

Triangulation In Practice

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Abstract

Triangulation is the means by which an alternate perspective is used to validate, challenge or extend existing findings. It is frequently used when the field of study is difficult, demanding or contentious and presence research meets all of these criteria. We distinguish between the use of hard and soft triangulation – the former emphasizing the challenging of findings, the latter being more confirmatory in character. Having reviewed a substantial number of presence papers we conclude that strong triangulation is not widely used while soft triangulation is routinely employed. We demonstrate that the usefulness of hard triangulation by contrasting an ontological analysis of *in-ness* with an empirical study of (computer) game playing. We conclude that presence research would be well served by the wider use of hard triangulation and for the reporting of anomalous and ill-fitting results.

Keywords: triangulation, involvement, Heidegger, game playing.

1. Introduction

Triangulation is the means by which an alternate perspective is used to validate, challenge or extend existing findings. Triangulation is used when the field of study is difficult, demanding or contentious and presence research is certainly all of these. It is widely used in a number of disciplines as varied as astrophysics (e.g. Gribbin, 2008); human-computer interaction (e.g. Gray and Salzman, 1998); neuroscience (e.g. Robson, 2009); nursing (e.g. Thurmond, 2001) and education (e.g. Altrichter *et al.*, 1996). Triangulation is, of course a metaphor derived from surveying and navigation. Triangulation relies on the idea of using two known points to locate the position of an unknown third point, thus forming a 'triangle'. Cohen and Manion (1986) define triangulation as an "attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint" (p.254). Similarly, Altrichter *et al.* (1996) regard triangulation as a means to achieve "a more detailed and balanced picture of the situation" (p. 117). Lincoln and Guba (1985) have gone as far as to say that, "Triangulation of data is crucially important in naturalistic studies ... No single item of information (unless coming from an elite and unimpeachable source) should ever be given serious consideration unless it can be triangulated" (p. 283). Denzin (1978) describes four different forms of triangulation:

Data triangulation involves the use of heterogeneous data sources, for example, qualitative and quantitative. Alternatively data may be gathered (using the same method) from different sources or at different times, for example, the pre- and post-use of a questionnaire. Data triangulation may also be achieved by gathering data using different sampling protocols, contrasting data gathered at different times and settings. Variance in events, settings, times, and so forth may bring to light revealing atypical data or recurrent patterns both of which may improve the confidence in the findings. This last point is not to be confused with longitudinal studies is to identify changes over time. (Denzin, 1970).

Investigator triangulation involves the use of multiple researchers in an empirical study. Investigator triangulation involves using more than one independent investigator in the study. This form of triangulation is particularly relevant in the interpretation of material, in for example, the various forms of textual or verbal protocol analysis.

Theory triangulation involves using more than one theoretical framework in the interpretation of the data. Theoretical triangulation is the use of more than one theory hypotheses when investigating a phenomenon. In theoretical triangulation, the perspectives or hypotheses used in the study may be related or have opposing viewpoints.

Methodological triangulation involves using more than one method to gather data. This is not always as simple as it appears. For example, it could be argued that methods which provide qualitative and

quantitative data are methodologically distinct. However both methods have similar objectives and scope. Dzurec and Abraham (1993) note that both qualitative and quantitative studies are designed “to understand and explain behaviour and events, their components, antecedents, corollaries, and consequences” (p. 76). Qualitative data is often used to “explain” or add depth to quantitative findings. Similarly combining qualitative and quantitative methods may help the researcher eliminate competing explanations.

Triangulation, in whatever form, is based on the assumption that using several data sources, methods and even investigators will obviate any bias in a data set or methodological approach. Thus, by using several different methods in the investigation of a phenomenon we can increase the confidence we have in our conclusions (Bryman, 1988). This does, of course, raise the spectre of confirmation bias and a point to which we will return in the final section of this paper.

We should also note other critiques of triangulation. As Fielding and Fielding (1986) and others observe, triangulation can only provide a fuller picture rather than any form of objective truth and its results must be interpreted and presented in this light. More fundamental reservations concern the combination of incompatible epistemologies, as argued in Silverman (2000, 1993) and Blaikie (1991). As Silverman (2000) points out, it is for example, nonsense to analyse interview material as unproblematic descriptions of an objective truth while treating data from other sources as socially constructed accounts of reality. On similar lines Blaikie concludes that true triangulation is limited to multiple data sources and multiple investigators in analyses which share a common ontology and epistemology,

While recognising that triangulation can neither bridge paradigms, nor establish ‘truth’ or ‘facts’, we argue that a careful application of the approach remains valuable in the verification of conclusions and in compensating for the *lacunae* and partiality of single techniques, data sources or researcher analyses. It is also the case that the large majority research studies in the presence domain adopt a positivist and empiricist paradigm, thereby avoiding epistemological conflicts in their application of triangulation.

