Vicariously there:
connected with our own and other characters

Tim Marsh, Kiyoung Yang and Cyrus Shahabi
Integrated Media Systems Center
University of Southern California
Los Angeles, 90089, CA.
marsht@usc.edu   kiyoungy@usc.edu   shahabi@usc.edu

Abstract

It is argued that the greater a user perceives him/herself to be vicariously in character or is able to empathize with other characters/humans, the more they have a sense of being connected to a mediated environment. The term coined to describe this sense of user engagement is "vicariously there". In this article we provide a framework of vicarious and empathic experience in mediated environments and review previous work and their measures. Focusing on three-dimensional interactive mediated environments (IME: digital games, virtual reality, virtual environments, etc.), we describe on-going research towards the development of ways to reason about the extent to which users feel a sense of engagement with, or connection to, characters or users. Limitations of this work are identified and future research directions towards an unobtrusive and continuous method are discussed.

1 Introduction

Irrespective of whether mediated via video phone/conferencing, the Internet or three-dimensional interactive mediated environments (IME e.g. digital games, virtual reality, virtual environments), a natural and powerful way to convey information is through or with humans or virtual/synthetic characters. By communicating in this way we can convey meaning and trust through emotions and behaviour. Furthermore, it is argued that as merging and emerging ubiquitous computing, media, technological artefacts and products pervade our work, leisure, travel and living environments it is anticipated that this natural form of mediated communication (through and with humans and characters) will become more widespread. However, there is a distinct lack of methodologies to inform analysis and design of human/character-human/character mediated interaction (HC-HCMI) from work in human-computer interaction (HCI) and limitations in definitions of the experiential concept of presence commonly referred to as a sense of "being there".

To bridge this gap, our research is working towards the development of ways to reason about users' sense of connection to humans and characters in mediated environments. In response to the inadequacy of the concept of presence and limitations of work in HCI, a framework of experience – i.e. three

Vs: voyeuristic, visceral, vicarious – informed from filmmaking (Boorstin 1995) has been developed to provide a way to reason about experience that is induced or evoked in, or witnessed by users of IMEs (Marsh 2001, 2002, 2003a). More recently, key publications in HCI have adopted the three Vs framework to inform experiential analysis and design of products and technological devices (e.g. Norman 2004; McCarthy and Wright 2004). However, our work aims to hold true to Boorstin's (1995) analysis from a filmmaking perspective. This article will focus on the vicarious experience[1] – to imaginatively experience something through another person, being or object – and describe ways to reason about the vicarious experience.

As illustrated in figure 1, vicarious experience from mediated environments is derived from undertaking various pursuits. For example, navigation and exploration (e.g. transfer of spatial knowledge), and the manipulation of artefacts. These are identified as primary or fundamental vicarious experiences that can occur with or without the involvement of characters and share similarities with the concept of

---

[1] "1a. That takes or supplies the place of another thing or person; substituted instead of the proper thing or person." "4d. Experienced imaginatively through another person or agency." (OED 1989); "1a: serving instead of someone or something else." "3: experienced or realized through imaginative or sympathetic participation in the experience of another" (Merriam-Webster's online).

"telepresence" - the sense of acting vicariously in remote or hazardous locations (e.g. outer space, deep sea diving). More sophisticated vicarious experiences come from humans (e.g. video phones/link) and virtual or synthetically generated characters (e.g. IMEs) transferred through action, gestures, vocal and facial expressions. While this type of vicarious experience has long been associated with other visual media (e.g. theatre, cinema and television) through interpretation of, and identifying and empathizing with characters such as the protagonist, HC-HCMI provide users with the opportunity to communicate, interact and empathize with other humans or characters. Hence, it is argued that the vicarious experience is a link, connection or mediator between a user and mediated environment. The term coined to describe this sense of user engagement is "vicariously there". This paper describes on-going work focusing on vicarious and empathic experience in three-dimensional interactive mediated environments (IME: digital games, virtual reality, virtual environment, etc.) as described next.
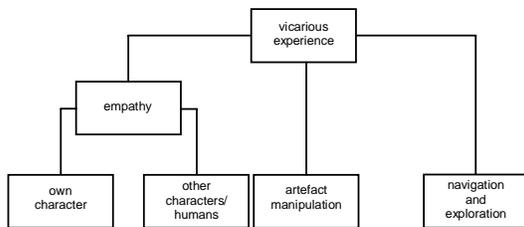

Figure 1: Framework of vicarious experience in mediated environments: navigation and exploration and artifact manipulation (that occur with or without the involvement of character), and empathy

1.1 Vicarious and empathic experience in IMEs

With increasing technological and artistic innovations, the vicarious and empathic experience in IMEs has become more complex through the development of character. Uniquely, IMEs provide users with the opportunity to assume the role of anybody or anything they wish, and to interact in scenarios (through either a first or third person perspective) within environments and with other characters in a non-linear narrative manner. So as well as interpretation of, and identifying and empathizing with characters through spectatorship as in theatre, cinema and television, users in IMEs can do the same with their own character and with other characters.

