outcome. What I am describing is **reflection-in-action**.

> "When someone reflects-in-action, he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case. His inquiry is not limited to a deliberation about means which depends on a prior agreement about ends. He does not keep means and ends separate, but defines them interactively as he frames a problematic situation. He does not separate thinking from doing, ratiocinating his way to a decision which he must later convert into action. Because his experimenting is a kind of action, implementation is built into this inquiry." (Schon, 1983, p. 68)

When we are working on new designs, we are indeed researchers in the practice context. As we are constantly reacting to the material and processes involved, we are working on a higher intellectual mode of thinking than that required of tacit skill and are acquiring tacit knowledge. "But", you may say, "this is just conjecture, albeit informed conjecture", and quite right, too. I need to articulate explicitly, in words, in black and white, exactly what I mean and prove my point. In doing so, I will be engaging in an even more complex level of intellectual thinking, that of **reflection on action.**

> "It takes considerable diligence to be in a position to be able to articulate a situation in working life – and this is crucial – to the point where we can grasp why it eludes precise description." (Janik, 1988, p. 62)

Tacit skill requires craftsmanship, tacit knowledge requires reflection in action and tacit understanding requires reflection on action. I don't have a reference for this. I do know in my heart that it's right though, and this is enough for me. This isn't a guess, clutching at something

that is ethereal, but a fact backed up by 30 years of the acquisition and application of tacit skill, knowledge and understanding.

> "Tacit (silent) knowledge (Polanyi,1958) and implicit learning have in common the idea of not knowing what you do know or have learnt.… Originally, Polanyis' interest was in the kind of knowledge which we routinely use and take for granted, such as the ability to recognise the face of a friend: it is irreducible to explicit proportional knowledge and cannot be articulated. It cannot therefore be taught, although of course there is obvious evidence that it can be learned or acquired." (Atherton, 2002)

Any argument involving a true craftsperson that possesses tacit skill is difficult, because our argument is 'silent'. We can only usually successfully articulate through the quality of our work. When I experienced working with a 17th C glass formula, I knew instinctively that this glass was developed by a glassmaker. Back then the craftsperson had the same credibility as the scientist or technologist. In fact, if we go further back in history we see Leonardo painting the Mona Lisa, producing analytical drawings of the workings of the human body and designing helicopters in his spare time. There was no difference in the credibility of the artist, scientist or craftsperson because they could well be disciplines practiced by the same person. In terms of conceptual understanding, ***reflective rationality*** was the only mode of thinking available. This results in a 'try it and see' kind of research. Since then, art and science have separated and become two very different disciplines, which in turn require equally different kinds of rationality.

Modern glass is not made to recipes developed by glassmakers but rather developed by technicians looking at chemical compositions. What is important in these recipes is the clarity required in batch production under rapid conditions. In other words glass recipes are designed to support industrial conditions, but it is not set up to be sympathetic to the maker. The problems of industrialisation are systemic: as industry became more dominant society required an increasingly complex structure. Administrative and political systems became more and more specialised, with a corresponding negative effect on the craftsperson. Once the link between the recipe and the process was broken in glassmaking the craftsperson could only specialise more. This way of conceptualising administrative intervention in educational and administrative systems is known as **technical rationality** and follows three main assumptions.

> "There are general solutions to practical problems.
>
> These solutions can be developed outside practical situations (in research or administrative centres).
>
> The solutions can be translated into teachers' actions by means of publications, training administrative orders etc."
>
> (Altrichter, Posch, Somekh, 1993)

The most crucial aspect of modern technical rationality is that administrative and political change is decided outside of the working environment and handed down the chain of management to the practitioner in the form of instruction or training. The most significant aspect of reflective rationality was that any change was made within the practitioners' working environment. Solutions to problems were found in the glassmakers working environment, inside the context in which the problem arises.

These days every person who works in a large organisation has to have their role defined. It is easier to define the role of the scientist or technologist in words because the nature of these disciplines concern definitions and proven facts. But as we know, tacit skills such as those belonging to the glassmaker cannot be articulated into words. As such, it is impossible to define the glassmakers' role (or that of any practitioner) adequately. The problem is that once we attempt to make a system transparent, we must try to define it in order for it to be understood. As it is impossible to articulate the tacit elements, what is left is only what can be adequately described. The tacit elements, those vital ingredients that are needed to achieve quality in anything that we do are lost.

Before the industrial revolution and the complex explicit administrative systems that accompanied it, the preferred mode of thinking was that of **reflective rationality**

> "Reflective rationality, in contrast follows three very different assumptions: -
>
> Complex practical problems demand specific solutions.
>
> These solutions can be developed only inside the context in which the problem arises and in which the practitioner is a crucial and determining element.
>
> The solutions cannot be successfully applied to other contexts but they can be made accessible to other practitioners as hypotheses to be tested."

<div align="center">(Altrichter, Posch, Somekh, 1993)</div>

As the influence of science and technology has been enhanced over the years, the influence and therefore the **credibility** of the craftsman have diminished. The introduction of technical rationality into modern society has created a complex hierarchy of managerial responsibility. Technical rationality, society's preferred mode of thinking, encourages a hierarchy of responsibility and undermines the importance and credibility of the craftsperson, and therefore of tacit skill. The problem is that within these power structures of large companies and organisations, we confuse this hierarchy of responsibility with a hierarchy of credibility.

> "This hierarchy expresses a genuine mistrust of practitioners. Within the conceptual framework of technical rationality, they are working on a low level of theoretical knowledge and are merely applying what has been predefined in the academic and administrative power structure above them." (Altrichter, Posch, Somekh, 1993,)

This hierarchy of authority is so strong within our society that credibility and tacit knowledge has very little influence in some of our established complex administrative systems. The fact that

something is written down overrides the vital knowledge of practitioners. Albert Mehrabian (1981) is credited with developing the 7%-38%-55% rule of communication. In this rule, words account for 7%, tone of voice counts for 38%, and facial expression and body language accounts for 55%. This means that more than half of communication is done through body language. And yet the established method of communication in the same building of large oganisations is through e-mail.

In science too, there is difficulty in conveying tacit information derived from social experimentation. In his talk on motivation for Ted.com, (2009) Dan Pink states, "There is a mismatch between what science knows and what business does". He goes on to discuss the issue of bankers' bonuses. Research shows that when goals are not clearly defined, as is the case with investment banking, financial incentives *do not work.* There is proof, *evidence* that the financial incentive does not work, and yet the written contract within our preferred mode of thinking, that of technical rationality, completely overrides that evidence. Ironically, much of this research was conducted by the US federal bank.

If words *only* are used to convey information, the text will convey meaning, not the experience of an author or teacher (Polanyi, n.d.). This meaning is subject to interpretation by the reader or learner. This is why American scientists couldn't replicate an experiment made in Russia 20 years earlier until the day that Russian scientists flew to America to show them how (Colins, 2001). Text alone wasn't enough, it took social interaction and the transfer of tacit knowledge before the test could be successfully replicated.
As the American scientific team had to trust that the Russian team did indeed succeed with their research, trust is an issue at the heart of our understanding of tacit skill.

If we as craft practitioners choose reflective rationality as our preferred mode of thinking, it seems natural that when faced with communicating through administrative systems, we feel that we are using the same words but dealing with a different language. Polanyis' model of written communication (Polanyi n.d.) underlines the difficulty that those who use technical rationality as their preferred mode of thinking have when considering the importance of tacit skill. If they do not possess tacit skill and haven't experienced being a practitioner, they can only find meaning in their own personal context.

Before the development of complex administrative systems, all decisions were made within the working environment, and the craftsman, in this case the glassmaker, also developed and built the furnace equipment, mixed the glass batch and produced the product. The experience of working with a 17th C glass had such a dramatic effect on my thinking that I began to look at other aspects of reflective rationality. The prototype design is based on a 17th C furnace, and more complex systems are planned which use ideas first seen during the renaissance, although using modern materials and technology in the construction. I have been working with glass since 1981 and it was only last year when I first began to mix my own glass batch. This way of working is far more labour-intensive, but this is not a negative. With the glassmaker more in control of the materials and the process, the skills that previously were thought beyond modern knowledge are retrievable again. It is not that the skills were necessarily lost, but that the ideological insistence on a way of working (which values speed and a mechanistic

heterogeneity over tacit knowledge and a thoughtful, cradle-to-grave approach to a process and a material) has made us blind to the possibility that a different way of working could give us the skills we thought we had lost.

I'm incredibly lucky to be fortunate enough to become expert in both craft engineering and glassmaking. I have built and maintained furnaces and have the skill and knowledge to be able to construct a new type of glass furnace, one that halves the energy costs for a practitioner, and not only levels the playing field, but gives an international advantage. What I wasn't prepared for was that when it comes to commissioning a piece of equipment such as a furnace, my years of experience actually count for nothing. I have had to bring in 'experts' who have never seen equipment such as this to certify that the furnace is safe. The issue of trust is a vital element in the acceptance of tacit knowledge and understanding by those who work within administrative organisations.

There is a necessity for the re-evaluation of tacit skills. People who work with their hands and hearts can't act as they feel they should because that way of acting, that thing they know they should do, is not in the job description. In modern society with technical rationality as its dominant model of thinking, the working practitioner has little or no credibility or voice. All my work is an attempt to square the circle – joining learning and making a living, history with the future, valuing the whole person – learning as much as writing – and the furnace design is an aspect of this determination to look to the past for what could be used in the future, just as I use a historical lens to view how tacit skills were valued in the past and how they could and should be valued again.

Conclusion

With the new type of glass furnace, using both technical and reflective rationality in its development, we are now free to melt our own glass recipes, based on the 17th century glass formulas. The glassmaker can once again control the working characteristics of the material that he or she is using. This will result in the acquisition of a higher level of tacit skill than previously possible and will become a vital teaching resource.

> "There should be a symmetry, rather than a hierarchy of power- a more dynamic learning culture, based on the understanding that local initiatives exist already, and that their growth process should be supported rather than being ruptured and thwarted by imposed change."

> (Altrichter, Posch, Somekh, 1993)

Technical rationality encourages the hierarchy of responsibility, and complex written administrative systems far outweigh the local systems developed by practitioners, undermining the importance of tacit skills. Not only does society mistrust what can't be written down, but it is increasingly failing to recognise the importance of tacit skill, knowledge and understanding. There should be a re-evaluation of the importance of tacit understanding in the development and implementation of administrative and political systems.

> "The conclusion of this book should then show how the meanings established in science and those achieved in the humanities (those discussed in the main body of the book) can be brought into existential harmony through recognition of the existence of meaningful order in the world. This synthesis, together with the further recognition of the life of mutual authority, might then show the way toward a restoration of meaning in the life of contemporary man." (Polanyi, Prosch 1977)

In the book 'Meaning', Polanyi and Prosch are discussing a synthesis between science and the humanities. However, we must remember that the ancient Greek root word 'tech' in technology, is in fact 'Art', or more precisely artisan. If we go back to the renaissance, we find that Leonardo was both an applied scientist and an artist. So in fact, technology could be described as 'Artology'. Art and science are in fact two opposites of a spectrum of the same discipline. It is in the rationality of the humanities and the relatively new rationality of our technological world that we must look to find the existential harmony that Polanyi describes, not in art and science itself.

We are very fortunate as creative practitioners that we differ from the majority of society in that we use reflective rationality within our practice as our preferred mode of thinking. I believe that if we as a society learn to recognise and celebrate reflective rationality (and with it the true value of tacit understanding), far from being an outdated way of making and knowing, as much of public perception views the crafts, creative practices and a synergy between technical and reflective rationality point the way ahead for the future of manufacturing in this country.

References

Schon, D. (1983) The Reflective Practitioner: How Professionals Think in Action. London Temple Smith, p.68

Janik, Allen (1988) 'Knowledge, Working Life and Scientific Method' in Knowledge, Skill and Artificial Intelligence, Harvard Business School Press, p62

Polanyi, M (n.d.) Models of Written Communication. Retrieved April 11 2011 from http://web.mst.edu/~gdoty/classes/concepts-practices/models.html

Atherton J S. (2002) Learning and Teaching: Tacit Knowledge and Implicit learning p 1 of 1. Retrieved May 2003 from http://www.dmu.ac.uk/~jamesa/learning/tacit.htm

Altrichter H, Posch P, Somekh B. (1993) Teachers investigate their work: an introduction to the methods of action research. Routledge, London, p 202.

Albert Mehrabian (n.d.) Retrieved September 2009 from http://www.businessballs.com/mehrabiancommunications.htm based on the book Mehrabian, Albert (1981). *Silent Messages: Implicit Communication of Emotions and Attitudes* (2nd ed.). Belmont, CA: Wadsworth.

Dan Pink, 2009. Retrieved Sept 5th 2009 from http://www.ted.com/talks/dan_pink_on_motivation.html

Collins, H.M. (2001) Tacit Knowledge, trust, and the Q of Sapphire" Social Studies of Science 31, p.71

Altrichter H, Posch P, Somekh B. (1993) Teachers investigate their work: an introduction to the methods of action research. Routledge, London, p 202.

Altrichter H, Posch P, Somekh B. (1993) Teachers investigate their work: an introduction to the methods of action research. Routledge, London, p 203.

Polanyi M, Prosch H. (1977). Meaning. University Of Chicago Press. p. x

Ian Hankey

Ian Hankey began his career in 1981 as a craft engineering apprentice at Pilkington Glass. He is a graduate of the Royal College of Art and has worked for some of the finest Glassmakers in the country including Simon Moore, Steven Newall and Catherine Hough. He has designed for Habitat, and spent seven years acquiring the highest level of craft skills as technical instructor in hot glass at the RCA. In 2003, he became manager of a glass factory and received four international design awards and is now on the design team at Teign Valley Glass and Caitheness Glass. He has lectured at national and international conferences at the V&A, the Wallace Collection, Liverpool University and Cambridge New College on the subject of the acquisition and application of tacit skill. He now works as a lecturer in Glass and Professional practices at Plymouth College of Art and continues his work within a research cluster working within the subject of sustainability and environmental issues in the crafts.

Recoding abandoned products: student visual designers experiment to sustain product lives and values

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Abstract

This conference paper outlines the development, delivery and evaluation of a student project for visual communicators in a second year teaching unit where students are investigating the communication contexts of contemporary consumer values and the material and symbolic waste to which design contributes. The student exercise is part of a pedagogical strategy to seed education about sustainable design practices and is in response to an ongoing research project investigating the role of visual communications design in supporting more enduring relationships with existing products and the value-creating practices of users. The authors' research draws in part on the sustainable design theory of Fry (2009) and the experimental work of Dutch design group Eternally Yours. The students were asked to employ the visual strategy of 'recoding' to reconceptualise abandoned products, a strategy of inserting new meanings into existing sign pairings of image signifier and referent and reformulating their value constructions. Recoding bears a strong relation to the familiar critical practices used in 'culture jamming' to disrupt the commercial construction of values in branding culture. As it encapsulates critical potential, recoding was presented to students as an opportunity for visual experiment and to transform the aesthetic expression of already existing products.

The ambition for this student project was that it would open up reflection on the sensory complexities and competencies of everyday practices of product use that might sustain product values and involve students in unveiling the experiential knowledge(s) of users and their artefacts. Primarily, recoding involves a strategic negotiation of how visual communicators can draw from and frame these reflections. It also involves the possibility to learn as both consumers and designers who implement use practices that evolve significantly, if incrementally over time. As such, practices can be linked to past competencies that are available for salvage, modification and redirection. This conference paper provided the researchers with the opportunity to reflect on the students' creative responses to the challenges of recoding within a learning context and evaluate the project's ability to advance the research findings, as well as refine it for future iterations. With exciting insights into the types of products, skills and experiences to which the students have access for their revisualisations, their creative outcomes revealed how challenging it was to find alternatives to the insistent tendencies of product advertising to fetishise novelty and perfect form.

Keywords

Introduction

The critical paradigm of sustainability confronts design with many challenges, not least that of how to sustain the value of the existing product environment. In a visual culture that generally promotes the accelerated and unsustainable consumption of barely worn goods, there is a need to explore how visual communication practices can actively contribute to the sustainment of product lives and values, not only for new products but also for products that are already in existence. This paper describes the development and evaluation of a student project for visual communicators in an undergraduate teaching unit where students are investigating the communication contexts of contemporary consumer values and the material and symbolic waste to which design contributes. Students experimented to 'recode' existing products and reconstruct consumer desire for products that have been abandoned using the visual format of either posters or a visual narrative. In the first section of this paper, we will outline the research context and critical strategy informing the project.

The authors' research is investigating the role of visual communications design in sustaining product lives and values drawing in part on the sustainable design theory of Fry (2009) and the experimental work of Dutch design group Eternally Yours. In the second section we lay out the teaching and learning process involved. This second section will describe how the project and its broader research context were communicated to the students and how it was anticipated that their material experiments could advance these research issues. In the third section we analyse a selection of the student creative outcomes in light of the critical strategy of 'recoding' and key issues, and explore some of the primary themes emerging from the student work. We explore what the work reveals about student insights and discuss these examples in terms of the challenge of recoding anchored by existing material, symbolic and practical flows. In the final section, we review the strengths and weaknesses of the project in light of the broader research context and consider how such a project might be expanded on in the future.

Research context and critical framework: the role of visual communications in sustaining product lives and values

The 'Recoding project' – as it is called and outlined in this paper – emerged from a broader research project being conducted by the authors investigating 'wearing' as a multi-modal concept that illuminates the social life of design (Gill and Lopes, forthcoming, 2011). The key proposal of this project is that visible indices of wear, reuse, salvage and creative modification in design constitute important cultural signs of material and social sustainability, which challenge the aesthetic idealism of modern design. As argued by Verbeek and Kokelkoren (1998) idealism became embedded in 20th century design as function, style and sign eclipsed products as material entities. While the aesthetic conventions of computer-aided design tend to fetishise the perfectibility of form and/as function, markings of wear resituate design in the contexts and practices of everyday life. We claim that the practice of seeking out, documenting and constructing these signs holds value for designers in that it enables new knowledge about material and cultural durability to emerge and therefore offers a potentially important contribution to design education in light of unsustainable consumption.

One of the key findings of the wearing project so far, is that there is a particular need for visual designers to experiment with fortifying the material and symbolic durability of products. Such an approach has been championed in industrial design, by for

example Eternally Yours through the 1990s. Other designers and design researchers, also predominantly from the field of product design, have for many years grappled with the central problem of rapid product turnover by promoting ecodesign strategies such as product lifetime extension (the recent collection *Longer lasting products* 2010 edited by Tim Cooper, contains contributions by the leading proponents of this approach) or product service system design, which aims to intensify the amount of users and uses of individual products through systematized product leasing or sharing (see for example the collection *New business for old Europe: Product-service development competitiveness and sustainability* 2006 edited by Ursula Tischner and Arnold Tukker). However in the main, the practices of visual communicators tend to be oriented toward generating desire at the retail end of product lives, in which the aesthetic of newness and novelty dominates. The wearing project put forward a range of possibilities for creative exploration with student designers in promoting visual cultures of sustainment. We posited that the strategy of recoding could be used to help visual communicators construct signs of sustainability by re-circuiting the value of existing abandoned products.

Recoding is a critical semiotic strategy in visual communications design that inserts new meanings into existing sign pairings, thereby attempting to disrupt sign flows and narrative/rhetorical conventions. This strategy bears a strong relation to practices such as 'culture jamming' which works to denaturalise and thus undermine the construction of value in the commercial contexts of brand culture. Contemporary culture jammers reuse the iconography and phraseology of this culture to generate new signs in public loci that aim to disturb and subvert branded environments (Mellick Lopes, 2009, p. 211). Tony Fry (2009) argues that as an aesthetic practice that has evolved over many decades it has spread itself too thinly across many political agendas and lost its potency. In his book *Design futuring* (2009) Fry argues that the imperative of sustainability provides recoding with a coherent conceptual project, to both expose what is unsustainable and to demonstrate new means of sustainment (p.82). We see many opportunities for recoding to transform ways of seeing already existing things whose sustainment over time could intervene in unsustainable consumption. In the first iteration of this student project, we sought to employ recoding as a constructive strategy of symbolic salvage and reuse that promotes the appeal of products based on existing relationships, experiences and practices rather than novelty and perfect form. Recoding recognizes the centrality of semiotic strategies in shaping visual literacies which product value depends on. Recoding is not constructing alternative values from the ground up, but rather practicing an intervention into a dominant aesthetic regime in which durability is deliberately undone by linking product desirability to 'box fresh' newness (i.e. untouched by weather, wear and the degradations of daily practices and product engagements). Its key significance is as an enabling strategy to develop critical visual literacy in student undergraduate learning. The guiding hypothesis was that the challenge of recoding abandoned products is an opportunity to practice reflection on tacit experiences with products as well as sensitise to the multi-sensory interactions that both support patterns of use and contribute to their decline. In addition, visual experiment to reconstruct desire for aspects of a product's life 'experiences' has the potential to interrupt or short-circuit the tendency to present virgin products.

The Recoding project is framed by the following research questions: How can visual communications design contribute to reconstructing consumer desire for existing products and practices? How do students frame their own experiences when visualising the products? And how do the students go about communicating their experiences of these products?

The Project Brief and Learning Process

To modestly advance the goal of visually supporting already existing things, the following brief was developed for students in response to the research questions that invited their experimentation with the visual representation of abandoned products. The students were asked to recode a product or object selected from their home or social environment to transform its meaning from abandoned to re-desired entity.

The brief was contextualised by a lecture series where the issues of "product-based well-being" (Manzini, 2003), the communication of product values via advertising and branded imagery, the accelerated pace of material and symbolic turn-over and the shortening of product life-cycles were outlined as a set of concerns for visual communications as they shape the commercial contexts of visual culture. It was via this lecture series that a broader research context for visual experimentation was communicated in a condensed way for students punctuated by the presentation of work by visual communicators who seek to respond critically to these issues. Additional insight into the features of contemporary consumerism was provided by the selection of readings to define and analyse theoretical concepts such as consumption, consumer desire, semiotics and sustainability and equip students with the conceptual tools to experiment semiotically (Manzini 2003; Sturken and Cartwright 2001; Boradkar 2010). As second year students, they possessed only a provisional understanding of semiotics and the idea that visual communicators have an important role in defining the way in which products signify meaning and value. By giving students the project, we seek to grow the beginning of an understanding of how visual communication actively *frames* perception, understanding and meaning of many artefacts, behaviours and practices; that our visual culture is an environment of signs that "enable our 'seeing' in a meaningful sense via the memory" of what is seen, perceived and thought (Fry, 2009, p. 30). We must recognise and acknowledge that the students can vary significantly in their understanding of and ability to mobilise the agency of the visual. In addition, we were keen to invite students to visually express their experiences of sustaining products in their own life contexts.

To define a specific problem context for the student project, the conditions leading to unsustainable consumption were illuminated via the findings of leading researchers (Manzini 2003 & 2006; Fry 2009) and highlighted in the critical photographic work of Chris Jordan who helps us to see the macro accumulative impacts of mass consumption. Jordan's image of 426,000 abandoned mobile phones retired to US landfill in one day serves as an opportunity to discuss the consequences of product obsolescence. It is also helps to underscore the wider absence of images of already used, experienced, and well-loved objects in an insistent visual domain of new product advertising – one of the findings of the wearing project. This insight led to class discussion about the perception that many artefacts in our homes simply lack duration along with durability, and with this comes the loss of particular skill-bases, competencies, memory and experience. With reference to examples such as mobile phones, music players (Walkmans, Discmans, MP3 players), gaming consoles, vinyl records and CDs, class discussion turned to the observations that so many products are retired before they are broken or fail to work, as they fall victim to shorter product lifecycles, the economics of innovation and planned functional and symbolic obsolescence. Discussion was directed towards considering the factors or conditions that might lead to a product's 'abandonment' as an appropriate starting point for students' approach to the brief.

A promising visual application of recoding for sustainability, presented to the students as one of few existing visual precedents, comes from the first anthology of the

Eternally Yours Foundation (van Hinte, 2004). This example is an expression of the group's interests in extending the psychological durability of products. The potential of advertising to contribute to product lifetime extension is the subject of a short essay in the 2004 anthology. The essay is illustrated with an image, showing an old, well-used Nikon camera with the tag line, "This Camera Works." In short, the advertisement's message is the camera's dependability, proven by visible evidence of incremental wear. Together with the promise of utility sit signs of its apparent age and experience, and in this semiotic intervention an alternative form of object desire is promoted. The example is significant because it underscores the aesthetic ageism of much current product advertising and points to a new role for advertising that promotes and supports the product throughout its life, rather than just at its beginning. An alternative 'advertising' could include information about use, repair and maintenance as well as recycling services, and document the accumulation of cultural value as the product extends its life across generations and industry cycles. The potential for further experiment is captured in the visual design's function as a form of both material resource recovery and symbolic salvage. This potential was discussed with students as a means to generate inspiration for recoding.

