

Translating experience

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ABSTRACT

This paper describes research investigating the significance of physical experience and materiality in creative digital visual art and design practice. Findings are presented from a recent phenomenological study, which indicates the ways in which memory of lived experience informs creative cognition and feeds the imagination.

The importance of physical engagement with the world through the senses enables emotional expression to be made in artworks that can be perceived by both artist and audience. Digital creativity support tools have been found, in this research, to lack interfaces that facilitate the translation of these visual aesthetic qualities in the virtual representation.

Hand use and the sense of touch stimulate novel ideas and enable practitioners to break from fixated thinking when working with digital design tools. Examples of artworks are presented that illustrate ways in which artists, working with digital technology, make use of physical experience to inform visual ideas and innovate design solutions.

The concepts of *somatic principles*, *performative materiality* and *instrumentness* are introduced in order to illuminate the current discourse surrounding the importance of physical bodily experience when working creatively with digital technology.

Categories and Subject Descriptors

H5 [Information Systems]: Information Interfaces and Presentation: *user interfaces; evaluation/methodology; input devices and strategies*

J. Computer Applications: J5 [Arts and Humanities]: Fine arts

General Terms

Design, Human Factors

Keywords

Physicality, hand use, creativity, art, craft, design

1. INTRODUCTION

Memory of physical experience informs creative cognition and inspires the imagination [1]. Most artists and designers are keenly aware of the significance of stimulating their imagination through experiencing new places, images and ideas; the artist's sketchbook is frequently the repository for visual memory prompts using photography, sketches, collaged ephemera and descriptive words. Memory of lived experience contains a wealth of visceral information that excites the emotions and affects the remembering and decision making processes that occur within creative cognition [15, 11]. Information supplied to the brain through the senses about daily experience is so complex that it must be clustered and blended [5] and only novel or emotionally laden experience is retained through a process of perceptual redundancy [6].

Recent research into digital creative practice has shown that the rekindling of lived memory informs visual representations and is essential in providing the practitioner with procedural knowledge with which to craft. Tacitly knowing how to use tools and which tools to select is fundamental in all making; digital technology is no exception [10]. Artists and designers find that input devices frequently lack the haptic and force feedback they would expect from conventional crafting tools [17]. This often leads to dissatisfaction and frustration that inhibits the creative process and disrupts *flow*: the fully engaged hyper-state of immersion in creative thought [3]. Practitioners often rely heavily on digital tools that lack fine sensitivity to pressure and gesture and note that the complex neuromuscular potential of fingers and thumbs is rarely exploited using current technology [22]. Understanding how physical hand use influences creative thinking will inform the development of better creativity support tools [18]. Physical making processes involve the working of a material and it is the physical characteristics and affordances of that material that inform the creative process. Expressions of materiality in the virtual world are often unconvincing in their visual representation and when output as digitally manufactured artifacts, are considered deficient in emotional and aesthetic qualities [22]. Research in the visual arts described in this paper is providing new knowledge that illuminates the role of physicality and materiality in creative cognition and digital practice.

2. MEMORY

2.1 Art practice informed by experience

Ward in Smith [19] describes how every new idea is the product of remembered experience. Wilson [25] asserts the connection between hand and brain in developing imaginative thought. In recent practice based research, investigations involving the generation of digital images based on specific

thematic memories, revealed the ways in which metaphors that combine physical experiences are used to generate novel ideas and drive the creative process [22] (Figure 1).



Figure 1
Panel – digitally printed silk
Cathy Treadaway

The artwork 'Panel' was developed as part of 'Five Elements' a series of five digital prints exhibited in 'Digital Perceptions'¹. The image blends a selection of remembered experiences of a location in China and explores memory through metonymy and metaphor. The title of the work 'Panel' suggests both cloth and wood and is able to express a memory capturing visual qualities of the carved and painted wooden doors, markets selling textiles, visits to a museum and the artist's emotional connection to the location, as well as the broader philosophical theme of the five pieces of work that comprise 'Five Elements'.

