Acts of Presence: Performance, Mediation, Virtual Reality

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In computer science, presence is a core element in the operation of immersive virtual reality technologies. Associated primarily with CAVE Automatic Virtual Environment, "presence research" into immersive modes of VR places emphasis on the qualia—or sensation and intuitive feeling—of "being present" in an overtly illusory three-dimensional environment, which frequently includes simulated interactions with human-scaled virtual agents. Comprising a 10-foot square cube composed of display screens receiving back projected images, the defining technical feature of CAVE is its continuous generation of the correct stereo perspective from a visitor's point of view, which allows a participating subject to freely negotiate the physical environment of the "real" cube and the virtual, 3-D environment projected within it.

Because of the participant's spatial mobility, scenarios for CAVE are implicitly theatrical, and CAVE applications invariably require some consideration of spectatorship, participation, and the orchestration of virtual representations of humans within the changing proxemic and temporal design of actions, as well as interactions between virtual agents and real human participants. Although used primarily as an experimental facility to test the effect of "telepresence," whereby a participant is transported—in aspects of their spontaneous behavior and response—from one real or virtual context or "location" to another, CAVE also presents questions and processes pertinent to recent contemporary art and performance. Here, even where the

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methods and purposes of experimental science may differ profoundly from the aims, modus operandi, and form of media-based artwork and multimedia theatre, the question of how phenomena of presence are performed, mediated, and received—how they are constructed in reception, in particular, and in the "absence" of a material object of attention—provides for confluence and potential dialogue between aspects of experimental science and contemporary performance practice, as well as their supporting discourses.

Indeed, the contemporary ubiquity of personal and social media also drives a sense that the presence of others is always already compromised or constructed in palimpsestual relationships between the "real" and the "virtual." These are phenomena that will increasingly inform everyday experience as immersive VR as well as other forms of computing and mixed and augmented reality come to enhance personal media and networked interactions. It is these developments, too, that experiments in CAVE technology and other modes of VR explicitly work toward.

In these contexts, *Performing Presence*, a four-year research project funded by the UK Arts and Humanities Research Council, has drawn on and applied analyses of contemporary art and theatre to develop scenarios for CAVE that explore how performance theory and practice can enhance phenomena of presence in immersive VR environments, while also drawing conclusions relevant to performance itself. It is a process that culminated in two mixed-reality "scenarios" for CAVE, designed according to protocols in computer science (Brogni et al. 2006) yet rooted more broadly in questions around the performance and reception of phenomena of presence.

Figure 1. Performing Presence*, CAVE Scenario Two (actors' version) (2008–09). The male virtual agent approaches the participant. (Video grab courtesy of the authors)*

Central to this project—and arguably to the phenomena of presence in CAVE as well—is the perception of disjunctive and palimpsestual relationships between "real" and "virtual" spaces, places, objects, and "agents." Unlike conventional telepresence systems, which allow participants to "act" and so experience their own "presence" at a distance, through, for example, teleconferencing, access grids, or robotic systems, CAVE applications conventionally aim to displace a participant's knowledge and experience of the "real" place they occupy—the CAVE cube and the laboratory in which it sits—toward a virtual environment which, although recognized as such, nevertheless provokes "real" autonomic and social actions and reactions appropriate to the specific virtual world it articulates: a "presence response" to an illusory environment that is evidently created through a series of projections. Significantly, too, CAVE applications operate not only in the artificiality of such simulations, but in the participants' unfolding, disjunctive experience of occupying a real cube whose topology is continuously redefined and may be extended beyond its evident physical confines by these interactive three-dimensional projections, as well as the differences between their own physical bodies and the illusory bodies with which they interact. Consistent with this experience of a disjunction between the "real" and the "virtual" in CAVE facilities, scenarios engaging with presence in immersive VR environments do not conventionally involve the realistic representation of places or people. Indeed, experimental research suggests that where virtual agents, in

particular, become increasingly "humanlike" or "realistic" in appearance the "presence response" of individuals experiencing such applications can dramatically fall as a consequence of "uncanny valley" (Seyama and Nagayama 2007; Brenton et al. 2005). Originally hypothesized by Masahiro Mori (1970) to account for observed reactions to robots with humanlike appearance, and subsequently applied to the variations in "presence response" to humanlike virtual agents in immersive VR environments, the theory of "uncanny valley" proposes that "people will have an unpleasant impression of a humanoid robot that has an almost, but not perfectly, realistic human appearance" (Seyama and Nagayama 2007:337). More specifically, and while still subject to debate, "uncanny valley" suggests that as artificial or virtual representations of humans attain a near-realistic appearance, so technical imperfections, as well as perceived abnormalities and differences from real humans, tend to produce eerie effects for participants, leading to a diminishing experience of "presence" within a simulated environment. "Uncanny valley" is a concept and theme, which like others defined firstly in relation to VR, finds a resonance in contemporary art and performance. Thus, the artist Tony Oursler's recent installation *Valley* (2010–11) for the Adobe Museum of Virtual Media, explores the disturbing nature of humanlike machines in another inflection of these questions around presence and with specific reference to Mori's seminal theory (Mori 1970). In the context of this effect, CAVE applications usually present overtly representational and even cartoon-like scenes and encounters, which nevertheless are intended to provoke "real" responses in the participant's knowledge of its artifice. Such responses are conventionally gauged by tracking skin response, eye movement, ECG (electrocardiogram) data, as well as semistructured interviews, questionnaires, and "presence graphs," whereby individuals reflect upon and map their perceived responses over time while watching a video recording of their engagement.