The Brief

To explore the opportunities to reconceptualise or reconstruct consumer desire for an object or product that has been abandoned – no longer in regular use or perhaps in a 'to-give-away' box – but still works. Select an everyday object like an appliance, electronic equipment, a tool or a piece of clothing and develop a concept to re-visualise or promote it in such a way that there is a desire to reuse.

The format specifications

Students were asked to develop a concept to pitch to the class in either a storyboard format of up to 6 images OR a series of 3 related posters. Students were encouraged to sketch, illustrate, photograph or graphically represent their visual concept.

The criteria for assessment

1. Visual Presentation: visually communicates a concept for re-seeding and sustaining desire for an abandoned product/object – 50%

2. Rationale: Develops a concept that is convincing and compelling and shown to be in response to a described problem/task about unsustainable consumption - 50%

The students were given 6 weeks to develop and execute the designs, in parallel with lectures, reading and class discussion about the contextual issues, and then they took turns presenting their concepts in class so that class discussion could occur.

In summary, it was anticipated that students would guage in an initial way the research themes in the form of their own potential to reconceptualise the already existing products 'found' – recalled or rediscovered – around them.

Analysis of Student Recodings

Six examples have been selected for analysis that test the research proposition that recoding is an enabling critical strategy to assist in fortifying the material and symbolic durability of products. These examples were not selected because they received the highest mark in relation to the assessment criteria but rather because

they reveal aspects of the thinking necessary to recode objects by drawing on the relationships, experiences and practices of students with products, and how concepts are positioned with respect to product advertising approaches. Ultimately, these examples provide insight into the challenges of recoding for student designers and permit us to evaluate this project's contribution to student learning of issues and competencies that bear productively upon the themes of our research.

Our analyses of student work tend to over-read the promising signs of recoding for sustainability – what is shown of this work is predominantly sitting within the aesthetic and rhetorical conventions of advertising and is not particularly radical or ambitious. However it does show the students' capacity to orient their work around an introduced set of values that bring sustainable design theory together with their own particular experiences of and with abandoned products. The brief intended to leave open the possibility for students to respond to the many dimensions of the social lives of an object, drawing from a wider spectrum of user experiences and periods of an object's life that stretch beyond retail 'end' promotions. Significantly, very few students actually took up the challenge posed by the Eternally Yours example of making the visibly worn product an object of desire. Some examples question the limits of an object's status as product (i.e. an entity primed for purchase) in illuminating it as a material artefact to be maintained, repaired, modified and/or cared for. In the following analyses, we point to the efforts of students to reflect and draw upon the nuances of everyday practices – the identifications of preferences and habits, interests, competencies, sensory observations – that are part of the 'backstory' of their product pitches, and often not readily made visible in product advertising.

Many students, following the Eternally Yours example, nominated to promote the ongoing viability of earlier generations of hand-held technologies – such as mobile phones, cameras, gaming machines and music players – due to their simpler functions or proven reliability. One such example is Figure 1 which chooses to recode a specific mobile phone model – the Nokia 3310. The concept seeks to re-circuit Nokia's international brand message "Connecting People" (i.e. connecting all people via the latest communication technology) and its purported 'universal' application to 'all', with a more situated, more inclusive message promising connection using *simple* technology for all users, not simply advanced ICTs for the most techno savvy. The design concept is situated in the preferences and habits of 'family' phone use patterns, and cross-generational needs. In three print poster designs, it promises a utility of 'simple efficiency' (Figure 1a), scale or 'size' of keys that can be readily used (Figure 1b), and a utility that is inclusive of all family members young and old (Figure 1c). The designs include information icons to represent simple functions – calling, SMS – as well as size and democratic applications. The concept draws upon the experiences and relationships formed around tried and tested hand-sets that keep working as they are passed through family members; the word 'family' in Figure 1c and the information icons are the signs that seek to recode – re-connect – the Nokia brand. There is a missed opportunity to include an image of a well-used hand-set that evidences sustained use, the student opting instead for a new product image that includes Nokia's brand image of connecting two hands.

A second approach to recoding an existing branded mobile telephone – the Sony Ericsson T230 – as reusable, simplified mobile phone technology is seen in Figure 2, but in this case the branding of the product is incidental. The image could be of any phone that enables the singular desire to make mobile calls, in a retail context where the convergent functions offered by smart phones such as emailing, SMS, gaming, navigation and web-browsing have redefined the mobile communication base-line as

one of multi-tasking. The recoding points to a mobile phone as something that "just makes calls," using the advertising convention of the persuasive tag line. The concept of reuse relies on the prevalence of making calls with mobile phones – along with SMSing – in contexts where web-browsing, navigation and gaming may not always be necessary in phones as they are offered by other devices and screens to which people have access in the spaces that we occupy – homes, universities, cars, etc. In developing a visual narrative for a moving image treatment, the student draws on the sensory experiences of techno-sounds made by hand-held devices and the way in which such devices make audible appeals to us via television advertising. Perhaps, this could remind the viewer/listener of the over-demands made by a smart phone's beeps and tweets. The concept also includes in this narrative the alternatives of both prior (tin-can) and advanced (smart phones) mobile phone designs that precede and supersede the generation of the T-230, a trope that positions the SE model as neither new nor the latest but still valued technology. This approach to promotion could work for any earlier generation of mobile phone preceding the smart phone, and as the low-tech hand-drawn illustration of the phone (with minimal hand-set details) is yet to be realised as a visually sophisticated product rendering it enables the viewer to see that the message of reuse can be applied beyond specific product branding.

One example that stands out for its potential to provide modest insight into the social story of an artefact beyond its retail acquisition is Figure 3, particularly as the artefact has a small but currently modish 'part' as décor in everyday domestic settings. The constant refreshes of home décor that are encouraged by product catalogues and home magazines mean that largely decorative ornaments such as these nesting dolls can succumb to retirement too easily. The concept proposes to animate a sequence of interactions with nesting dolls (matryoshka or babushka dolls). As seen in the *Toy Story* trilogy, the concept seeks to convey the extent to which artefacts 'play' with or without us and to anthropomorphise how they 'feel' when we value them and entrust them with our responsibilities. The doll winks at the end of the sequence as an indication of its secret life as animate keepsake of other treasures. It encourages audience creativity to think about applications for the nesting entity in their care, and inspires them to be responsible for finding things for it to care for in return. The concept intends to re-value the artefact as part of 'customised' practices of utility and symbolism as a guardian of belongings to be kept out of view. In suggesting that this small object could have utility beyond a mere aesthetic function to nest intricate decorative dolls inside each other, it encourages viewers to start small with the minutiae of the everyday.

To promote the appeal of board games, the concept for Figure 4 turns to the sensory experiences and enthusiast preferences of gaming audiences. In a series of three posters, the student recodes board games by undermining the construction of values in the commercial gaming sector as based around exclusive access to 'high definition', immersive intensity and 3-D graphics. The posters seek to reconstruct desire for old-time gaming by re-appropriating these features as qualities of board game play (e.g. high definition without system overload) while undermining the dependencies of its digital competition – i.e. endless power usage, large computer capacity and high definition screens. The experiences of playing these games is triggered by close-ups of boards/cards, layouts and pieces – although this could be done even more sensitively and with elements of human presence/use – to accentuate the tactile sensory and physical experiences of in-person group gaming. The now ubiquitous language used to promote digital technologies is inverted on itself to seed interest in a collection of games – Monopoly, Scrabble, and Uno – that can be found in boxes on many household shelves. The 'copy' language is inclusive of the preferences, literacies and competencies pursued by digital gaming

audiences. Significantly, many of these board games would be now available on mobiles and computers in a digital format. From a perspective of valuing material endurance it is seen as a positive that this concept stops well short of promoting games appeal as a mobile and expanding product form and instead promotes these brand-name games as already existing board games that are available in their '3-D' boxes.

A similar kind of material recovery is promoted in a series of posters (Figure 5 a, b & c) using a concept that symbolically salvages past beauty values to visualise found hair curlers. The practice of using plastic curlers to style women's hair is promoted as an example of a non-energy intensive beauty practice, as well as making use of a long-available product that can be recovered from op shops or family homes and not simply re-manufactured. This product's promise of beauty is shaped to a hippie environmental consciousness for those who would like beauty without costing 'nature' too much, where nature refers to given body attributes, the untouched and liberated, as well as energy resources. It is also packaged using a retro-aesthetic – incorporating a black and white photograph of Marilyn Monroe and hand-rendered type – harking back to an age of 1950's Hollywood glamour where manipulation for beauty's sake is perceived as more low-tech and therefore less energy intensive. The concept does not provide advertising standards of a product brand name or place of purchase, and seeks to generate interest in recovering and testing the plastic curler and the retro/hippie beauty values it embodies.

Providing audiences with access to a time in a product's life where its experience is valued rather than to be abandoned, disposed of or replaced, Figure 6 depicts a handbag made from a pair of well-loved jeans. Well-worn jeans, according to Daniel Miller, is one of the most personally intimate garments in our possession due to their physical proximity as a regularly used second skin and their reciprocal moulding to our bodies (Miller, 2009). Playing on this perception of intimacy, Figure 9 recodes jeans as "loved ones" by drawing on the emotive significance of possession and the possessions one might put in their care as a handbag. The concept promotes the material recovery of used jeans in addition to their creative modification via sewing practices, as well as the potential to salvage the memories and experiences associated with the garment's use-life. Probably, jeans are one of the more visually palatable forms of sustained wear and tear in a commercial context where consumers pay extra for fashionably distressed and stone washed jeans. Visually, there is little to distinguish this image from any photograph of a deliberately (i.e. fast-tracked) distressed denim handbag. Therefore, there could be more sensitivity executed to photographically positioning the experienced jeans as part of a chain of love and care. The hand-written type compensates to ensure we understand this notion of salvaging the intimacy of well-loved denim.

The examples discussed show evidence of students visually framing experiences and while they could draw from a wider spectrum of patterns of use, they illustrate a modest potential to reflect on product life cycles and the kinds of practices and relationships they are a part of. We have pointed to examples of reconceptualization that promote themes of reuse and material recovery, material and symbolic salvage, and creative use and modification, but a limitation in terms of a capacity to visualise wear and patterns of use. Thus the strategy of recoding can open students to the practice of reflection and visual experimentation on the research themes.

Evaluating the Recoding Project and Future Project Cycles

This first cycle of the Recoding project gives us the opportunity to evaluate the brief and the student learning process for the refinement of future iterations. Student evaluations draw attention to the need for more direction from the project brief and provide us with further insight into the challenges of thinking about both recoding and conditions leading to product abandonment. Some students over-shot the brief and interpreted recoding as re-making products with a handful of industrious students re-purposing and modifying objects – e.g. building suspended tea-lights out of delicate and abandoned tea-cups – rather than the revisualisation of existing products (with the potential to re-circuit meaning and purpose/function). Some of them then struggled to visualise their new product, grappling with defining this new/old product in relation to advertising conventions and product values. A second point of confusion for students was about whether recoding pointed to a pre-determined visual outcome – i.e. a form of product advertising – or an experimental semiotic process, their confusion indicating that they were inside the creative possibilities of recoding and grappling with its precedents in critical re-branding, with few tangible applications to steer them in the context of supporting sustainable product values.

The brief needs to work harder to direct students to alternative visual experiments beyond those conventions provided by current advertising and better explain the intention behind the 'open' formats asked of students to create either a visual narrative or posters. This option was given due to the versatility of these formats and a history of their experimental application as, not exclusively retail-bound, creative visual forms. Part of the confusion about the visual outcome arrived from the fact that students weren't asked to specify an audience or placement for their visual concepts, for example to determine either specific public locations or magazines for posters in print, or media locations for visual narratives in moving image. Yet Figure 4 was successful because it did address a specific gaming audience. Consequently, it is worth adding to the brief the question of where and for whom the recoded message needs to arrive to create the most impact.

Consequently, a second iteration provides an opportunity to strengthen the brief to avoid these confusions and to direct students more decisively toward visual experimentation as an outcome of a defined research process. For example the next iteration could more clearly ask students to reclaim an abandoned item from within their own product "milieu" (Margolin, 2002) so that they are drawing on some thing they already have some experience of and then to depict this product in the context of its changed/revaluing practice (i.e. with human users, or in a set of circumstances that reveal the changed meaning and/or functions). As described above, this was a starting point for students but could be a more deliberate strategy. We take our cue here from the visual concepts shown, say behind Figures 4 & 5a-c – board games and hair curlers – that could be strengthened by further insight into the circumstances or specific practices in which products could be reconceptualised within human interaction. This has the potential to challenge the conventions of advertising that prevailed (such as the convention of anthropomorphising inanimate objects seen in Figure 3). The potential to further explore the multi-sensory perceptions and the backstories of tacit experiences that surround both pleasure and dissatisfaction with product lives – i.e. that ensure attachments with us that pierce the skin deep and embed themselves in the everyday - has only just started with these project outcomes. We have identified great opportunity to visualise these insights using the multi-modal tools of image, text, type, sound, moving image and the history of stylistic, rhetorical and narrative conventions available to visual designers in re-constructing the sign chains of value and meaning. Then by considering where this recoded visual communication needs to arrive, the outcomes could more clearly tie

into traditions of culture jamming which work as anti-branding via an explicit situated-ness. For example in Figure 4, which recodes the preferences of a gaming audience, the format of three posters offers a flexible design that could be mobilised individually or sequentially in print applications for public locations or specialist magazines, or web browser banners to re-generate desire for the experiences of board gaming.

In future reiterations with a strengthened brief, there would be opportunity to revisit the criteria for assessment to ensure that students are rewarded for examples that more clearly challenge aesthetic norms and depict products situated in a context where their re-use is sustained and valued. To support this direction, a research exercise could be included where students could be asked to source examples of the visual representation of an abandoned item (during its use life) from a range of commercial and alternative contexts, such as advertising examples and also images that document a product in the context and patterns of its use. This would assist students to identify some of the conventions of product visualisation (i.e. reflect on the aesthetic norm of newness), analyse the contextualisation of use practices, and think about possible alternatives.

The reflection on a familiar product could be furthered via experiential research in the form of auto-ethnography where the students observe and diarise their experiences of reviving a product and incorporating it into their everyday practices. Such documentation might note details about the circumstances of use as well as information about the practices, skills and multi-sensory perceptions that support particular products and those that might contribute to their decline and transition to a state of abandonment. This research process could assist to strengthen the kinds of observational competencies and experiential reflection of practices and visible traces of wear that we have argued are necessary to position students proactively in relation to sustainability (Gill and Lopes forthcoming, 2011). We have developed additional projects within a four-year program to seed and shape those skills as students move through their course. One of the most promising aspects of the Recoding project is the way in which it potentially personalises the question of sustainability, asking students to directly draw on their experiences to reconceptualise the value of material artefacts. Such a project situates students from second year in a position to revisit and refine what they have learnt not only about sustainability but about themselves as visual designers and consumers in future projects.

Conclusion

The pedagogical exercise of recoding an abandoned product, while challenging, provides students access to reflection on visual communication's role in supporting existing and projected domestic and social product lives. Recoding as a strategic tool available to designers represents the ambition the researchers share for the transformative potential of visual communication design to reshape perceptions of design's already made world. This paper has outlined the process of framing, delivering and evaluating a student project to capture this ambition and direct it toward meeting an identified niche in seeding sustainability education for visual designers.

References

Gill, Alison and Abby Mellick Lopes. (2011). "On wearing: A critical framework for valuing design's already made." *Design and Culture.* (forthcoming).

Boradkar, Prasad. (2010). *Designing things: A critical introduction to the culture of objects*. Oxford: Berg, 2010.

Cooper, Tim. (Ed.) (2010). *Longer lasting products; Alternatives to the throwaway society*. Farnham, UK: Gower.

Fry, Tony. (2009). *Design futuring: Sustainability, ethics and new practice*. New York: Berg.

Manzini, Ezio. (2003). Scenarios of sustainable well-being. *Design Philosophy Papers,* 1. Retrieved June 8, 2010, from http://www.desphilosophy.com.ezproxy.uws.edu.au/dpp/home.html

Manzini, Ezio. (2006). Manifesto: the slow approach to distributed economy and sustainable sensoriality. *Slow + Design*. Retrieved November 15, 2010, from http://www.dis.polimi.it/manzini-papers/slow+design_background.pdf

Margolin, Victor. (2002). *Politics of the artificial*. Chicago: University of Chicago Press.

Mellick Lopes, A. (2009). *Ecology of the image: The matter of ideas in design*. VDM Verlag, Saarbrücken.

Miller, Daniel. (2009). Buying Time. In Elizabeth Shove, Frank Trentmann & Richard Wilk (Eds.), *Time, consumption and everyday Life: Practice, materiality and culture*. Oxford and New York: Berg.

Sturken, Marita and Lisa Cartwright. (2001). Consumer culture and the manufacturing of desire. *Practices of looking: An introduction to visual culture*. London: Oxford University Press.

Tukker, Arnold and Ursula Tischner. (2006). *New business for old Europe: Product-service development competitiveness and sustainability.* Sheffield: Greenleaf Publishing.

van Hinte, Ed. (Ed.) (2004). *Eternally yours. Time in Design: Product value sustenance*. Rotterdam: 010 Publishers.

Verbeek, Peter-Paul & Petran Kokelkoren.(1998). The things that matter. *Design Issues*, 14 (3), 28-42.

Figures

Figure 1a-c: Three posters for recoding Nokia 3310: Simplified and inclusive mobile phone technology.
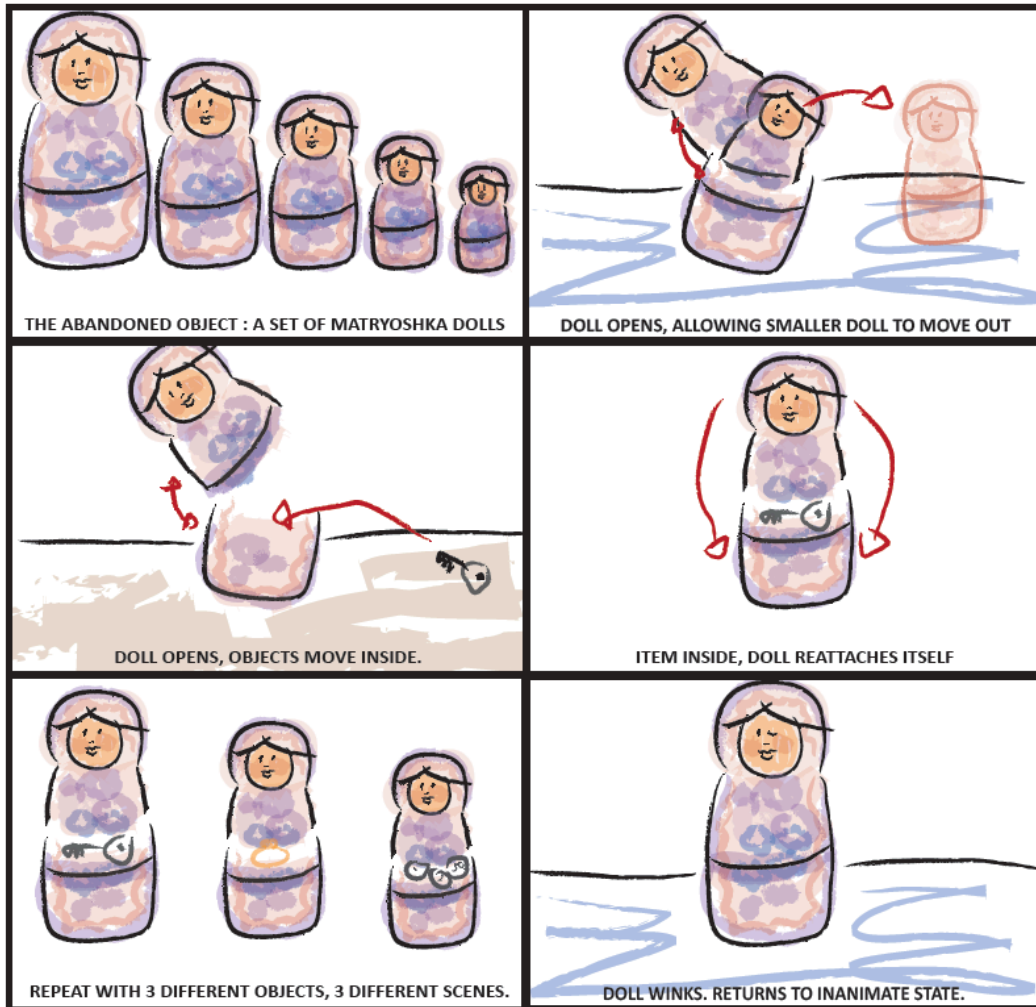

Figure 2: Visual narrative recoding for Sony Ericsson T230: Countering the smart phone with a narrative of simplified mobile phone technology.

STORYBOARD - MOVING IMAGE CAMPAIGN AND NARRATIVE

THE ABANDONED OBJECT : A SET OF MATRYOSHKA DOLLS

DOLL OPENS, ALLOWING SMALLER DOLL TO MOVE OUT

DOLL OPENS, OBJECTS MOVE INSIDE.

ITEM INSIDE, DOLL REATTACHES ITSELF

REPEAT WITH 3 DIFFERENT OBJECTS, 3 DIFFERENT SCENES.

DOLL WINKS. RETURNS TO INANIMATE STATE.

The dolls will begin as a complete set, sitting on a bedroom dresser lifeless and motionless. The larger doll will move forward towards stray objects that have been left on various surfaces. For example, in the bedroom, jewellery will be the main object of focus. The doll and the jewellery will move toward each other, as if there is a magnetic force between them, until the jewellery makes its way into the base of the doll. The head of the doll will then attach itself to the body and make its way to the bedside table, waiting for the owner to collect the jewellery when needed. This sequence will then repeat itself in the kitchen and then in the living room. Once the last doll has housed her object, the doll will position itself in its final resting place and wink towards the audience, prior to returning to an inanimate state.

The camera will present the dolls in Marco view, drawing attention to the detail on the dolls, as well as presenting them in a life size state. For each different scene, the dolls will house a different item, showing the versatility of the new found function. The ad will be a collection of still images, complied together to create movement. The movement between the various stills will be small, but when compiled, it will create very abrupt and scurried movements. I propose serene like, upbeat and optimistic music to be played in the background to create an overall positive atmosphere within the ad. Soft, romantic and warm colours are to be used. These aspects will work in combination to create a very inviting and engaging world, where viewers will be very fascinated with these dolls, and their unusual depiction.

Figure 3: Visual Narrative for animated treatment of Matryoshka dolls.

Figure 4: Three related posters for recovering board games.

Fig 5a, 5 b & 5c: Three related posters for recovering the plastic hair curler with retro beauty aesthetics.

Figure 6: One of three poster designs promoting the material salvage of well-loved denim jeans.

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Transformative Learning in Sustainable Design Education

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Abstract

Both designers and educators have a unique role to play in the creation of sustainable futures due to their ability to help people see new realities, develop new cognitive skills for dealing with complexity and create the social capacity to act on the basis of new knowledge. Transformative learning aims to build new cognitive capacities as well the agency to put new knowledge into practice. This learning has the potential to transcend the notorious value/action gap that divides our awareness of environmental threats from our capacity to take appropriate action. Beyond the mere dissemination of information, transformative learning engages participants in dialogic and experiential learning processes with the aim of creating deep learning experiences. Because the problems with regards to sustainability are both complex and deeply entrenched into our culture, these transformative learning processes are essential for the learning associated with sustainability and ecological literacy. Transformative learning is a pedagogic practice developed in and women's education in the 1970s offering frameworks and strategies that can be adapted to address current issues. This paper describes a transformative learning project I recently developed as part of my practice based doctoral research on the visual communication of ecological literacy.

