

Presence, Narrative and Schemata

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Abstract

This paper documents the early stages of research into the effect of manipulating narrative upon reported sense of presence. It is argued that presence, rather than a state, should be defined as an indicator of the ongoing development of relationships of significance between the user and the perceived environmental stimuli. If the manipulation of narrative affects reported sense of presence according to existing measurement techniques, it suggests that presence is dependent upon post-perceptual constructs, such as schemata, and that a perspective that only considers presence as a “perceptual illusion of non-mediation” is flawed. This paper will conclude by setting out the empirical studies planned to explore the hypothesis that narrative, schemata and content are important factors in generating a sense of presence.

Keywords--- Presence, Schemata, Scripts, Narrative

1. Introduction

To view presence as either a unitary, or a uniquely perceptual construct is untenable. Instead, it appears more likely that presence is an emergent property of a combination of cognitive and perceptual processes and stimuli. Whilst recognizing Lombard & Ditton’s oft-quoted definition of presence as a “perceptual illusion of non-mediation” [1], examining presence from an additional level of abstraction provides an opportunity to develop a new model that avoids the inherent contradictions and instabilities in the construct. Fundamentally, presence indicates that a relationship has been established between stimuli within an organism’s frame of reference. This is true for all of the major types of presence suggested to date: self/environmental (the organism exists in relation to the environment), object (the object exists in relation to the organism) and social (other organisms exist in relation to the organism). The key factor is significance – presence indicates that the stimuli are deemed worthy of inclusion within the primary frame of reference for the organism.

Approaching presence from this perspective, several clarifications can be made. Rather than drawing a line between perceptual and cognitive processes, such as presence and absence [2] or suggesting that emotional response and presence are orthogonal [3], a definition of presence as an indicator of successful relationships of significance circumnavigates the problematic issue of how presence relates to constructs such as suspension of

disbelief, attentional investment and object identification. This paper documents the early stages of developing this model. First, a theoretical framework based upon manipulation of schemata will be argued to support an indicator model of presence. Following this, empirical studies designed to test this model will be introduced.

2. A Schematic-Indicator model of Presence

2.1. Presence and evolution

The debate over the relationship between presence and mental representation is long and complex. On one hand, it has been argued that presence and content are unrelated [4]. On the other, models have been proposed that bind presence to various psychological, neurological and cognitive constructs. These include emotion [5], reality judgment [6], and “successfully supported action within an environment” [7]. Whilst it is increasingly recognized that presence cannot be successfully defined as a unitary construct [8], determining an exact mix of contributory processes is equally problematic [9]. What is obvious, however, is that any definition of presence must fulfill four basic criteria:

1. It must conform to current neurological and physiological understanding. In other words, it must fit the physical facts as we know them.
2. It must take into consideration operationally valid models of mind (including perception and cognition). That is, if it contradicts existing theory that is based upon empirical evidence it must provide justification or, at the least, explanation, for doing so.
3. It must provide means of empirical testing, i.e., there must be means to confirm or deny its claims.
4. It must provide opportunity for further development and application to systems and procedures. In other words, it must be useful.

A perceptual model of presence fulfils these criteria, but begins to fail when examined in more detail. Primarily, the flaw is logical. Presence is generally agreed to be a subjective state or, at the least, an emergent property of neurological activity. Subjectivity requires a self/other relationship to exist; it is a phenomenological state that requires some form of consciousness. Consciousness, clearly, is not reliant upon perception to occur, or sensory deprivation environments would be profoundly different

experiences (the effect of long-term sensory deprivation upon consciousness is another matter). Botella et al [6] similarly argue that all perception is, in fact, mediated, so the idea of a perceptual illusion of non-mediation is internally incoherent. Secondly, it is recognized that simply increasing sensory input fidelity does not automatically imply greater presence beyond a certain threshold [4], which suggests, at the least, room for something else to be occurring. Thirdly, there is evidence to suggest that the manipulation of imposed narrative within an environment [10] and that conceptual priming [11] affect levels of presence. Finally, there is the still unresolved 'book problem'. Simply stating that reported presence from media with low immersive capabilities is not presence but something fundamentally different, if indistinguishable when using existing measures, is an unacceptable theoretical stance.

On the other hand, attempting to define presence as a distinct modular, or even combinational cognitive module or process has proved equally unsatisfactory. The fact that presence can be used to describe constructs ranging from emotion to activity has led to a situation where almost anything can be described as presence, and the field, as Slater has rightly pointed out, loses focus and meaning. Surveying the literature, the question one is most frequently confronted with is not "what is presence?" but, on the contrary, "what isn't?"

