



SHARPENS YOUR THINKING

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Published version

MCAULIFFE, Marisha and FRANZ, Jill (2009). Shifting the Focus: The Role of Presence in Reconceptualising the Design Process. In: Undisciplined! Design Research Society Conference 2008, Sheffield Hallam University, Sheffield, UK, 16-19 July 2008.

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Shifting the Focus:

The Role of Presence in Reconceptualising the Design Process

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Abstract

In this paper the relationship between presence and imaging is examined with the view to establish how our understanding of imaging, and subsequently the design process, may be reconceptualised to give greater focus to its experiential potential. First, the paper outlines the research project contributing to the discussion. Then, it provides brief overviews of research on both imaging and presence in the process highlighting the narrow conceptions of imaging (and the recognition of the need for further research) compared to the more holistic and experiential understandings of presence. The paper concludes with an argument and proposed study for exploring the role of digital technology and presence in extending the potential of imaging and its role in the design process. As indicated in the DRS Conference Theme, this paper focuses "...on what people experience and the systems and actions that create those experiences." Interface designers, information architects and interactive media artists understand the powerful influence of experience in design. 'Experience design' is a community of practice driven by individuals within digital based disciplines where the belief is that understanding people is essential to any successful design in any medium and that "...experience is the personal connection with the moment and... every aspect of living is an experience, whether we are the creators or simply chance participants" (Shedroff, 2001, p. 5).

Keywords

Design, Design Process, Presence, Imaging, Grounded Theory

Designing is a complex creative process and the activity of design has been described as having three elementary activities: imaging, presenting and testing (Zeisel, 1984). The general concept of imaging has been referred to in many varied forms and contexts from linguistics to cognitive science. The increasing emphasis on digital design tools and methods, and research on presence provides the opportunity to give greater attention to these activities particularly imaging and its role in designing.

Presence is the experience of "being there" in a mediated environment. It has also been described as "the willing suspension of disbelief" (Coleridge 1847): of being engaged by the representations of a virtual world. It is a term more familiar to disciplines such as cognitive science, psychology, computer science, neuroscience and infomechatronics than it is within architecture or interior architecture. The human brain and senses provide this experience of presence in colours, sounds, movement, texture and feelings. Designers and manufacturers of technologies including immersive displays, computing and

network technologies and interactive computer graphics are providing significant funding into presence research as it provides more accurate reproductions and simulations of reality than were previously possible. Ijsselsteijn and Riva (2003) propose that "...research interest in presence has mainly been motivated by work in three related domains: teleoperation, simulation and telecommunication" and that "...presence research offers the possibility to engineer a better user experience, to optimize the effectivity (sic), efficiency and pleasurability of the different applications. From an application viewpoint, presence research will spur the development of numerous tele-applications in home and professional environments" (Ijsselsteijn and Riva, 2003, p. 7). Presence research has advanced to become common currency in areas such as virtual environments, advanced broadcast and cinematic displays, teleoperation systems and advanced telecommunication applications. In terms of using presence in the design process in interior architectural environments, digital tools have the possibility to heighten a sense of experience in places and space, beings and things that are not actually present.

The research informing this paper is part of a larger study which aims to investigate the relationship between presence and imaging in the design process, but more specifically, examining the role of presence in the discipline of interior architecture. The relationship between people, objects and space within interior environments emphasises sensorial, emotional and experiential integration in a highly relevant context for exploring the capacity of presence to enhance the experiential potential of design. The study's underlying premise is that if a designer attains a sense of presence while designing using virtual environments the possibility for experientially rich outcomes will be enhanced.

Experiential knowledge is knowledge gained through experience as opposed to a priori knowledge. Lawson (2001) argues that design, as a discipline, is highly dependant on experiential knowledge and the actual experience of designing and the development of experiential knowledge used in design may significantly change the design process: "...our experiential knowledge tends to be much more solution focussed whereas our theoretical knowledge tends to be more problem focussed. That is to say designers have an experiential knowledge base which is much more likely to be structured about flat wheels and dished wheels than it is about problems of providing strength, manoeuvrability and so on" (Lawson 2001, p.142).