Key words

Sustainability, ecological literacy, transformative learning, epistemology, critical pedagogy

Introduction

Alfred Korzybski famously stated "the map is not the territory". This simple aphorism reminds us that our ideas about reality are not the same as reality itself. In the seminal book *Steps to an Ecology of Mind* communications theorist and anthropologist Gregory Bateson explained that the dominant map of reality is a poor reflection of reality itself; "most of us are governed by epistemologies we know to be wrong" (p.493). Epistemological error is a pivotal concept in the construction of the ecological integrated, whole systems paradigm that is now emerging and creating a basis for systemic understanding of current conditions. Ecological thinkers propose that converging economic, social and ecological crises reflects a dysfunctional understanding of reality and basic epistemological error. Reductive modes of understanding are incapable of understanding complex ecological, social or economic systems. Problems arise as our perceptual and cognitive modes of understanding perpetuate epistemological error, error that is deeply entrenched in contemporary thought. Communication designers and educators have the potential to address these collective misunderstandings through experiential and multi-sensory communication, informed by critical pedagogy. We can move beyond our accustomed way of seeing and thinking using conceptual tools that will allow a new way of seeing and understanding to emerge. New cognitive capacities can be learned but the processes through which new abilities are developed can be a severe challenge.

Designers and educators have a unique role to play in the creation of sustainable futures due to our ability to help people see or imagine new realities, develop new cognitive skills for dealing with complexity, and create the social capacity to act on the basis of new knowledge. My practice based doctoral research on the visual communication of ecological literacy uses multimodal design to as part of epistemic learning processes. Epistemic learning refers to what sustainability educator Stephen Sterling describes as 'third order' learning, learning that challenges epistemological assumptions (2003, p.109). Beyond the mere dissemination of information, this work aims to engage participants in dialogic and experiential learning processes toward deep learning experiences. Because the problems concerned with sustainability are both very complex and deeply entrenched into our culture, these deep learning processes are essential for the learning associated with ecological literacy. Epistemic learning is also known as transformative learning, a pedagogic practice developed in consciousness-raising and women's education in the 1970s. These teaching practices have been powerful change-making tools and have witnessed a massive shift in power relations for women in the twentieth century. The same strategies are of value now to confront contemporary challenges in regards to human relations with the natural world.

This paper will describe the theory and practice of transformative learning as I am applying it within my doctoral research on the visual communication of ecological literacy. The work addresses epistemological error as an attempt to create third order learning and communications that will facilitate whole system thinking as a basis for ecological literacy. Visual communications made as part of this practice-based project directly address perceptual failures. Learning environments aim to help negotiate some of the more psychologically demanding processes that result from deep learning. The practice-based work takes the form of a series of multimodal graphic displays and transformative learning processes in which these graphics are used. After describing the theoretical groundings of transformative learning, this paper contains a brief case study of a transformative learning project. This process was designed to reveal key concepts in ecological literacy in a

participatory action-learning context. This paper will develop the proposition that transformative learning has the potential to transcend the notorious value/action gap that divides our awareness of environmental threats from our capacity to take appropriate action. The paper will also describe how communication design can become a tool for transformative, epistemic and third order learning by enabling an engagement with complex ecological information and concepts. Design tools, skills and processes facilitate this process.

Epistemological Error

Our understanding of reality leads to a particular type of practice in business, finance, culture, education and politics. The notion that the current understanding of reality (epistemology) is a poor reflection of reality has been described in detail by cultural commentators in multiple fields (Bertalanffry 1969, Bateson 1972, Shiva 1988, Orr 1992, Capra 1997, Spretnak 1997, Sterling 2001, Plumwood 2002, Barabasi 2002, Meadows 2008, McGilchrist 2009). Our way of knowing determines that we are incapable of perceiving systemic interconnections between our problems. Sterling explains that "the dominant Western epistemology, or knowledge system, is no longer adequate to cope with the world that it itself has partly created" (2002, p.3). Sterling states that this shift involves moving from "mechanism, which has dominated Western thinking for over three hundred years to a new organism; from the machine metaphor to the systemic metaphor of ecology" (2002, p.8). The shift to sustainability requires a shift in epistemological assumptions. This shift can be understood using Bateson's and Sterling theory of learning and communication levels that will be introduced in the next section.

In *Steps to an Ecology* of *Mind* Bateson explains that the "massive aggregation to man and his ecological system arise out of efforts in our habits of thought at deep and partly unconscious levels" (p.495). Human consciousness evolved toward instrumental ends to serve human desires, without taking into account our embeddedness within larger ecological systems. The reductive focus is ultimately self-defeating. Our inability to perceive ourselves as embedded within ecological systems is the result of a system of erroneous thought; "There is an ecology of bad ideas, just as there is an ecology of weeds" (p.492). Epistemological error is not necessarily a serious problem "up until the point at which you create around yourself a universe in which that error becomes immanent in monstrous changes of the universe that you have now created and try to live in" (p.493). Epistemological error in a technologically advanced society is lethal. The basic epistemological fallacies suggested by whole systems analysis are that mind and nature are independent of each other and that humans are separate from each other and the natural world. These ideas suggest a radical disconnect between humans and nature. A shift in our perception and thinking are needed for an understanding of the fundamental interdependence of all phenomena to emerge.

Levels of Learning and Communication

A key to resolving this dilemma is developing a better understanding of how communications and learning works. Gregory Bateson described a framework of learning in *The Logical Categories of Learning and Communication* in 1964 and further developed in 1971 (Bateson, 1972, p.279). Bateson explains that learning is a communicational phenomenon and that both learning and communication occurs at different levels. Bateson's framework for learning distinguishes between levels of abstraction. These ideas have proved valuable for subsequent communication theorists and educators. Stephen Sterling's interpretation of Bateson's work maps

the four levels of learning in a trajectory from no learning to deep learning. Sterling describes a four-stage process in sustainability education:

> **Levels of Learning and Communication (Sterling)**
> Level A- No change (no learning: ignorance, denial, tokenism)
> Level B- Accommodation (1st order - adaptation and maintenance)
> Level C- Reformation (2nd order learning - critically reflective adaptation)
> Level D- Transformation (3rd order learning - creative re-visioning) (2001, p.78)

Epistemic learning occurs in the higher orders of learning where review of basic premises occurs. Sterling maintains that for sustainability to become possible, third order epistemic or transformative learning must occur (2001, p.79). This third order learning is necessary such that systemic understanding becomes commonplace and capacity for embedding ecologically positive practices into structurally unsustainable systems becomes possible. Education for sustainability must transcend the traditional transmissive learning approach (first order learning) because information alone does not necessarily lead to change (Sterling, 2001). He explains that "not only does it not work, but too much environmental information (particularly relating to the various global crises) can be disempowering, without a deeper and broader learning process taking place" (2001, p.19). Environmental communications and education require deeper engagement processes than mere dissemination of information; both communication theorists (Crompton, 2010) and educators (Sterling 2001, Kahn 2010) ascribe to this basic precept. The next section explains how transformative learning theory and practice facilitates epistemic learning for sustainability and ecological literacy.

Transformative Learning

Transformative learning (TL) engages an ecological view of education that is relational, holistic, participatory and practical. Transformative learning involves becoming aware of one's assumptions in order to address issues from a critical perspective and take action on the basis of new knowledge. While transformative learning is a process with the potential to transcend the notorious value/action gap that divides our awareness of environmental threats from our capacity to take appropriate action, it remains a severe challenge due to the fact that individuals are often intensely threatened by the prospect of re-examining accepted norms of beliefs and behaviour. Transformational learning is complete when an individual is able to act according to beliefs he or she has validated through critical reflection. The journey to a place of agency is by no means an assured outcome. As the consequences of not addressing basic premises become more severe and obvious (as the ecological crisis continues to become more severe), perhaps the journey through TL will start to appear like the more benign option.

Endeavors to create conditions that will develop an awareness of context and power, of political consciousness and the potential for social action have at least a fifty-year trajectory in adult education. Transformative learning involves a process of increasing an individual learner's capacity for change. Attempts to design processes of transformative learning might not always succeed, but there is evidence of progress in over 150 doctoral dissertations and hundreds of scholarly papers that map the territory (Kitchenham, 2008, p.120). Jack Mezirow's *Ten Phases of Transformational Learning* was first published in 1978. Mezirow's transformative learning theory is based on extensive research in a 1975 American nationwide study of consciousness-raising in women education, a study that sought to explain the

unprecedented new presence of women in higher education (Mezirow, 2009, p.19). Mezirow identified phases most often encountered during the learning processes women experienced as part of their empowerment process. These learning experiences resulted in profound shifts in women's capacity to take action on the basis of their new beliefs.

In addition to the women's movement in adult education, Jack Mezirow was influenced by Thomas Kuhn's work on 'paradigms' (1962), Paulo Freire's concept of '*conscientisation*' (1970), and Habermas' 'domains of learning' (1971) (Kitchenham, 2008; Mezirow, 2009). Mezirow describes transformative learning as a process of "becoming critically aware of one's own tacit assumptions and expectations and those of others and assessing their relevance for making an interpretation" (Mezirow and Associates, 2000, p.4). This process is informed by a critical awareness of contextual, biographical, historical and cultural aspects of our collective beliefs and feelings in regard the problems under examination. Transformative learning "enables us to recognize, reassess, and modify the structures of assumptions and expectations that frame our tacit points of view and influence our thinking, beliefs, attitudes and actions" (Mezirow, 2009, p.18). Through critical reflection we learn to "act on our own purposes, values, feelings, and meanings rather than those we uncritically assimilated from others" (Mezirow, 2000, p.8). Learners develops greater agency as they become more emotionally capable of change. The results are evidenced in reflective discourse and in ultimately in action.

A goal of transformative learning is perspective transformation. Educational researchers suggest that perspective transformation is often the result of a disorienting dilemma triggered by a life crisis or major life transition (Mezirow 2009). Bateson, in an exploration of the processes used by Alcoholics Anonymous, described the event of "hitting bottom" that is seen as an essential catalyst for addicts to start a process of change within the AA method (1972, p.312). Perspective transformation can also result from an accumulation of transformations over a period of time, such as interventions within education. Perspective transformation enables a revision of our taken for granted 'frames of reference'. A frame of reference is the manner in which we make meaning and reflect collectively held cultural paradigms. Frames of reference are both 'habits of mind' (socio-linguistic, moral, epistemic, philosophical, aesthetic) and the resulting points of view (Mezirow 2000, p17). Frames of reference are significant for designers and educators because they describe the basis on which learners make sense of communications.

Transformative learning is a challenge because the prospect of re-examining accepted norms of behavior, beliefs and frames of reference can be threatening. Mezirow describes transformative learning as "often an intensely threatening emotional experience in which we have to become aware of both the assumptions under girding our ideas and those supporting our emotional reactions to the need to change" (Mezirow 2000, p7). Transformative learning can challenge our sense of self and our identity; "who we are and what we value are closed associated. So questions raised regarding one's values are apt to be viewed as a personal attack" (Mezirow 2000, p18). These inherent difficulties mean that that most learning "tends to be narrowly defined as efforts to elaborate our fixed terms of reference" (Mezirow 2000, p18). The impasse within education for sustainability is found in this deadlock. The result is that we continue to add new theories onto dysfunctional frames of reference rather than do the much harder work of re-examining our problematic basic assumptions. Epistemological error is then perpetuated through communications and education.

Sterling suggests that transformative learning might only be possible for a minority of learners but even this might be adequate to provoke a transition towards sustainability. Sterling explains; "short of social or ecological catastrophe, transformative learning is unlikely to occur beyond a 'significant minority' but this might be sufficient to help generate wider second order learning, a questioning of values, in any particular learning context" (Sterling, 2003, p.22). Bateson also suggests that higher-level learning is "difficult and rare" (Bateson, p.301-302). Arguably, if ecologically literacy hit a critical mass through transformative learning processes, less severe and demanding learning could effectively disseminate sustainable practice on a wider level.

Ten Phases of Transformational Learning

Mezirow's *Ten Phases of Transformational Learning* (1978) identified these phases as most often encountered during transformative learning processes:

> **Mezirow's Ten Phases of Transformative Learning**
> 1. A disorienting dilemma
> 2. Self-examination
> 3. A critical assessment of assumptions
> 4. Recognition of a connection between one's discontent and the process of transformation
> 5. Exploration of options for new roles, relationships and actions
> 6. Planning a course of action
> 7. Acquiring knowledge and skills for implementing one's plans
> 8. Provisional trying of new roles
> 9. Building competence and self-confidence in new roles and relationships
> 10. A reintegration into one's life on the basis of conditions dictated by one's new perspective. (Mezirow, 2009, p.19)

Within my practice-based research I have used these phases as I guide to design transformative learning processes. Modified for the purposes of sustainable design education, the ten steps are described below:

> **Ten Phases of TL for Sustainable Design Education**
> 1. Confrontation with data regarding the environmental crises.
> 2. Self-examination of personal attitudes in regards to environmental crisis.
> 3. A critical assessment of assumptions and basic premises.
> 4. Recognition of discontent and possibilities for transformation.
> 5. Exploration of sustainability in a social learning context.
> 6. Planning a learning process for sustainability literacy.
> 7. Acquiring new knowledge and skills needed in new sustainable industries.
> 8. Developing new sustainable methods of working and living.
> 9. Building confidence to actively promote sustainability.
> 10. Reintegration into one's life based on ecologically literate perspective.

Using these ten phases as a guide I designed transformational learning processes as part of action research processes. Recognizing that within environmental communication and education, practice is constrained by the systems within which it is embedded (these being the broader educational system, and this within the larger social system), communicators and educators need to work to towards transforming institutions and communities while facilitating personal learning experiences. This process is based on the concept that learning will need to happen on multiple levels,

i.e. personal, institutional and within the wider social order, for sustainability to become emergent.
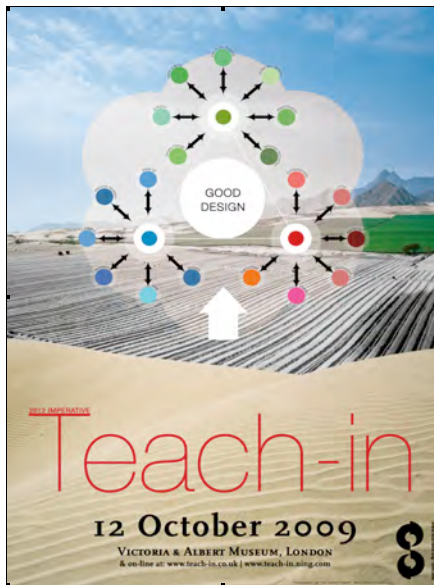

Fig 1. Teach-in postcard

Fig 2. Teach-in poster

A Case Study: The Teach-in

The 2012 Imperative Teach-in was launched in the first phase of my doctoral research as an action research project that aimed to create change in the process of doing research. The teach-in was produced by EcoLabs with the help of grants from the Network for Social Change and the CETLD at the University of Brighton. The explicit goal was to embed ecological and sustainability literacy in design education by 2012. The 'Teach-in' itself took place on the October 10th 2009 in a large lecture theatre at the Victoria and Albert Museum (V&A) in London. The Teach-in attempted to engage students with real problems transforming institutions as part of their own transformative learning process.

Fig 3 & 4. Small group discussions

In preparation for the event, a panel of twelve lecturers from six different universities served as advisors and developed the Teach-in content collaboratively over a series of meetings. At these meeting we first established some general goals for the Teach-in by answering three questions (answers in Fig.5 and on the Teach-in Ning website).

Q1: What would design education look like in a sustainable world?
Q2: What do we need to do to get from here to there?
Q3: What is the best thing the teach-in could do to help this process?
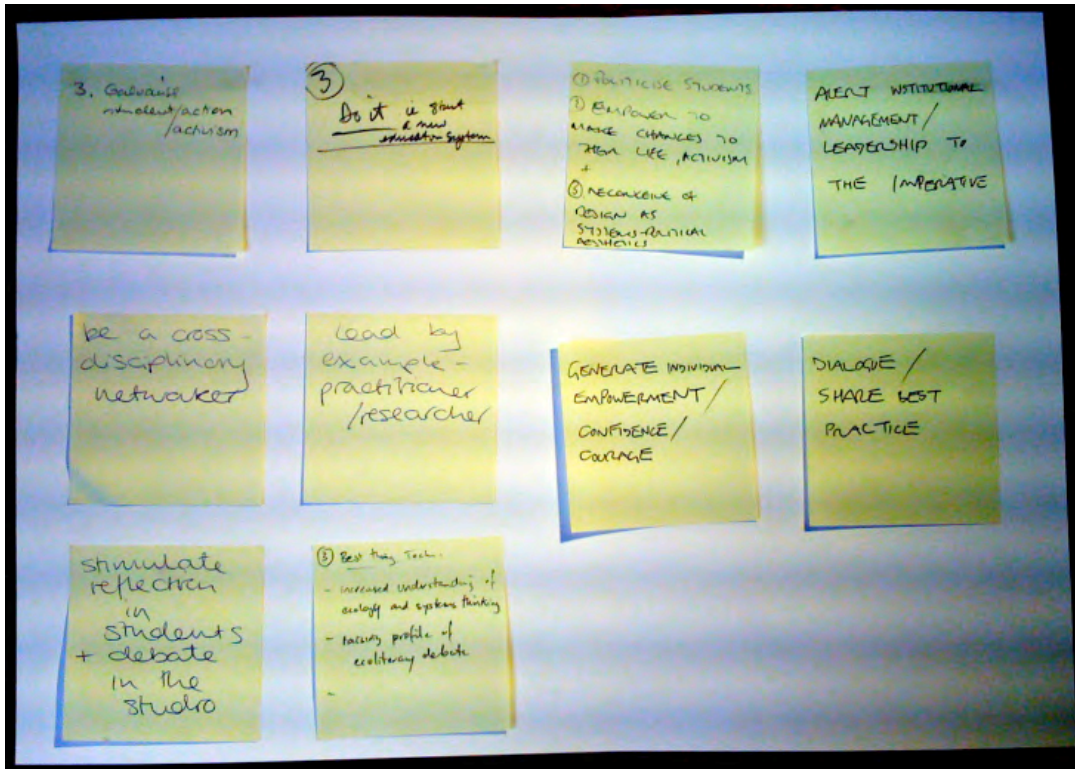
Fig 5. Answers to questions

These meetings were organized horizontally using consensus processes for the decision-making, explicitly attempting to bring activists strategies into an academic context to elicit greater engagement. We chose Aldo Leopold's 'Land Ethic' as a key text and identified other concepts which were later written up as the '2012 Imperative' document. Speakers were chosen on the basis identified objectives.

The Teach-in was advertised widely as a student conference and 275 people attended the event. These were mostly groups of design students from half a dozen local universities. Meanwhile the entire event was broadcast live online at various universities where organized mass viewings were arranged. All design disciplines were represented in the organizing committee and/or the audience; architecture, product design, fashion design and communication designers. The project explicitly aimed to work beyond traditional disciplinary silos and open the scope of design problems and possible solutions.

The event itself took place in an auditorium and also in an outside space where small group discussions took place. The days started with a presentation on climate change by Richard Hawkins from the Public Interest Research Centre. Both myself and Emma Dewberry introduced the concept of ecological literacy in presentations. Between speakers, John Thackara engaged the audience in discussion. Andrew Simms from the new economics foundations described structural obstacles preventing sustainability from becoming possible.
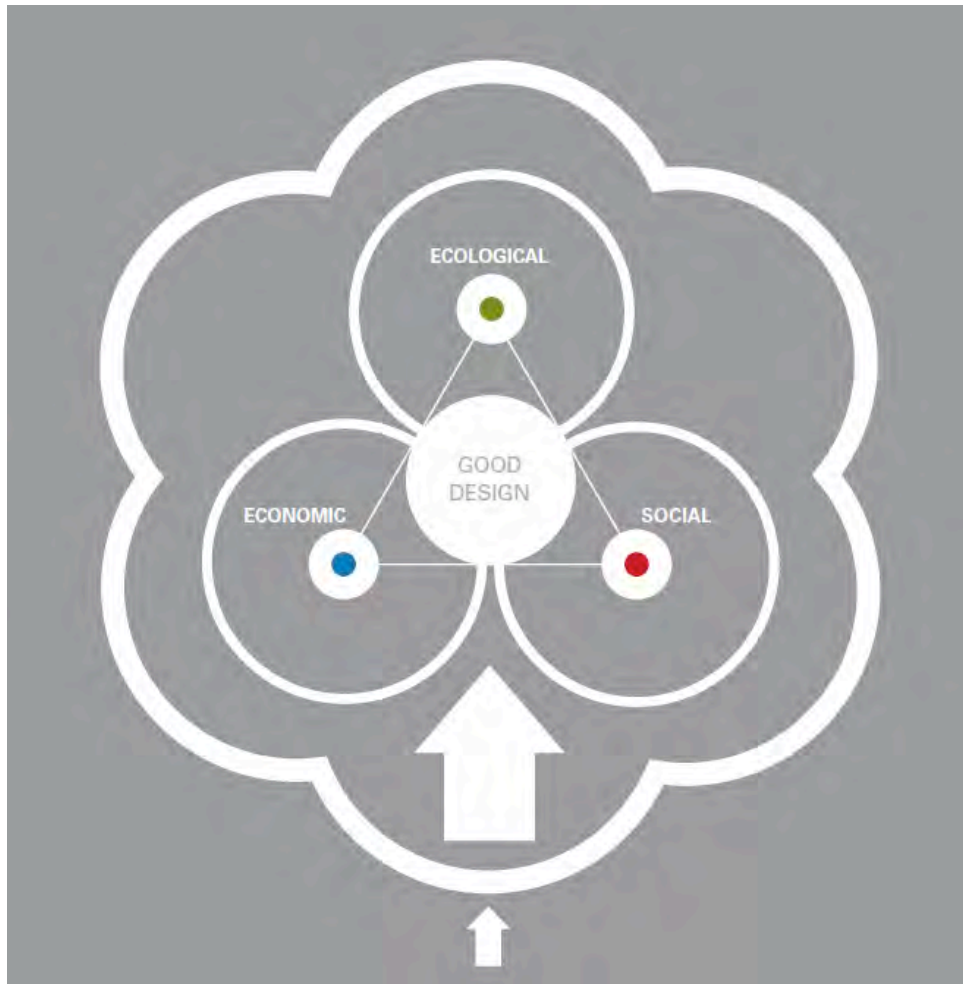
Fig 6. Good design triangle in flower