When defining presence, it is important to distinguish between first- and second-order mediation, as identified by the International Society of Presence Research's explication statement. According to the ISPR, first-order mediation is the natural process of information pick-up from an environment, via a mediating process of perception and perceptual processing. This is to be distinguished from second-order mediation, i.e., through some form of technological artefact. It is the illusion of non-mediation at the second level that concerns presence researchers. This, it could be suggested, renders Botella et al's argument redundant. There are issues with this stance however, that must be recognized. For example, does technological mediation include wearing glasses to correct optical defects? Does this mean, then, that spectacle wearers are subject to second-order mediation more-or-less permanently? By this definition, our lack of attention to the mediating technology means that we experience presence whenever our vision is thus corrected. This is clearly not a satisfactory position. Floridi [12] suggests that the traditional models of presence are rooted in the notion of Epistemic Failure, that is, a cognitive failure by the individual to spot the mediation. He notes that not only is there an inherent Cartesian dualism at the root of the model, but that the "conceptual reduction of a broad spectrum of phenomena to a single unifying frame of interpretation" is riddled with contradictions and inconsistencies.

The model proposed in this paper is presence as an indicator of a particular type of organization of environmental stimuli and information. What is clear from the last two decades of presence research is that perception, emotion, attention, arousal, suspension of disbelief, consistency of signal, memory, fidelity of stimuli and so on,

all play a part within presence. Crucially, presence is a reported output of an emergent state, and focusing upon what purpose such a state may serve enables a circumnavigation of the issue of its exact constituent parts and processes, without rendering the outcome valueless. Tackling presence as an evolutionary development has been suggested before [13] and this approach to the issue of presence from the perspective of evolution, and an evolutionary model of consciousness, is key to a better understanding of how to work with it.

The first step in the formulation of this model is to draw a direct causal link between consciousness and presence. Without consciousness, there can be no presence, as there will be no subjective states. Sanchez-Vives & Slater [14] are amongst those who argue that presence research is an important new perspective from which to tackle consciousness studies, though they accept that the exact nature of the relationship is unclear. For example, is presence simply spatial consciousness? It can be argued that this is not the case, that consciousness is necessary for presence, but the opposite is not necessarily true – self/other relationships, and therefore subjectivity do not have to be based upon spatial relativity. Presence is a means of managing spatial consciousness.

Secondly, it should be asked what all versions of the construct have in common. The answer is evident: all are rooted in the notion of a relationship of significance being established between the self and external stimuli.

Thirdly, the evolutionary benefit in establishing and successfully managing such relationships of significance (it should be noted that a distinction is being made between 'significant' and 'attended to') parallels theories for the development of mind, cognition and consciousness put forward by cognitive scientists, neuroscientists and philosophers of mind.

To summarise, an organism that has an awareness of its own boundaries and is able to establish a conceptual relation to the environment and objects within the environment has a survival advantage over one that is environment-blind. Thus, frames of reference and the establishment of relationships of significance within them, confer a distinct evolutionary advantage. Together, they form an emergent state that positions the organism in relation to stimuli and enable information structuring, including recognition, memory and predictive trialing to occur. This model avoids the question of reality of the stimuli and with it the more complex question of whether the environmental stimuli being responded to are external / perceived, or internal / represented. All that matters is they have been incorporated into the frame of significant reference for the organism.

Presence, according to this model, is the name given to the reported output of this state in action, and we can reconceptualize the three example types of presence referenced at the start of this paper as follows:

1. Self / Environmental - a spatial relationship of significance is established, positioning the organism within a field of stimuli.

2. Object – an object, whether ‘real’ or computer generated is incorporated into the field of significant stimuli, establishing a relationship between it and the organism that may lead to interaction (or avoidance).
3. Social - other organisms are identified within the environment and distinguished as agents, implying a different set of schematic relationships than static or mindless stimuli.

2.2. Presence and schemata management

A frame of significant reference can be viewed as a snapshot of the organism’s management of active schemata: nominally, the current state of internal affairs. Not only are objects currently deemed significant identified and mentally represented, but also the relational concepts that bind them together are active. In other words, the frame of significant reference is a perceptually orientated semantic network [15], essentially the same as a single instance of an active frameset or script [16, 17]. The notion of a frame of significant reference also fits Schank’s dynamic memory theory [18] and, although not explicitly connectionist, can easily be understood from that perspective.

These parallels are important, as they provide a means to import knowledge and models, developed by scholars investigating knowledge representation, into the presence debate. In other words, they provide means with which to codify relational content. Although we recognise that most presence researchers would credit the importance of content in generating presence, actual references to content within studies are sparse, and no attempt has been made to stratify the component elements and factors of content in relation to presence. Narrative theory provides one approach to this deconstructive process; scripts and frames suggest a complimentary approach that may assist in modeling the phenomenon. Dynamic memory, which develops these ideas further, allows a theoretical bridge to be established between presence and the organisms pre-existing tendencies, knowledge and, crucially if one sees perception as an active, directed process [19, 20], assumption and expectations.