It is this thinking that is informing the current study and its underpinning methodology of grounded theory. This methodology was chosen and deemed to be an appropriate methodology for several reasons. First, grounded theory focuses on process and action (Strauss and Corbin, 1990). It is described as "...the linking of sequences of action/interaction as they pertain to the management of, control over or response to, a phenomenon" (Strauss and Corbin, 1990, p. 143). Second, it lies within a constructivist paradigm where it is understood that "...concepts and theories are *constructed* by researchers out of stories that are constructed by research participants who are trying to explain and make sense out of their experiments and/or lives, both to the researcher and themselves. Out of these multiple construction, analysts construct something that they call knowledge" (Strauss

and Corbin 2008, p.10). Interactions with participants take place in their 'natural setting' and their broad range of experiences allow for capturing multiple realities around a single phenomenon. Therefore, the emerging theory comes from capturing the participants' everyday reality.

Initially, a pilot study was undertaken and the content was then analysed as to whether certain questions led to data and would address the research aims and objectives. It was also through this pilot study that the interview guide was analysed to see if it would provide the appropriate relevant data. From this, subsequent interviews and focus group questions were refined in order to include new themes as they emerged. The researchers found that the pilot focus groups and interviews provided essential feedback about the feasibility of the format of both. It also provided the ability to monitor the questions that were attempting to explore key issues in the design process. In analyzing the data from the pilot study, patterns began emerging about the identification of important concepts. A questionnaire was then designed and sent out to over 650 'novice', 'competent' and 'expert' designers (see Dorst 2008 for explanation of these terms) within education and practice engaged in interior architecture and design issues. The feedback from these questionnaires should give some insight into designing and its process in terms of visualisation, imaging and imagining. A select number of the questionnaire respondents will then be interviewed and the resulting data will be analysed using GT methods. It is anticipated that, should some questionnaires reveal certain data but the respondent be unavailable or reluctant to be interviewed, a mixed method will be required to analyse the outcome of the questionnaires, since GT methods are not usually used to analyse written questionnaire data.

It should be noted that this paper utilizes the term "virtual" or "virtuality" as the digital mediated experience involving computer technology; as well as the non-digital virtual experience – dreams, imagination, fantasies and day-dreams. Although it is evident that much research on presence has been done in the context of psychology, virtual environments and digital technology, the potential for further research on presence and its impact on the design of interior architectural environments is largely not evident.

Context

The practice and discipline of the design disciplines have long relied on developing certain ways, qualities and methods of representation, especially utilizing traditional forms of representation, such as hand drawn perspective and sketching. Interior architects and designers are required to learn to envision, then to represent spatial solutions using tools or mediums to represent those ideas so the client and end user can see the translation of the designer's ideas into some form of 'reality'. The very nature of interior design is about person environment relationships and how we, as humans, interact with those spaces. Designing and the design process is about these complex relationships and includes "...the creation of spatially realized alternatives to a possible spatial solution" (Shedroff 2001, p. 5).

Traditionally, due to the potential cost of the design process, digital design representation in the design development stage of a project was rarely viewed as a viable option to pre-visualization of a project, especially in small to medium-scale projects. However, as undergraduate students in such fields

as interior design, architecture and landscape architecture become more proficient with software in modelling and presentation, it has become a more viable/economical option, especially for medium to large design firms. Whilst this has seen a dramatic increase – and indeed welcomed by marketing companies - in what some see as a ‘more realistic’ representation of a designer’s ideas, it has been argued that the use of digital design representation is too stylistic and even barren and repetitious. Some critics argue that it is often difficult to translate the designer’s ideas; that too little is left to the imagination and virtual models can appear too real with buildings appearing as if they are complete, inhibiting implications for potential enrichment of the space.

This statement mirrored some of the issues raised by design educators and practitioners discussing the importance of ‘connection’ and ‘relationships’ with our built environments. Perhaps this was more to do with design process and representation, and the ability to “be within” a space both in the design process as well as in the final product.