I developed visual designs to communicate dominant themes and incorporated these into communications material and presentations (some of these are reproduced here Fig. 1,2,6,7,8). These visuals aimed to help learners consider the implications of interconnected and embedded systems. The most critical learning associated with sustainability is a much deeper understanding that humanity is embedded within the ecological system and must develop respect for the needs and limits of this system for long-term prosperity to become possible.
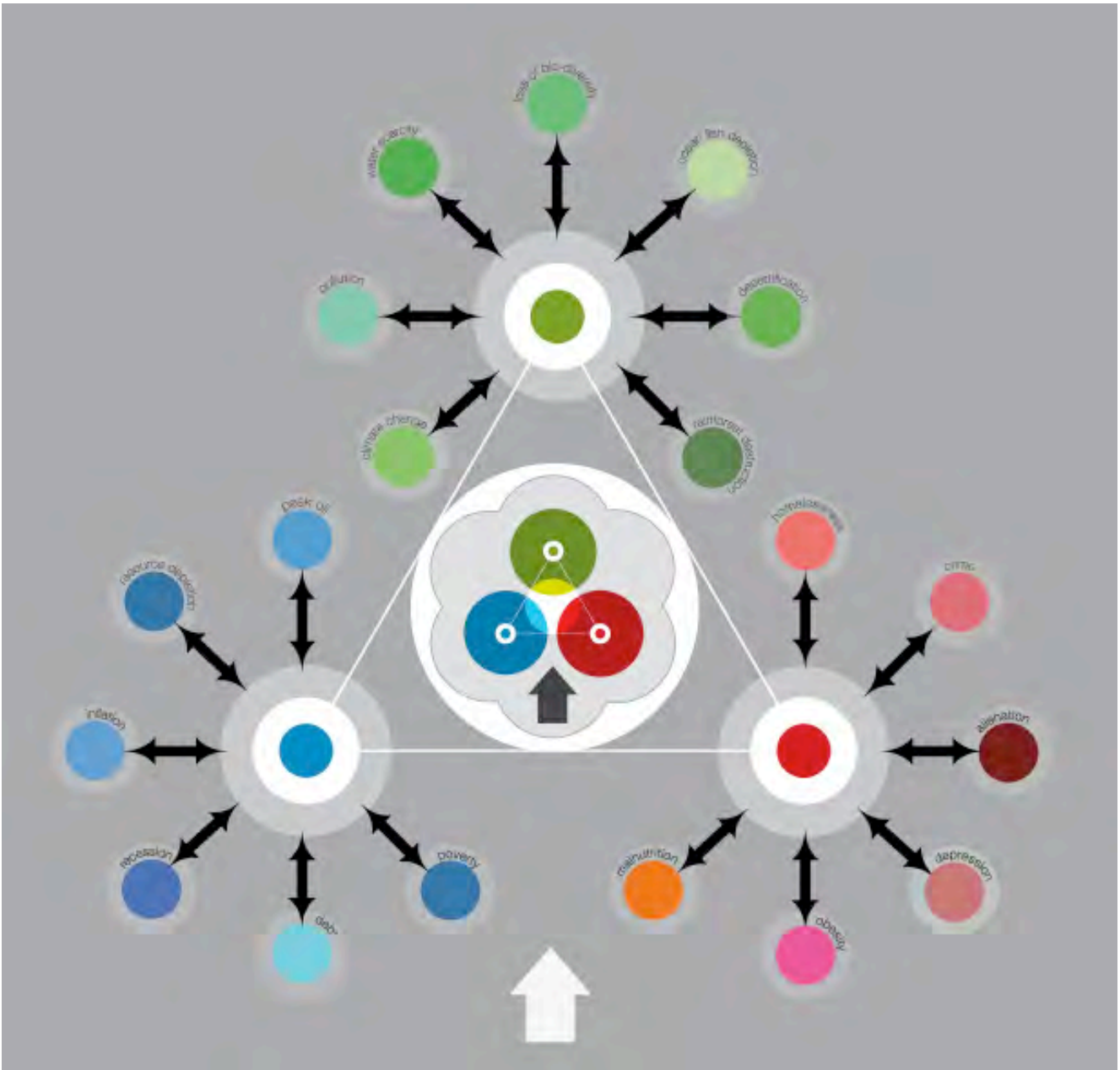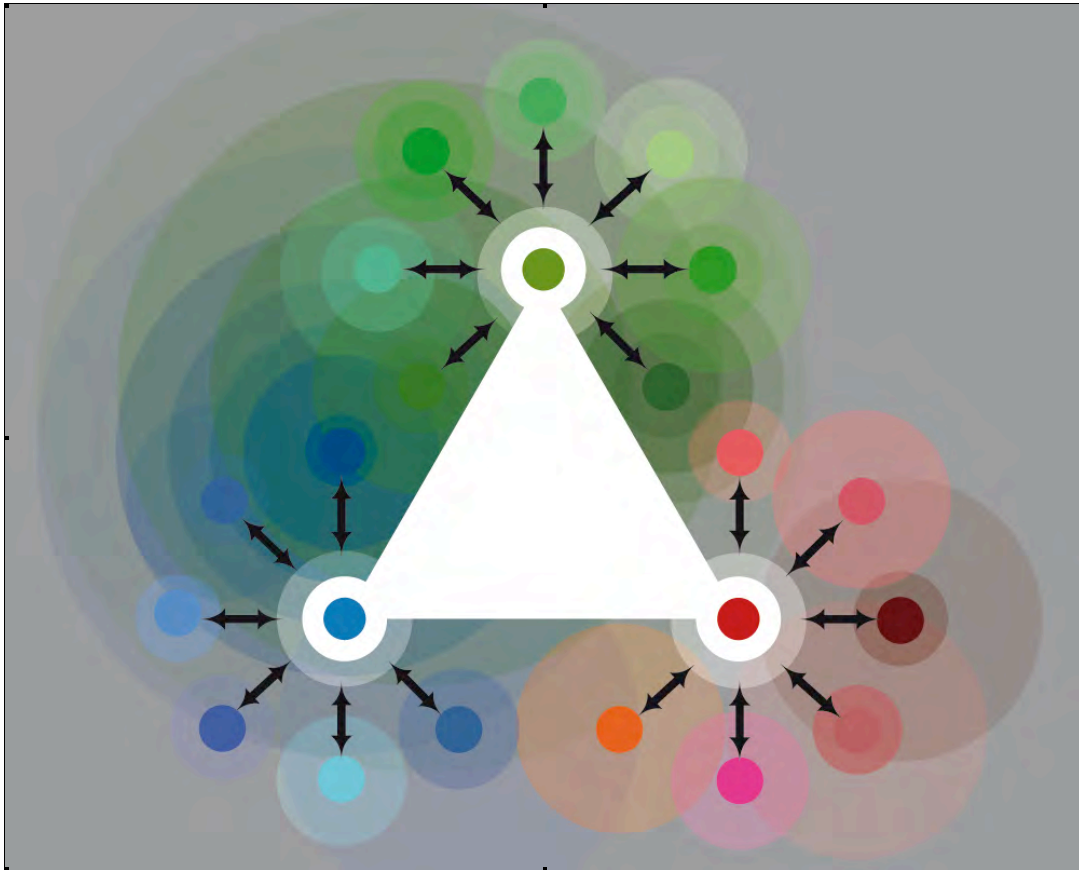
Fig 7. Triangle of embedded systems with labels

Fig 8. Triangle systems connections

Various speakers introduced the notion of paradigm shift towards a whole systems perspective. The conceptual and practical implications of this shift were explored by speakers Ben Gill from BioRegional, Stephanie Hankey from Tactical Tech, Jonathan Crinion from Crinion Associates and John Thackara from Doors of Perception. Presentations were interspersed with small group discussions and exercises designed to initiate critical reflection. Discussion space demonstrated how feelings of despair regarding ecological crisis are shared. Large group discussions made space for some of these reactions to be articulated.

Towards the end of the day, two proposals were presented:

1- The **2012 Imperative** aimed to embed ecological literacy into the curriculum. The document was based on Aldo Leopold's *Land Ethic* as guidance for an ethical and ecologically informed orientation to design education.

2 - A '**Ten-Step Checklist'** aimed to initiate carbon reduction programs at local institutions. Institutions were encouraged to sign up to a programme to reducing carbon emissions by 10% in 2010. Time was allocated for small group discussions on these action points.

These initiatives challenged participants to work towards embedding ecological and sustainability literacy into the curriculum at their own institutions while also attempting to transform university facilities to reflect good environmental practice.

The event aimed to catalyze a movement for change in design education and encourage collaboration in the design of a sustainable educational paradigm. The

initiatives are open to be adapted to local institutions although there are common themes such as carbon reductions that every institution needs to address. One problematic issue that became apparent was how individuals attempt to dismiss carbon reductions as an issue that was not relevant or of interest for their own institution. An ecologically literate worldview is built on the premise that it is an ethical imperative to protect the relative stability of the climate system. We must leave ecological systems capable of supporting future generations. Failing to reduce carbon emissions locally is therefore no longer an ethically benign choice. Denial strategies come in many different guises and educators must be wary of allowing diversion tactics to circumvent agenda for transformation to sustainable levels of carbon.

A social network was established on-line to share information after the event (now with over 300 participants). Videos of presentations and other resources are posted on the project website. For more information see the project websites: http://teach-in.ning.com and http://www.teach-in.eco-labs.org.uk.

Evaluation of the Teach-in process was accomplished by three different surveys and feedback forms distributed both before and after the event. Feedback and emails have been received from participants throughout the project. Surveys demonstrated a strong desire amongst participants to address sustainability but also indicated that important concepts associated with sustainability literacy were unfamiliar to many participants. While responses to the Teach-in itself were over-whelming positive at the time, the project has obviously not been able to 'embed ecological literacy in design education by 2012'.

One event is unlikely to transform design education but repetitive and sustained attempts at transformative learning just might. Although the event failed to catalyze the required action in design education it is possible that seeds have been sown for deeper explorations and transformations. From this first experiment four principles of transformative learning for ecological and sustainability literacy were developed.

Alot of different issues were brought to my attention, many of which, as well as some of the people that were mentioned i will look into further. What did strike me was the idea that you can't take on the world and that you need to work within a certain distance/community to make change and/or urge others to do the same.

The focus on imbedding ecological literacy into design education. I also like the fact that students are being given the chance to have a say about their education and being put on the same level as their tutors.

How difficult it is to enage people whoa rent already concerned with these issues. Some useufl approaches to making positive responses. I am further convinced that I need to learn more myself & to engage more students in the learning & debate

Fig 9. Examples of feedback

Transformational Learning for Sustainability Literacy

Trans-disciplinarity

Transformative learning processes must be designed to cross-disciplinary boundaries to engage a whole systems, integrative approach and enable understanding of connections and relationships between issues.

Participation

Environmental values are not fixed, but emerge out of 'debate, discussion and challenge, as people encounter new facts, insights and judgments contributed by others' (Owens, p.1145). Environmental values, like other cultural priorities, are learned attitudes. New values and behaviours cannot be disseminated if imposed from above but sustainability and ecological literacy could be realized through a substantial process of engagement using participatory processes.

Values

Ecology demonstrates that our actions have implications well beyond our immediate sphere of interactions. Ecological understanding reveals that widening our sphere of concern to include the natural world is a geophysical imperative for human survival over the long term. We have a responsibility to confront value systems that fail to prioritize the maintenance of ecological stability and planetary health.

Action

Transformative learning is complete when an individual is able to act according to beliefs he or she has validated through critical reflection. The journey to a place of agency is by no means an assured outcome but without action the transformative learning process is incomplete. While solving a problem might well be beyond the capacity of any one individual, the goal of transformative learning is to help learners become capable of participating in a process of change. Theories about change divorced from action are worse than useless because they promote cynicism and hypocrisy. Educator Paulo Freire states;

> an inauthentic word... results when a word is deprived of its dimension of action, reflection automatically suffers as well; as the world is changed into idle chatter, into verbalism, into an alienated and alienating 'blah'. It becomes an empty word, which cannot denounce the world, for denunciation is impossible without a commitment to transform, and there is no transformation without action (1970, 68).

Transformative learning aims to help learners develop the capacity to put new ideas into practice. This focus on action addresses the value action / gap in sustainable education.

This paper proposes that transformative learning has the potential to address perceptual and epistemological errors and build a foundation for systemic understanding. Bateson called for "a shift in our way of seeing… to affirm the complexities and mutual integration" (B&B, p.176). Communication designers and educators can help this with this shift. Designers and educators working with perception and cognition can address these key problems areas.

Conclusion

Our current way of knowing determines that we are incapable of perceiving systemic interconnections and therefore ill prepared to deal with the complexity presented by converging ecological, social and economic problems. Supporting a worldview that describes our complex interdependency with the natural world, a whole systems ecological paradigm is necessary to underpin effective practice across disciplines. Ideas presented in this paper resonate with the deep ecology approach originated by ecophilosopher Arne Naess. The term 'deep ecology' refers to a movement engaged in deeper questioning of "every economic and political policy in public…It asks 'why' insistently and consistently" (Naess, p195). Harold Glasser explains that the 'depth' metaphor refers to the level of problematizing towards all "practices, politics, values and assumptions that propel the ecological crisis" (Glasser, p.205). The deep ecology approach is focused on praxis. This work is relevant for designers who are also engaged with practice and whose work impacts the environment. Communication design is uniquely placed at the intersection of disciplines to help facilitate learning processes. Transformative learning has developed over the past thirty years and now offers a comprehensive toolkit and conceptual framework to inform a transformation in design to support sustainable practice.

There remains a great distance between accepting something as an intellectual truth and perceiving, thinking and acting according to this position. Bridging the value / action gap is a challenge for sustainability communicators, designers and educators. David Orr states;

> *The study of environmental problems is an exercise in despair unless regarded as only the preface to the study, design and implementation of solutions. The concept of sustainability implies a radical change in institutions and patterns we have come to accept as normal (1992, p.94).*

Orr holds that apathy can be bred by institutional practices that fail to act according to sustainable principles; "students learn that it is sufficient only to learn about injustice and ecological deterioration without having to do much about them, which is to say, the lesson of hypocrisy" (1992, p.104). Moral development requires educators help learners engage with real problems (p.105). Disengagement, rationalized through relativism can make powerful educational institutions complicit with the great tragedies unfolding in the natural world. The imperative to leave ecosystems healthy for the next generation is a biological imperative for survival and must become a normative position within academia and design. This value must be made explicit at every level and become the basic principle for prioritizing thought and action. In 1972 Bateson wrote; 'The organism that destroys its environment destroys itself (p.457) nearly forty years later it is about time that our actions start to reflect this basic fact.

References

Barabasi, A.L. (2003). *Linked.* London: Plume.

Bateson, G. (1972). *Steps to an Ecology of Mind*. Chicago: University of Chicago Press.

Bateson, G., Bateson, M.C. (1988). *Angels Fear: Towards an Epistemology of the Sacred*. University Of Chicago Press.

Bensen, J. (1999). *Environments, Ethics and Human Concerns.* Milton Keynes: The Open University.

Buchanan, R. (1992). 'Wicked Problems in Design Thinking, *Design Issues'.* 8 (2), pp.5-21.

Bourdieu, P. (1991). *Language and Symbolic Power*. Cambridge: Polity.

Bourdieu, P. (2001). *Masculine Domination*. Cambridge: Polity.

Bourdieu. P. (2000). *Reproduction in Education, Society and Culture.* Cambridge: Polity Press.

Capra, F. (1997) *The Web of Life.* London: Harper Collins.

Clark, M. C. (1993). Transformational learning. In R. G. Brockett (Ed. in Chief) & S. B. Merriam (Vol. Ed.), *New Directions for Adult and Continuing Education*: No. 57, San Francisco: Jossey-Bass. pp.47-56.

Clark, M. C., & Wilson, A. L. (1991). Context and rationality in Mezirow's theory of transformational learning. *Adult Education Quarterly*, *41*(2), pp.75-91.

Cohen, S. (2001). *States of Denial*. Cambridge: Polity.

Cross, N. (1982). *Designerly Ways of Knowing*. Design Studies, 3(4), pp.221-227.

Crompton, T. (2010). Common Cause. London: WWF.

Duschl, R. (2008) Science education in three-part harmony: balancing conceptual, epistemic, and social learning goals. *Review of Research In Education* 32, 268.

Ehrenfeld, J. (2008). *Sustainability by Design*. London: Yale University Press.

Freire, P. (1970). *Pedagogy of the Oppressed*. London: Penguin.

Glasser, H. (1985). Demystifying the Critiques of Deep Ecology. In Zimmerman, M, Callicott, J.B., Sessions, G., Warren, K., Clark, J. (Eds.), *Environmental Philosophy,* 3rd Edition. New Jersey: Prentice Hall.

Greenwood, D. and Levin M. (1998). *Introduction to Action Research: Social Research for Social Change*. London: Sage Publications.

Kahan, D.M. (2010). Fixing the Communications Failure*. Nature.* 463, pp.292-297.

Kahn, R. (2010). *Critical Pedagogy, Ecological Literacy, and Planetary Crisis*. New York: Peter Lang.

Kitchenham, A.B. (2008). The Evolution of John Mezirow's Transformative Learning Theory. *Journal of Transformative Education*. V6 (2), pp. 104-123. London: Sage.

Lakoff, G. and Johnson, M. (1999). *Philosophy in the Flesh.* New York: Basic Books.

McGilchrist, I. (2009). *The Master and his Emissary*. London: Yale.

Meadows, D.H. (1982). Whole Earth Models and Systems. *The CoEvolution Quarterly*, Summer, pp.98–108.

Meadows, D., Wright, D. ed., (2008). *Thinking in Systems*. London: Earthscan.

Merriam, S.B. & Caffarella, R.S. (1999). *Learning in adulthood: a comprehensive guide*. San Francisco: Jossey-Bass Publishers.

Merriam, S. B., & Clark, M. C. (1991). *Lifelines: Patterns of work, love and learning in adulthood*. Jossey-Bass Publishers.

Mezirow, J. (2000). Learning to Think Like an Adult. *Learning as Transformation.* San Francisco: Jossey- Bass.

Mezirow,J.(1978). Perspective Transformation. *Adult Education Quarterly*, 28, pp.100-110.

Mezirow, J. (2003). Transformative Learning as Discourse. *Journal of Transformative Education*, 1, pp58-63.

Mezirow, J. & Associates, (2000). *Learning as Transformation.* San Francisco: Jossey-Bass.

Mezirow, J. & Associates, (2009). *Transformative Learning in Practice.* San Francisco: Jossey-Bass.

Naess, A., (1985). The Deep Ecological Movement: Some Philosophical Aspects, in Zimmerman, M, Callicott, J.B., Sessions, G., Warren, K., Clark, J., ed., *Environmental Philosophy,* 3rd Edition. New Jersey: Prentice Hall.

Orr, D. (1992). *Ecological Literacy*. Albany: State of New York Press.

Orr, D. (2002). *The Nature of Design*. Oxford: Oxford University Press.

Owens, S. (2000). `Engaging the public': information and deliberation in environmental policy. *Environment and Planning A 2000*, Vol. 32, pp 1141 – 1148. [online]. Available: Retrieved 11 January, 2011 from http://www.envplan.com/abstract.cgi?id=a3330

Plumwood, Val., (2002) *Environmental Culture*. Oxon: Routledge.

Reason, P. and Bradbury, H. (2006). *The Handbook of Action Research*. London: Sage.

Shiva, V., (1988). Reductionist Science as Epistemological Violence. In Ashis Nandy (Ed.). *Science, Hegemony and Violence.* Oxford: Oxford University Press.

Sousa Santo, de. B. (2007). *Cognitive Justice in a Global World.* Plymouth: Lexington Books.

Spretnak, C. (1997). *The Resurgence of the Real.* New York: Addison-Wesley.

Sterling, S. (2001). *Sustainable Education—Re-visioning Learning and Change*, Schumacher Briefing no. 6. Dartington: Schumacher Society/Green Books.

Sterling, S. (2003). *Whole Systems Thinking as a Basis for Paradigm Change in Education*. Phd. University of Bath.

Sterling, S. (2002). A Baker's Dozen. Towards Changing our "Loaf". *The Trumpeter.* 18 (1).

Sterling, S. (2010). Living *in* the Earth : Towards an Education for Our Time. *Journal of Education for Sustainable Development.* London: Sage. 4 (213).

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Generating tacit knowledge through motion: A vision on the matter of space

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Abstract

This paper aims to observe and bring forth the embodied experience of space, while an individual interacts through moving. This research project is about how architecture can be conceived, setting out from the embodied experience of space. There is main focus on dance, because of the level of spatial awareness and expression of the movements. The boundaries of architecture are explored by means of empirical methods. The experienced space is based on the subject's practice but can this embodied experience be handled and moulded by the architect, the so-called designer of spaces? Movements can be considered as an expression drawn from the embodied experience in a particular space. Techniques of movement analysis were used, in an attempt to capture this embodied experience through motion. Can the results of this assumption contribute to the design-based architectural thinking, through understanding the outcome of tacit knowledge represented from spatial visualizations? This is an ongoing research project and as such this paper concerns a work in progress. The goal comprises the development of an architectural implementation, with regards to the embodied experience of space in design.

Keywords

embodied experience, space, practice-based approach, tacit knowledge, spatial visualizations

Introduction

Over the last decades, architecture seems to have gone through a certain prominent evolution. Nowadays, most of the architects start a new project at their design table, by means the relation of the embodied experience to the designed space fades away. In this case the architectural design is mostly defined from a rational point of view. Plans and sections only represent a fixed state of being of a specific space. The embodied experience seems to be reduced to the visual fixation on the printed page and thus alienating the body from the mind (Gartner, 1990). We may assume this evolution is more persistent since the introduction of computer technologies in the architectural

design process. Nowadays 3D designing software simulates representations of buildings and their environment with the characteristics of a realistic picture. The generated images are mostly considered as inspiring at first sight, but once one look behind the aesthetics of the image, the architecture represented may not have the same effect in real live. By these means architects have the tendency to lose more and more the relation with substantial embodied experience of space and focus too much on generating a visual sensation.

It appears that there is a risk of creating architecture that only satisfies the visual perception and leaves the spatial experience in the design itself aside. Gartner (1990) clearly approaches this problem:

> Philosophical alienation of the body from the mind has resulted in the absence of embodied experience from almost all contemporary theories of meaning in architecture […] Experience, as it relates to understanding seems reduced to a matter of the visual registration of coded messages – a function of the eye which might well rely on the printed page and dispense with the physical presence altogether". (Gartner, 1990, p.10-11)

Paul Virilio (1994) notes that this purely visual way of designing often fails in creating relevant architecture. Plans and sections reveal no indication of time. They try to capture objects by using quantitative criteria rather than qualitative aspects. Virilio talks about the" [...] architectural measure of space… [as] movement; it is the quality of a volume and is therefore difficult to note down" (Virilio, 1994, p.107). Faced with this problem, Virilio (1994) has relied on dance, in particular the dance movement analysis as a source of qualitative approach to design. In this study we denounce the same problem with a slightly different perspective on dance. We investigate the embodied experience of space of dancers and dance practice in the search for a tool that could contribute to the designing process.

Human body, space and movement

How does space affect the experience of an individual who moves through it? A possible answer lies in the fundamental relationship between the human body and space. According to Otto Bollnow (1963), space can never be assumed as an undefined void. It is always qualitatively related to the human environment and also very closely related to the human experience and behaviour. In addition he places the human need for movement as a basic concept of space. He considers the ambivalent space as a medium, dialectically constructed between the subject and his environment, between man and his environmental dispositions. He describes the dynamics of 'back and forth', a fundamental dualistic movement for leaving and coming back, which defines the human space. Bollnow (1963) came with the description of a number of movements for paths, roads and streets, as well as how space is experienced along such movement.

He also introduced the notion of hodological space, a kind of space that is totally different from the mathematical space. This hodological space corresponds to the actual human experience, when moving between two different points on a map, which is totally different from a geometrical line connecting two points. The mathematical concept of space, as it is represented on plans and maps, is highly contrasting with the hodological space based on the actual topological, physical, social and psychological conditions of the person moving from point A to point B, both in an open landscape or in an urban or even architectural environment. The hodological space described by Bollnow, is an essential aspect in this study. While an individual moves through space, he doesn't only experience space, but he will also draw certain (experiential) knowledge from it. This specific experiential knowledge, obtained by moving through space, can be used in the architectural designing process, to achieve a better incorporation of the embodied experience into the architectural design.

In an attempt to clarify the issue of understanding and communicating about the embodied experience in architecture, it is also important to look at the notions of *perception* and *sensation*. In the book "*The Primary World of the Senses",* Erwin Straus (1963) establishes a fundamental distinction between both. Perception (percipere), he argues, is a secondary rational organization of a primary, non-rational dimension of sensation (*sentire*). The primary sense is the one that we share with animals; it is not a mode of knowing. Strauss also clarified this distinction with two other contrasting concepts: the *space of geography* and the *space of landscape*. Geographical space is the world we perceive by our perception, wherein things are fixed with unvarying properties and an objective notion of space-time. Landscape space is the world we perceive by our sensation, a space with variable references that constantly changes as we move. This study concentrates on the primary sense, because it gives a landscape to the embodied experience.

Dance and embodied experience

When an individual moves through space, he reacts and anticipates through a certain body language. His movements are generated by internal stimuli and tend to express the body's state of being (*Affect and the moving body*, n.d.). The quality of the movement becomes an expression of the influence imposed by his environmental dispositions and his internal feelings. In art this type of communication has often been called expressionism. In dance, expressionism was the label given to a particular kind of movement developed largely by the German theorist Rudolf von Laban and his disciple Mary Wigman. Within this type of dance, the dancer exposes his internal emotions through movements. This implies a close relationship between the movement and personal experience. The latter clarifies the reason why dancers were asked to perform during the experiments of this research.

Observation of dance offers a good starting point to explore the relationship between movement and its visual understanding, requiring a reconsideration of our awareness of the human body. Developments in the cognitive sciences (e.g.: George Lakeoff and Mark Johnson 1999) have brought into perspective the importance of embodied experience as a foundation for the development of a concrete frame of mindset. The embodied experience can not only be interpreted as a biological element, it can also be affected by the perception of the mind. Dance offers a medium for clarification on how this may occur. The body creates spatial forms, while at the same time the experience is expressed through its communicative movements. Dealing with dance in the context of architecture might bring a more valuable understanding of the embodied experience through the spatial cognition of the artist in relation with its environment. Can we assume that analysis of these spatial movements may lead to a better implementation of the embodied experience in the architectural designing process?

Dance and architecture have space as a common interface. Dance is dynamic in a sequence of time, related to space, while the materialized space is purely static. Can we apply the analysis of movements to create architecture? In the past these questions also inspired several architects and choreographers, which resulted in revolutionary theories and insights. William Forsythe (2009) for example, describes his way of dancing, as the creation of lines and geometric shapes in space – an architecture, which offers a wired volume. He regards motion as living architecture. Living in the sense of changing the arrangement of cohesion. The Swiss dance theorist Rudolph von Laban (1966) described the kinesphere of the body as a crystal form. It describes a three dimensional geometry generated from the ends of the extended human body, it includes twenty-seven points in space, which rotate with the movement.