Read in relation to theatre and performance, however, this very disjunction and experience of displacement from "real" to perceivably "illusory" environments and actions can itself be understood as one engine driving toward the phenomena of presence. More broadly, it is in these applications' implicit exposure of the functioning and effect of representation—the capacity of overtly illusory acts and bodies to produce powerful experiences of presence *in*, rather than *in spite of*, their apparent immateriality and artificiality—that CAVE becomes of interest as a forum in which presence "is" a phenomena performed in and perceivably arising in response to "its" signs, rather than a quality ostensibly revealed by the "present" performer and "in" the performing body. Evidently, in contemporary performances by media-based companies such as Forced Entertainment, 3-Legged Dog, Big Art Group, and The Builders Association, as well the work of media artists such as Lynn Hershman Leeson, Gary Hill, Tony Oursler,[1] and many others, contemporary media's capacity to produce and amplify phenomena of presence in palimpsestual relationships with "live" acts and performance, including the simulation of "other" bodies, places, and personalities, is woven into explorations of contemporary and everyday experience. Such work, in common with the approach to CAVE in *Performing Presence*, assumes an erosion of the frequently rehearsed binary between "presence" and "presence effects," where the latter is commonly defined as the illusion of presence produced by an electronic reproduction of the signs of the body and the experience of perceiving the body as if it were present in the knowledge of its absence (Fischer-Lichte 2008:100–101). Indeed, if, as Derrida proposes, "[f]rom the moment that there is meaning there are nothing but signs" such that "[w]e *think only in signs*" (1976:50), then it is inevitably in the performance of its signs that, as a phenomena, presence emerges and recedes.

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1. For extended discussions of select artists' engagement with themes and phenomena of presence, on Tim Etchells and Forced Entertainment, see Giannachi and Kaye (2006); on The Builders Association, see Kaye (2007); on Lynn Hershman Leeson, see Giannachi and Kaye (2011:26–60); on Gary Hill, see Giannachi and Kaye (2011:61–92); on Tony Oursler, see Kaye (2008); on Big Art Group, see Gallagher-Ross (2010). The New York–based media and theatre group 3-Legged Dog have integrated three-dimensional projections into a series of live theatrical performances, to engage with simulated and immersive experiences in performance contexts.

It follows, too, in this paradigm, that the "presence" of the physical and material body itself cannot, in a simple way, be divorced from "its" signs, and consequently, just as the illusions of CAVE are inevitably intertwined with the participant's experience of "the real," so the perception of "the body's" presence is always already intertwined with the absences of the sign. In this respect, perceptions and experiences of presence are also a function of meaning and so context, and it is this, too, with which the *Performing Presence* scenarios for CAVE engage. Read in this relational context, and as subject to acts of representation and perception, presence is thus processual: a dynamic structure of intention, feeling, and perception emergent in the contextual performance and reception of the sign, rather than a quality inherent to the body, individual, or action or established in the real or illusory stabilities of a specific time and space. Produced in the motilities and differences in which signs function, the experience of presence is thus a product of—rather than an answer to—the absences in which signs operate.

In *Performing Presence*, then, the fundamental proposition driving the CAVE experiments is that phenomena of presence can be performed, received, and modulated in amplifications of the disjunctive experience that underlies the experience of CAVE. Thus, rather than deploy CAVE's simulations toward a displacement of the participant's attention from their "real" circumstances and contexts—from the physical cube and the VR lab, from the "real" individuals who facilitate the experiment—and toward an ostensibly unified illusion of a virtual world, these scenarios emphasize exchanges, dialogues, and thematic reversals between the simulated and the real, provoking an awareness of the layers and doubling within which CAVE functions even as its virtual worlds unfold. Thus, the *Performing Presence* mixed reality experiments in CAVE progress in explicit interactions between "simulated" and "real" performers—and in overt exchanges between the virtual projective world and the "real world" of the lab—to explore how an amplified relationship between the virtual environment and its "real" contexts may be used, paradoxically, to reinforce the qualia—the phenomena of "feeling present"—within a meaningful simulated world. These strategies also follow the proposition that the signs of simulation themselves invoke the idea and experience of the real: that the experience of the real always already shadows and is articulated *in* the encounter with simulation.