Sensory stimulation derived from visual, aural and haptic responses to the lived environment were shown to stimulate the imagination and enable new visual representations to be formed using digital technology. These responses were frequently poetic; directed by an intuitive reaction to remembered experience that was enhanced with emotion.

Collaborative investigations involving empathic art making were used to interrogate this process [23]. A series of art works were developed in which memory of specific time and locations were used to fuel the creative process. The practitioners involved in the investigations found that the mutual experience of physical engagement with the environment enabled a shared visual response to be made. It became possible to communicate a common visual language and to establish shared end goals and criteria for idea selection.

¹ 'Digital Perceptions': an international touring exhibition of digital textile artwork and conference June 2005 – 2007 supported by the Surface Design Association, Wales Arts International, Scottish Arts Council and the Missouri Arts Council, USA.



Figure 2
Kilmory – digitally printed silk
Alison F. Bell and Cathy Treadaway

The initial stage of the creative process involves *preparation* in which the senses are stimulated and ideas recorded [20]. Digital cameras, sketchbooks and journals were used to gather visual information and digital tools including computers running Adobe Photoshop® software, scanners and printers were used to develop imagery iteratively shared between the collaborating artists. The imagery was exchanged between practitioners in layers via websites and on hard storage media enabling a series of artworks to be produced for exhibition² (Figure 2). Analysis of the qualitative research data indicates the importance of physical experience in the development and refining of visual representations. The shared experience enabled an empathic response to be made to the physical situation, informing both the critical selection of ideas within the creative process and providing direction to the development of the work.

2.2 Crafting and memory of physicality

The investigations described above incorporated both analogue and digital crafting processes. The sketchbook was fundamental to the collection and collation of initial visual ideas. Sketches produced on-site while the practitioners were physically immersed in the environment, were later perceived to be richer in conveying memory of the experience than the digital photographs taken at the same time and in the same location. The photographic images were unable to convey the emotional response of the practitioner; how it felt at that time and in that place. The sketches incorporated the muscular and gestured

² The artworks produced during the research comprised a series of digitally printed silk panels which were exhibited in 'Recursions: material expressions of zeros and ones' Museum of Design, Atlanta, USA 2005, 'Digital Perceptions' Leedy-Voulkos Gallery, Kansas City USA and Collins Gallery, Glasgow 2006

response of the body within the environment; the wet paper trapped the gritty sand, blown onto the sketch, resulting in textured marks that spontaneously captured the memory of physical sensation of sand on skin, wind on face and temperature of the location. The incongruity of the photographic representation compared to the physical sketch became the stimulus for the artwork 'Kilmory' (Figure 2).

The research findings indicate that practitioners find physical sketchbooks continue to be vital in digital art and design practice. The physical property of the book and the ability to flick through quickly, at a glance, in a non-sequential manner, assists the recollection and assimilation of visual ideas. The physical action of cutting out images, sticking, manipulating and assembling photographs, sketches and ephemera within a physical book also provide a sense of bodily and mental satisfaction as well as time for reflection.

Physical crafting takes time and the slowness of making frees the mind to reflect on the creative process and to develop new ideas [7] Creativity takes time [20] and hand making processes that are slow to perform, facilitate thinking space in which ideas can be associated and refined. Research has found that art and design practitioners, who work with digital imaging technology, crave hand crafting processes and they frequently engage in such activities in order to stimulate new ideas and break out of fixed patterns of thinking [22]. The physical manipulation of materials and tools also stimulate new ideas through the sensory information they convey. Objects can act as carriers of memory through a variety of sensory properties: sight, smell, sound as well as touch. Each sensory prompt becomes capable of stimulating memory and building imagination through physical proximity or bodily contact.