Technology is advancing with ever-increasing speed and architects and designers are responding by creating more ‘intelligent’ and technologically sophisticated buildings. On the other hand, it is through these advancements that designers face the danger of losing sight of designing for experience and human connection within the spaces and places that they create. Both traditional media (two-dimensional drawings and card models), and more recently, digital technology (virtual three-dimensional programs), are used as visualization tools in the architecture and design industries. Whilst these tools are still inherently important in terms of visual expression, client understanding and visual ‘connection’ with a project, it is as important to also utilise these tools to enhance experiential interior architectural elements, translating those elements from virtual three-dimensional forms to our physical built environments.

Imaging and the design process

The design process is complex and much has been written on the subject, including the activities of *imaging*, *drawing* and *representing* and their relationship. For example, Schon and Wiggins (1992) state that “A designer sees, moves and sees again. Working in some visual medium – drawing, in our examples – the designer sees what is ‘there’ in some representation of the site, draws in relation to it, and sees what has been drawn, thereby informing further designing” (Schon and Wiggins, 1992, p. 135). Other writers, such as Tovey (1989) believe that visual thinking and reasoning, and drawing, are integral to the design process: “Seeing involves receiving visual information and interpreting it according to certain codes, conventions and stereotypes. Imaging is an internalized vision of seeing, using similar codes and conventions. Drawing is an externalized equivalent of imaging and seeing. The three activities work together complementing each other and encouraging purposeful and productive visual thinking” (Tovey, 1989, p. 25). Although this author discusses drawing as the stage following imaging, it is imaging, or visualising in the designer’s ‘mind’s eye’ that is important: “Drawings and 3D models are languages for handling design ideas. *The actual process of creating design ideas goes on in the mind*, and the

drawings and 3D models are attempts to reproduce the designer's mental images" (Ibid) (my italics).

According to many authors including Zeisel (1981) the ability to mentally formulate a plan or solution to a design problem is central to the design process. When undertaking the early stages of design, the designer formulates a visual language in his/her head, based on external forms then manipulates those representations to formulate a solution to a design problem. These internal visualisations and manipulations are thought to play a key role in the resolution to design problems, although this may depend on the school of thought in terms of design process. As Tovey (1989) and others suggest, it could be argued therefore, that design happens in the mind, and it is generally viewed that designers must be able to visualise their design in their minds eye prior to representing it physically. Although Ferguson (1977) discusses the importance of imaging from an engineering standpoint with historical examples given, he emphasises that this "thinking with pictures" is an essential part of engineering education and development of art and science and the ability to deal with the complexities of designing. He states:

"Many features and qualities of the objects that a technologist* thinks about cannot be reduced to unambiguous verbal descriptions; they are dealt with in his mind by a visual, nonverbal process. His mind's eye is a well-developed organ that not only reviews the contents of his visual memory but also forms such new or modified images as his thoughts require. As he thinks about a machine, reasoning his way through successive steps in a dynamic process, he can turn it over in his mind. The designer and the inventor, who bring elements together in new combinations, are each able to assemble and manipulate in their minds devices that as yet do not exist" (Ferguson, 1977, p. 1).

*In using the term 'technologist' here, the author refers to craftsmen, designers, inventors and engineers.

The statement illustrates that the designer visualises in their mind's eye the design of the form/object and parts of the object. Many researchers suggest that this process appears to involve storing, retrieving, and manipulating a repertoire of mental images of shapes and forms in order to synthesise them thus creating a new form/object. This has been referred to as creative mental synthesis (or in Zeisel's work, 'real creativity', although this term can have many different meanings in various writings and disciplines). However, while this has been a generally accepted view for sometime, it does not imply that it has been empirically validated. On the contrary, a great deal of the design literature discussing design thinking is based on introspection and anecdotal evidence. Lawson (1980) in his work on design thinking was largely anecdotal but he also points the way towards a possible area where appropriate empirical methods may be found: "Of all the questions we can ask about design, the matter of what goes on inside the designer's head is by far the most difficult and yet the most interesting and vital. This leads inevitably into the realm of cognitive psychology, the study of problem solving and creativity, in short thought itself" (Lawson, 1980, p. 94). Although much research has been undertaken in the area, there is still a need to use a more systematic methodology in order to validate the views expressed in the design literature relating to creative mental synthesis. Muller (1989) suggested an educational