This proposition and approach to the phenomena of presence in CAVE is rooted not only in these assumptions around presence and the sign, but also in the analysis and exploration of theatrical and media-based performances. Specifically, the *Performing Presence* scenarios drew directly on a series of artists' workshops on presence and live performance hosted by the project in 2006 and documented on the DVD-ROM published with this article. Led, variously, by the artistic director of Forced Entertainment, Tim Etchells; the performance artist Fiona Templeton; the actor Bella Merlin; and the director, actor, and scholar Phillip Zarrilli; each of these demonstrations articulated a doubling or layering in the mechanisms and experiences of presence in performance. For Etchells, then, "performer presence" was presented as articulated and enhanced through "frames" acting ostensibly as means of obscuring, blocking, or restricting the performer. Such "constructions," Etchells suggests, can become a kind of "gift," in which the performer "appears through a particular aperture, to articulate presence in the layers or constructions that make you *there*" (Etchells in Kaye and Giannachi 2011). Where Etchells's dramaturgy sought to expose, articulate, and thematize the frameworks within which the performer acts, Merlin's approach to performer presence is founded in a post-Stanislavskian realism that draws on Chekhov and Grotowski, to reproduce a certain "seamlessness" in performance. Yet here, too, the performer's attempt to occupy "the moment" is articulated in a fracturing and doubling of attention: in layers of "presentness" and "artifice"; in the attempt to "remove blocks" through the *via negativa*, and the sense of "play" engendered by the artifice of performance; and the "dual consciousness" in which, Merlin suggests, the actor "utterly commits to the present while also having an eye open to the extent to which we feel present and the degree to which we feel fractured from the present" (Merlin in Kaye and Giannachi 2011). Templeton, in contrast, emphasized audience engagement, exploring the proposition that presence "can't happen without attention," by focusing on the doubling or mirroring of performer and witness,

event and reproduction, and the layers of awareness in which the sense of the "presence" of self, other, and event may be articulated and modulated (Templeton in Kaye and Giannachi 2011). Finally, Zarrilli returned to the performer, proposing that, where presence (*prae-sens*) is "to be before one" or "to be at hand," it thus remains a hypothesis and possibility: "something that is emergent; it is not an essence, it is not a thing" (Zarrilli in Kaye and Giannachi 2011). Observing and exploring the capacity of performers to move in and out—and across the thresholds—of performance, Zarrilli's workshop explored the emergent qualities effected in the actor's attempt to "create a constantly dialectical state of possibility [...] a disposition toward being ready" in which the actor "appears to and for an audience," to provoke and capture the "inner feeing of something happening as it's happening" (Zarrilli in Kaye and Giannachi 2011). The design, animation, and execution of Scenario One also drew directly on the US company The Builders Association's interplay and articulation of "live" and "mediated" performance, and specifically on the performer Kyle deCamp's live performance with her "virtual" child, rendered as a mobile, two-dimensional projection in a series of scenes for *Super Vision* (2005), key elements of which are also presented on the DVD-ROM.

Configured toward a participant's first encounter with the experience of immersive virtual reality, the *Performing Presence* scenarios do not restage these workshops, but transpose propositions derived from these and other performance modes and tactics toward the protocols and conventions of experimental scenarios for CAVE. In this sense, these simulated and mixed reality performances bring together methodologies and elements from performance theory and practice and experimental computer science, with a view to producing outcomes for both fields of practice and enquiry (see, e.g, Giannachi et al. 2009).

Performing Presence Scenario One (2007–8) thus amplified the dissonant relationship between a live human performer and her virtual representation (or avatar), which was rendered from the performer's motion capture rather than from the stock animation and computer-generated imagery (CGI) that CAVE applications usually deploy, to allow for a greater subtlety in the range and detail of simulated movement. Occupying the CAVE cube with the participant, and within a virtual interactive scene, the live performer and her virtual counterpart interacted before and with the participant, to implicitly present, in the virtual scene and in narrative content, the differences between the two worlds in which the CAVE functions. Yet, in this difference, the avatar implicitly echoed the modes and forms of movement and behavior of the performer, who is the source of "her" motion capture, replaying the performer's manner of breathing, and detailed aspects of her physical attitude and gesture. The participant was finally left alone with the avatar, having implicitly been positioned in the performer's place, and was then invited by the avatar to respond and judge "her" performance.