Anticipating the review of the use of triangulation in presence research (next section) we distinguish between hard and soft triangulation. Hard triangulation is characterised by the challenging and testing findings. Soft triangulation is more confirmatory and complementary in character.

2. Triangulation in Presence Research

The term triangulation itself is infrequently used in presence research, instances of explicit use predominantly occurring in studies with an emphasis on social presence. Most approaches to triangulation, whether or not using the specific term, appear to have the “soft” intent of providing as complete a picture as possible, or to better understand data obtained from different sources, this latter point being a common justification for the use of qualitative methods. However “harder” exemplars can be found. We present a sample of both styles of triangulation below. Illustrations are drawn from across the body of presence literature, but predominantly from later sources in order to focus our discussion on the current state-of-the-art.

2.1 Data triangulation

Data triangulation entails obtaining data from different sources, or at different times or under different conditions, but would not include studies where these comprise the independent variables in an experiment. That being said, data triangulation is commonplace in presence research although rarely explicitly commented upon. For example, both Bailenson and Yee (2006) and Mark and Kobsa (2005), discussed below in the context of investigator triangulation, use multiple groups of participants as do very many other studies. To take just one illustrative example of triangulation of data sources, the analysis of social presence in a pedagogic computer conferencing application discussed in Rourke *et al.* (2001) takes data from two different graduate-level conferences. While the main thrust of their argument is methodological, the authors identify differences in the degree of social presence between the conferences, leading them to suggest that an unexpectedly low density of social presence indicators may relate to a high degree of familiarity among participants. Further, the sensitivity to such differences is taken to be an indicator of the robustness of the coding instrument. In an instance of temporal data collaboration, a technique which is less widely adopted outside explicitly longitudinal studies, Bouchard and colleagues (Bouchard *et al.*, 2007) examined data at different stages of the therapeutic process in their investigation of the comparative efficacy of therapy administered face-to-face or by video link.

Questionnaire construction necessarily requires data triangulation, as in the work of Lessiter and her colleagues (Lessiter *et al.*, 2001) on the ITC-SOPI questionnaire. In its validation the instrument was

administered to six sub-samples, in total over 600 participants who experienced varying levels of immersion and different display content. Items which were “conceptually or statistically inconsistent” or had low internal reliability coefficients as calculated by Cronbach’s alpha (a statistical test) were excluded from the final version.

2.2 Methodological Triangulation

Methodological triangulation which involves using more than one method to gather data is ready-to-hand in the literature. Perhaps the most common approach is to combine qualitative and quantitative measures. Edmondson (2007) is typical here, and states an explicit aim of triangulating qualitative and quantitative data in a multi-methods approach exploring the potential of tele-presence technologies in of teacher professional development. Groups of teachers undertook training in traditional and online training. Quantitative methods employed comprised the collection of data from a “concerns based” measure of how far teachers had adopted the instructional strategies which were the subject of the training - and the results of a mathematics test which again assessed aspects of training content. Qualitative data was obtained from a grounded, thematic analysis of video of the online training sessions and interviews which formed part of the concerns based assessment. It is observed that, taking into account practical limitations, the triangulation produced “corroborating evidence” for the conclusions drawn about the effectiveness of the training.

A particularly comprehensive application of multiple methods is described in Di Bias and Poggi (2007), who report a large scale collaborative learning project mediated through virtual reality learning spaces and other collaborative spaces. “Social virtual presence” was identified as the key factor in the project’s success. Data was gathered through a combination of surveys, interviews, focus groups, chat logs, video of class interactions, written reports from tutors, student-produced artefacts, forum posts, capture of tutors’ screens in online sessions and expert review. Analysis methods included quantitative analysis of closed questions, thematic coding and classification of open-ended responses, identification of explanatory or illustrative examples, and visualisation using graphs. As stated, the aim and subsequent results of this panoply of methods was “to provide a picture as complete as possible of the learning experience.” rather than to challenge or contest findings.

From the early years of the field, presence researchers have advocated the corroboration of subjective reports by physiological data (Ijsselstein, *et al.* 2000). Among the more recent and rigorously reported examples of this genre, Garau *et al.* (2004) and later Slater *et al.* (2006) present results from a study conducted using a ‘CAVE-like environment’ – a virtual bar - to investigate the relationship between physiological responses, breaks in presence and the behaviour of virtual characters towards the participants. The Garau report focuses on a range of qualitative measures – an immediate post-experience question, a longer semi-structured interview, subjected to thematic analysis, and a graphical representation by participants of temporal variations in sense of presence. Discussion of the results notes that subjective responses mirrored the experimentally-induced break in presence, while in overall consideration of the methods employed the authors note that the qualitative work provided insights regarding temporal variations and produced the unexpected finding of spatial variations in presence within the same environment. Slater *et al.* consider the results of the physiological measures - galvanic skin response, heart rate, heart rate variability, and event-related heart rate changes. Changes in heart rate, heart rate variability and galvanic skin response were shown to be responsive to induce breaks in presence and utterances by virtual characters.