need to investigate the capabilities of designers with respect to the mental manipulation of shapes in design and Kokotovich (2000) argued that whilst there has been extensive research over the past thirty years in perceptual psychology, the research has not specifically addressed issues in design thinking. He proposed that "(D)eveloping a detailed understanding of creative mental synthesis will serve to support design education, and therefore the improvement of design practice. Cognitive processes are central to the process and practice of design. Consequently, it is important that some of these cognitive processes be identified and understood" (Kokotovich, 2000, p. 2).

Even within disciplines such as science, visualisation, reasoning and imagining play a part in how individuals make sense of certain 'problems'. Gilbert, Reiner & Nakhleh (2007) explore the role of visualisation in science education. Although primarily written for curriculum and pedagogy within science, this research does explore internal and external representations and visualisations within such areas as science practice, science education researchers, computer specialists, and cognitive scientists, illustrates the future implications for curriculum design and teaching and learning within the discipline of science. This research has direct relevance and potential impact on design research and design education in the future.

Lawson (2005) argues that reasoning and imagining are most important to designers as a critical part of the design process. Whilst reasoning and imagining differ in that reasoning "is considered purposive and is directed toward a particular conclusion" and imagining is where the individual draws from their own experience "...combining material in a relatively unstructured and perhaps aimless way", both are considered to be a part of the creative process of designing. He explains that even in the most structured and disciplined fields such as engineering, many design problems are solved using the combination of imaging, imagining and reasoning in this creative and imaginative process (Lawson, 2001, pp 137-138).

In discussion on imaging, the issue of imagination and spatial cognition arises. In the 17th century philosophers began to understand ideas of imagination, which has been subjected to many empirical beliefs over the ages. Following their lead, ultimately science became involved and imagination became a matter under study by what is now known as 'cognitive science'. Since imagination and ideas surround it are of a metaphysical nature, there still remains misunderstanding and disagreement over what the human imagination entails. Although the questions surrounding it are approachable from many angles, researchers within areas such as cognitive science, and increasingly more so designers, continue to focus on the 'imagery' aspect of the human imagination. It was Aristotle who has been credited as being one of the first to attempt to explain 'imagination' when he began to address mental images, associating it with 'common sense' (*sensus communis*). However, after much debate, many philosophers determined that 'common sense' and the 'human imagination' are two different things (Descartes-*Treatise on Man*).

In understanding this spatial cognition is also a related area. It is a fundamental human ability which has had much attention over the past 50 years and there is a significant amount of literature on the subject. Spearman

(1904) proposed spatial ability as a two-factor model for intelligence and was also credited with the invention of factor analysis. Following on from the 1900's the issue of spatial factor has become an important measurement on intelligence tests and is still the focus of a large amount of literature and research. However, this research is not focussed in this area even though it could be argued that imaging plays a large part in spatial cognition. It is not the intention of this paper to review either imagination or spatial cognition studies.

The previous discussion gave a brief overview of imaging and its relationship with other concepts such as visualisation and mental process. These concepts are conveyed in Figure 1. Both the discussion and Figure 1 highlight an emphasis on vision and visual images in the cognitive sense. Very little if any research appears to give recognition to the role of other senses or the imagined role of other senses in emotional and experiential interaction with imagined spaces, places or scenarios. This is in contrast to research involving presence as is described in the following section.