Generating knowledge

The knowledge acquired by the dancer while dancing is unspoken knowledge, impervious for any spectator. Can this knowledge be captured from the dancer's mind by analyzing the spatial movements in relation to space? As has been set out in the previous paragraph, we can assume that dancers communicate their experience through expressive gestures. In this research the movements of the dancer are analyzed, to understand how an architectural intervention affects the embodied experience

For Spinoza (as cited in Perez de Vega, n.d), " knowledge and ideas engendered by the imagination are inadequate, as they provide a perception of reality not based on reason but on one's subjective viewpoint." This kind of knowledge tells us more about ourselves than about the object of our observation. He illustrates this with the example of a soldier and a farmer observing the traces of a horse. The two will recall different thoughts based on their own subjective view; for the soldier these will bring images of other soldiers and of war, for the farmer they will remind him of a plow and a farm field. Therefore for Spinoza perception of the mind cannot be trusted. In other words, our perception of

something involves attributing its existence, but it does not give us any knowledge of its true nature. It only gives us a description of an individual's personal experience, based on a subjective psychological and physical condition. Only properties such as mathematical and physical tell us more about the real environment. Although embodied experience, which is highly subjective, can be essential in this context to formulate our experiential knowledge. This research starts from the experiential/implicit knowledge, generated by an interaction between an individual and space. This embodied knowledge may be useful in the architectural design process, with the focus on communicating knowledge drawn from this experience, to achieve a practical awareness in the relationship between man, space and experience. Michael A.R. Biggs (2004) presents how knowledge can be achieved, based on the experience. Within this inquiry there has been looked for a way to transfer implicit knowledge, generated by the embodied experience of space, into explicit knowledge. By practical means of tracking a dancer movements in a specific spatial constellation and translate it into interpretable spatial visualizations.

Methods and result

Practice - based approach

The complexity of the research question has been set out in the paragraphs before. The given practical nature of the research caused an experimental approach. Every experiment was preceded by a concept phase, in which the setup was defined. After each experiment a concluding and reflecting phase followed, from which a new concept for a next experiment was created. Each of the following phases of the research depend on conclusions and reflections of previous experiments, which explains the process-based character of this inquiry (see fig. 1). As such the research can be divided into three different experimental phases.

Within these three different experimental phases, the setup was continuous (fig. 2). The dancer was asked to experience the pattern by interacting with it through movements. The dancer received two different inputs, on the one hand a music fragment, that stayed the same during each experimental phase and on the other hand a pattern (analogous space) projected on the floor, which was variable. The analogous space is in this case a space represented by patterns. It is comparable with the opening sequence of Dogville, a film by Lars Von Trier. "There, too, in an almost perfect orthogonal projection, the plan of the small village of Dogville is communicated. Within this framework we see people going about their daily activities. This direct communication immediately puts the audience in an analogous space, one configured with simple lines and some stage props. The audience can imagine how it is to live in this seemingly peaceful small town (Lagrange T., 2008).
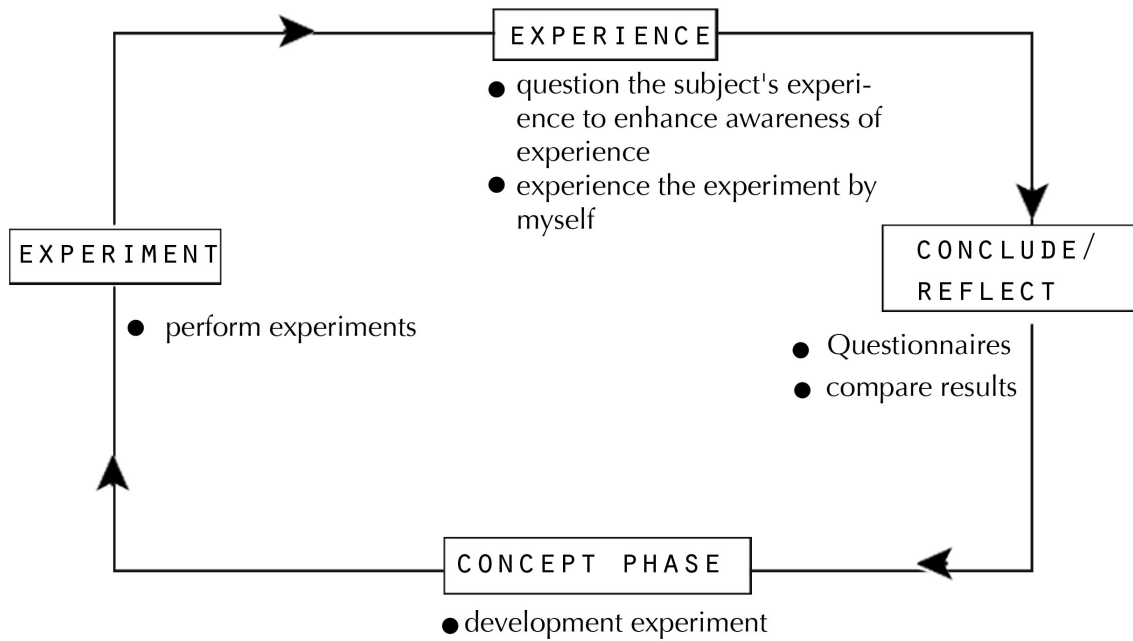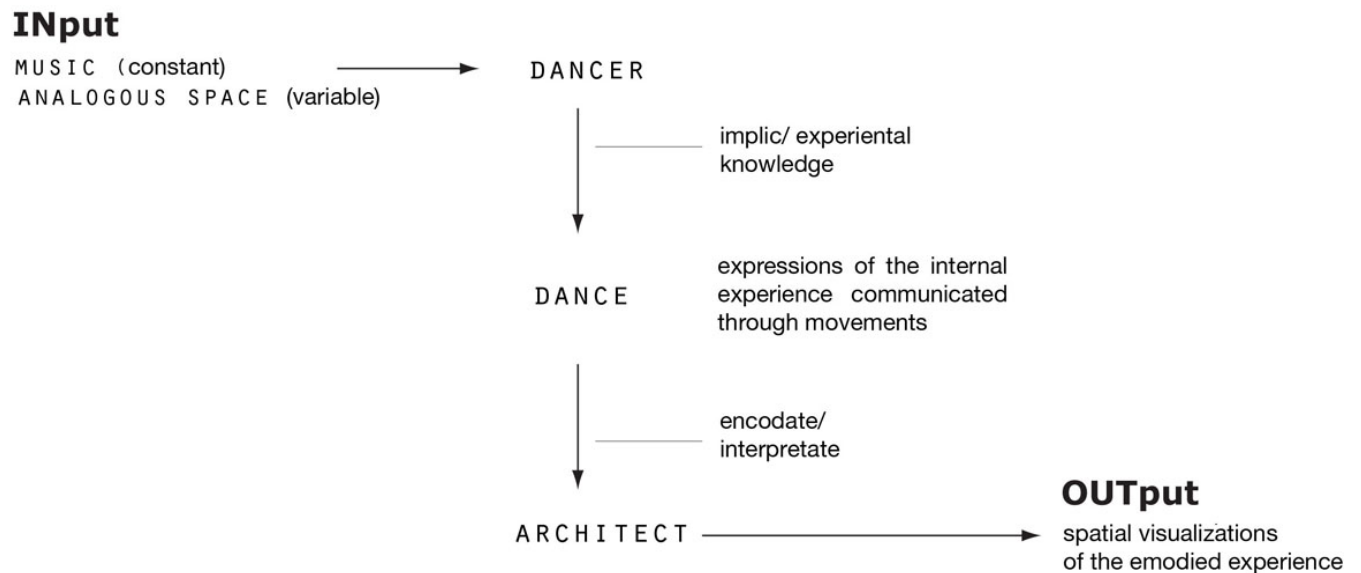
fig 1. method diagram

fig.2 experiment setup

Phase 1

In the first experimental phase a method was explored to represent the alternation of movements in function of time and space (fig.3). Through corresponding arguments that Virilio (1994) provides, quoted in the introduction of this paper, this research investigates in developing a general approach on how an architect can deal with the spatial experience of an individual. Where Virillio (1994) made use of an already existing dance notation, this research introduces a movement notation inspired on Laban's movement theories (1966). Connecting five points on the human body, respectively the two hands, the two feet and the head, makes an abstract visualization of the human movements.
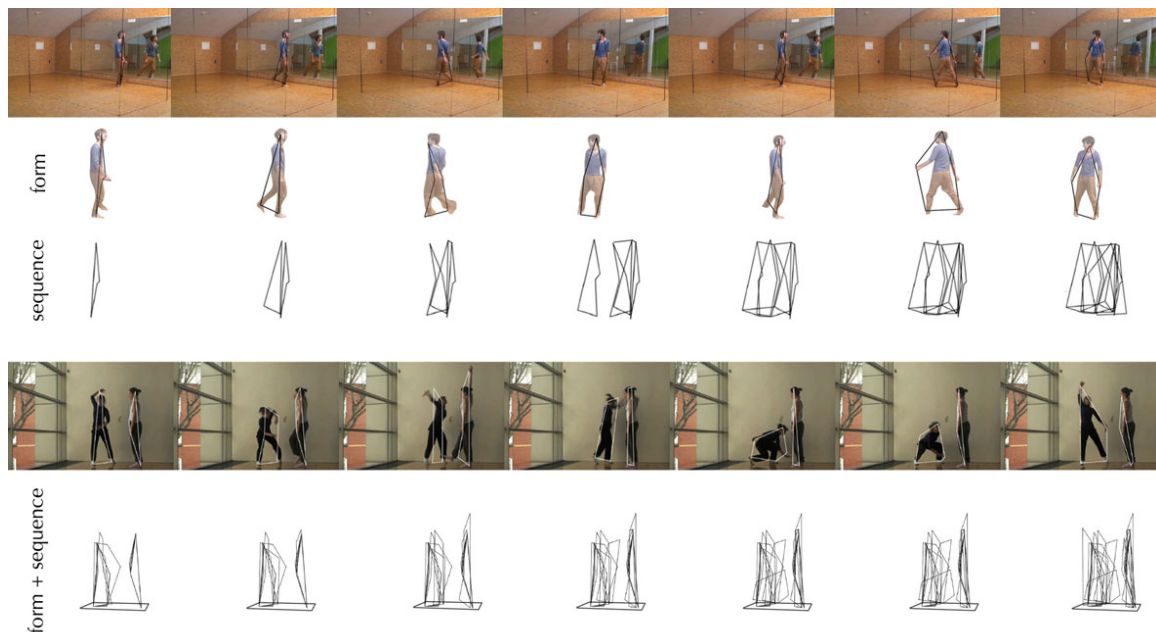

fig. 3 alternation in movement in relation to time and space

Picture frames, ordered in sequences of time, give the opportunity to communicate the movements in relation to space. However it is still impossible to situate the effect of space on the experience of the dancer. To illumine the embodied experience in relation to a specific, limited space, patterns were projected on the floor. These patterns are assuming an architectural intervention. The movements of the dancer give an expression of his embodied experience. By tracing the movement and the pattern and placing them in sequence of time, an abstract spatial visualization occurred. These visualizations are a base for a first reflection. This was established as follows. The dancer was asked to describe his experience in relation to the proposed pattern. A

comparison was made between the dancer's description and the obtained visualizations. The conclusions from the experiment state that this notation has potential in order to communicate certain knowledge, which we couldn't perceive before. Nevertheless it is still impossible to understand exactly how the three-dimensional space has its affects on the experiences.

Phase 2

In the second phase a motion capture system (mocap system) was introduced, to further comprehend the influence of the three-dimensional space. The mocap compromises eight high definition infrared camera's to track markers attached on the moving body. As such the system allows the human movements to be captured, in three dimensions. In a wide range of disciplines this kind of movement analyzing techniques is already introduced. Until now these techniques were barely used in relation to the architectural practice. There can be assumed that the research is innovative within its nature.

In the first experimental phase, only rectangles were projected. Within this phase different basic patterns (a circle, a rectangle, a line, and a triangle) were introduced to the motion capture, in an attempt to better situate the difference in experience with different patterns. By capturing a sequence with no pattern, a reference point was established for comparison. The *mocap* system also has a few spatial restrictions. Hence it's not possible to place any 3D object into the motioncap. Also there are some limitations in movements. During this experimental phase the dancer and the music fragment were unchanged, to hold those two influencing elements constant. Consequently the range of the focus, on the spatial affect of the patterns, enlarges. The expressional movements, noticed by extremities in energy within the gestures of the dancer, were filtered with the mocap system. The coordinates captured from the movement, were reduced to a two-dimensional convex-hull, defined by the extremities of the human body. The three-dimensional pentagons obtained from the dancers movements, were placed in the order of time. This leads to three-dimensional, spatial visualisations obtained from the movements in relation to a certain pattern. A top view and isometric view stands for the third dimension of the visualization (fig. 4).
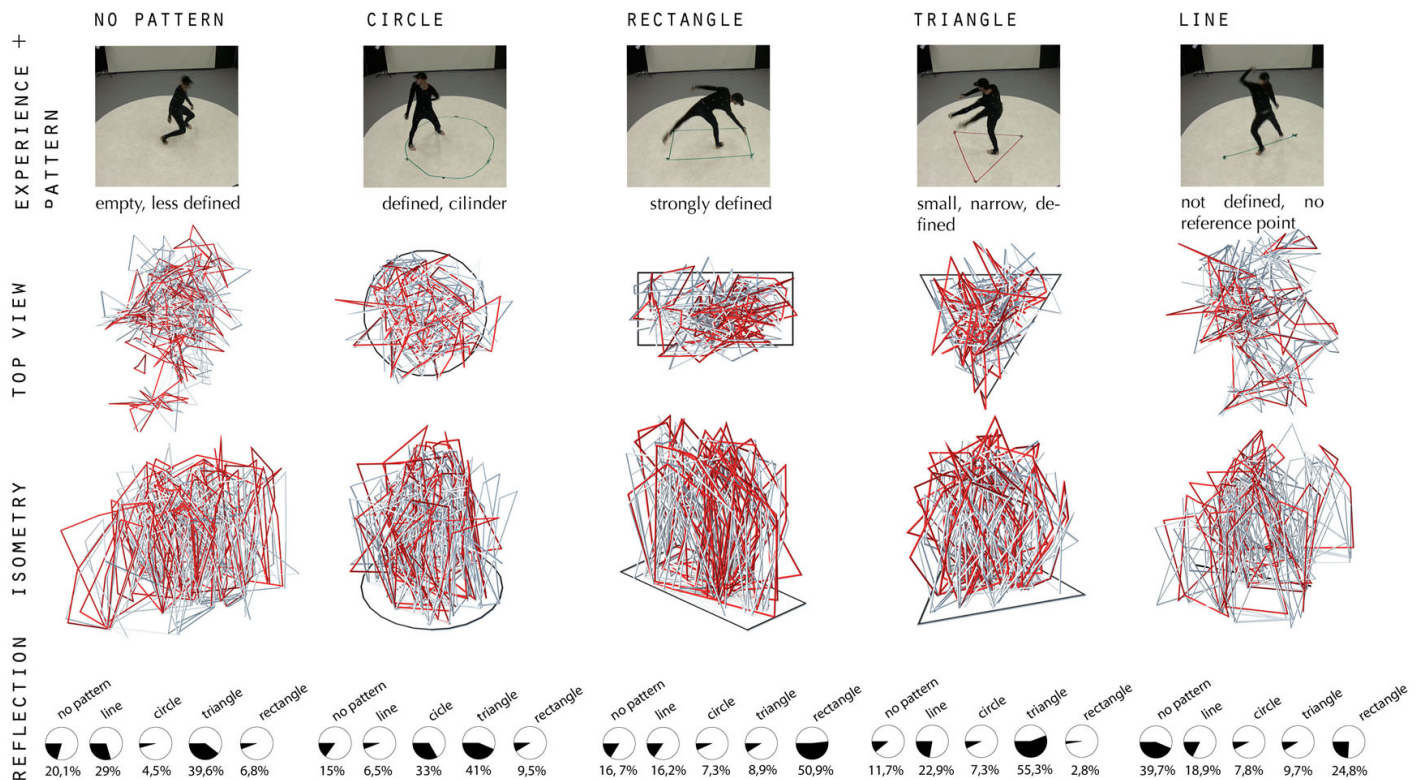
fig. 4 spatial visualizations of experience + reflections (basic patterns)

When observing the different visualizations next to each other and comparing them, it is clear that there are noticeable differences between each of them. As explained earlier, these visualizations represent an expression emerged from the embodied experience. From this comparison of the spatial visualizations there is assumed that every pattern had its unique experience. The dancer also confirmed this conclusion in his description of the experience (fig. 4), although some patterns were slightly different experienced. For example the circular pattern, the linear pattern and no pattern were experienced as not determined, free and unlimited. By comparing these particular visualizations, it's rather difficult to note a difference between the three. The experience of the rectangle and the triangle were more determined, because of the boundaries of these particular patterns.

In a first attempt to evaluate the effect of these experiments a group of two hundred individuals was asked to fill in a questionnaire. They were asked to try to recognise one of the four used patterns (circle, rectangle, triangle, line) according to its visualizations without knowing the pattern projected underneath. A majority of the respondents (ca. 52%) succeeded in recognizing the visualizations of the triangle and the rectangle pattern. While a small percentage of the respondents could distinguish the other two patterns (circle, line). The results of the questionnaires were compared to the dancer's

description and visualizations. The comparison indicates a great deal of similarities, which may state that these visualizations communicate certain knowledge.

Phase 3

Reflections on the experiments of the second phase established the hypothesis of communicating embodied experience by means of visualizations. In the third phase more archetypical patterns were introduced, to analyse the notion of architectural elements into the embodied experience. Hence within this experimental phase several architectural elements were determined with three different patterns, projected on floor. The dancer was asked to dance referring to the various preceding patterns.
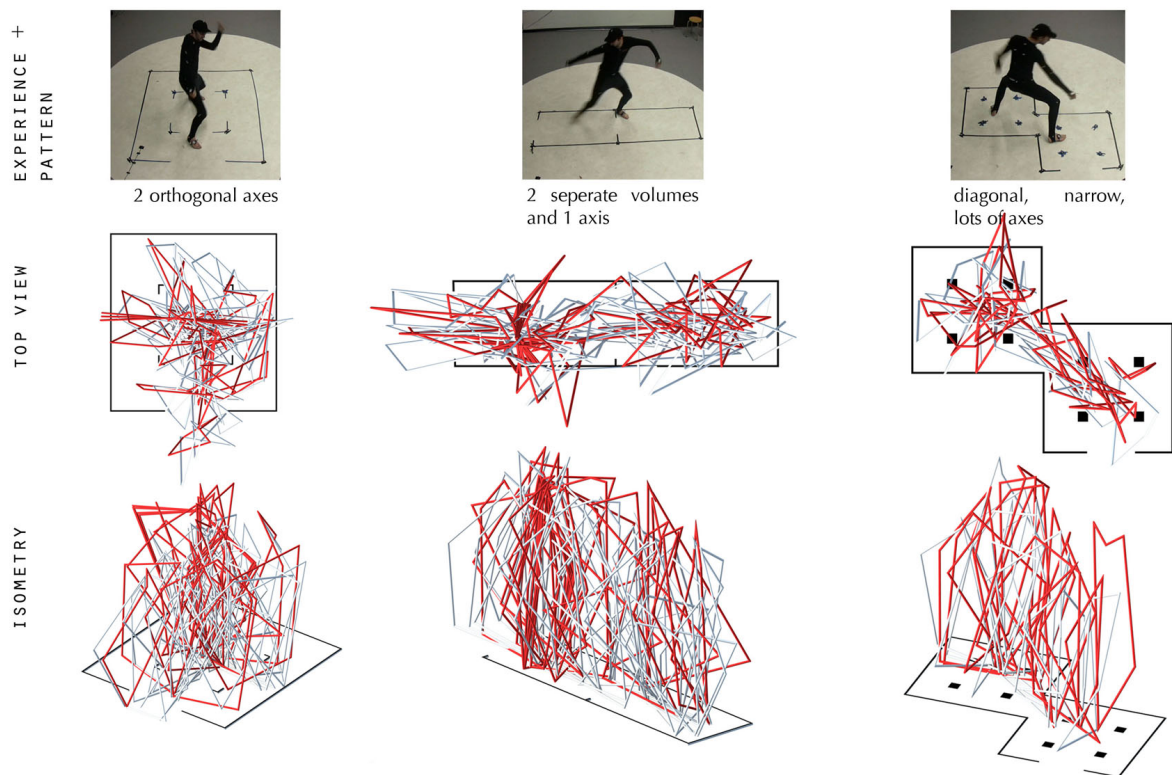

fig. 5 spatial visualizations (archetypical patterns)

The visualisations exposed in fig. 5, were obtained from the data filtered with the motion capture system. By observing and comparing the visualisations, unique traces of the architectural elements become noticeable in the visualized embodied experience. Although these visualizations are developed in three dimensions, it's still difficult to really comprehend the spatial representations from the dancer's movements. Therefore other methods were explored to visualise the dancer's expressions, two other methods (fig. 6) communicate information related to the preceding patterns represented on fig. 5.
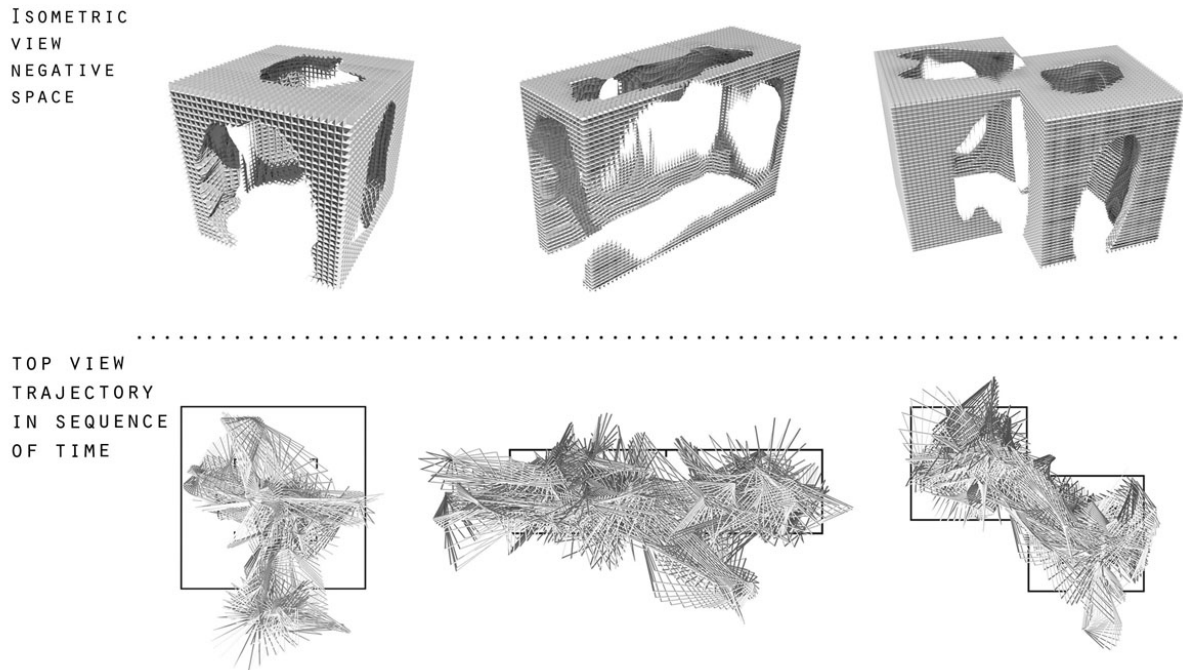
Image 6. Exploration visualizing methods