Many other presence studies combine physiological and subjective, self-report measures of presence. While in some cases these are simply reported as complementary measures, in others discrepancies between the results of different measures are carefully interrogated. Callan and Ando (2007), for example, in an investigation of sound, imagery and presence, used discrepancies in correlations between fMRI measures of neural activity and subjective estimates of strength of imagery as a basis for a discussion of underlying mechanisms and relationships.

2.3 Investigator triangulation

Most instances of investigator triangulation lie in studies using qualitative methods, usually where coding of data is required, and are broadly self-similar. Triangulation here is confirmatory in nature and a means of demonstrating the reliability of the coding instrument rather than challenging conclusions. (Indeed, it is difficult to imagine how this might be otherwise unless the aim of the work is to highlight differences in researchers’ interpretive frames.) Two or more coders/raters categorise the data and a reliability index is calculated and reported.

Among the sizeable body of studies relating to social presence in collaborative learning media, for example, Rourke *et al.* (2001) provide a detailed description of the development of a scheme for coding social presence in computer conferencing transcripts together with inter-rater reliability in the scheme's application. Three researchers initially worked together to establish coding procedures which were then applied in coding the transcripts by two coders. Reliability was, as expected, higher for 'manifest' indicators such as addressing by name than for 'latent' indicators such as humour.

Another typical use of multiple raters is in scoring task performance. Mark and Kobsa (2005), for example, investigated the effects of system transparency and differing modes of collaboration in a collaborative information visualisation environment, using two coders to score the quality of responses to collaborative tasks. Coders first coded a sample of results as a means of calibration, then worked independently, achieving a high degree of reliability. Discrepancies were discussed and resolved between the coders. Similarly, in their longitudinal study of collaboration in an immersive CVE (collaborative virtual environment), Bailenson and Yee (2006) had two raters score collaborative verbal tasks requiring creativity with acceptable levels of reliability. (The study is also an instance of method triangulation, combining analysis of non-verbal behaviour and subjective ratings of presence, co-presence, simulator sickness and entitativity – cohesion- with task performance.)

Triangulation of coder results is not limited to verbal media: Patel *et al.* (2006) report on the relative efficacy of learning tai chi moves in 2D video and 3D immersive applications. Participants' moves, knowledge of tai chi and overall performance were blind-coded by two coders, albeit with relatively modest degrees of reliability.

2.4 Theory triangulation

Theory triangulation, which involves using more than one theoretical framework in the interpretation of the data is relatively infrequently encountered in presence research. However, the results of studies adopting this mode of triangulation are generally rigorously discussed and produce rewarding conclusions.

A strong element of theoretical triangulation can be found in the development of questionnaire instruments. Here (again) Lessiter *et al.* (2001) discuss the factors identified in the construction of the ITC-SOPI in the light of other factor-analytic theories, including the components identified by Schubert *et al.* (1999), Witmer and Singer (1998) and Kim and Biocca (1997). Most components closely paralleled each other, while apparent divergencies could be attributed to the scope of the questions included in the different instruments. A further hard instance of theoretical triangulation can be found in de Kort *et al.* (2007), who report the development of a Social Presence in Gaming questionnaire. Using focus group data, the scale was developed through factor analysis and the results discussed in the light of the Biocca *et al.* (2001) conceptualisation of social presence as operationalised in the Networked Minds instrument. The authors note, in contrast to Biocca and colleagues, the absence of co-presence as a distinct dimension in the gaming scale, while the Psychological Involvement dimension only partially coincides. The differences are discussed and attributed to the varying degrees of interdependence engendered by the application domains of gaming and telecommunication.

Work in social presence provides a number of further instances of theoretical triangulation. These include Hwang and Lombard (2006), whose study used both social presence theory and uses and gratifications theory to explore predictors of instant messaging use. Their analysis provides suggestions for the further refinement of both theories. Taking a similarly robust approach, Abeele *et al.* (2007) foreground triangulation in their investigation of the relationship between social presence, connectedness and perceptual awareness. Social facilitation (presence) theory (Zajonc, 1965) is invoked, the authors arguing that "If the social facilitation framework can be successfully applied, this would provide us with extra evidence that perceptual presence is a prerequisite property of social presence." (p.217) Participants completed tasks in the real presence or 'symbolic' presence (in the form of an image) of either friends or strangers. Only a partial correspondence between measures of social presence and mere presence was established, leading the authors to question aspects of task and experimental design. It is argued that social facilitation theory is a valuable tool in the triangulation of social presence data.