It is assumed that at any given moment, multiple scripts will be active for any organism, although only a number of these may be attended to at any given point. This allows for modularity and parallel processing, both of which appear crucial to handling the massive information loads inherent to cognition and, more specifically, consciousness. No contradiction is apparent between the notion of a frame of significant reference (or attended script-instance) and less cognitively orientated models of consciousness, memory and information processing, such as Damasio’s somatic marker hypothesis [21]

The assumed existence of multiple scripts, along with other key assumptions of this model – the existence of a subjective conscious state, a modular semi-computational mind, active information exchange between organism and environment – all require evidential support. A short examination of the literature reveals that this support exists. With this support in place, a theory of presence based upon

scripts or schematic management must then fulfill the four criteria set out at the beginning of this paper. The model proposed does indeed appear to do so.

The relationship between presence and schematic management remains to be explained. Presence, according to this model, is a perspective, a particular methodology of measurement and analysis of the existence and success of perception-orientated scripts. The underlying consensus across existing presence research is that stimuli (virtual or otherwise) may or may not trigger an emergent, subjective and psychological state, roughly conceptualized as ‘sense of being’, to a greater or lesser extent, with a broad range of factors impinging upon this emergence. This state – the active processing of relational concepts, scripts, frames, schemata or conceptual dependencies – is ongoing, and presence is a set of tools, an outlook through which to approach it.

If presence is recorded therefore, we should expect to see evidence of schematic relationships of significance occurring. Put another way, the book problem should come as no surprise and rather than being an issue, should be taken as demonstrating that virtual environments and other media share the capacity to influence an organism’s representation of its surroundings and establishment of networks of attentional resources, contextual interconnections and predictive scenarios. However, it is not as Waterworth & Waterworth state: “Presence seems to have become just another word for conscious attention. In trying to solve the so-called book and dream-state problems that baby of presence has been thrown out with the bathwater of conscious attention” [22]. According to the schemata model, if there is a shared definition, it is between conscious attention and relationships of significance within an active script-set. Presence, on the other hand, is just what it has always been, prior to and beyond the definitional debate, a series of tools that demonstrate that ‘something is occurring’ when subjects experience virtual environments and stimuli.

2.3. Presence and narrative

It is therefore suggested that what has been problematically termed presence is in fact evidence of relationships of significance amongst received stimuli. Central to this argument is the notion that these emerge from an interplay of perceptual, cognitive, emotional and experiential factors. A program of empirical studies is needed, and has been developed, to test this model. In order to further place these in context, a brief description of narrative and its relationship to presence is required.

Narrative here is defined as “the semiotic representation of a series of events meaningfully connected in a temporal and causal way” [23]. Narrative is understood as an artificial encoding of a series of linearly organized, causal relationships. There is, of course, an additional line of enquiry that needs to encompass the specific issues surrounding interactive narratives, but it falls outside the scope of this paper. In essence, a narrative is a highly formalized script the reader can accept at various levels. There are two perspectives that can be inferred from this:

the first being that mental scripts are inherently narrative. Indeed, narrative psychology, concerning itself with the “storied nature of human conduct” [24] is an established psychological perspective. The second implication is that narrative artifacts allow readers to import formalized scripts into a network of existing schematic relations. This second idea resonates with both Baar’s Global Workspace Theory [25] and Dennett’s reading of Gregory’s Potential / Kinetic Information theory from the perspective of the evolution of mind [26].

Defining narrative as a particular subset of script, one that utilizes primarily linear, temporal and causal relationships, sites it within the overall framework of schematic frames of reference. Although keeping a flexibility of definition that describes narrative as a grammar, rather than an artifact, thus allowing it to be deployed across media (including mental architecture), the definition nevertheless enables us to explicitly test the model proposed.

A simple hypothesis can be drawn from the model: manipulation of narrative will affect presence as measured by a representative sample of existing tools. If this hypothesis is confirmed, then it suggests that presence cannot be purely perceptual. There may very well be an illusion of non-mediation, but it emerges from an engagement with content as well as form.

If presence is affected by the manipulation of narrative, it follows that what is being observed is the result of schemata, or scripts. This provides evidence to support the model of presence as a measurement of these relationships of significance.

This second inference will, of course, require independent validating: in other words, alternative tests that provide strong evidence for the existence and development of schematic relationships will need to show correlation of results. Identifying these correlational tests will be a significant challenge in the research plan.