The negative space occurred through subtracting the movements from the extruded pattern. It illustrates the unused space in relation to the boundaries of the pattern. Apparently the embodied experience never occurred in the corners of the patterns. The trajectories show a total representation of de movements in order of time, ordered in 5-frames/ sec. This method, not only communicates abstract visualizations of the gestures, but also the velocity of the movement. The visualizing methods showed in fig. 5 & 6, each have their own way of communicating the embodied experience. The combination of these visual methods can be comprehended in such a way that it forms a base to develop a design tool for the architectural practice. As shown in the 3D model, a more extended form of communication is attained, compared with the two-dimensional representations (fig.7).
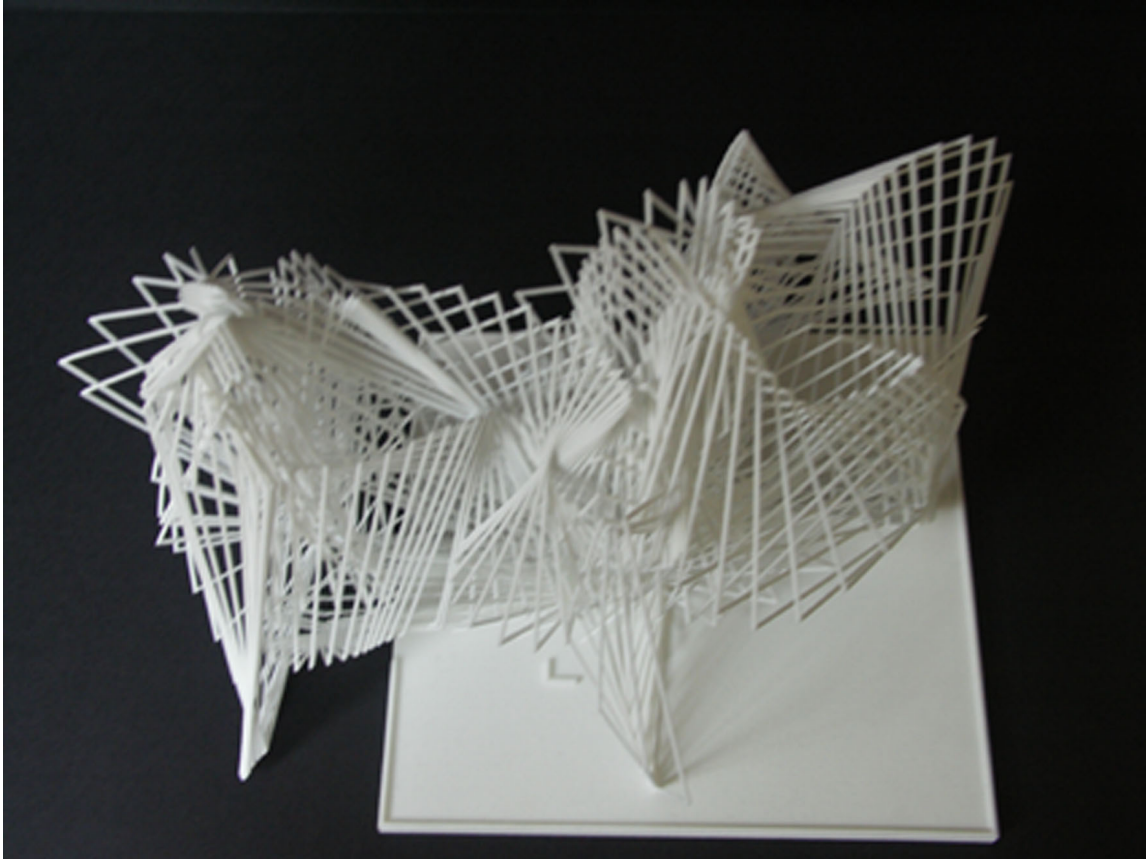
Fig. 7 3D model

Conclusion

The discussed experiments give an indication of how to deal with the complexity of the research question. Preliminary conclusion could be that the different patterns have their reflection in the experience of the dancer. This difference in experience in relation to certain patterns becomes communicative through spatial visualizations. This allows us to partially situate the different affects of various patterns and how to communicate it to others. The inquiry already succeeded to some extent, to change a certain implicit knowledge into explicit knowledge, by which it became readable and partly interpretable. However this knowledge is better comprehendible, by undergoing the experience and interacting with this particular analogous space. The first outcomes of the research encounter the possibility for implementation of the embodied experience into the design process.

Further research

The results of this research project were accomplished in a Ma program (Department of architecture) within a period of four month. Further research will focus on the method to analyze the spatial visualizations, using a set of parameters, in order to objectify the reflection method. In the second experimental phase, questionnaires were introduced to reflect on communicability of the visualizations. As a part of the respondents could not interpret the visualizations it looks appropriated to revise and refine the 5-point representation method, to ensure that the embodied experience becomes transmittable to more spectators. When this is achieved, there shall be investigated on how to incorporate this kind of movement analysis into a real-time, interactive design tool. As a result there will be needed some research on how interactive technologies can be used in the architectural design process.

This research can be addressed to different artistic disciplines, although there was mainly searched to embed embodied experience into the architectural design process. Set designers or media performers for example may share a common interest in a knowledge concerning space, derived from the embodied experience.

Reflections on several experiments within this inquiry showed the influence of some uncontrollable factors. The embodied experience is inseparable connected to the personal perceptual capacity, mood, state and structure of the individual. Other experiments require exploration on the influence of the personal factors, by conducting experiments with different persons. The place wherein the experiments were conducted strongly determines the outcome as well. The set used periodically, took place in laboratorial environments with its spatial restrictions. The dancer was always instructed to experience the pattern. There are many more questions that we can ask our self. For example: What shall happen if patterns are projected in a public area where people daily interact? Will the embodied experience of the pattern still be visible into the visualizations?
As such this inquiry has lot of other issues to investigate in further experiments.

References

Barrios Solano M. (2009), Interview with William Forsythe, Dance Teck interactive, Herlau, Dresden, Germany.

Biggs M. A. R. (2004). Learning from Experience: approaches to the experiential component of practice-based research. Hatfield. University of Hertford shire.

Bollnow, Otto F. (1963). Mensch und Raum. Stuttgart, Kolhammer

Briginshaw Valerie A. (2001). Dance, space and subjectivity. Chippenham and Eastbourne: CPI Antony Rowe,

Copeland R. & Cohen M. (1983). What is dance. Oxford: Oxford University Press

Gartner, S. (1990). The Corporeal Imagination: The Body as the Medium of Expression and Understaning in Architecture, in The architecure of the In-Between: The proceedings of the 1990 ACSA Annual Conference. San Fransico.

Gavrilou, E. (2003). "Inscribing Structure of Dance into Architecture", Proceedings 4th International Space Syntax Symposium, London.

Knapp P. H. (1948). Emotional Aspects of Hearing Loss. Psychomatic Medic 10.

Lakoff, G., and Johnson, M. (1999). Philosophy in the Flesh, New York, Basic Books.

Laban, R. (1966). Choreutics. London: Macdonald & Evans.

Lagrange T., (2008). Mental spaces, a design tool seen in historical perspective, A few considerations, Proceedings of the Conference Analogous Spaces [CD ROM]. Ghent

Loke, L. & Robertson T. (2010) Studies of Dancers: Moving from Experience to Interaction Design. IJDesign, vol 4 no 2.

Perez de Vega, E. (n.d). Experiencing built space: movement and effect. Retrieved October 20, 2010, from http://www.epdvs.com/ACADEMIC/epdvs_ExperiencingBuiltSpace.pdf

Perez de Vega, E. (n.d). *Affect and moving body*. Retrieved October 20, 2010, from http://www.epdvs.com/ACADEMIC/epdvs_AffectAndMovingBody.pdf

Schwartz, E. (2000). Les trames architecturales du mouvement chez Rudolf Laban, Nouvelle de danse, Bruxelles, 42/43, p. 39-55.

Spinoza, Benedict d. (1994). *The Ethics* in A Spinoza reader: t*he Ethics and Other Works*, ed. and trans. Edwin Curley. Princeton, N.J.: Princeton University Press.

Straus, E. (1966). The forms of spatiality. Phenomenological psychology in *The selected papers of Erwin W. Straus*. New York: Basic Books.

Virilio, P. (1993). Traces of Dance: Choreographers' drawings and notations. London, England. Edition Dis Voir. p.107

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The educational spatial connoisseur as the spatial critic

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Abstract

This paper aims to provide a better understanding of the transfer of *experiential knowledge* in the education of design in architecture. A lot of knowledge in architectural design, such as knowledge of construction, plan organization, etc. can be communicated verbally or under written form, however, *the experience and appreciation of spatial quality, i.e. experiential knowledge,* is difficult to communicate explicitly. Nevertheless, we believe that this knowledge transfer happens to a larger or lesser extent in the Design Studio, not explicit but tacit. Because it deals with appreciation, one can introduce the concept of *connoisseurship*, i.e. the art of appreciation (Eisner, 2002) The act then of making public what someone as a connoisseur has experienced requires an *act of criticism* (Eisner, 2002). When it comes to recognizing and disclosing spatial quality in architecture, one can speak of *spatial connoisseurship* and *spatial criticism*. The question is then: how the experience of spatial quality actually is transferred in an educational environment? When is the *educational* spatial connoisseur a spatial critic? The paper provides a theoretical framework for detecting and analyzing this transfer of experiential knowledge as it happens in dialogues between teachers and students in the Design Studio. In the theoretical discourse we argue that having a well formed sentiment (Hume, SOT), a rich imagination and refined multi-sensory capacities, are important properties of a spatial connoisseur in order to be able to experience and appreciate spatial qualities. The study shows, on the basis of a protocol analysis of the dialogues, that in current teaching situations the emphasis is mainly on rational argumentation in appreciating spatial qualities, rather than on sentiment, imagination and multi-sensory capabilities.

Keywords
education, architecture, experiential knowledge, connoisseurship, emotions

Introduction

The education and training of interior architects involves the teaching of various kinds of knowledge. In the Design Studio, where the process of designing is taught to the student, the teacher is faced with the problem that knowledge about experiencing and appreciating the quality of a space, i.e. spatial

experiential knowledge, is difficult to transfer. The purpose of this paper is to provide a better understanding of this tacit knowledge in architecture, and to indicate how students can be taught to become a connoisseur in this field. (see Figure 1) We demonstrate that appreciating the quality of a space is not something which happens through a process of reasoning. It is rather a matter of sentiment, an acquired ability to feel delight or dissatisfaction when perceiving the environment through the use of various senses, as a means of approving or disapproving respectively of the quality.

renovation of a holiday dwelling, Raum Architecten

Figure 1. How does the teacher as a spatial connoisseur appreciates the quality of this spatial form? And how does he share this appreciation with his students?

Background

A lot of knowledge in architectural design, such as knowledge of construction, plan organization, etc. is an *explicit knowledge* for it can be communicated verbally or under written form. At the same time, trained architects have at their disposal a kind of knowledge which they apply in the design process as well as in experiencing spatial qualities, but which is difficult to communicate explicitly. Polanyi terms this 'tacit knowledge'. Tacit knowing encapsulates the idea that "we can know more than we can tell." (Polanyi, 1967, p. 4). Alexander (as cited in Schön, 1983, p. 52) states: "An architect can often recognize a 'bad fit' of a form to its

context, but he usually cannot describe the rules by which he find a fit bad or by which he recognizes the corrected form to be good." This knowledge is present unconsciously and implicitly in the patterns of our activities, and it determines the feelings with which we react to what we experience. So, during the design process, a trained architect can *perform* spontaneously the design act, and he can also spontaneously *experience* the quality of his design action and the result. Niedderer (2007) recognizes at least two types of tacit knowledge: *procedural knowledge* as tacit knowledge in action and performance, and *experiential knowledge* as tacit knowledge of perception and experiencing.

Experiential knowledge, a kind of knowledge consisting of the capacity for experiencing quality and the ability for very fine qualitative discrimination (Niedderer, 2007), is an attribute of a *connoisseur.* A connoisseur is a person who has developed sensitivity for recognizing and judging quality in a certain domain, acquired by experience and a careful dedication to this domain (Eisner 2002). Connoisseurship is defined by Eisner (2002) as *'the art of appreciation'.* For an existing space, the trained architect can recognize and appreciate the spatial qualities through the act of experiencing the space. At the other hand, during the design process, the architect imagines and appreciates the qualities of the space which he develops. In both situations he is a spatial connoisseur, and his ability of recognizing and appreciating the spatial quality of existing or future spaces constitutes his experiential knowledge. (Figure 2)
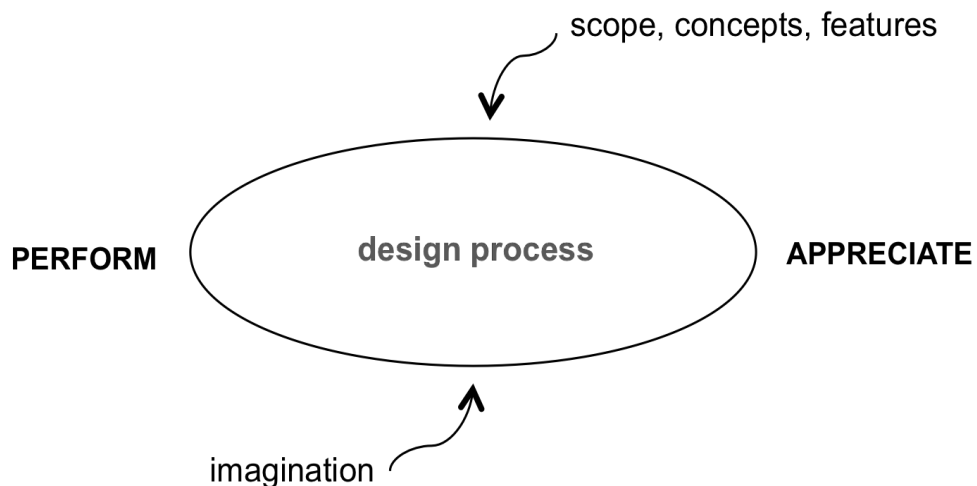

Figure 2: the design process, seen as a continuous sequence of performance and appreciation.

Methods used

Theoretical framework: The spatial connoisseurship

A spatial connoisseur is a person who is trained in discerning and appreciating very fine differences in quality of a space. But how does he recognize and in doing so appreciate the quality of a space? Two concepts have to be explored, i.e. *spatial quality* and *appreciating spatial quality*. Eventually, in what consists the experiential knowledge of the spatial connoisseur?

Spatial quality

Good or bad qualities of a space are not objective properties of the space itself. A good quality is an attribute that we, as a person, attach to something during the process of appreciation. "Beauty is no quality in things themselves: it exists merely in the mind which contemplates them." (Hume, SOT, 7) The emotions which we feel during experiencing a space, constitute the quality of the space. "But beauty of all kinds gives us a peculiar delight and satisfaction; as deformity produces pain […]" (Hume, T III, 2, viii, 1). One can compare perceiving the quality of space with perceiving colors: colors as well are no primary characteristics of the things themselves. If we label a space as qualitative, we mean nothing but that, by the primary constitution of our nature, we feel pleasure and 'satisfaction of the soul' during perceiving the space. "Pleasure and pain, therefore, are not only necessary attendants of beauty and deformity, but constitute their very essence." (Hume, T III, 2, viii, 1). In 'Of the standard of taste', Hume names this as having *a sentiment*. It is a disposition or a second nature of a person for having a feeling of approval or disapproval during experiencing objects or spaces. Hence, the experience of the quality of space of a spatial connoisseur is no quality of the space itself, but it is a **mental construct** of the architect.

Is good taste then something subjective? Is it a personal matter that we cannot discuss, remembering the adagio: de gustibus non est disputandum? Is there no common standard available for distinguishing good from bad, beauty from ugliness? Hume argues that subjectivity should not lead to relativism. A **norm or certain standard** of what is generally considered good or bad is formed spontaneously in each community. "If […] there be an entire or considerable uniformity of sentiment among men, we may thence derive an idea of the perfect beauty." (Hume, SOT, 12) Each community has its connoisseurs whose taste is considered experiential knowledge. The connoisseurship is reserved for individuals who have naturally certain qualities and have refined those qualities by experience. "And the joint verdict of such, wherever they are to be found, is the true standard of taste and beauty." (Hume, SOT, 23)

Space is not experienced as a series of isolated retinal pictures. Space offers shapes and surfaces moulded for the touch of the eye and the other senses. "Qualities of space, matter and scale are measured equally by the eye, ear,

nose, skin, tongue, skeleton and muscle." (Pallasmaa, 2005, p. 41) The experience of the quality of space prior to the emotions which we feel as a consequence and which are evoked by the sentiment, is thus intrinsically ***multi-sensory***.

Summarized: the quality of space is a mental construct, is multi-sensory experienced and relates to a certain standard. The spatial connoisseur has a well formed sentiment which incorporates the standard of taste of the community of concern.

Process of appreciating

What makes someone a connoisseur? According to Hume, the connoisseurship presuppose a well formed *sentiment* which is supported by the *delicacy of imagination*, assisted by *good sense*, improved by *practice and frequent perusal,* perfected *by comparison,* and cleared of *all prejudice*.

When experiencing a space, we will recognize and judge initially with our **sentiment** the quality of the space. Having this well developed second nature allows us to feel an emotion of satisfaction or dissatisfaction during experiencing a space. Quality judgments are thus essential related to emotions and the pleasant or unpleasant emotions we feel during the experience of a space or object constitute the appreciation or disapproval of it.

Experiencing the quality of the environment, presupposes that we have refined senses. 'As for **sensibility**, the arts invite us to attend to qualities of sound, sight, taste and touch so that we experience them; what we are after […] is the ability to perceive things, not merely recognize them' (Eisner, 2002, p. 5, my emphasis). A well formed sentiment is multi-sensory related to the environment.

An adequate appreciation of qualities requires an active ***imagination*** (Gracyk, 2008). 'One obvious cause, why many feel not the proper sentiment of beauty, is the want of that delicacy of imagination, which is requisite to convey a sensibility of those finer emotions.' (Hume, SOT, 14). Imagination creates chains of associated ideas, encouraging thoughts to move rapidly from one idea to another (Gracyk, 2008). The delicacy of imagination is the ability to recognize the smallest ingredients in the composition of the whole. "Suppose one wakes in the morning and smells the distinctive aroma of coffee, and the experience is pleasurable. This appreciation depends on an imaginative association: the smell brings to mind its cause, the brewing coffee, and its purpose, the consumption of the coffee and its setting" (Gracyk, 2008, p. 11), and we would like to add: sitting in a homy kitchen on a beautiful morning with the sun in your face. "The agreeable sentiment is a response to this imagination as a complex association of impressions and ideas, not to the smell alone." (Gracyk, 2008, p. 11)

Prior to the imagination, there is first the process of sensory experience and gaining impressions which are represented in our mind in the form of ideas. These ideas or concepts will feed our imagination whereby we can see possibilities we have not encountered or a new reality. (Eisner, 2002) Or

according to Hume: imagination is producing new ideas or concepts by imposing a new order on past impressions, impressions from our ***memory.*** "It is a process that depends initially upon the ability to experience the qualities of the environment, qualities that feed our conceptual life and we then use to fuel our imaginitive life." (Eisner, 2002, p. 4). Peter Zumthor (2006)(1), a contemporary practicing architect, starts his book *Thinking Architecture* with recalling memories. Very sensorial, Zumthor describes images from his memory. He remembers and appreciates a kitchen of his youth.

> When I think about architecture, images come into my mind. [...] Some of the other images have tot do with my childhood. There was a time when I experienced architecture without thinking about it. Sometimes I can almost feel a particular door handle in my hand, a piece of metal shaped like the back of the spoon. I used to take hold of it when I went into my aunt's garden. That door handle still seems to me like a special sign of entry into a world of different moods and smells. I remember the sound of the gravel under my feet, the soft gleam of the waxed oak staircase, I can hear the heavy front door closing behind me as I walk along the dark corridor and enter the kitchen, the only brightly lit room in the house. [...] The small hexagonal tiles of the floor, dark red and fitted so tightly together that the cracks between them were almost imperceptible, were hard and unyielding under my feet, and a smell of oil paint issued from the kitchen cupboard. Everything about this kitchen was typical of a traditional kitchen. Perhaps it was just the fact that it was so very much a kitchen that has imprinted its memory indelibly on my mind. The atmosphere of this room is insolubly linked with my idea of a kitchen. [...] Memories like these contain the deepest architectural experience that I know. They are the reservoirs of the architectural atmospheres and images that I explore in my work as an architect. (Zumthor, 2006, p. 7)

These very memories Zumthor uses during the design process to create new images:

> When I design a building, I frequently find myself sinking into old, half forgotten memories, and then I try to recollect what the remembered architectural situation was really like, what it had meant to me at the time, and try to think how it would help me now to revive that vibrant atmosphere pervaded by the simple presence of things, in which everything had its own specific place and form. (Zumthor, 2006, p. 8)

Appreciating quality is a matter of emotions. Nevertheless, reason has a place in this process, albeit a secondary place. The role of reason or good sense is instrumental. It helps to make connections and see relationships. It helps to recognize typical patterns inherent in good design. Each design begins with and is structured around certain concepts and features, and reason enables analyzing the extent to which these conditions are met.

Summarized: the process of appreciation the quality of space relies on a sentiment, refined by a delicate imagination. This imagination is fed by previous

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(1) Peter Zumthor, Basel °1943, is a notable architect of the phenomenology movement. Phenomenology in architecture is a philosophical tendency and a specific field of research. The philosophy is based on perceiving and perception of matter and their multisensory characteristics. Other architects of this movement also are Juhani Pallasmaa, Steven Holl, Alvar Aalto, Caruso St John.

multisensory experiences, collected in our memory. The sentiment is improved by practice and frequent perusal and perfected by comparison. Finally, the mind of the connoisseur has to be cleared of all prejudice. He must be able to move into different cultures and time periods.

Theoretical framework: The spatial criticism in educational moments: knowledge transfer

Connoisseurship, as the art of appreciation (Eisner, 2002) is a personal 'event', something acquired via a combination of senses – visual, tactile, auditory, etc. (Lloyd-Zannini, 1998). The task of making public what someone as a connoisseur has experienced requires an *act of criticism* (Eisner, 2002), as the art of disclosure (Smith, 2005). When it comes to appreciating and disclosing spatial quality in architecture, one can speak of *spatial connoisseurship* and *spatial criticism*, respectively. Because the topic of interest in this paper is detecting in what education moments students learn about experiencing and appreciating the quality of space, the object of this research is the act of spatial criticism of *the educational spatial connoisseur*. In the Design Studio the interaction between teacher and student consists of a rather intense dialogue. The research question in point is: how does the teacher and the student communicate during that dialogue about the experience of spatial quality, an experience which is a kind of tacit knowledge, which relies on sentiment and imagination, and which is intrinsically multi-sensory?

In his research concerning the transfer of *tacit knowledge*, Schön (1983) noted that the design action in which a designer spontaneously and intuitively *acts*, whereby he uses his *procedural knowledge*, can be transferred by *reflection in action*. In his dialogue with the student the teacher designs and reflects loud and clear on how he performs the design. In this way, the teacher transfers his tacit knowledge on the design action, notably his procedural knowledge. Thereby he uses two modes of communication: a *language of performance*, in which he designs and at the same time tells what he is doing and *a language of theory*, whereby he talks about the theory of design actions in general (Schön, 1983). The knowledge of a designer by which he *experiences the quality* of his design action and of the result, i.e. his experiential knowledge, however remains mainly implicit (Niedderer, 2007). The language used for the transfer of the latter and described by Schön as a *language of appreciation* (2), is limited to epitheta such as 'terrible', 'nice', etc. Can one here say that neither the subject nor the knowledge of the teacher can be made explicit all the way through language?

Designing is searching for the possible (De Jong & Van der Voordt, 2002). In the Design Studio, the student and teacher discuss the development of possible

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(2) Compare with 'the art of appreciation' of Eisner (2002), which is construed here as 'connoisseurship'.

spaces. We suggest that during this process we can distinguish moments where they communicate about the *possible experience of the qualities of the space under design, i.e. a tacit knowledge, which is multi-sensory experienced and is appreciated with the sentiment, refined by imagination*. The *knowledge transfer* between architecture student and teacher in the Design Studio involves, in an indirect way, three aspects of education. Firstly, it is important that the teacher gives support and guidance to the student for **developing and using a well formed sentiment**. With such a disposition the student can recognize and appreciate good qualities of spaces. (Hume, SOT) Secondly, it is important that the teacher gives support and guidance to the student for consciously **cultivating his imaginative abilities** to distinguish more subtle quality differences. "Constraints on the imagination has to be loosened". (Eisner, 2002, p. 4) The sentiment is a response to a complex association of impressions and ideas and the imagination rearranges impressions and ideas to new associations (Grazyck, 2008). Thirdly, it is important that the teacher makes the student aware of **the use of all his senses** to feed his sentiment and his imagination. "The student has to pursue spatial impressions in a particularly focused way with all the senses. He has to slow down perception and to savor the qualities of space." (Eisner, 2002, p. 5) The communication between teacher and student which goes along with this knowledge transfer is thus not multi-sensory as such, but the communication takes place in a multi-sensory context. One could say that it has to be a communication in an atmosphere of spatial imagination addressing emotions (sentiment) and multi-sensory experiences. With this theoretical scheme in mind, we performed the protocol analysis of dialogues in the Design Studio.