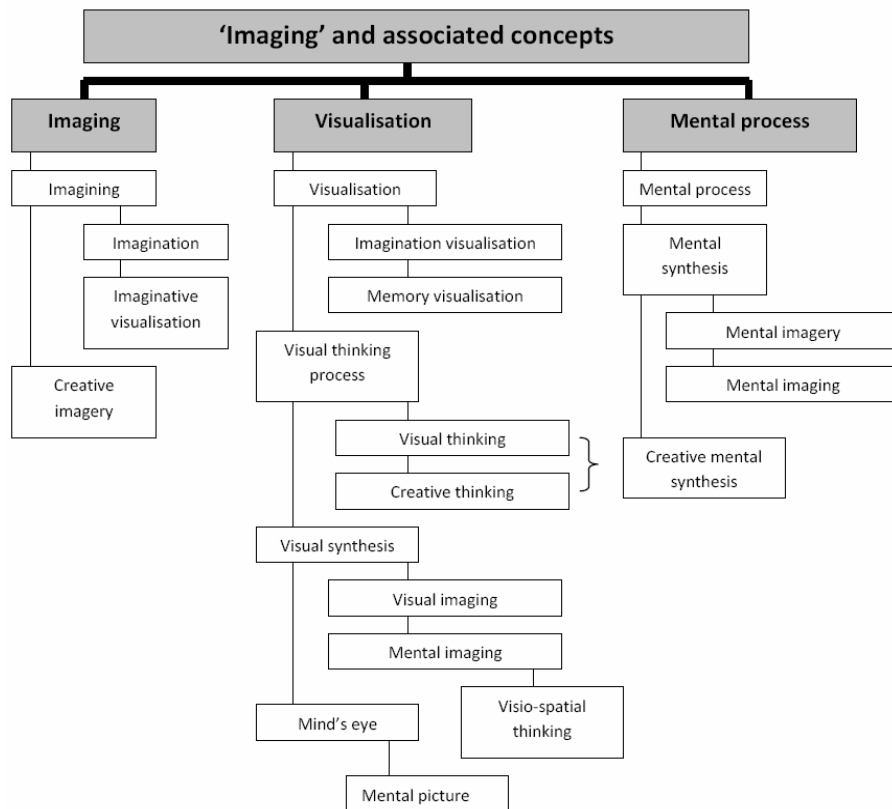


Fig. 1. Dominant and associated concepts of imaging and related concepts

Presence

Presence is not a revolutionary concept (examples may include the "willing suspension of disbelief", identified by Coleridge (1847); reverie, identified by Bachelard (1971); and 'flow', identified by Csikszentmihalyi (1990) and is used in many different contexts. The term is used to describe human experience in non-immersive, non-interactive, and non-digital environments, and there are many descriptions of it (Lombard & Ditton (1997)). Presence has been utilised across various disciplines including sociology (e.g. Zhao, 2001), psychology

(e.g. Lessiter, Freeman, Keogh & Davidoff (2001)), communication (Biocca, 1997), computer science (e.g. Minsky, 1980), and engineering (e.g. Draper, Kaber & Usher, 1998). It is either mediated or non-mediated by technology: non-mediated presence includes social presence (Zhao, 2003, Biocca, Harms and Burgoon, 2003), and mediated presence includes spatial presence (Steuer 1991); social presence (Cook & Persinger, 1997, Biocca & Nowak, 1999), and presence as social or cultural construction (Mantovani & Riva 1999).

Presence has been defined as a subjective experience of 'being somewhere', usually in the sense of being in a computer-generated or computer-mediated environment. It is a term more familiar to disciplines such as cognitive science, psychology, computer science, neuroscience and infomechanics, than it is within architecture or interior architecture. In a traditional context, the term presence has been defined as a state of being present in a place or something felt or believed to be present. Thus, presence could indicate either a tangible condition when something or someone is actually present in the physical world, or may also connote a personal perception of the world (physical or virtual), embodied in a feeling or belief.

Zhao (2003) describes that "(B)eing there" is a metaphor, referring to presence in an environment other than where one's body is. In the literal sense of the word, therefore, "being there" is impossible because nobody can be here and there at the same time. To get there from here, one needs to relocate one's body in space and time through locomotion, yet as soon as one gets there, what was once "here" will become "there." Thus, at any given point in time, a person can only be "here" - a place that is within his or her immediate sensory reaches. In that regard, it is legitimate to say, "I'm going there," "I'll be there," "I was there," or "I've been there," but it does not make sense to say, "I'm there." However, in a figurative sense, "being there" is possible in at least two different ways: through (a) sensory extension or (b) sensory simulation" (Zhao 2003, p. 1).