3. An Study of Triangulation

As a more detailed illustration of triangulation, in this section we present a simple, qualitative study of why people play video games and triangulate these results against a very different perspective, namely one which has been derived from an ontological analysis of the preposition 'in'.

3.1 Why do People Play Computer Games?

Independently of the development of the ontological account (section 3.3) of involvement and engagement, a study of why students played computer games was undertaken by a Master's student as part of his project work. He asked students in the School of Computing at Edinburgh Napier University while they were attending their first year tutorials to write a short, free form description of why they played computer games.

Of the 100 students solicited, 87 responded. None was paid. Permission to use these data for the purposes of publication was also obtained. The responses ranged from a sentence or two to three paragraphs. The participants in this study were assured that we would neither record or report any personal details, save to say that most of the students were male, typically aged 17-18 years and were native English speakers.

The accounts of game playing were read and re-read to gain familiarity with the material, then analysed using Atlas/ti (www.atlasti.com/) qualitative analysis software, adopting a grounded approach following the guidance in Giles (2002). Through this process initial recurrent themes were identified and the data coded by theme in a subsequent pass through the material. After consolidating duplicate themes, removing those with little supporting data and checks for intra-coder consistency, 10 themes remained. The themes, detailed below, are presented with two sample quotations from the free form descriptions.

3.2 The Codes

Achievement. The theme of achievement was mentioned by many of the respondents (23 mentioned either 'achievement' or 'challenge').

P29: "I like the challenge of the most difficult level settings and the records of all the medals I have collected on the level selecting screen".

P8: "The satisfaction of finally completing it, especially if you have been working hard on it";

Competition. While game playing is often portrayed as a solitary pursuit, competition is a recurrent theme.

P25: "the competition between you and your friends in 2 player games makes it more exciting and competitive."

P24: "not everyone can be that good at a game and it's every gamers duty to rub everyone else's nose in the fact that you are better than them";

Enjoyment. Unsurprisingly, a number of those surveyed described their enjoyment of computer games (e.g. 26 people used the word 'fun', 4 made reference to 'laugh' and a further 26 mentioned 'enjoy').

P80: "I enjoy spending time trying to complete the missions"

P64: "The multi-player option. I enjoy this part of a game the most as you can have a good laugh with your friends"

Escapism. Many participants also made reference to 'escape' or 'escaping' their situation.

P39: "I enjoy this because I think everyone needs to escape sometime and for me this is ideal.

P81: "It's fun. It allows you to escape from modern day life and kill things."

Immersion. Game players explicitly describe themselves as being immersed in what they are doing.

P75: "Makes me forget where I am and immerses my mind in another universe."

P39: "Depending on the game type I can find myself quite involved in the story line and feel very inside the game."

Lawlessness. The desire to kill and destroy (mentioned by 19 participants) appeared frequently in the data set:

P10: "Committing crimes because I can't do it in real life.

P43: "Kill ugly people and break the law"

Relaxation. Nineteen participants also said they played computer games because it relaxed them.

P66: "I find playing these games releases some tension"

P86: "[I] switch off and relax"

Socialising. Contrary to the image of the solitary gamer, many of the participants made reference to the role of games in making and interacting with fellow gamers.

P28: "It allows me to interact and have fun with friends over the internet"

P50: "I play MMORPG's (Massively Multi-player Online Role Playing Games) and the enjoyment is getting to meet new people with the same interests as me."

Timelessness. Many participants remarked on the loss of the sense of time whilst playing.

P57: "Forget about what is going on around me, time is no longer a factor and even food isn't needed ... three days with no sleep is nothing when I'm in a game."

P24: "I play until my contact lenses dry out and stick to my eyes ... then put on glasses and start again"

Transportation. Descriptions of computer games transporting players into a different world and reality were frequently reported. These were identified by phrases such as 'taking me away'.

P49: "[They] takes me away from the hardships of everyday life.

P82: "Visiting places [similar to] fairy tales"

The results are in no way unexpected and indeed echo the earlier work of Provenzo (1991, p. 64-65) who wrote, "Video games allow the viewers to engage actively in the scenarios presented . . . [Adolescents] are temporarily transported from life's problems by their playing, they experience a sense of personal involvement in the action when they work the controls, and they perceive the video games as not only a source of companionship, but possibly as a substitute for it".

The next section presents an ontological analysis of the preposition *in*. As such this analysis provides a vivid contrast with these descriptions.

3.3 *In* - An Ontological Perspective

Ontology refers to the study of the nature of being and as such is distinguished from epistemology, the study of the nature and character of knowledge. A number of ontological arguments and positions have already appeared in presence research (e.g. Mantovani, 2001, Sheridan, 2001; Biocca, 2001) and while they are of considerable interest they are not directly relevant here. Indeed rather than arguing for an ontological account of presence *per se*, we are interested in the instrumental use of ontology for triangulation.