Protocol analysis

The transfer of experiential knowledge, i.e. knowledge about the experience of spatial quality, is investigated based on a protocol analysis of dialogues concerning an entire design process. The respondents are nine students of 2nd bachelor Interior Architecture, University Antwerp, department of Architecture, and two teachers of the same faculty. The students were selected using stratified sampling. A group of seventy 2nd Bachelor students was split into three subgroups, depending on their school results of the 1st Bachelor: high, medium and low. Out of each subgroup three students were taken at random. For each of these nine students on average six dialogues were video recorded. The teachers are the permanent members of the Design Studio of 2nd bachelor Interior Architecture. In the Design Studio, where teacher and student communicate on the design the student has prepared, the student sees alternatively the two teachers. The design assignment was not initiated by the researchers. It was an assignment that fitted in the current pedagogical program, developed by the teachers. The assignment of concern was to design a shelter for a short stay for two users with a special occupation. Only the following constraining parameters were given: construction in wood, dimensions of the shelter: 3mx3mx3m.

The special occupation of the users, like astronomers, a businessman with his mistress or two bird watchers, was a free choice. During a complete design process of six weeks, the dialogues between the nine students and two teachers were recorded on videotape and simultaneously observed by a researcher. The recorded data were then transcribed. The protocol analysis was performed using the transcriptions and the videos; the two media were compared constantly. The sequential ordering of the conversations was respected during the analysis, so that a developmental perspective of the entire studio setting could be obtained. Fifty four dialogues were recorded on videotape, transcribed, analyzed and interpreted. It is important to mention that the researcher who did the analysis is an architect, teacher and PhD student on this topic. Hence, someone in the process of becoming a spatial educational connoisseur.

The theoretical framework, developed in this paper, was used as a point of view to analyze and interpret the data. This point of view includes that the communication between teacher and student in an architectural Design Studio, where an experiential knowledge has to be transferred, has to be a communication in an atmosphere of spatial imagination, addressing emotions (sentiment) and multi-sensory experiences. During the analysis, three questions were borne in mind: (1) is there a focus on the development of a well formed sentiment of the student? (2) Is attention paid to cultivating imaginative abilities of the student? (3) Makes the teacher the student aware of the use of all his senses to feed his sentiment and his imagination?

Results

The tools for communication in the Design Studio are speach and body language, technical drawings with written comments, perspective drawings, three-dimensional models and pictures used for inspiration. Body-language and gesture of the teachers and the students were not investigated in this stage of the research.

Question 1: sentiment

It is apparent from the analysis that the emphasis in the actual communication between the teacher and the student is primarily on explaining and reasoning. In every stage of the design, the teacher is interested in *why* the student decides to design something in that particular way. The teacher asks the student to explain what the concept behind and the meaning is of his design decisions. According to the teacher meaning has to come from the activity of the users in the shelter. Every aspect of the design, like function, aesthetics, program, material, construction etc., should be related to this meaning. For example:

> Teacher in a conversation with a student who designs a shelter for astronomers:
>
> Teacher: '[...] Yes, okay, no, I think that the essence of your story is: watching the stars. In the daytime, the users sleep and in the night time, they work and watch the stars and live. This is what we have to discover in your design. And for that reason, you should design a shelter that is very much closed in the daytime, (*the teacher makes with his hands a*

closed volume) but the volume should go open in the night time, by pulling or kipping or sliding, etc. Do you have a suggestion for that? [...] (see Figure 3-4)
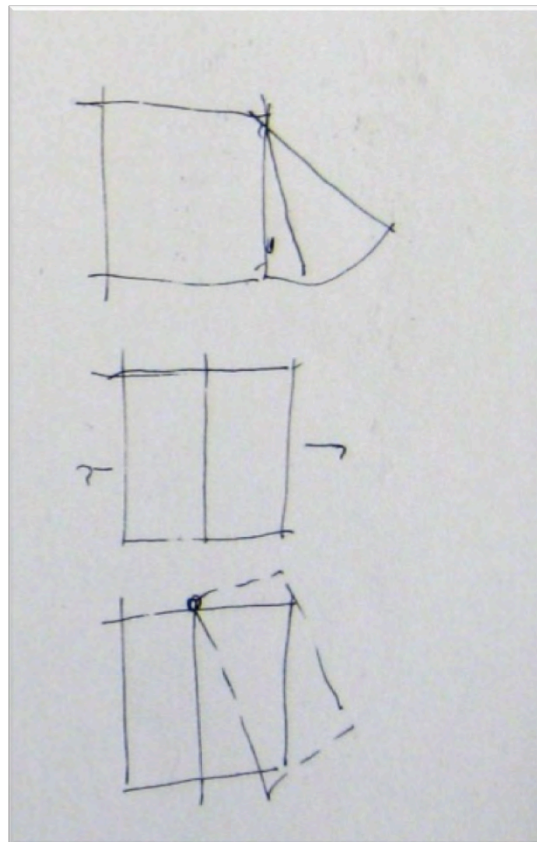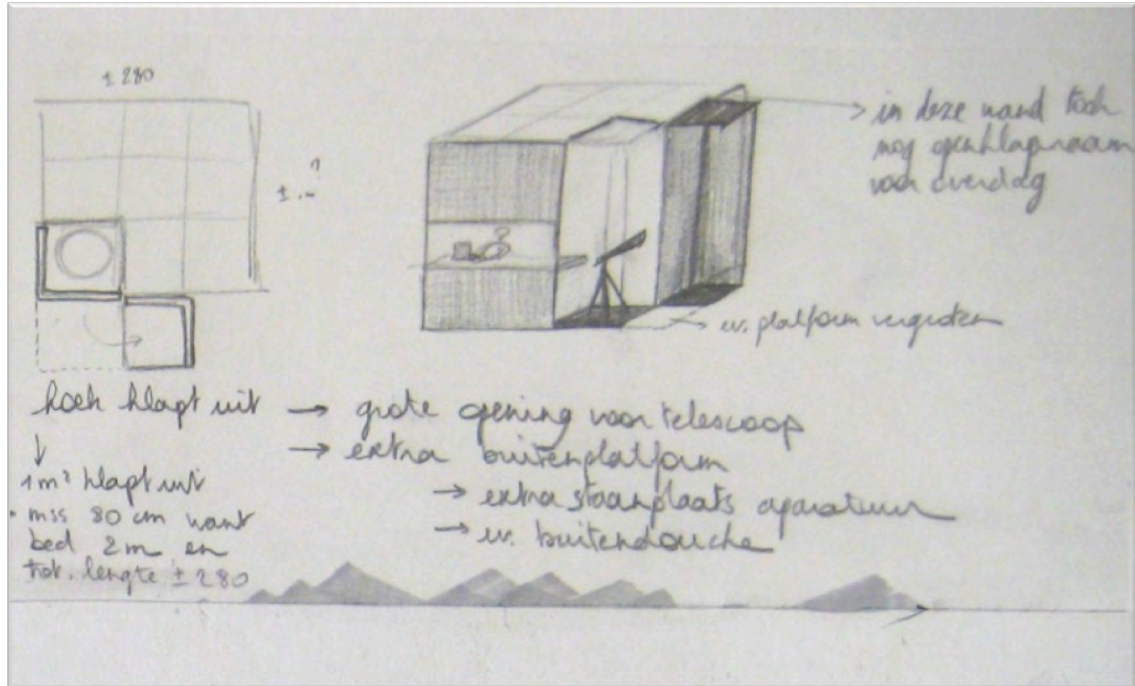

Figure 3-4: Design in process of the student (left), drawing comments of the teacher (right)

Teacher: '[...] no, but the approach could be by arranging the space you create instead of by filling up the space. So creating space instead of filling up space with kitchen furniture or a toilet or a thing or ... At some point, you have to arrange all these things in the space but you have to limit it to the essence and give attention to the main purpose. Because that is the issue. All the rest is secondary. At night time, they live and at day time, they sleep, everything is closed, no light inside the volume. (*the teacher imitates intimacy with his body and his hands*) because I have to sleep, sleep, sleep, because in the night I want to watch the stars. That is the essence of your design project. Try to represent this in all the facets of your design. You are too much involved with other things. Okay? [...]' (see Figure 5)
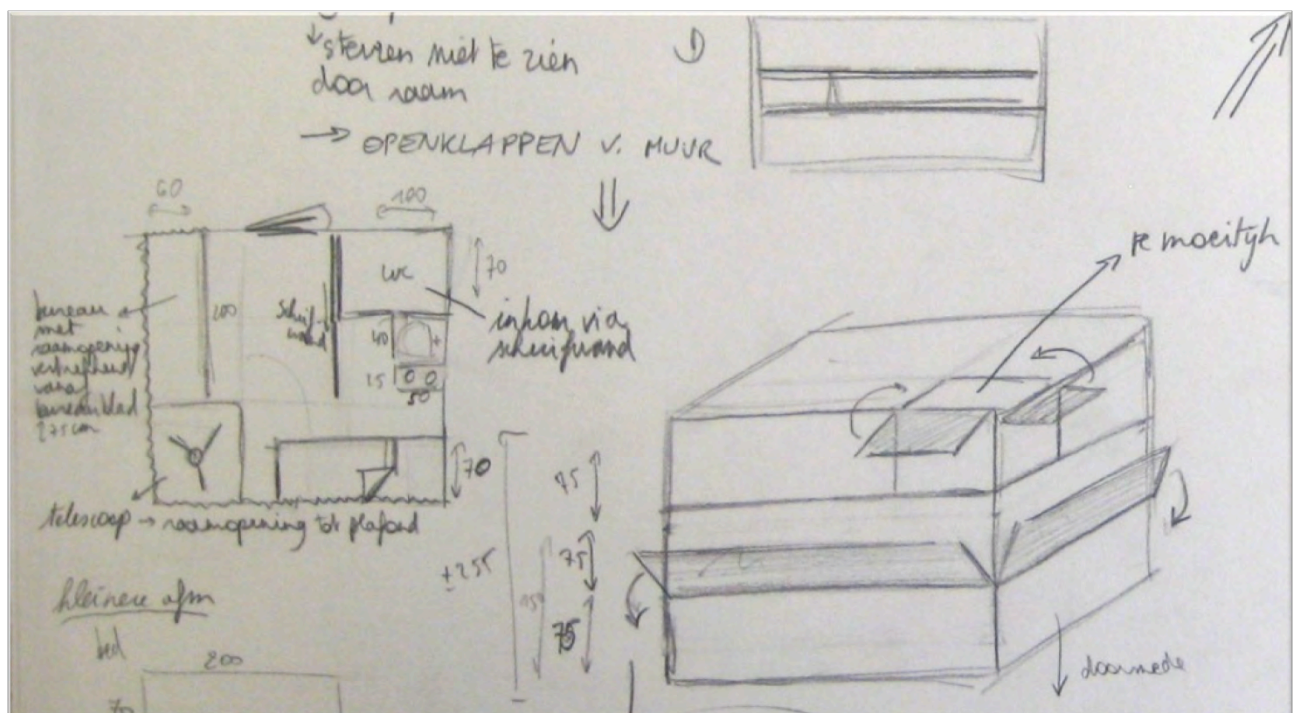

Figure 5: Design in process of the student, filling up space

Teacher in a conversation with a student who designs a shelter for 'butterfly watchers':

Teacher: '[...] This is a butterfly in the facade?
Student: Yes, and it is a window shutter. You can open it in the daytime.
Teacher: The whole piece?
Student: Yes.
Teacher: Ah, it is possible to open this graphic?
Student: Yes, to give the impression that a butterfly comes out of the volume.
Teacher: hm, I agree with the intention to give a reference to the volume by adding a graphic element. But to open it? I don't know... Do you know Valerio Ogliati?
Student: No
Teacher: He designed a house for a musician. The facade is built in concrete and the mold for the concrete was sculpt with a sort of logo, a decoration, a universal logo. It is a circle with a star. That gives a graphic image to the whole facade. But he had a reason; the logo had to do with music. He had a story. That is better than making a window in the shape of a butterfly. [...]' (see Figure 6)
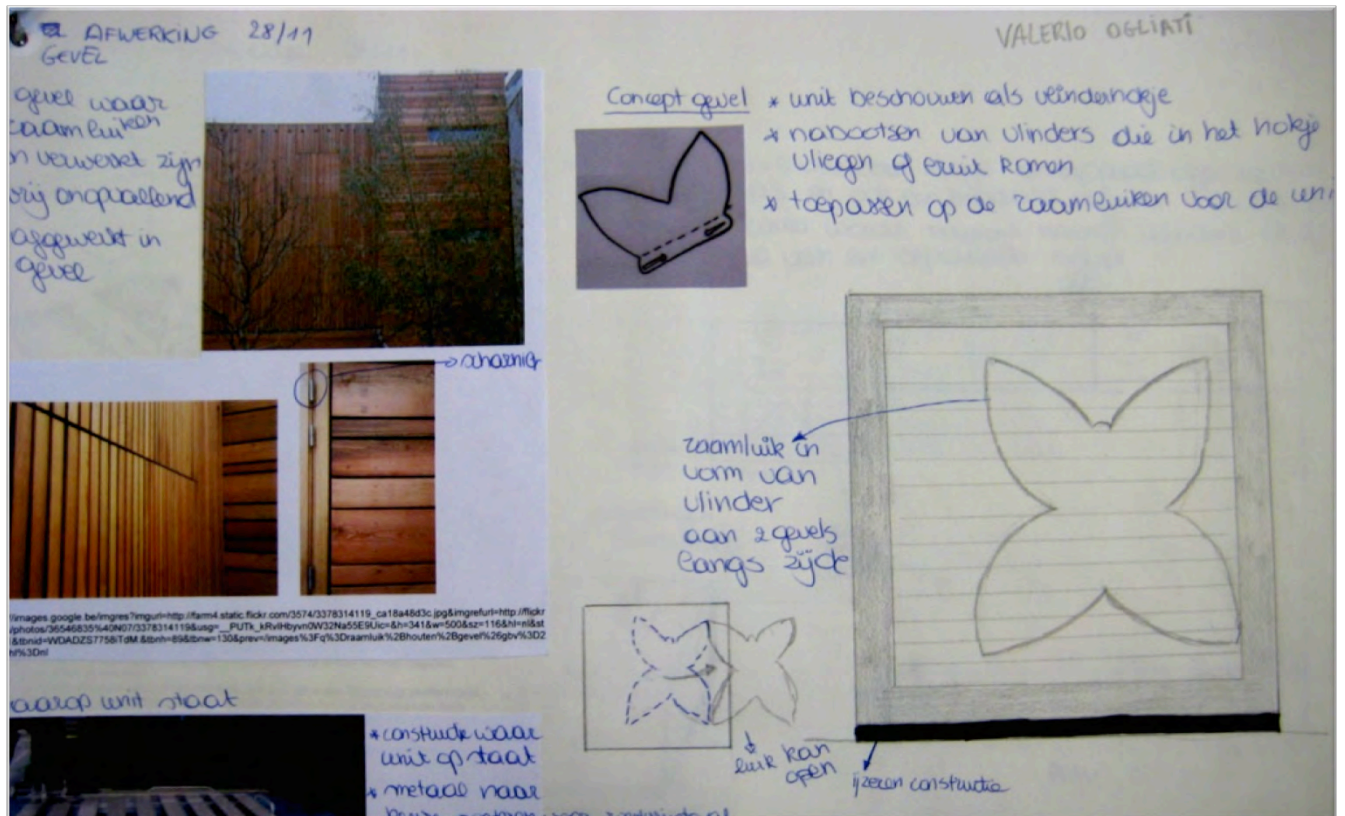
Figure 6: The window shutter in the façade.

It is clear from these examples that there is no special attention to the experience and expression of emotions by the student or the teacher. Good students can easily construct a sound reasoning about their design decisions and in addition make a relative good design with sufficient spatial qualities. Weaker students at the other hand can often also provide an adequate reasoning by their selves or adopt it from the teacher, but present eventually a design with inferior spatial qualities.

Question 2: imagination

The word imagination is used during the conversations. There is due attention to the use of imagination during the design action, although to a lesser extent during the appreciation of quality. For example:

> Teacher: '[…] but you should write the scenario, like what do the people who live in the shelter encounter. What are their actions from minute one to the last, so to speak? If you really think about their actions and their experiences, you can formulate more easily an answer on the design. Try to imagine … […]'

> Teacher: '[…] Try to imagine which things you need for what purpose. When do you close the volume and open it? What has to be opened and what has to be closed? And out of this context, you should make design decisions, out of this construction, you should think. […]'

Question 3: multisensory

There is no special attention to the use of *all* the senses, to have deep multisensory experiences. Nevertheless, one can discover in the dialogues some implicit references to multisensory experiences. But after all, there is no specific focus on taste, touch, smell, sound and sight. For example:

> Teacher: '[...] and is it a pleasant spot?
> Student: yes, I liked it. If you leave the road, you see directly a charming path. And if you walk like ten minutes, you arrive at an big and calm open space with a decent soil with another little path. So...
> Teacher: hm
> Student: It is a really nice location. [...]'

Words like 'big and calm open space' or 'decent soil' are implicit indications that the student experiences the place with her body, with her eyes and ears, and also with the bottom of her feet and thus the skin of her feet.

Discussion

Our theoretical framework suggests that appreciating spatial qualities is a matter of emotions in the first place. A well formed sentiment, and not reason, is the essential prerequisite for experiencing and judging the qualities of a space. However, reason has its role to play, albeit a secondary role, e.g. in detecting general rules and conditions which must be met in order to provide a minimum basis for a qualitative design. After all, architecture is not about experiential knowledge alone. Functional requirements with respect to spatial organization, light, comfort, etc. ., are equally important.

These preliminary results show that, in the Design Studio, reasoning is used as an important tool in the educational context, as a means to judge whether a design action is good or bad, and to appreciate the result, i.e. the future space. What also is apparent in the analysis is that being able to present an adequate reasoning is not a guarantee for being able to produce a design of high quality. This gives rise to two assumptions. Firstly, a student capable of making a design of high quality does this because she has already a relatively well formed sentiment, as a result of previous experiences and learning. Secondly, we can assume that reasoning during the design process is done to some extent to avoid expressing emotions. Students and the teacher are not attentive to emotions, as they are unaware of the importance of sentiment. Could the transfer of the experiential knowledge turn out to be more clear and less tacit if we could use our sentiment? Shouldn't we train the students and the teachers in expressing their emotions during designing, in order to develop the sentiment of all the students and in order to make explicit our experiential knowledge?

The theoretical analysis shows also that appreciating spatial quality requires an active imagination. Frequent multisensory experiences in the past ensure a rich imagination. The analysis of the data illustrates that the word imagination is used but that there is no special attention to the use of imaginative abilities and the multi-sensory experiences during experiencing and appreciating good quality. We conclude that there is attention for the use of imagination during the design action,

i.e. the procedural knowledge, but not during the appreciation, i.e. the experiential knowledge. Hence, the experiential knowledge is being less developed than the procedural knowledge of the students. Do we not acknowledge the importance of our experiential knowledge?

Finally, we would like to emphasize that this study was based on data collected in one Design Studio with only two teachers. We are well aware that this could somehow limit the general applicability of the conclusions. We are planning to extend this research to a larger number of teacher-student environments. We also are considering to develop specific design assignments in order to test more in depth our theoretical framework. Hereby, we would like to be able to investigate the presumably complementary roles of reason and sentiment. Furthermore, the way teachers and students use their body-language in order to express their emotions will be an essential part of the study.

References

De Jong, T.M. & Van der Voordt, D.J.H. (2002). *Ways to research and study urban, archi- tectural and technical design*. Delft: DUP Science.

Eisner, E.W. (2002). *The arts and the creation of mind*. New Haven – London: Yale University Press.

Hume, D. (2000). *A Treatise of Human Nature.* (Norton, D.F. & Norton, M.J., Eds.). Oxford – New York: Oxford University Press. (Original work published 1739/40) (Referenced by the siglum T)

Hume, D. (1965). *Of the Standard of Taste, and other essays*. (Lenz, J.W., Ed.). Indianapolis: Bobbs-Merrill. (Original work published 1757) (Referenced by the siglum SOT)

Grazyck, T (2008). Hume's Aesthetics. *Stanford Encyclopedia of Philosophy.* Retreived January 5, 2011, from http://plato.stanford.edu/entries/hume-aesthetics/#ImaPoiVie.

Lloyd-Zannini, L. P. (1998). A review of Elliot Eisner's Cognition and curriculum reconsidered, *Gifted Child Quarterly*. 42(1), pp. 63-64.

Niedderer, K. (2007). Mapping the Meaning of Knowledge in Design Research. *Design Research Quarterly*. 2(2), pp. 4 -12.

Pallasmaa, J. (2005). *The eyes of the skin*. *Architecture and the Senses*. Chichester: John Wiley & Sons.

Polanyi, M. (1967). *The Tacit Dimension*. New York: Anchor Books.

Schön, D. (1983). *The Reflective Practitioner. How professionals think in action*. Aldershot: Ashgate Publishing.

Smith, M.K. (2005). Elliot W. Eisner, connoisseurship, criticism and the art of education. *The encyclopaedia of informal education*. Retreived June 14, 2010, from http://www.infed.org/thinkers/Eisner.htm.

Zumthor, P. (2006). *Thinking Architecture*. Basel-Boston-Berlin: Bïrkhauser Verlag AG.

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Building on cultural spaces and places for enhancing the intuitive capabilities of students of business and management

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Abstract

Much of the conventional approach to business and management education places a strong emphasis on a primarily rational approach. Yet, particularly at the senior levels of management, and in problematic areas, rationality needs to be complemented by a parallel intuitive approach to knowledge sharing and creation. Social and management sciences have traditionally drawn relatively little on arts, humanities and cultural domains. With a need for a more intuitive emphasis in extending management knowledge, this offers opportunities for drawing on well-established dimensions in these domains.

This paper draws on a particular experiment in the repeated use of a well known art gallery for business and management meetings and educational purposes. This was part of a much broader decade-long series of initiatives in the use of cultural spaces to help address the intuitive "gap" in management education. A number of conclusions are drawn from the analysis of experiences, in particular that the physical ambience of a arts-based physical environment can augment management learning, but also there is great importance in the pedagogic design and in the facilitation style applied.

Keywords

Artistic inquiry; Cultural spaces; rational and intuitive; management knowledge

Introduction

Much of the origins of business and management education lie in subjects which overtly have a strong "rational" orientation, such as economics and operations management, and which are often represented by the acquisition of explicit knowledge. These may be appropriate for more routine aspects of business. But much of the reality of management, and particularly leadership, cannot be reduced to formulae. Because of this, managers frequently need to be able to draw on non-rational approaches, which can be summarised as needing an "intuitive" orientation. This would routinely apply in areas such as leadership, innovation, and human relations. This is an area well explored by for example Isenberg (1984), Sadler-Smith and Shefy (2004), Sadler-Smith and Burke (2009).

However, within the social sciences there is a strong orientation in favour of representing and communicating knowledge through writing and mathematics. Both writing and mathematics are capable of representing both rational and intuitive knowledge. But intuitive knowledge can be particularly well represented through media well understood in the arts and humanities. The rapid extension of media richness in image, audio, video, in analogue and now in digital forms is greatly increasing the potential for non-written and non-mathematical representation.

We have for over a decade been concerned with introducing intuitive approaches into the teaching and learning of business at all levels – undergraduate, postgraduate and in both executive education and within business and non-business organisations. Our experimentation has taken us physically outside the traditional university classroom, and outside the type of artefacts conventionally associated with learning in the social sciences. This paper relates the experiences from one specific strand of the experimental work, and reaches a preliminary assessment of the lessons learnt from these experiences.

We particularly have used cultural spaces and places for the specific purpose of management education, including:

- A wide variety of museums
- Art galleries (including the production of art in the gallery building itself)
- A recording studio
- Theatre and improv rehearsal spaces
- Generic urban spaces as a locale for improvisational research into management

And some of the artefacts developed and deployed include:

- Exhibitions/performances (Holtham, Colton, Dove, Lampel and Ward, 2002; Holtham et al, 2006)
- A garden shed (Ward and Holtham, 2000);
- Postcards (Holtham, Colton, Dove, and Ward, 2003; Holtham and Dove, 2006);
- Dialogue Sheets (Holtham, Owens, Bogdanova and Holtham, 2008)
- Sketchbooks and journals (Owens and Holtham, 2008; Douthwaite et al, 2010).