Craft can be described as skillful making using tacit knowledge or know how; practical ability, acquired by physical experience [4]. When working digitally, practitioners draw inspiration from making in the physical world to attempt '*to reclaim the bodily or human aspect to the digital process*' (Carrigy 2007)

2.3 Conveying emotion

A handcrafted artifact is able to convey properties beyond its material constituents; it is a unique response to a material by the craftsman, often by hand. It may reference cultural tradition and process in its workmanship [24]. The way in which its audience perceives the crafted artifact may be impossible to prescribe, however the maker frequently strives to communicate values, intentions and emotional content through the making process. The emotive qualities of an artwork or 'aura' are derived from the *workmanship of risk*³ [14] and are a unique acumination of creative responses to physical human interaction with the world [21]. Practitioners note the flatness of the digitally crafted product; CAD work is often described as looking the same, homogenous and without character⁴ [12]. The lack of adequate physical bodily interaction with digital creativity support tools is felt by art and design practitioners, interviewed in the research, to be responsible for the perceived deficit in emotional content of digitally produced artwork.

³ Pye [14] contrasts the safe machine made *workmanship of certainty* with the *workmanship of risk* in hand making when at any moment a mistake can be made and the work ruined.

⁴ Matt Duckett founder of NICE states: '*I find if you stay on the computer too long, everything ends up looking the same*' [12].

3.0 PHYSICAL EXPERIENCE



Figure 3

Ceramic hug: Bonnie Kemske

3.1 Touch

Research at Edinburgh University is exploring the development of haptic interfaces to enhance the users' ability to craft more intuitively with digital technology [17]. Appreciation of exactly how touch, manual dexterity and gesture inform creative thinking is limited. Recent studies in neurophysiology and psychology are illuminating the ways in which perception is modified by touch [26]. This research has identified that separate streams of sensory information are fed to the brain from visual stimulation [26]. These have been shown to enable both physical manipulative action and also the perception of objects. Prytherch [13] links the sense of touch with sight and perception and asserts that both provide information to the brain in different ways. Haptic senses result from successive experiences in which substance is encoded; vision provides information concerning shape and location. Research by Goodale and Milner cited in Wing [26] identifies how visual control of prehension informs perception and cognition in order to mediate physical action. These connections between *vision*, *touch* and *cognition* inevitably impact on perception of physical experience and influence imaginative thought [25]. Harris [7] contends that those practitioners that have learnt haptic skills, such as textile handcrafting, have a more acute sense of touch and are more likely to feel constrained by the lack of sensory stimuli inherent in digital crafting. This appears to be confirmed by recent research involving human touch and ceramic surface at the Royal College of Art, London, which suggests that craft practitioners have a greater sensitivity to haptic stimulation [9] (Figure 3). This research has found that tactile surface qualities are perceived differently across the body and a range of stimuli such as temperature, pain, pressure, vibration, light touch and texture activate a variety of different nerve cells in the brain. The propensity of the body to acquire tactile sensory information through the whole body, not just the hands, indicates the rich information flow concerning experience in the physical world that informs cognition. This tactile information is mediated by visual perception, providing both information into the body and expressive output from the body, back into the physical world.

3.2 Bodily experience and digital interaction

As technology becomes physically smaller, ubiquitous and embedded, it is becoming less 'object based' and can be perceived as a set of invisible distributed processes. Schiphorst contends that *'technology is becoming an inseparable aspect of experience, palpable yet invisible'* [16]. Her research uses somatic principles to explore the lived experience of the moving body. In performance-based research at Simon Fraser University Canada, the Whisper project involved interactive digital artworks that investigate user experience from within the living body. Working with embedded sensors and wearable computing technology, the study sought to explore how the participants became aware of their own body state and they were encouraged to share this knowledge with others in a public art space space.



Figure 4

Wearable from Jacare Jungle: Tara Carrigy

Like Schiphorst, research by Tara Carrigy at NCAD Dublin is investigating physical computing using body sensors and wearable technology to create interactive artworks. Carrigy contends that:

'Computing is getting physical and interfaces are getting more tangible. The digital process is merging with the material world, connecting to it through sensors and interfaces that convert analogue to digital and back again' [2]

Her artworks involve the embedded integration of sensors into garments enabling the wearer interactivity with video images within performance (Figure 4). The 'Adaptive Craft' project comprised two artworks: 'Jacare Jungle' an interactive performance work for children that involved the dance performers in dynamic interaction with *'an interface that visually represented sensor data collected by their Wearables, using it to trigger responses in the theatrical backdrop of projected light and pattern'* [4, pp.301].