The ontological account we develop is based on Heidegger's analysis of being (1927/ 1962), so let us take a moment to remind ourselves of that. First of all, Heidegger's philosophy focuses on the ontology of human beings (who he describes as *Dasein*). In doing so, he distinguishes and distances himself from those who are concerned with epistemology which he regards as "disinterested and theoretical knowledge". To be a human being - *Dasein* - is to be 'in-the-world' which is a fundamental fact of our being. This world comprising everyday practices, equipment and common skills shared by specific communities. Thus *Dasein* and world are not two distinct entities (hence Heidegger's use of hyphens) but one which is a direct result, a direct consequence of *Dasein*'s involvement with it. However rather than focussing on being or world, we consider the apparently insignificant preposition, 'in'. Heidegger's hermeneutic analysis of this word (Heidegger, 1971) is as follows:

'In' is derived from 'innan' - 'to reside', "habitare", "to dwell". 'An' signifies 'I am accustomed', 'I am familiar with', 'I look after something' ... The expression 'bin' is connected with 'bei', and so 'ich bin' ['I am'] means in its turn 'I reside' or 'dwell alongside' the world which is familiar to me in such and such a way. Dasein's way of being-in consists in dwelling or residing, that is, being 'alongside' the world as if it were at home there.

Building Dwelling Thinking, Heidegger (1971)

We can clearly distinguish between the categorical sense of *in* as inclusion, being-in ("she is in the office") from the existential sense such as "she is in the mood"; "she is in management". Heidegger uses etymology to demonstrate what he describes as the primordially of *in* as meaning involvement. By primordially he is underlining the most fundamental nature of *in*; or the aspect of *in* which does not rely upon other concepts. So *in* contrast to mere containment, the existential aspect of *in* is better understood in terms of involvement. This is *in as involvement*. It is the *in* of being in love, of being in business, of being in the cinema (i.e. involved with the movie rather than sitting in row g).

3.4 Involvement

Involuntary involvement or *thrownness* to use Heidegger’s terminology refers to our unwitting participation in a situation. When we find ourselves thrown into a situation we cannot, for example, choose not to understand our native language; in the context of a meeting most of us cannot let a clearly incorrect assertion go by without objecting to it; we cannot help jumping at scenes in scary movies. All of these examples illustrate the fact that we cannot help but be involved in certain situations. This is not to suggest that we cannot ‘tune’ out, direct our attention elsewhere and be voluntarily involved. For the purpose of this argument we shall define voluntary involvement as *engagement*. So, I can choose to read a novel or watch a movie – whatever - which, if suitable entertaining, will engage me. I can sit working at a piece of academic writing until my engagement with it is interrupted by the tap on the door of a hapless undergraduate.