Methodology

The research approach used in this paper is action research, with the authors at different times and places being all of researchers, designers of the collaborative and pedagogic activities, and also participants in the activities. So the specific approach taken is participatory and collaborative research. Very few of the activities outlined involved working with strangers; it would be appropriate to refer to Skinner's notion (1996) that action research can include "the search for understanding in the company of friends".

Given that the risks of bias are accentuated by this approach, a variety of methods of data collection were used. There was very extensive reflective note-taking by the organisers, including active use of artist-style sketchbooks. There was also extensive recording of the events through all of audio, video and photographic documentation. Each session had its own formal feedback collected at the end of the event, and in some cases after the event as well. Interviews were conducted with a sub-set of participants in each case.

Specific Experiences

We examine here a group of events at the Whitechapel Gallery. This gallery is in the East End of London and immediately adjacent to the City of London. The Gallery was reopened in April 2009 after a major refurbishment incorporating the former Victorian public library next door. At the opening one exhibition held in the Gallery drew

explicitly on the heritage of the building. This was the Bloomberg Commission by Polish artist Goshka Macuga "The Nature of the Beast". Macuga's text on the Commission (Macuga, 2010) includes explicit reference to the events discussed in this paper. The Commission included the display of a full size tapestry reproduction of Picasso's Guernica on loan from its normal location in the United Nations, New York. The original version of Guernica was displayed in the Whitechapel Gallery in 1939 to raise awareness of, and funds for, the Republicans in Spain. Macuga's project (Whitechapel Gallery, 2009):

> ..draws connections across historic and contemporary world affairs, their protagonists and the cultural ripple effects they have triggered. The room has been designed to accommodate meetings, discussions and debates around a central table, with Guernica once again as a backdrop

What was highly unusual about this exhibition was an announcement by the gallery that meetings could be arranged around the large octagonal table, albeit with two main conditions, namely that visitors would have full and uninterrupted access to the gallery, and that the photos, videos and write ups of the event would be made available to the artist and Gallery archive.

Three Events

The Whitechapel Gallery announcement in April 2009 came at exactly the time that a newly-founded interdisciplinary university creativity centre was anxious to make rapid progress, and as a result three bookings were made to utilise the unique features of the exhibition to support the inaugural activities of this creativity centre. The general objectives for all three events started from the utilisation of this highly unusual location for events that would add cachet to, and attract interest in those events. This was an almost unique opportunity for participants to work physically within an art gallery. This aspect was augmented by working in an environment that was fully open to the public. The use of a very large nearly-round table is itself actually quite a rare event. And, what turned out to be crucial, the events were supported by a strong administrative and logistical infrastructure on behalf of the Whitechapel Gallery, which was essential for exploratory events of this nature.

The three meetings can be summarised as below, using the naming convention W1, W2, W3

	Who	What	Time
W1	Associates of Centre	Pilot event	2hrs
W2	MBA Elective Session	Class including artefact production	1hr + 2hrs in studio
W3	Multi-university network	Inaugural Meeting	2hrs

Table 1: Overview of events

The organising team set up the three events in part as experiments into whether creative activities of knowledge workers could be enhanced by being held in this unusual, indeed unique iconic space. This enhancement could either be directly, e.g. by use of the space or artefacts, or indirectly e.g. by attracting interest in attending the meeting. There was however an aim shared for all of the meetings to be more effective or productive as a result of being in the specific physical location.

Effective/productive in the context of knowledge work means that there is improved sharing of knowledge, creation of knowledge and commitment to action.

Analytical Framework

Our analytical framework for creativity in general is based on the long-standing model developed by Rhodes (1961) also see Scritchfield (1999). This is the four P model of process, product, people and press. Isaksen, Dorval and Treffinger (1994) developed the 4Ps by showing that although the themes overlapped, they operationally function together and that in all cases, the context plays a major role

We have however in line with some others, changed the fourth P to "place". Slightly unusually, but addressing at once two of the 4 P's, we are here treating the creation of the creativity centre as itself the **product** of a creativity **process**. Central to that are the various **people** involved, and in this paper the **place** dimension is of particularly great significance. We also agree with Fritz (1994), who strongly emphasises how much creativity, problem solving and innovation are themselves essentially change management processes. We have represented the key relationships, just discussed, in diagrammatic form in Figure 1.
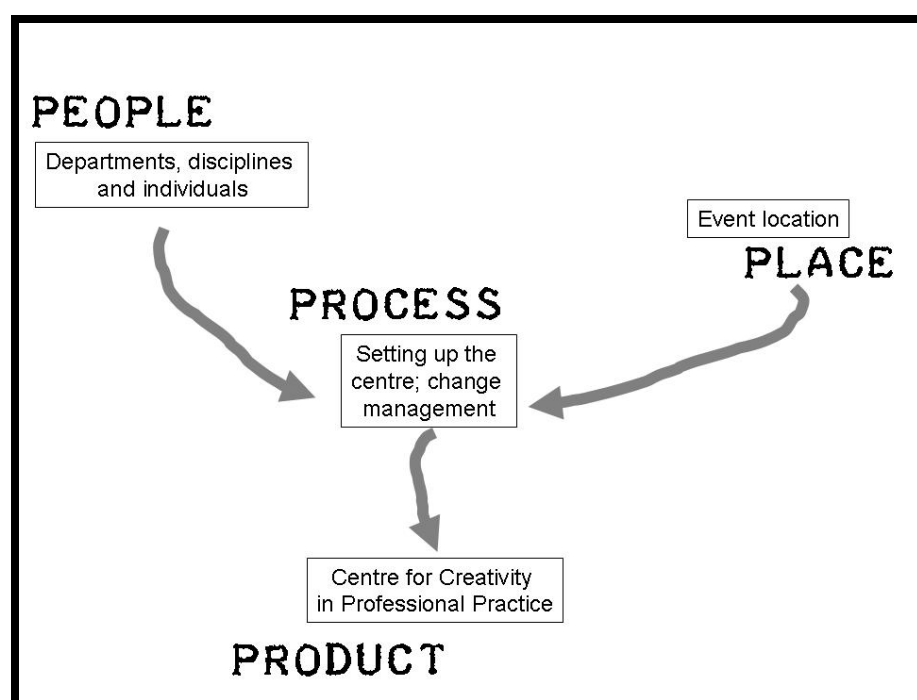
Figure 1 The overall approach under review

Scharmer and Käufer (2000) proposed seven theses to reorientate the 21st Century university, and their thesis number 7 saw "universities as birthplaces and hubs for communities of creation", which:

> …do not strive for a type of science which merely reflects the world, but for a science capable of grasping reality by contemplating the underlying forces of its genesis. In such a university, learners and researchers shift from being distant observers to creative co-designers of a praxis in progress – to midwives assisting in the birth of innovation.

Organising these events would be very much what this midwife role might be for a university.

Event Details

Figure 2 W1 with five participants at the far side of the table; rest are the public

W1 was a small pilot event held with six associates or members of the creativity centre who had all been closely involved in some direct way with creativity processes. This was regarded as a very high risk venture, and was also arranged at short notice, which meant there was very little time to choreograph the event, so it had a highly improvisational quality. It actually was the first "live" meeting held in the Gallery in front of the public (as opposed to events at private views). This was a creativity workshop, with associates of the creativity centre demonstrating creativity tools they used in their own professional practice (Figure 2). The participants sat at the large round table, which was glass-topped to show off documents and other artefacts about life in the East End of London in the late 1930's in particular.

Figure 3 W2

W2 involved a whole half-day session of an MBA elective "Business Mystery: The Art of Management" being held in the Gallery with 19 participants in total (Figure 3). This was also regarded as a risky event, as this type of fine-art based activity had not been attempted on the elective in its previous four years of operation. More time was available for planning, and this was needed to create just the right balance of challenge and business focus for the student activities.

The overt aim of the session was to produce an optych, an eight piece painted artwork made up of eight segments of a circle, mirroring the eight segments of the table (Figure 4). One hour was spent at the table, including in break out groups, on the concept and overall design. The group then went to the Gallery's Clore Studio, where they spent two hours on the more detailed planning of each segment, the design of the segment, and finally its actual painting on foamboard.

Figure 4 The Optych: Flow Tide and Rapids

W3 was the inaugural meeting of the Research Series Seminar Network, with 20 participants. In order to minimise what was still regarded as a risk, this event had even more significant amounts of prior planning and facilitation. Participants first introduced themselves by walking with one or two others around the gallery, with groups reporting back on their experience. The same groups then brainstormed proposals for the operation of the network on a triangular pre-printed sheet. New and larger groups then formed at one side of the gallery (Figure 5) to synthesise by theme the proposals of the individual teams. The penultimate stage involved a promenade with all participants being presented with the three syntheses laid out on the floor of the gallery. The final plenary session was feedback on the whole event at the table.

Figure 5 W3: Larger group work synthesis

The whole round table was itself artwork, and for W3 and especially W2, participants did not really work at the table for the majority of the time, nor use the table artefacts to any great extent. All meetings and especially W2 and W3 had objectives that were to a greater or lesser extent independent of the gallery location. And in particular, the organisers had very limited time. It was decided not to have a computer, projector and powerpoint, and at no time was that a problem, not least as the whole event was predicated on not needing these facilities, so choreographed accordingly. Use was made of small group activity (W1 had consisted only of a small group), break out groups and use of other areas, namely the education studio in W2 and the large empty floor space in W3.

Event Lessons

One thing that was very clear was that there was a noticeable learning curve between the events. A key lesson from W1 was that the impact of working in public had been underestimated by both facilitators and participants; so this was emphasised a lot more for W2 and W3. There was a concern with the security of personal items left around the table, also covered in W2 and W3 briefings. There was a distinct issue with the noise levels when there were many visitors in the gallery, but no real way of amplifying audio by participants. The most important lesson of all from W1 was that the use of the room was feasible even for high-stakes events. And one member of the public had actually joined in the exercises.

There was a quite different lesson from W2: there was little doubt that having 19 people sat round the table acted as a deterrent to the public. In W3: despite being a Friday afternoon, the Gallery was very quiet and once again the presence of a table full of people even seemed to deter some public from coming into the gallery at all.

Public Involvement	W1	W2	W3
Watching	Quite high	Minimal	1 person closely
Participation	One person	None	None
Footfall	High	Medium	Low

Table 2: Interactions with public

The question of working in public is not a unique situation. Retail and customer services staff do it all the time, though for them the link to the public is an integral part of their job. It is much rarer for knowledge workers, though it happens in the public sector, for example in central and local government, where meetings including formal advice and cross-examination are often open to the public. Artistic performances are explicitly put on for the public and some hybrids, arguably courts of law, are a combination of several of the above.

Working in public carries deep symbolic value such as promoting openness and transparency. Yet at the very same time it could have negative connotations – a privileged group, or a set of people performing in public. It was also noticeable that the experience was very different even for different participants in the same meeting. It is not just a shared, but potentially also a contested space. The meeting participants clearly could affect the visitor's enjoyment of the gallery, firstly just by physical presence, secondly via noise, and thirdly through actual obstruction of the exhibits, particularly at the round table.

Important factors which emerged

One aspect which was very clear in W1 and also in W3 was that working across disciplines enhances the possibilities of drawing on associates who may not fall directly within any one specific discipline. It is probably not by accident that many of the participants were working at the margin of conventional disciplines or not in a university at all. Also, because no single school, department or discipline can "own" the topic of creativity, there are attractions in events which bring many disciplines together on "neutral ground"

Following on from both the above, this underlies the importance when creating a cross disciplinary network of sustaining "loose ties", even at the risk of some loss of focus. In business strategy one of the key findings relating to innovation is that it is more likely to occur when there are "weak ties" between potential collaborators (Granovetter, 1973), compared to the formalised "strong ties" found within organisational structures and hierarchies.

Building a community or network may be said to have at least two speeds. One is slow – and a good example here has been the UK National Teaching Fellowship scheme, which underpinned the W3 event. Fellows are appointed for life and most typically physically meet at the annual symposium. So relationships evolve slowly over quite long periods of time. By contrast, other teams or collaborations are driven by quite short-term instrumental goals, such as winning or implementing a network grant bid. Here immediacy, novelty and getting things done tend to dominate.

All three Whitechapel events were unconventional, and as such carry both risks and opportunities. Holding the events in a particularly iconic location certainly further adds to the opportunities.

Returning to the 4 P's via Table 3:

	People	Process	Place	Product
W1	Ad Hoc; weak ties	Improvisational	Gallery	Proof of concept of place and process
W2	Well-established team; strong ties	Highly structured	Gallery and art education room	A collaborative artwork; optych
W3	Inaugural meeting of network; strong, medium and weak ties	Semi-structured	Gallery	Team building and action planning

Table 3: Summary relative to the 4 P's

Product

Each event had a purpose. Also, the events cumulatively formed an explicit part of the setting up and evolution of the creativity centre. Interestingly, as a result of the double-loop learning dimension, the process itself was also a product.

People

This is one of the most intriguing aspects of the experience. The three sets of participants were quite different from each other, though there was some minor overlap of facilitators and participants across the three events. As a result there was very little process similarity between the three events, which had to be highly customised to reduce the risks involved.

Process

Firstly, there was and is an overall change management process, namely trying to shift attention from an approach wholly based on school/department/disciplines, to one which is multi-disciplinary, trans-disciplinary or even anti-disciplinary. Secondly, there was the actual process used in the events themselves. This involved some form of facilitation, which as mentioned differed quite dramatically across the three events.

Place

This is relatively unusual in that the physical place was held constant, and then different types of event held in that one physical place. In fact even then, there were quite different types of use of the spaces in the Gallery on each occasion. Jeffrey (2003) identified a number of tools that characterize and support the collaboration process, including story-lines and metaphor, choice of vocabulary, the nature of dialogue and the role of mediating agents. In this context, physical place is very much a mediating agent, which can impact on dialogue and also enable metaphor to be very directly drawn upon.

Discussion

The lessons learnt from this experience were derived from interview of participants, plus immediate written feedback. A method called the "Twitter Telegram" (140 characters on a stylised telegram form) was introduced as a method of getting feedback very quickly and worked extraordinarily well. Comments fell into three broad categories:

Meetings in an unusual iconic location - the importance of place

It was clear from all three events that meeting participants were very much affected by working in an iconic and unusual space. There were expected indirect benefits from building on the ambience of the gallery to create different types of dialogue. It was also expected that in forming and storming the artefacts gave people something interesting to catch their joint eyes. As it turned out, almost everyone mentioned the war crimes videos as "disturbing", "dislocating." Surprisingly, Guernica itself was less often mentioned, perhaps because it is such a familiar image.

Working in public

What was striking about the workshop was firstly the almost completely unexpected nature of the relationship between the public and the participants of the workshop. There were no ground rules; all those involved had to adjust their behaviour. Perhaps most strikingly, the workshop participants became part of an art installation, themselves being observed at work by the gallery visitors. In the next level, visitors asked if they could participate which had been anticipated and in fact was agreed would be encouraged.

Using events in setting up a creativity network

The organisers benefitted greatly from the diversity of colleagues attracted to the external events W1 and W3. They also benefitted from the rather radical experiences of the MBA students, who had not been expecting to produce an artwork at the gallery. There is every indication that loose ties are of some considerable significance in building an ongoing creativity network, and hence unusual events providing a "neutral ground" may be often more appropriate than more formal events concerned with e.g. transferring knowledge **from** academia **to** business or vice versa.

Wider Implications

It certainly proved to be a valuable event for the participants (and hence for the creativity centre), and allowed deeper learning about how the creative process is affected by location and novel stimuli. It is also unlikely that this event would have been initiated without the new Centre providing a climate for innovation in creativity methods across disciplinary boundaries.

Billoni (2002) has identified the general potential of using an art experience as a stimulus to wider knowledge and insight. This approach of holding a real meeting in a public art space with ordinary visitors could be replicated in almost any art space in the world, given some degree of courage and support by the gallery itself, as well as some willingness to take risks by both meeting attendees and the visitors.

Specific points which arose from the feedback across all three sessions were:

- The artefacts are a direct stimulus to learning in any subject
- The general ambience or aura serves to motivate, achieve focus and even promote attendance

- The locale is a stimulus to conversation

- There are custom facilities, props and tools which support learning generically

- The location is disruptive and so helps "unfreeze" conventional lines of thinking and behaviour

Analysis

Our initial concern was to extend methods of learning about management beyond the primarily transmissive to those which are more constructive or even enactive (Bruner, 1966) in their intentions. It was soon apparent that the benefits of these approaches do not simply relate to diversity in methods. They also enabled the enhancement of different types of knowledge in students.

This aligns with McGilchrist's (2009) thinking in the left and right brain debate, that rational and intuitive dimensions are deeply interwoven and inseparable. However the teaching of management too often makes a stark distinction between the two, with the intuitive often described as "soft skills", insinuating that they are "fluffy", lacking the rigour of more quantitative, rational disciplines.

Our fundamental question is whether acquiring intuitive knowledge through arts-based approaches is a novel but transitory supplement to a dominantly rational mindset, or whether it can in time become a core dimension of the business school as a whole. A powerful case was been made by Antonacopoulou (2010) for the introduction of "critical thinking" as one such core dimension. We extend her case to propose the need for "creative and imaginative thinking" as another core dimension of the management curriculum. However, as Antonacopoulou found, it is not possible to alleviate tensions within the MBA curriculum:

> ..by just introducing an isolated course on critical thinking into the MBA curriculum. Reflexive critique calls for a holistic, interdisciplinary, integrative analysis of management theory and the practice of managing.

The experiment supported the view that cultural resources could play an active and inspirational role within a new style of management degree which set out inter alia to promote both critical and creative thinking. But there is a need for some caveats. In particular, we remain sceptical about "The Star Trek School of Management", or even the "Henry V School of Management" where cultural resources are deployed in a direct, over-literal, sense to generate insights into twenty-first century management.

A basic model of competence in management and leadership can be based on Aristotle (Flyvberg, 2001; Broadie and Rowe, 2002). Aristotle was Alexander the Great's management tutor or coach, who proposed five components of leadership knowledge:

Scientific Knowledge (comprised of facts + insights) + Skills + Practical Wisdom

In Aristotelian terms, a huge amount of management knowledge and learning is concerned with skills and practical wisdom. It is not enough for managers to know something. They must be able to enact that knowledge. It is not enough for managers to put theory into practice. They need to put themselves into practice. This needs a combination of both rational and intuitive approaches to learning, and our experience suggests that cultural resources, appropriately deployed, can have a core role to play in enhancing insights into the intuitive dimensions of management in particular.

Special Thanks

The Whitechapel Gallery were of exceptional helpfulness:

They accepted the artist's conditions to make the room available free for meetings

They put up with strange and unusual requests in the context of a gallery

They were extremely helpful in fixing up electricity supplies and extensions

They tolerated risks in terms of using the glass topped table

Nicky Sim was involved throughout, with intern Sara Guerrero being heavily involved in W2 in particular. The Gallery Assistants were uniformly helpful, particularly in W3 where we felt the public was being deterred, and the assistants told people lurking at the doors that they were welcome to come in.

Bibliography

Antonacopoulou, Elena P. (2010) Making the Business School More 'Critical': Reflexive Critique Based on Phronesis as a Foundation for Impact. *British Journal of Management*, Vol. 21, S6–S25

Billoni, Anthony G. (2002) *The art gallery excursion as a bridge to idea generation and a heightened aesthetic experience.* Masters Thesis, International Centre for Studies in Creativity, Buffalo State College, Buffalo, NY

http://www.buffalostate.edu/orgs/cbir/readingroom/theses/Billotgt.pdf

Broadie, Sarah and Rowe, Christopher (2002) *Aristotle: Nicomachean Ethics; Translation, Introduction, Commentary.* Oxford University Press, Oxford

Bruner, Jerome S. (1966) *Toward a Theory of Instruction*. Cambridge: Harvard University Press.

Douthwaite, Sue; Dove, Angela; Holtham, Clive; Lee, Hee Yu; Palmer, Paul (2010) "Personal and Career Options: embedding reflection within the academic curriculum" Learning at City Conference, London 3rd June, 2010

Evered, R. and Meryl, R.L. (1981) Alternative Perspectives in the Organizational Sciences: Inquiry from the Inside' and 'Inquiry from the Outside; *Academy of Management Review*; 1981 Vol. 6 Issue 3, p385-395

Flyvbjerg, B. (2001) *Making Social Science Matter – Why Social Inquiry Fails and How it Can Succeed Again*. Cambridge: Cambridge University Press.

Fritz, Robert (1993) *Creating: A practical guide to the creative process and how to use it to create anything - a work of art, a relationship, a career or a better life* Ballantine Books

Granovetter, Mark S. (1973) The Strength of Weak Ties, *American Journal of Sociology* Volume 78 Number 6 (May 1973): 1360-1380

Holtham, Clive; Colton, Stephanie; Dove, Angela; Lampel, Joseph; Ward, Victoria (2002) "Shared Information Displays in Management Learning – lessons from experience and experiment" ACM Computer Supported Collaborative Work (CSCW) 2002 Workshop, New Orleans: Public, Community and Situated Displays: Design, Use and Interactions around shared information displays

Holtham, Clive; Colton, Stephanie; Dove, Angela; Ward, Victoria (2003) "Slow Knowledge: uses of the postcard in re-forming organisational time, place and meaning" 'In search of time' conference, Palermo, May 2003

Holtham, Clive and Dove, Angela (2006) "Learning on the cards" QuBE Diagnostic, Cass Business School, London

Holtham et al (2006) "Impacts of analogue and digital documents on collaborative processes in professional education and training" CSCW06 Workshop Banff, November 2006

Holtham, Clive; Owens, Allan; Bogdanova, Mariana and Holtham, Susan (2008) "Visual imagination in professional development", European Institute for the Advanced Study of Management (EIASM) Workshop, "Imagining Business; Reflecting on the visual power of management, organising and governing practices", 26th-27th June, Said Business School, University of Oxford

Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (1994). *Creative approaches to problem solving*. Dubuque, IA: Kendall-Hunt

Isenberg, C. (1984). How senior managers think. Harvard Business Review, November-December, 81-90.

Jeffrey, Paul (2003) *Smoothing the Waters: Observations on the Process of Cross-Disciplinary Research Collaboration* Social Studies of Science (Sage); August 2003, Vol. 33 Issue 4, p539-563

Macuga, Goshka (2010) *Goshka Macuga: The Nature of the Beast*. Whitechapel Gallery, London

McGilchrist, Ian (2009) *The Master and His Emissary: The Divided Brain and the Making of the Western World*. Yale University Press

Owens, Allan and Holtham, Clive (2008) "Innovative reporting on professional reflection-in-action: drawing on methods with origins in the fine arts" Art of Management IV Conference, Banff, Alberta 9th-12th September

Rhodes, M. (1961) *An analysis of creativity*, Phi Delta Kappan, 42, pp 205-210

Sadler-Smith, Eugene and Burke, Lisa A. (2009) Fostering Intuition in Management Education: Activities and Resources. Journal of Management Education, Volume 33 Number 2, April 2009 239-262

Sadler-Smith, E., and Shefy, E. (2004) The intuitive executive: Understanding and applying "gut feel" in decision making. The Academy of Management Executive, 18 (4): 76-92

Scharmer, Claus Otto; Käufer, Katrin (2000) *Universities As the Birthplace for the Entrepreneuring Human Being*

http://www.ottoscharmer.com/docs/articles/2000_Uni21us.pdf

Scritchfield, Michael Lee. (1999), *The creative person, product, process and press: The 4P's.* Buffalo, NY: International Center for Studies in Creativity http://www.buffalostate.edu/orgs/cbir/readingroom/html/Scritchfield-99.html

Stringer, E. (1996) "Action Research: A Handbook for Practitioners" Sage: Thousand Oaks

Ward, Victoria and Holtham, Clive (2000) "Experimenting With Learning About Knowledge: The Art Exhibition and The Garden Shed" PKADD Conference, Lyon September 2000

Whitechapel Gallery (2009) *Bloomberg Commission: Goshka Macuga: The Nature of the Beast* http://www.whitechapelgallery.org/exhibitions/the-bloomberg-commission-goshka-macuga-the-nature-of-the-beast

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