It is argued that vicarious and empathic experience can occur in three ways. Firstly, the greater a

user perceives him/herself to be vicariously in character acting in a three-dimensional interactive mediated environment the stronger the connection or link between user and IME. Secondly, other characters' behaviour (actions, gestures, facial and vocal expressions, etc.) tells us something about their feelings, emotions and persona, and just how much a user can read these indicates the degree to which they empathize with other characters. Thirdly, other characters' responses to a user's/character's behaviour not only acknowledges their existence but also reflects the empathy they have for us. This further strengthens the link between user and IME. The stronger the link, the greater a user feels to be vicariously connected or *vicariously there* with other users and characters.

2 Previous work

Research on empathy from numerous fields of study is beginning to attract increased attention. For example, work linking cognitive science and phenomenology identify empathy as one of the fundamental aspects of consciousness itself (e.g. being and self awareness):

> *"One's consciousness of oneself as an embodied individual in the world is founded on empathy – on one's empathic cognition with others, and other's empathic cognition of oneself." Thompson (2001:2)*

In many areas of computer-mediated communication there has recently been a spate of workshops and call for papers (e.g. British HCI 2004, AAMAS 2004, etc.) addressing the 'moderate research literature on empathy' (Preece and Ghozati 2001). Previous work on vicarious and empathic experience includes that on virtual characters in digital media (Laurel 1993; Murray 1997), in "on-line communities" (e.g. listservs, bulletin boards) using textual communication (e.g. words, use of capitalization) (Preece 1999; Preece and Ghozati 2001), Picard's (1997) work on "Affective Computing" where computers react to our emotions, the construction of "believable characters" to aid in studies of bullying of young people in schools (Woods et al. 2003) and studies of virtual characters in mediated environments (Marsh 2001, 2005a).

Increasing support can be found linking empathy to presence. For example, Sas and O'Hare (2003) look for correlations between presence and empathy. Additionally, in "The Cyborg's Dilemma", Biocca (1997) highlights similar philosophies to those of Thompson (2001) (as emphasised in the quotation above) by turning to Zillman (1991) to link embodiment to presence saying that "observers of the physical or mediated body read emotional states,

intentions, and personality traits by an empathic simulation of them." However, as mentioned, there are limitations with the concept of a sense of presence because current definitions largely restrict arguments to real-time "instant by instant" experience of "being there". This makes it difficult to consider empathic and vicarious experience beyond the instantaneous that occurs in unfolding situational and episodic events.

Past work on empathy and its measures from psychology informing our research includes: Davis (1994), Eisenberg and Miller (1987), Ickes (1993, 1997), Levenson and Ruef (1992), Zhon, Valiente and Eisenberg (2003). (See the last two for informed reviews). According to Levenson and Ruef (1992), empathy comes in three forms. "Cognitive empathy" is to know what someone is feeling, but does not automatically imply kindness (e.g. a torturer can know how you feel and intensify the pain). "Compassionate empathy" is responding kindly to someone, for example, comforting (i.e. consoling, reassuring, etc.). Thirdly, "emotional empathy" is to know what a person is feeling (i.e. similar to cognitive empathy) but also, to feel what that person is feeling. Empathy may be transferred through actions, stories/anecdotes or facial expressions. The more one person feels what another is feeling the higher the degree or accuracy of "emotional information being transmitted". The term "empathic accuracy" (e.g. Ickles 1993; 1997) was coined to describe this.

It is argued that these three types of empathy can occur in IMEs. However, because we control a character, slight differences to these can be identified. These variations can be best placed into the three previously described categories:

1. with our own character: the extent to which a user perceives him/herself to be vicariously in character

2. our readings of other characters'/users' behaviour (e.g. actions, gestures, facial and vocal expressions) tell us something about their feelings, emotions and persona: the more a user feels these, the more empathy they have for the other character

3. other characters responses to a user's/character's behaviour:
    i.   acknowledges our existence
    ii.   reflects the empathy they have for us

In an attempt to capture the vicarious experience in interactive mediated environments, this article will focus on firstly, the transfer of emotions and traits to users and secondly, users' empathy from interacting with their own character and other characters within a mediated environment, as discussed below.

