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The TGarden Performance Research Project

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THE TGARDEN DREAMED

When you walk into a TGarden,[1] *you choose from a set of sumptuous garments, each with a different strangeness. Some billow around you in clouds of fabric, so that you grow three times larger but no heavier. Some add an odd elasticity to your body, so you tend to flop as you walk. Some may rip as you walk, or stick to each other or the walls, so you must tear yourself free as you disambiguate your body from ambient matter.*

You notice, as you enter the room, that there are a few other people – costumed, unlike yourself. It is hard to distinguish some of them from the projected visual textures sweeping over every part of the floor and the walls. As you move you notice that you leave a trail behind you. The air is filled with a hubbub of sound. Everything visual and auditory seems somehow made by living entities, but you cannot place them. The room has aquatic kinematics, but there are no identifiable creatures of the sea.

As you wave your arms you notice, perhaps immediately, perhaps after a while, that some aspect of the room's sound space varies according to your movement. But it takes a fair amount of play to begin to understand what is happening. A particular gesture does not always elicit exactly the same sound; it seems as if you are dragging your fingers and limbs across materials like wool or metal sheet or rubber. If you can learn how to move to generate some desired effect, then you can begin to write calligraphically and play as if you were "bowing" through the medium.[2]

Five years ago, I described this vision of TGarden to my companions in the Sponge and FoAM networks of artists and engineers.[3] Many popular imaginaries condensed around this dream, and it became a project into which at first four and eventually over twenty-five artists and engineers poured heart, body, and craft. As the set of creators shifted, the vision refracted according to the interests and professional biases of the creators,[4] until the dream of the TGarden responsive play space materialized as an installation-event called

TG2001, which we exhibited in ten cities over five generations of work in the three years from 2000 to 2002.[5]

This essay is a Janusian exercise in retrospection and anticipation. I document the imagined TGarden to lay the groundwork for a future series of installation-events and performances. This documentation serves three purposes. My first purpose is to describe the kind of theatrical inquiry that the TGarden materializes.[6] My second purpose is to describe the conceptual and aesthetic theatrical research questions and arguments that the TGarden poses in tangible form. The TGarden was born from a conversation among members of an experimental art-research group called Sponge, founded by Laura Farabough, Chris Salter, and myself in 1997. In order to understand the TGarden project, you should keep in mind that it is a poetic response to some challenges concerning performance and responsive media technologies. Finally, my third purpose is to locate the TGarden with respect to Antonin Artaud's, Peter Brook's, and Jerzy Grotowski's notions of theatre and performance, a way to place the interface between this kind of materialized performance research and modernist traditions of theatrical inquiry.

THE TGARDEN BUILT: TG2001

The TGarden project produced a series of installation-events, beginning with prototype systems exhibited at Siggraph 2000 in New Orleans, LA, and at Medi@Terra 2000 in Athens, Greece. Following those studies, the environment was redesigned and built afresh by an expanded team of artists and engineers.[7] The TG2001 responsive play space was realized as a co-production between the Sponge and FoAM art-research groups and a consortium of institutions, including The Banff Centre / New Media Institute, Starlab in Brussels, the Georgia Institute of Technology, V2 Rotterdam, Ars Electronica in Linz, and the Daniel Langlois Foundation for Art, Science and Technology in Montreal.

For the Ars Electronica, we staged TG2001 as a theatrical event in miniature. Let me describe this experience from the visitor–player's point of view. You choose one of a set of fantastical costumes made of white fabric that can register projected images. You are led into a small space draped in black curtains and are then dressed by an attendant. The attendant belts the pocket computer and battery around your waist and straps sensors to your arm or chest. It feels like a medical exam, but with a more erotic charge. You are told little about how to move, but the attendant suggests that, when you don the costume, you put on not only a new body but also a new voice. You are told to listen, move, and attend to what is happening as you move. You are released from the dressing chamber into a room roughly twenty-by-twenty-by-twenty feet, in which there are one to four other people, also dressed in diverse, fantastical costumes. The costumes serve as phenomenological experiments: one

Figure 1. Visitor realizing effect and improvising gestural repertoire in the TG2001 responsive space, Ars Electronica, Linz, 2001.