In terms of presence and sensory stimulation, the author argues that a person's sensory extension changes the "being" of a person by electronically extending the reaches of the person's natural senses such that he or she is able to experience "being" in a remote environment without actually physically being in that environment - there, in that place. On the other hand, this sensory simulation brings the "there" *here* to a person by presenting to the individual, through sense manipulation, with an experience similar to the one obtained from an actual encounter.

Therefore, the sense stimuli creates the "being 'there'"; the "there" being a virtual environment or a mental model, rather than the real environment the mental model represents. A sense stimulus is in this case a presence medium which is used to make what is not present seem present. A presence medium can take physical, electronic, or verbal forms. Physical presence media, such as paintings, artificial plants, dolls, and performing arts, simulate the sensation of encountering a real object by presenting a substitute that physically resembles the object.

Lombard and Ditton (1997), and Lombard, (2000a) describe 'presence' as referring to the sense of 'being somewhere', usually in the sense of being in a computer-generated or computer-mediated environment. Presence is an

experience of being engaged by the representations of a virtual world, being: "the perceptual illusion of nonmediation in which the medium appears to become either invisible, or transformed into a social entity." (Lombard and Ditton, 1997, p. 22) The authors describe presence as the invisibility or transparency as a large open window, with the medium user and medium content (objects and entities) sharing the same physical environment whereas in transformation, the medium can appear to be transformed into something other than a medium, a social entity to be more like human-human interaction: "An illusion of nonmediation" occurs when a person fails to perceive or acknowledge the existence of a medium in his/her communication environment and responds as he/she would if the medium were not there." (Lombard and Ditton, 1997, p. 5)

Virtual presence is defined as the creation of an illusion of presence created by artificial immersive devices; commonly affiliated with 'virtual reality' (VR) or 'virtual environments' (VE) systems, where computer programs are used to generate virtual objects and environments presented to the individual through a variety of technologies. The artificial immersive input devices are used to stimulate the senses and to create an illusion of being within a remote virtual environment. Virtual presence could be considered as a special case of telepresence where the environment is artificially created.

Literary Presence

Literary presence can be described as an illusion of presence created by story telling – in text, virtual or visual form – and is a common artistic goal for traditional communication technologies through books, art, theatre, television and film (Lombard & Ditton, 1997). Through this presence the individual is led to believe through the spoken word, images and sound that they are someplace else, or are in the presence of people who are not actually there. The strength of illusion is in the willingness to suspend disbelief. (Coleridge, 1847) It is generally described by Lombard and Ditton (1997), Jacobson (2002), Coleridge (1847), Gerrig (1993) and Gilbert (1991) as an illusion of presence created by story telling – in visual, auditory, traditional text, or haptic forms – and is a common artistic goal for traditional communication technologies through books, art, theatre, television and film (Lombard & Ditton, 1997).

Lombard and Ditton (1997) define literary presence under the category of "presence as transportation – 'You are There'" (the authors define six categories of presence, as illustrated previously). They discuss this as perhaps the oldest version of presence, and describe oral story telling and written narrative. Coleridge (1847) indicates a type of presence when he describes writing his *Lyrical Ballads*:

"(...) it was agreed, that my endeavours should be directed to persons and characters supernatural, or at least romantic, yet so as to transfer from our inward nature a human interest and a semblance of truth sufficient to procure for these shadows of imagination that willing suspension of disbelief for the moment, which constitutes poetic faith." (Coleridge, 1847, ch. Xiv)

Bachelard (1998) also identified a form of presence when discussing poetic imagination and reverie. Poetry consists of authentic images that represent an “emergence of the imagination” and:

“The cosmic reverie...is a phenomenon of solitude which has its roots in the soul of the dreamer. Cosmic reveries...situate us in a world and not a society. The cosmic reverie possesses a sort of stability or tranquillity. It helps us escape time. It is a state. Let us get to the bottom of its essence: it is a state of soul.”(Bachelard, 1998, p. 56)

Bachelard’s view is that the authentically poetic image emerges from a form of forgetting or ‘not- knowing’ that “is not ignorance but a difficult transcendence of knowledge.” In this, he claims that neither history nor psychology can ever fully determine or explain the phenomenon.