3   Capturing vicarious and empathic experience in IMEs

Zhon, Valiente and Eisenberg (2003) identify four ways to measure empathy. Firstly, self-report using questionnaires or picture-stories, secondly other-report from teachers, parents or peers, thirdly, coding of individuals' facial, gestural and vocal indices, and fourthly, physiological measures such as heart rate and skin conductance.

It is argued that, irrespective of the method, the evaluation of experience in IMEs should be ideally carried out using techniques that are both unobtrusive to users and continuous. Firstly, unobtrusive techniques allow users to continue to pursue their activities and experience the mediated or gaming environment while disruptive interaction can interrupt or break users' encounters (Marsh 2003b). Secondly, although some design aspects and genres of IMEs allow for asynchronous interaction, in general they are continuous time-based interactive systems (Smith, Duke and Massink 1999). Hence user's emotions fluctuate in response to situational and episodic events. Therefore, it is argued that evaluation or assessment techniques should be continuous and unobtrusive. However, until such a method is developed, it is necessary to make some compromises.

For example, techniques that attempt to assess user's feelings of a sense of "presence" in a virtual environment include, getting users to verbalize either a sense of "presence" or "breaks in presence" (Slater and Steed 2000) and having users continuously reposition a sliding potentiometer to reflect their sense of "presence" (IJsselsteijn et al. 1997). While these techniques are continuous, they are problematic because of the requirement of the user to divide their attention between the mediated experience and the operation of the slider or keep in mind the verbalization. Hence, the data collection methods (i.e. slider, verbalization) may confound the actual thing that we are trying to measure or detect (i.e. presence, experience or breaks).

Alternative schemes that are continuous and do not require the user to perform any additional operations are for example, objective physiological measures such as, alpha brain waves (using an electroencephalograph: EEG), skin resistance or temperature and heart rate. Correlations between physiological data and events within a mediated environment provide a means of assessing design and experience (Meehan et al. 2001). However, besides the potentially high costs, it is questionable whether the probes and sensors attached to a user are disruptive or encumbering.

The approaches developed for use in our pilot studies and described next are self-report methods, one using a vicarious empathic matrix questionnaire and the other using web-based sliders. This work builds on the literature review provided by Levenson and Ruef (1992). They describe one approach developed for use during marriage guidance counselling sessions. The idea is an attempt to identify couples' relationship and communication difficulties. In it, one half of the couple (the listener) views a video recording of their spouse (the talker) and rates the spouse's (the talker) feelings and emotions. The spouse (the talker) then views the video recording and rates what they believe to be their own feelings, moods and emotions expressed during the recording. That is, their feelings at the time when the video was shot. The correlation between the couples' rating (i.e. between talker and listener) then provides an indication of the accuracy of "the emotional information being transmitted" between the talker and listener. The higher the correlation, the higher the accuracy of "emotional information" "transmitted" from one person to another; the term they use to describe this is "empathic accuracy" (Ickles 1993; 1997).

In interactive mediated environments however, it is not feasible to ask a virtual character of their own feelings to provide correlation data. One option could be to ask the designer or developer to rate the virtual character's emotion, moods and traits. However, this is open to bias and inaccuracies as they could see or read things into their artistic creations that others don't. To overcome these drawbacks, a method was devised whereby users were firstly asked to rate their own virtual characters' or other characters' emotions and traits and secondly, rate their own emotions and traits. This method was utilised in the questionnaire-based matrix approach as described next and also, building on this work, in the web-based approach as described in section 3.2.

3.1 Questionnaire-based approach

The correlation between the matrices provides a measure of empathy between a user and their character. The higher the correlation between the two matrices, then the greater the empathic accuracy. A weak correlation between the two may point to a weak attachment or lack of engagement between user and character. Furthermore, if a mediated environment does not provide appropriate experiences for which it was originally designed then it may have been unsuccessful. That is, if the mediated environment's main objective is to provide training within a typical combat scenario then we would expect experiences associated with that scenario to be induced in users. For example, feeling scared and tense should be induced in users as opposed to say

feeling relaxed and happy. Leaving aside the case of users with a disposition that will never allow them to feel these, if users do not experience these or have other feelings uncharacteristic of the scenario then either they have reached a high threshold through prior exposure or the mediated environment or scenario is inadequately designed.