Scenario Two (2008–9) extended the interactive aspects of the first, while overtly articulating exchanges between the virtual environment within the cube and the "real" immersive VR laboratory beyond it, as well as between virtual agents and lab staff. Here, participants encountered male and female virtual agents, who, in dialogue with the real manager of the labo-

Figure 2. Performing Presence*, CAVE Scenario Two (actors' version) (2008–09). The virtual agents invite the participant to discuss their experience. (Video grab courtesy of the authors)*

ratory, conducted an "experiment" that invited participants to respond to a range of questions. As the scenario unfolded, the "experiment" repeatedly broke down, prompting various interactions between the agents, the participant, and the lab manager, and finally resulting in the apparent malfunction and disintegration of the female virtual agent. Scenario Two was also realized in two versions: firstly, through motion capture of trained and rehearsed actors; secondly, in naïve and untrained performers' reenactments—without rehearsal, preparation, or discussion—of the physical score and dialogue defined by these actors and then notated from video. This twin performance of the scenario acted as a control within the experimental design, so that participants' responses to structure and dramaturgy, rather than performance style, might be more clearly understood. This twin scenario also allowed an exploration of how participants responded to the motion capture of a rehearsed and controlled performance, in contrast to the reproduction of "noisy," unfocused everyday behavior by untrained performers.

In their outcomes,[2] these experiments suggested that this emphatic juxtaposition of—and thematic exchange between—"real" and "virtual systems" readily amplified participating subjects' responses to these virtual agents' behaviors and a concomitant sense of their own presence to these overtly simulated contexts and acts. Indeed, participants' own reflections suggested that, in emphasizing these juxtapositions and exchanges, moments of overt artifice, simulation, and "absence" could readily produce a heightened "presence response." Recounting the female agents' breakdown in Scenario Two, one respondent thus remarked:

P2/2611: And that was actually when I found them believable, because they reveal themselves to be virtual characters (*laughs*).

Q: Okay, that's interesting, an interesting comment.

P2/2611: Yeah. And that was the highlight of the thing, because she just gets funky (*laughs*), she just breaks up, breaks down. So she was honest about being a virtual character (*laughs*).

Analogously, in the context of the virtual agents' continuous stepping "in" and "out" of performance and "in" and "out" of differing fictional realms and spaces, some participants invested directly in their sense of the "doubleness" of the agents. In Scenario Two, one participant thus recalled his own systematic dissimulation to the male agent, an engagement that reinforces, through a heightened participation in the scene, a sense of the virtual agent's migration toward real space, intention, and action. Recounting the virtual experiment, the participant is asked:

Q: What motivated the answers that you gave?

P3/2202: [...] The male one, I thought he was quite aggressive; I didn't like him at all. I didn't like his face, the way he was staring, or anything. So I had to lie and say that he was a people person, or he was very open. [*Pause: 8 seconds*] But I just decided to do what I would do in a real situation, and if it was someone like that then I would just lie [...] Even though I knew it wasn't real and they couldn't come over and hit me because it would just go right through, but I just didn't... I didn't want to have to...

Q: You think you might have upset him?

P3/2202: Yeah, and I didn't want to upset him.

Q: Would you have answered the questions differently had he not been in the room?

P3/2202: No, because he would come back in the room for that little bit and suddenly appear right in front of me. So I probably wouldn't.

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2. A total of 57 individual participants visited the *Performing Presence* scenarios, going on to complete questionnaires, interviews, presence graphs, and other qualitative reports and reflections on their experiences.

Q: Okay. But if he was out of the way and definitely couldn't hear, would you have answered honestly?

P3/2202: As long as I knew he wasn't coming back in (*laughs*).

It is an exchange which also suggests the experience of the uncanny—in the sense of a "secret encounter" with an object or image imbued with an unexpected animation (Royle 2003:2)—an aspect amplified throughout these scenarios by the use of silence as the virtual agents variously and actively wait in anticipation of participant actions or responses to questions. It is a tactic that also explores Etchells's proposition that it is in that which is refused or in the act of withdrawal that phenomena of performer presence tend to emerge and become amplified (Etchells in Kaye and Giannachi 2011).

As these exchanges and responses suggest, the scenarios approach phenomena of presence as processual and variable—and as a function of perceived meaning and interaction over the technical aspects or effect of immersion or responses to immersion per se.[3] As a result, the qualia of "feeling present" in these experiments is treated as the effect and outcome of ecologies of temporary acts, meanings, and exchanges—and of juxtapositions, potential reversals, and imbrications of perceptions and so experiences of the "real" and the "simulated." With regard to performance, these CAVE experiments suggest that phenomena of "being present" arise as that which ghosts the system: as phenomena arising and amplified in differences and dissonances between the sign and its referent; between the "simulated" and the "real"; in the doubling, layering, and absences in which signs function. It is through such processes that, in CAVE, these virtual bodies and places may trespass into the phenomena of "the real," even as they are dissolved into the digital image. In both forums, phenomena of presence gain ground in articulations of the doubleness of simulation and in exposures of its place in and dissonance from the "real" acts in which it is encountered.

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3. For a discussion of the variable relationship between the technical features of immersion and presence response see Slater (1997).

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