Spatial Presence

Spatial presence is the feeling, state or sense of being in another place.. (Steuer, 1992) Steuer describes this as “...the experience of natural surroundings; that is, surroundings in which sensory input impinges directly upon the organs of sense.” (Steuer, 1992, p. 6) Steuer also identifies the different environments that spatial presence provides: “In unmediated perception, presence is taken for granted—what could one experience other than one’s immediate physical surroundings? However, when perception is mediated by a communication technology, one is forced to perceive two separate environments simultaneously: the physical environment in which one is actually present, and the environment presented via the medium” (Ibid).

This form of presence also includes research on embodiment, as identified by Schubert Friedman & Regenbrecht (1997), who propose an interpretation of presence as embodied presence: “Presence is observable when people interact in and with a virtual world as if they were there, when they grasp for virtual objects of virtual cliffs.” (Schubert Friedman & Regenbrecht, 1997, p. 1) They also identify this spatial presence and the reaction to it: “...presence emerges when possibilities of bodily action in the virtual world are mentally represented” (Schubert Friedman & Regenbrecht, 1997, p. 2).

Virtual reality interfaces are evolving to embody user progressively and Biocca (1997) examines the effect of embodiment on sensation of physical, social and self-presence in virtual environments, and the effect of avatar representation on body image and schema, which has become distorted.

“...inside the virtual world there is more than a computer graphic representation of the self, there is an internal subjective representation of the self, that is a model of the self’s body and a model of one’s identity. Self-presence is defined as users’ mental model of themselves inside the virtual world, but especially differences in self-presence due to the short term or long term effect of virtual environment on the perception of one’s body (i.e., body schema or body image), physiological states, emotional states, perceived traits, and identity. Self-presence refers to the effect of embodiment in the virtual environment on mental models of the self, especially when that model of the self is foregrounded or made salient.” (Biocca 1997, p. 19)

He proposes that embodiment in an avatar has an effect on the mental model of the self, that is, when the user is embodied in an avatar, several events are occurring: the body schema or body image model of the user's body could be influenced by the mapping of the physical body to the geometry and topology of the virtual body, and the virtual body may have a different social meaning or role than the user's body. The constant pursuit of presence and telecommunication of our bodies with technology binds a tight weave of the physical body and computer interface, to the point that cognition and identity are so far embodied, and our consciousness between the experience of the un-mediated body and the mediated virtual body raises the question: "where am I present?"

The different orientations to and conceptions of presence are shown in the Figure 2. A common quality emerging from the work on presence is that of experience and experiencing in a holistic sense involving all our senses, albeit in an imagined, virtual or synthetic way. This is particularly evident in the poetic and metaphoric use of language including concepts such as immersion, embodiment, parasocial interaction, and so on.

According to the *Peach Deliverable D4.7 Presence Research and Technology: Future Markets (Issue 1)* (2008) and Riese (2007), the fields and disciplines of architecture and construction stand to benefit substantially from presence research due to their relevance in visualisation and immersiveness.