3.1.1 Method

The questionnaire matrix approach has been used in several pilot studies with different gaming genres (e.g. role-playing, first-person shooter). See Marsh 2001, 2005a. The matrix consisted of adjective pairings that were altered slightly according to user and genre. For example, the following pairings were used with teenagers and young male adults at a computer games club: *confident-unconfident, relaxed-tense, calm-angry, happy-sad, strong-weak, brave-cowardly, cheerful-serious, assertive-timid.* These were designed to illustrate the extent to which emotions, feelings and personality traits could be induced in users. Pairings were obtained following observation of, and interviews with players.

The matrix was administered following an IME encounter and data obtained by initially posing the questions: "…in a moment I'm going to ask you for words to describe your character", then, for each adjective pairing: "…would you say that your character [*user's identified character inserted here*] was"…"confident" or "unconfident", etc. Questioning in this way continued until all emotions/traits were identified and rated. Next, users were asked to rate their own feelings while controlling their character using the second matrix. As mentioned, the correlation between this matrix and the matrix describing their character's emotions/traits provides a measure of empathy between the two.

3.1.2 Findings

Using the matrix provided a way to reason about the extent to which users empathise or take-on emotions and traits of their character and other characters. For example, in a pilot study with children in a role-playing environment, empathic match with their characters for all users ranged between 56% and 100%. In contrast, the empathic match with the antagonist for all users was comparatively smaller from 11% to 67%. So data demonstrates that the method can distinguish between protagonist and antagonist.

Probably the most serious limitation of the matrix questionnaire was its inability to detect variations in emotions, feelings or experience between adjectives during the unfolding of a mediated encounter. For example, many users wanted to select both the *happy-sad* pairings to reflect their experience over the unfolding scenario. Although continu-

ous assessment methods such as sliders, dials and verbalizations get round this problem, as mentioned they require users to divide their attention between the mediated experience and the data collection technique being used, thus disrupting what is being measured (i.e. experience).

The seven-point adjective pair scales were in fact + or – 3 and included a mid-point neutral option, making it difficult to provide correlations between user's ratings for themselves and their characters. Because adjective pairs are used, one has to decide whether to utilise a neutral option. Pilot studies have investigated using and omitting a neutral option and have found advantages and disadvantages with both. For example, its inclusion provides users with a way to opt out and its exclusion forces users to choose between pairs that may not accurately reflect the user's experience. Another limitation of the matrix questionnaire is that the results might have been tainted by users providing socially desirable responses. For example, male teenagers and young adults in one study were less likely to admit to feeling *unconfident, weak, cowardly or timid*.

Another disadvantage was the limited set of questionnaire items might not have necessarily reflected a user's IME encounter within the vicarious/empathic matrix. Therefore, future research should work towards identifying an appropriate number of items that can adequately capture the vicarious and empathic experiences. One approach and source for future work to overcome this limitation is George Kelly's (1955) Personal Construct Psychology.

3.2 Web-based approach

The web-based approach was devised to be as unobtrusive as possible to user's gaming encounters and its simplicity allows for multiple measures to be taken of a user's encounter. It builds on knowledge gained from studies using the questionnaire matrix and is an attempt to overcome some of its limitations. Six seven-point scales (from low '1' to high '7') were used*: confident, calm, strong, happy, brave, serious*.

It was administered in the same way as the questionnaire-based approach by asking users to rate themselves and their character, but in contrast to adjective pairings, ratings are taken along just one scale. This allowed for simple correlations between user and character to be taken. Furthermore, the minimized web page with movable sliders for each scale was displayed on the desktop next to the study gaming environment (described next) at all times. This provided the opportunity for users to switch with ease between game play and web-rating page.

3.2.1 Study method

Five subjects (three females and two males) volunteered to take part in the study. The gaming environment used was Doom III. One male complained of feeling dizzy and so was unable to complete the study. Of the remaining subjects, only one had experience with this game. The subjects various age ranges were: 18-22, 23-27, 28-32 and 38-42.

The game play used in the study consisted of two parts with each part reaching a natural conclusion. This provided an appropriate opportunity to get users to rate their own and their character's emotions without disrupting the user's game play. The first part is best described as an introduction to the game's features, narrative and characters, including the character that the subject controls (i.e. marine). The introduction part was achieved by ingeniously interspersing non-linear narrative (subject interacts with environment) with linear narrative filmic-like techniques (game controls narrative and subject becomes a spectator). The second part was predominately non-linear with subjects' main objectives being to locate the whereabouts of a scientist and then fight with zombie-like characters.