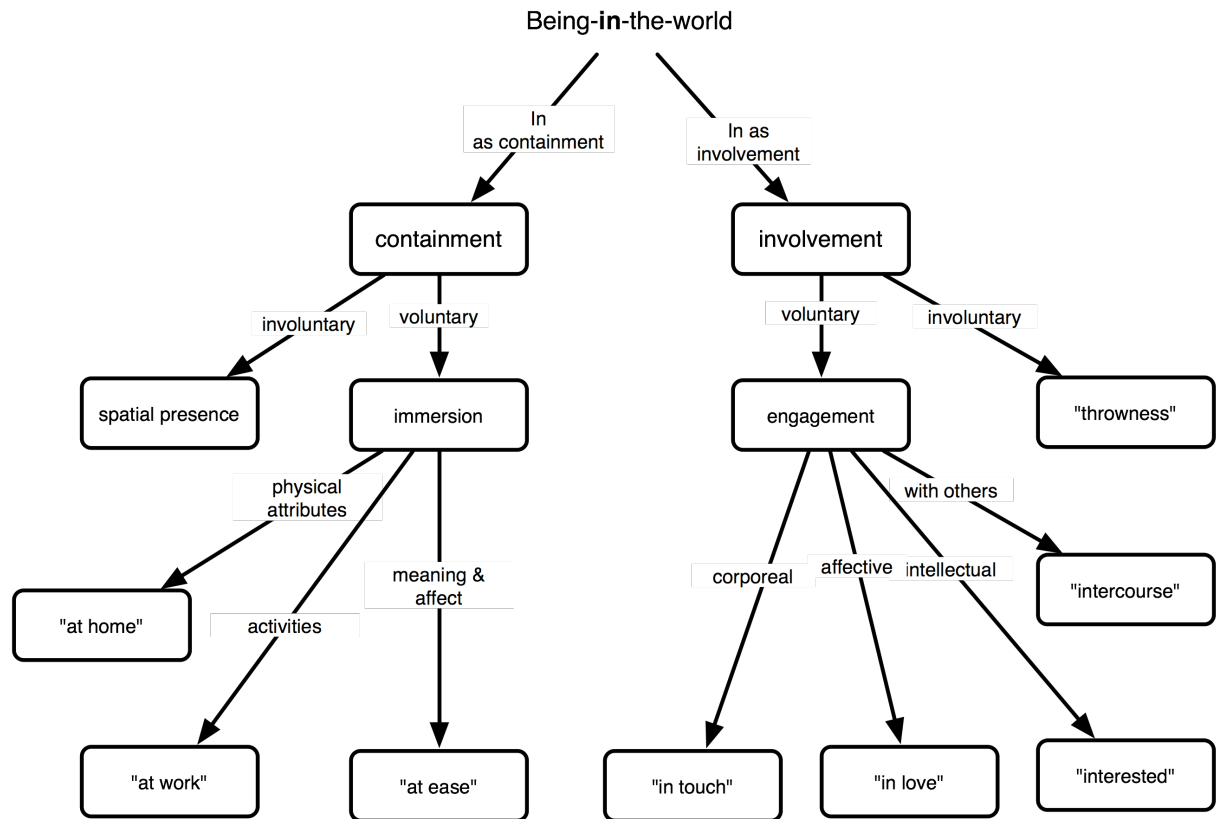


Figure 1: The *In*-Structure

Having established that involvement can either be voluntary or involuntary, we define ‘choosing to be involved’ as being engaged and engagement must, by definition, take a predicate. This distinction may serve to disambiguate the often inter-changeability of the terms, for example, Bracken and Pettey (2007) who have reported a study of immersion. They write “Immersion was measured by asking participants to respond to five statements ... Examples of items include: “How *involving* was the video?”, and “How *engaging* was the story?” (p.283). The presenting predicates of engagement include the corporeal, emotional, intellectual, and the social – but, of course, there may be more. So we can be engaged physically (“in touch”); engaged emotionally (“in love”); engaged intellectually (“interested”) and engaged with others (“intercourse”). Figure 1 illustrates these relationships.

These predicates are also consistent with empirical studies of involvement and engagement (offering further evidence of soft triangulation). Involvement (and/or engagement) is widely cited as a dimension of presence (Witmer and Singer, 1998; Lombard and Ditton, 1997; 2004; Schubert *et al.*, 1999; Usoh *et al.*, 2000; Larsson *et al.*, 2001; Lessiter *et al.*, 2001; Slater, 2003; Wirth *et al.*, 2007). For example, Lessiter *et al.* (2001) treat involvement as an aspect of engagement while Slater’s (2003) discussion of presence terminology treats involvement as a near-synonym of both interest and emotional engagement, and is “at a different logical level” from presence. Nunez (2007), in his gloss on Slater’s point, states that “presence

would be the sense that one is physically in a concert hall, and this would be independent of engagement with the content". *In as involvement* eloquently contrasted with *in as containment*.

Nunez, Slater, and Baños *et al.* (2004) also suggest an affective aspect to engagement. Involvement and engagement are treated as having corporeal connotations, for example, Tajadura-Jiménez *et al.* (2007) note that "...physical distance between one's body and events occurring in a mediated environment may modulate one's *involvement* in that experience. Close is arousing, intimate, *engaging*..." (p.35). While Jones (2007) notes "One function that would appear integral to the act of mental simulation is what has commonly been referred to in the literature on fiction, film, and presence as the "suspension of disbelief" (p.120). Because *engaging* in a narrative requires some effort, willingness and motivation on the part of the individual that initial step toward receptivity to the narrative requires explanation." In their discussion of engagement. Finally, Ofek and Reiner (2007) write, "We suggest that this result suggests that emotional effects may improve the *involvement* and hence may improve presence" (p.363).

We now turn to the left hand side of figure 1, that is, the treatment of *in as containment*. If we treat *in as containment* in the same as *in as involvement* we must consider the voluntary and involuntary aspects of it too. We begin by defining involuntary containment as spatial presence and voluntary containment as immersion.

3.5 Containment

Involuntary containment should be understood as we must be somewhere. We are *res extensa* and by definition we occupy and are located in space. Indeed as long ago as the fourth century B.C. we find Archytas of Tarentum observing that, "to be (at all) is to be in (some) place" (quoted in Casey, 1997, p.4). Half a century or so later, Aristotle also includes *where* as one of the ten essential characteristics of every substance. So, mirroring our discussion of thrownness, we have no choice but to experience being somewhere – and this experience is spatial presence.

Defining voluntary containment as immersion may seem a little unexpected but the etymology of the word reveals that it refers to *plunging into water*, other forms of immersion include immerge – to plunge, and emerge – to rise from the sea (Skeat, 1879). We can now see dipping into a book in a new light.