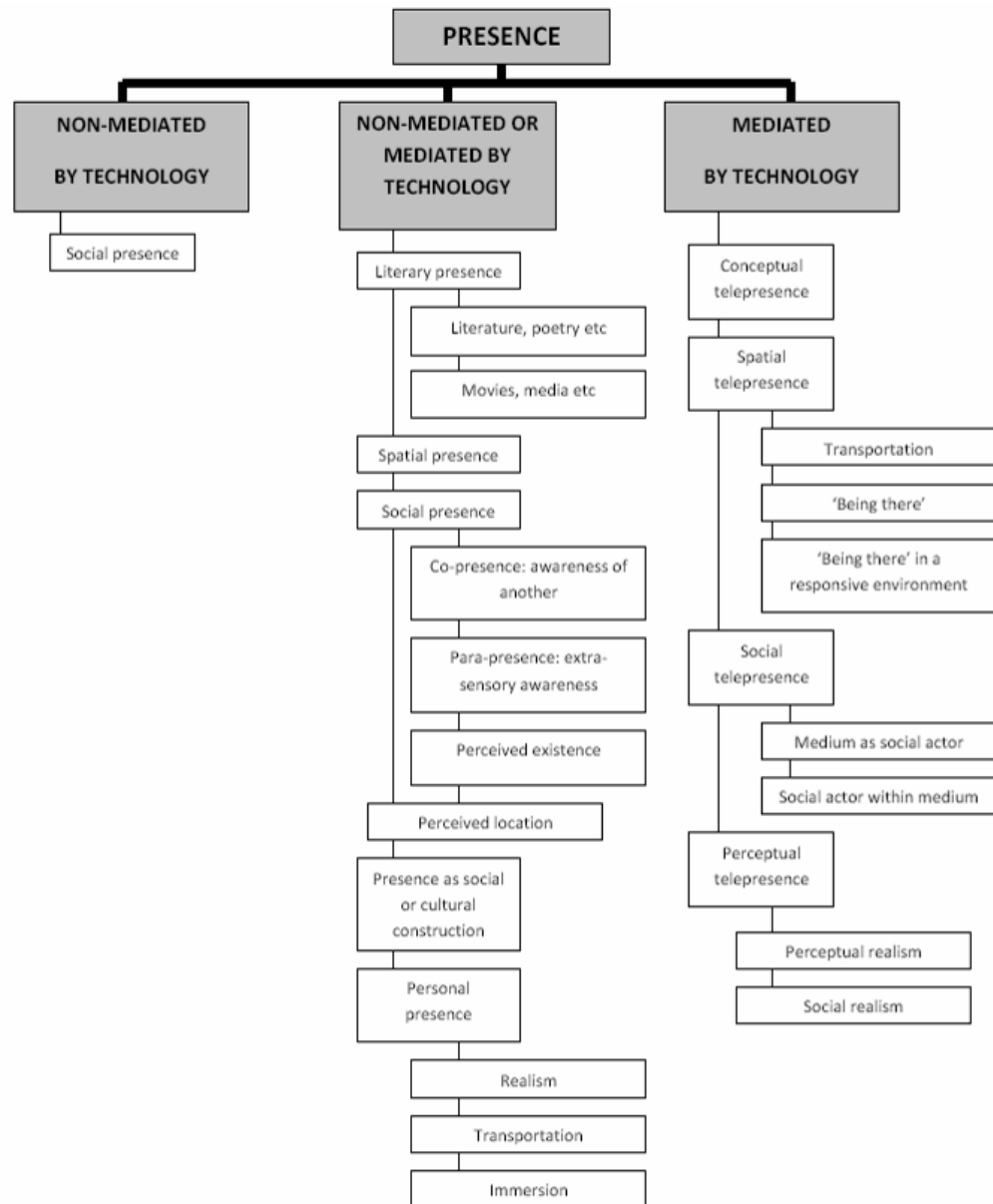


Fig. 2. Presence: orientations and constructs

Conclusion

The comparison of imaging and presence undertaken in this paper highlights the potential of presence to inform a richer and more experiential understanding of design and designing. As previously noted, this proposition forms the basis of a current study situated within the context of interior design/interior architecture. This is particularly relevant given the emphasis in interior design/interior architecture on sensory and emotional experience. The previous overview, especially that on presence, also highlights the significance of digital technology in developing as well as in facilitating the activity of imaging in the design process.

In all this research recognises the potential of new and hybrid disciplines and technology to inform design theory and design methodology. The value of this paper is in highlighting this potential. The project also recognises the need to

employ rigorous research methodology in producing outcomes that have substance and relevance in a world that is at risk of becoming increasingly desensitised and inhuman(e).

This research is a response to the argument by Dorst (2008) that "...we should refocus our attention and enrich academic design research by working on a deep and systematic understanding of the 'design object', the 'designer' and the 'design context'" (Dorst, 2008 p.6).

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