Before game play began, subjects rated their feelings for use as baseline measures. All responses were given using the web-based sliders. Following each part of the game subjects were asked to rate their own feelings and the feelings of the character that they controlled (i.e. marine), as follows. Subjects played the first part of the game and then rated how they felt on the scales. Next, users rated how they believed the character that they controlled (marine) felt during the first part of the game. Users then played the second part of the game and following its completion, rated how they felt during the second part of the game. Finally, users rated how they believed the character (marine) that they controlled felt during the second part of the game. Following each rating, all scales were reset to their minimum value. The overall time to complete the study ranged from twenty nine to thirty eight minutes (32.25 mean, 4.03 SD).

3.2.2 Results

Subjects had no problems understanding and providing responses for all scales with the exception of the scale "strong", with all subjects asking for a clearer description. Dropping the scale "strong" increased the correlation for all subjects for the second part. Baseline measures of subjects' feelings taken before game play had began differed from their response for both the first and second parts suggesting all subjects were affected by game play.

As shown in table 1, for the first part of the game there were no or low correlations between all sub-

jects and their characters and high correlation following the second part.

Table 1: Correlations (Spearman's rho) between subjects and characters

subject:	1	2	3	4
first part	-0.288	0.361	-0.5	-0.296
second part	0.737	0.824	0.725	0.726

3.2.3 Discussion

The high correlations between subject and their character for the second part suggest that as the game unfolds the empathic match or accuracy increases. While we acknowledge the low subject number of this preliminary study, the high correlations suggest a good case for continuation of the research.

All ratings were taken after each part had reached its natural conclusion on completion of an objective. At this point the game fades to black and then displays a static screen waiting for the users input to begin the next objective. This provided an appropriate opportunity to get users to rate their own and their character's emotions without disrupting the user's game play.

The web-based method is not continuous and so cannot detect variations in emotions, feelings or experience and link these directly to situational and episodic events. However, the simplicity and ease of use of the web-based sliders ensured that users made several ratings and these sets of responses were efficiently carried out. The seven-point scale meant responses were provided along just one scale and so allowed for simple correlations between user and character to be made.

In an attempt to overcome difficulties of users providing socially desirable responses, wherever possible scales were chosen to hide less desirable responses. Finally, while the small number of scales increases the efficiency of the user's responses, the number of scales may not be enough to adequately or accurately reflect user's vicarious and empathic experience.

4   Future Work

Initially, future work will explore further the web-based approach to capture vicarious and empathic experience with users, their characters and with other characters in mediated environments.

In the longer term, the goal of the research described herein is to develop experiential assessment techniques that are unobtrusive and thus allow users to pursue their activities and continue to experience a mediated or gaming environment In addition, this technique should allow assessment to be carried out continuously so that fluctuations in user experience occurring from situational and episodic events can be captured. One approach that we are pursing involves the capture and query of user behaviour (e.g. gestures, directional and angular movement, mouse and keyboard events) with and within mediated environments contained in a database termed "immersidata" (Shahabi 2003). Already we have utilised the "immersidata" to detect breaks in user experience (Marsh et al. 2005b) and now we are working towards capturing the actual experience that is induced and evoked in, or witnessed by users.

Acknowledgements

References

Biocca, F. The cyborg's dilemma: Progressive embodiment in virtual environments. *Journal of Computer Mediated Communication,* 3(2), 1997.

Davis M. H. *Empathy: A social psychological approach.* Maddison. WI: Brown & Benchmark, 1994.

Eisenberg N. and Miller P. A. The relation of empathy to prosocial and related behaviors, *Psychological Bulletin,* 101, 91-119, 1987.

Ickles W. Empathic Accuracy, *Journal of Personality,* 61, 587-610, 1993.

Ickes W. (ed.) *Empathic accuracy.* New York: Guilford Press, 1997.

IJsselsteijn W. A., Freeman J., Avons S. E., Davidoff J., de Ridder H. and Hamberg R. Continuous assessment of presence, *Perception,* 26 *(suppl),* 42-43, 1997.

Kelly G. *Principles of Personal Construct Psychology.* New York: Norton, 1955.

Levenson R. W. and Ruef A. M. Empathy: A Physiological Substrate, *Journal of Personality and Social Psychology;* 63, 2, American Psychological Association Inc., 234-246, 1992.