The second project 'Smart Yoga Wear' sought to present biofeedback in an intuitive and non-invasive manner through dynamic video representations in order to enhance the user's yoga practice. Both projects investigated the ways in which physical crafting could be combined with digital technologies, not to create a static craft object but towards *'a more integral union where the object is in transition, mediating between digital and physical world.'* [2, pp.302]

4.0 TRANSLATION

4.1 Materiality

Crafting processes involve direct engagement with a material. The physical properties and affordances of that substance require the practitioner to develop specific knowledge of how to work with it, based on empirical experience. This tacit knowledge of both material and tool use becomes combined in the act of crafting. Memory of the experience of crafting a physical material informs digital visual representations and provides the practitioner with an intuitive understanding of the creative potential and limitations of the digital craft. For example, in virtual draping for fashion, an understanding of the ways in which cloth handles and falls provides the digital designer greater awareness of the subtleties required in the virtual representation.

Physical materials can also act in a performative role within art and design making [8]. Research has shown that in collaborative art making the use of physical materials to explore concepts and construct prototypes, prior to and during digital design processes, is beneficial to creative thinking. Jacucci and Wagner [8] contend that *'materiality supports intuitive and simultaneous manipulation, mobilizing our tacit knowledge and enabling participation.'* In their research, physical objects have been shown to stimulate creative thinking through their multi-sensory dimensions, encouraging seeing, touching, smelling, gesturing, lifting and moving. They contend that important design decisions occur in the transitions and translations between representational formats and scales, and that material form provides opportunities for richer dialogues, particularly when working collaboratively. They contend that the multi-sensory stimulation, derived from material objects, provides deeper understanding than it is possible to communicate verbally.

4.2 Instrumentness

Recent research into creativity in digital musical collaboration has explored the notion of instrumentness, which *'points to the way musical instruments are controlled and conceptualized through values such as virtuosity and playability'* [1]. By exploring the metaphor of the musical instrument and its physical qualities they have proposed a new paradigm for developing software and interfaces that consider the aesthetics of use *'pointing to alternative values that differ from traditional usability'* [1]. Comparisons are made between making music on a physical instrument, which requires skilled competency (craft) and using a computer. Bertelsen and Breinbjerg, et al. contend that software can be considered a *material* comparable with music notation; by manipulating the notation, or computer code, it is possible to compose new work. McCullough [10] has made a similar claim for crafting with software when developing digital visual representations. The concept of *instrumentness* also implies the investment of time to practice with the software in order to become highly skilled. It negates the requirement for usability and transparency of software in favor of complexity of code that provides an expansive range of possibilities to enhance creative performance.

5.0 DISCUSSION

This position paper has identified some of the ways in which memory of physical experience informs creative cognition within digital visual art practice. The potential of physical material and crafting processes to stimulate creative digital practice has been illuminated through practical art making activities that have resulted in the production of artifacts for

exhibition. The research has shown how multi-sensory information, acquired through physical experience, informs the development of visual concepts and impacts upon the making process through the development of tacit knowledge in both tool use and understanding of material properties. There is evidence that making by hand, touch and manipulative activities, have a significant impact on creative thinking and imagination [22]. Emotional content can be translated from artist to artifact through physical making and can be perceived in the work as 'aura' or 'emotional charge'⁵ frequently lacking in the product of the machine.

Future computing, which is distributed and pervasive, will become increasingly physical through increased human interaction [16]. This will provide greater opportunity to interrogate the ways in which materiality is experienced and translated into digital visual representations. Interfaces that exploit the complex multi-sensory stimulation, perceived through experience of the world, will extend the creative potential of technology within art and design practice. Metaphors drawn from physical objects, such as musical instruments and performative activities, such as constructing physical models or using dance and movement, can suggest new approaches to software development and interface design.

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