Again this ontological treatment is consistent with empirical studies of spatial presence and immersion. For example, Kallinen *et al.* (2007) emphasize the active nature of immersion, "In a highly immersive state people's attention is focused on the source of immersion and there is little attention outside the stimuli." (p.187). Together spatial presence and immersion – involuntary and voluntary *in as containment* – create a sense of place. We experience places not spaces. However, from Plato until almost the present, this archaic primacy of place is submerged in Euclidean *space*, in concepts of the relationship between space and time, and in the dominance of the positivist scientific paradigm directed at uncovering universally applicable laws. Place disappears as a fundamental aspect of being and becomes a mere site or specific instance of universal Euclidean space, until the concept is reclaimed by modern and post-modern authors. A real place is a particular space which is overlaid with meaning by individuals or by a group of people. This has been expressed succinctly as "place = space + meaning" (Harrison and Dourish, 1996) and in the words of the pioneering humanistic geographer, Relph "Places are sensed in a chiaroscuro of setting, landscape, ritual, routine, other people, personal experience, care and concern for home and the context of other places" (1976, p. 29).

These observations are broadly in line with empirical studies of immersion. Slater's view of immersion (which appears to be broadly accepted) is that immersion is a property of the environment, as that the great number of sensory modalities it provides, the greater the sense of immersion and hence presence (Slater, 2003). Earlier, and in a similar vein, Lombard and Ditton (1997) argued that presence can be seen as perceptual response to a mediated environment and should not be confused with immersion, which relates to the technology itself and its capabilities of enveloping the user. These observations are supported by Nunez and Blake (2006) who report that experienced computer gamers, who it may be assumed seek to maximise their immersion, regard background music as an important part of experience. Although "properties of the environment" might be better thought of as, the affordances which the environment offers, it is nonetheless the case that immersion is an emergent property of one's interaction with the environment – real or synthetic, populated (social) or barren.

So, returning to figure 1, we propose that involuntary containment results in spatial presence; while immersion can take a number of (overlapping) forms. If our immersion is predicated on the affordances offered by the physical properties of the environment we might feel "at home"; if we exploit the (affective) affordances (e.g. Gaver, 1991; 1992) we find appealing or compelling we might find ourselves "at ease" or

relaxation (Freeman *et al.*, 2004); finally, if we exploit the affordance of the environment which allow us to work, or play we may find ourselves “at work” (e.g. Hindmarsh *et al.*, 1998).

3.6 Triangulating These Data

Figure 2 illustrates the use of the *In*-ontology to triangulate the findings of this study. What we can see is that the codes arrived at from the qualitative analysis tend to favour the existential aspects of *In* rather than then categorical or spatial aspects.

So the group of codes encapsulating socialising, achievement, relaxation, enjoyment and so forth are examples of engagement (i.e. engagement with others; engagement with an intellectual goal; engagement with an affective state “being excited” or “being afraid”). The experience of timelessness is an example of thrownness, that is, involuntary involvement – e.g. P24 writes “I usually loose (sic) all track of time and what’s going on around me” and P57 notes that “[I] forget about what is going on around me, time is no longer a factor and even food isn’t needed ... three days with no sleep is nothing when I’m in a game”.