3. Empirical Studies – a research plan

For the next twelve months, a series of research exercises and empirical studies have been planned to both test this hypothesis and investigate it in more detail. The first stage of this is to assemble a group of narrative experts from both traditional and interactive content development, who will examine a series of narrative variations on a single fabula. According to the Russian Formalist school of narrative theory, a fabula represents the actual events contained in a story, as opposed to the *sjuzet*, the version of events as related by the narrator. In essence, therefore, the aim of this study is to attempt to rate the impact of *sjuzet* manipulation upon its overall intensity. For example, a narrative may be broken down into narrator, plot, character. Each of these aspects may then be subdivided: plot into pace, causality and level of disorder [27]. These subcategories can then be individually manipulated, to create versions of a fabula to a defined brief. The same basic sequence of events can be effectively re-configured as distinct narratives. The outcome of this study will be an attempt to rate a sample of these narratives according to intensity. A separate subject

group will then independently rate these for intensity to confirm the working scale.

A virtual environment will be built according to the specifications of the base fabula (i.e., it must allow for all the actions and events contained within the fabula itself). The second study in the program will pilot this environment and three of the identified narratives, agreed as having high, low and conflicting narrative intensity. The results of this study will enable a greater understanding of the constraints of the environment and subject expectations to be brought to the main study scheduled for the early part of 2006. Primarily, the pilot study will test the basic hypothesis – that a variation in narrative intensity affects presence. Confirmation of the hypothesis will then naturally lead to the question of which aspects of narrative manipulation are most crucial to this effect: is, for example, a first-person perspective more effective at generating presence than third-person; or is priming material that builds named characters into the narrative more effective than one which suggests other characters, but only describes them according to plot function?

The subsequent empirical study will present the environment to a larger subject group, who will be subdivided into narrative variation groups. Each of these narratives will be characterised by an emphasis upon a key factor identified from the initial studies and will be delivered to subjects as priming material. Subjects will be asked to complete a simple task within the environment and factors relating to their ability to do so will be measured, as will objective outcomes (time spent in environment, etc). Presence questionnaires will be used as the primary source of data. Subjects will also be videoed and their actions in the environment captured in real-time to enable further analysis of points of specific interest. A final variable in the study will be the embedding of a contradictory narrative element in one of the groups. It is already documented that contradictions in stimuli and interaction negatively affect presence [28] and the study will test whether this holds true for content-based contradictions as well.

Nunez and Blake [11] found that priming did not directly affect presence, but was a “mediating variable”. A recent study by Banos et al [29] suggests that whilst imagination alone can generate presence, reinforcement from perceptual cues (i.e., a virtual representation of the same environment) is necessary to maintain it. The primary goal of the research program detailed above is to break these findings apart further and determine which aspects of content are crucial and which less so to generation and maintenance of presence. Its aimed outcome, therefore, is a practically applicable framework that VE designers can use to enhance presence. The combination of using narrative and priming to maximize the subject’s own contribution to their sense of presence has clear advantages, especially in the light of the apparent ceiling of the effect of display realism upon presence [14, 30].

Manipulating narrative as a means of influencing the schemata that subjects engage with the VE through is only a small part of the field of study directly focusing upon the role of content in generating presence. Already, there is a substantial body of research examining the nature of

narrative within interactive and virtual environments, with particular focus on the use of AI agents to control narrative and allow the levels of interactivity demanded by the user [31, 32]. It will be interesting to see how possible it is to control not just the illusion of non-mediation, but the illusion of freedom to act within a VE, something which games designers have been working on for some time. In a sense, it will be approaching the problem from the other direction: if presence requires the user to be able to carry out 'successfully supported action' [7] in an environment, it is worth considering how to manipulate the expectations of what actions are possible, therefore reducing the technical load on the system.

Finally, subsequent studies will need to examine the difference between methods of deploying and manipulating narrative, not just in terms of priming media (audio, text, video etc), but real-time, internal adjustments to the experience. In other words, what types and intensities of cues delivered in situ to the subject damage presence, and which further enhance it.

Conclusions

Presence is generally agreed to be a desirable emergent factor in immersive computer environments, but remains elusive in definition. Multiple models have been proposed, but although there is increasing agreement that the idea of a unitary construct is misleading, a commonly agreed set of standards is still unforthcoming. This paper has suggested that by examining the evolutionary purpose of what is currently loosely called 'presence', one finds that the construct can actually be explained as a network of relationships of significance, contextual dependencies or scripts. Presence, it is then argued, is an indication of these scripts emerging and functioning.

A set of four criteria that must underlie any theory of presence has been put forward, and it is suggested that a schematic-indicator theory of presence meets all four conditions. To provide empirical data to support this theory, a series of studies are proposed.

Stepping back from presence and viewing it at a more abstract level allows unification between current theories. It is not, as has been suggested [22], that presence has been confused with conscious attention. Rather that presence is a means for conscious organisms, by way of networks of conceptual relationships and shifting frames of significant references, to interact with their environments, real and virtual, external and internal, actual and abstract.

Acknowledgements

The authors would like to acknowledge the contribution of Dr Steve Hand and Dr Darren Van Laar to the formation of ideas contained in this paper.

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