Marsh T. Presence as Experience: Framework to

Assess Virtual Corpsing, *Presence 2001: 4th International Workshop on Presence,* Temple University, Philadelphia, PA, USA, 2001.

Marsh T. Towards Invisible Style of Computer-Mediated Activity: Transparency and Continuity. PhD. dissertation, Department of Computer Science, University of York, UK, 2002.

Marsh T. Presence as Experience: film informing ways of staying there, *PRESENCE: Teleoperators and Virtual Environments,* 12:5, 538-549, 2003a.

Marsh T. Staying there: an activity-based approach to narrative design and evaluation as an antidote to virtual corpsing, In: G. Riva, F. Davide and W. A. IJsselsteijn, *Being There: Concepts, effects and measurements of user presence in synthetic environments.* Amsterdam, The Netherlands: IOS Press, Chapter Five, pp. 85-96, 2003b.

Marsh T. Vicarious experience: staying there connected with and through our own and other characters, Chapter submission, In: P.J. Williams, S.Q. Hendricks and W.K Winkler (eds.), *Gaming as Culture: Social Reality, Identity and Experience in Role-Playing, Collectible, and Computer Games.* Jefferson, NC: McFarland, (Forthcoming), 2005a.

Marsh T., Yang K., Shahabi C., Wong W. L., Nocera L., Carriazo E., Varma A., Yoon H., and Kyriakakis C. Automating the Detection of Breaks in Continuous User Experience with Computer Games. In *Proceedings of CHI'05 Human Factors in Computing Systems, Extended Abstracts*, Portland, Oregon, USA, ACM Press, 2005b.

McCarthy P. and Wright P.C. *Technology as Experience.* MIT Press, 2004.

Meehan M., Insko B., Whitton M. and Brooks F. Objective Measures of Presence in Virtual Environments, *Presence 2001: 4th International Workshop on Presence,* Temple University, Philadelphia, PA, USA, UNC-CH CS Tech Report No. 01-009, 2001.

Merriam-Webster's on-line: http://www.m-w.com/dictionary.htm

Murray J. *Hamlet in the Holodeck.* MIT Press, 1997.

Norman D.A. *Emotional Design: Why We Love (or Hate) Everyday Things.* New York: Basic Books, 2004.

OED. *The Oxford English Dictionary*. Second Edition. J. A. Simpson and E. S. C. Weiner (eds.).

Oxford: Clarendon Press, 1989.

Picard R. W. *Affective Computing.* London: MIT Press, 1997.

Preece J. Empathic communities: Balancing emotional and factual communication. In: *Interacting With Computers: The Interdisciplinary Journal of Human-Computer Interaction,* 12, 63-77, 1999.

Preece J. and Ghozati K. Observations and Explorations of Empathy Online. In: R. R. Rice and J. E. Katz (eds.), *The Internet and Health Communications: Experience and Expectations.* Thousand Oaks: Sage Publications Inc. pp 237-260, 2001.

Sas C. and O'Hare G.M.P. Presence equation: An investigation into cognitive factors underlying presence. *Presence: Teleoperators and Virtual Environments,* 12(5), 523-537, 2003.

Shahabi C. 2003. AIMS: An Immersidata Management System, VLDB First Biennial Conference on Innovative Data Systems Research (CIDR2003), Asilomar, CA, 2003. Available at: http://infolab.usc.edu/DocsDemos/p138-shahabi.pdf

Slater M. and Steed A. A Virtual Presence Counter, *Presence: Teleoperators and Virtual Environments,* MIT Press, 9, 5, 413-434, 2000.

Smith S., Duke D. and Massink M. The hybrid world of virtual environments. *Computer Graphics Forum,* 18, 3, pp C297-C307, 1999.

Thompson E. "Empathy and Consciousness." in *Between Ourselves: Second-person issues in the study of consciousness,* edited by Thompson E. Charlottesville, VA: Imprint Academic, 2001.

Woods S., Hall L., Sobral D., Dautenhahn K., and D. Wolke A. Study into the Believability of Animated Characters in the Context of Bullying Intervention. *4th International Working Conference on Intelligent Virtual Agents,* 2003.

Zhon Q., Valiente C. and Eisenberg N. Empathy and Its Measurement. In: S. J. Lopez and C. R. Snyder (eds.), *Positive Psychological Assessment: A Handbook of Models and Measures.* Washington DC: American Psychological Association, 2003.

Zillmann, D. "Television and physiological arousal." Pp. 103-134 in *Responding to the Screen: Reception and reaction processes,* edited by J. Bryant, & D. Zillmann, 1991.