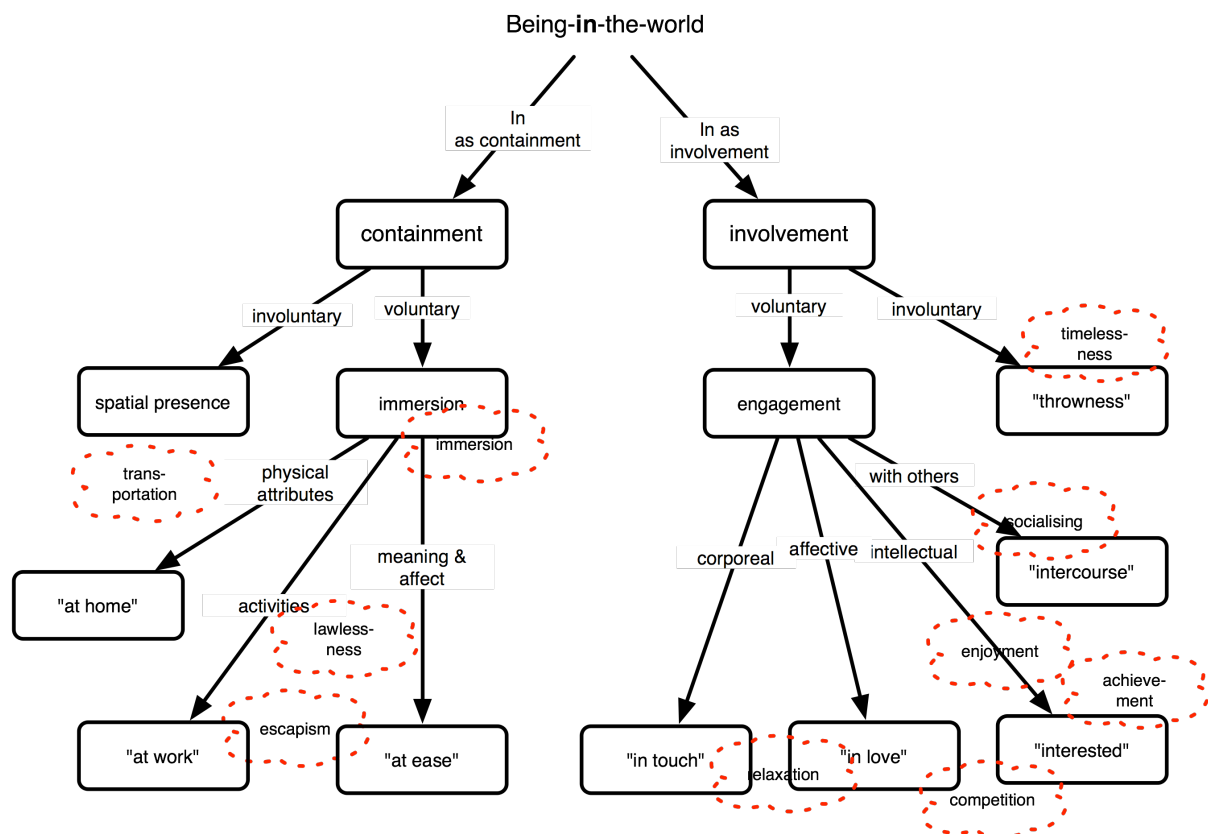


Figure 2: Triangulating the Games Data with the *In*-Structure

The game players also report being transported to another place; escaping this world for somewhere else and being immersed “in another universe” which afforded an alternate set of behaviours such as lawlessness. This is *in as containment* as contrasted to *in as involvement*.

4. Discussion

We began by noting presence research is necessarily challenging. Presence, irrespective of a precise definition, is a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience (*cf. ispr.info*). The experience of presence is private, personal, frequently remarkably elusive and not directly accessible (not withstanding the status of fMRI studies). Writing of experience, Davis (2003) notes, it is not an object (or even a collection of objects) but a process; and experience is an intangible process of interaction among humans and the world that has its existence in human minds. This suggests that presence (as an experience) is something which we can only understand, measure, quantify

– whatever, indirectly and this very indirection requires that we take the greatest care in our research. Given this we have argued for the thoughtful application of triangulation.

We then reviewed a sample of the presence literature and found evidence of what we have characterised as hard and soft triangulation. The former helps to ensure that valid conclusions are drawn by contesting interpretations – this is particularly apparent in cases of theoretical triangulation - while the latter sometimes extends the scope of description but in other instances seeks to confirm rather than challenge findings. Confirmation bias is not merely a consequence of doing bad science; it is fundamentally unhelpful. Moreover, in many studies where complementary methods have been applied or data gathered from different sources (for example) the reasons for so doing remain tacit.

We then described a simple study of why a group of young people play computer games. Following a qualitative analysis of what these people had to say we sought to triangulate these data with an ontological model of involvement and containment. We found (soft) evidence of agreement between this model and empirical findings relating to involvement, engagement, spatial presence and immersion. We also were able to show 'hard' triangulation between the data and the model. The very contrast and agreement between a Heideggerian-inspired ontological model and these qualitative data tends to inspire confidence in our conclusions. More significantly the perspective lent by the ontology has highlighted the contrast between the voluntary and involuntary aspects of containment and involvement in the data – between immersion and the involuntary spatial presence pertaining to *res extensa*, between engagement and thrownness. These subtleties have not been discussed previously in presence research and further the understanding of what it is to 'be' in a mediated world.

We conclude by observing that while triangulation, whether or not explicitly acknowledged as such, has been widely practiced by presence researchers, hard triangulation remains under-utilised, potentially to the detriment of the development of presence as a science. Not only this, but, as is demonstrated in particular by the theoretical triangulation described in some of the reports reviewed above and in our study reported here, hard triangulation is productive of revealing insights arising from the consideration of anomalous results. By contrast, while softer forms of triangulation add to the breadth of material for discussion, they do not in themselves fix a flawed study. Whatever form of triangulation are invoked, a clear statement of motivation for the procedures employed adds to the robustness of conclusions which may be drawn and may help to avoid the snare of confirmation bias.

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5. References

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ⁱ Dasein is from Da-Sein, which literally means being-there/here, though Heidegger was insistent that the term was to be used un-translated.