Figure 2. Visitor responding to induced "elasticity" of living physics. (Linz, 2001)

is a transparent skin that clothes you in heavy armor, another increases your volume but keeps your weight unchanged. In any case, each costume defamiliarizes your body so you may more readily improvise gestures. The room is filled with a humming, slowly varying, textured tone, occasionally shot through with explosive streaking sounds. In some cycles, these explosions are triggered by a dynamic of accumulating charge and release. In other cycles, a dense aural texture thickens the ambience but also makes it harder to individuate your own contribution to the sound field. The floor is painted with moving shapes and lines and textures cast from a video projector twenty feet directly overhead. As you move you see that your shadow is, in turn, shadowed by graphics projected on the floor – patterns and wings that echo and respond to

Figure 3. Visitors playing in TG2001, V2 Las Palmas, Rotterdam, the Netherlands, 2001.

Figure 4. Professional dancers in TG2001. (Rotterdam, 2001)

your movement. As you pass other people, sometimes the shadows overlap and mix and sometimes they explode into dust. Sometimes, as a person passes near you, your shadow detaches and jumps across the floor to her. She steals your shadow and drags it along by accident the first couple of times, but then takes it intentionally, as everyone joins the impromptu game. Sometimes you exchange and re-exchange shadows. As you lift your own arms, you may notice very subtle changes in the field of sound, perhaps a sinusoidal "signature" whistle. It is not clear at the outset what aspect of the sound field varies according to your gesture, so you must improvise to tease out which threads of

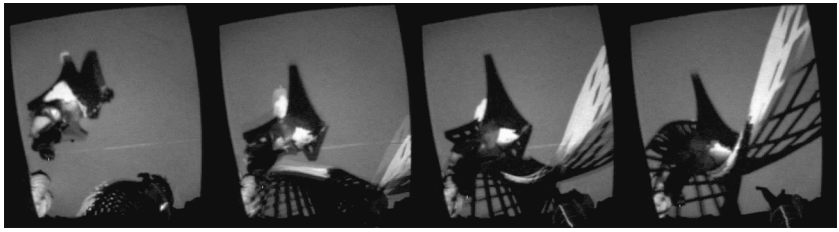

Figure 5. Passersby swap or steal projected wings as the camera-tracking confuses identities.

the tissue of sound figure as your own expression. The TG2001 has many "climates," so each time you re-enter the space you may encounter a very different texture and dynamic. The music may be static one time and driving and percussive the next. You may find several small epiphanies in this responsive space. At first, the room seems like a wash of sound and moving images. After you realize your own media-shadowed body's limits and dynamics, you begin to play with others. Speaking is not necessary and often seems out of place. You begin to play with your own patterned shadows or you may play with the room as a whole.

TECHNICAL ARCHITECTURE

Later in this essay, I will situate the TGarden with respect to Artaud's call for a theatrical language beyond text, but in order to prepare the ground for that comparison, I will first sketch the technology that we built to create TGarden scenarios.

In a TGarden, effects propagate in a concurrent circle of processes from people moving in a room; to sensing data from accelerometers, photocells, magnetometers, pressure, bend or stretch sensors, infra-red trackers, and cameras; to computing statistical indices and state dynamics; to sound and video synthesized in real time, according to both the ostensive state of the system and the contingent movement of the people playing in the space.[8]

In his survey of theatre and performance, *The Empty Space*, Peter Brook observes that, in theatre rehearsal, the relation is director plus dramatic subject plus designer, and later, actor plus dramatic subject plus director, whereas in performance, the relation is actor plus dramatic subject plus spectator. But in TGarden's case, since the spectator is the actor, what exists is a *generative* relation: performer plus system yield subject.

During the Banff design workshop in March 2001, we faced the difficult task of describing what it was, concretely and experientially, that we wanted to build. We asked ourselves, when a visitor steps into the space, what should

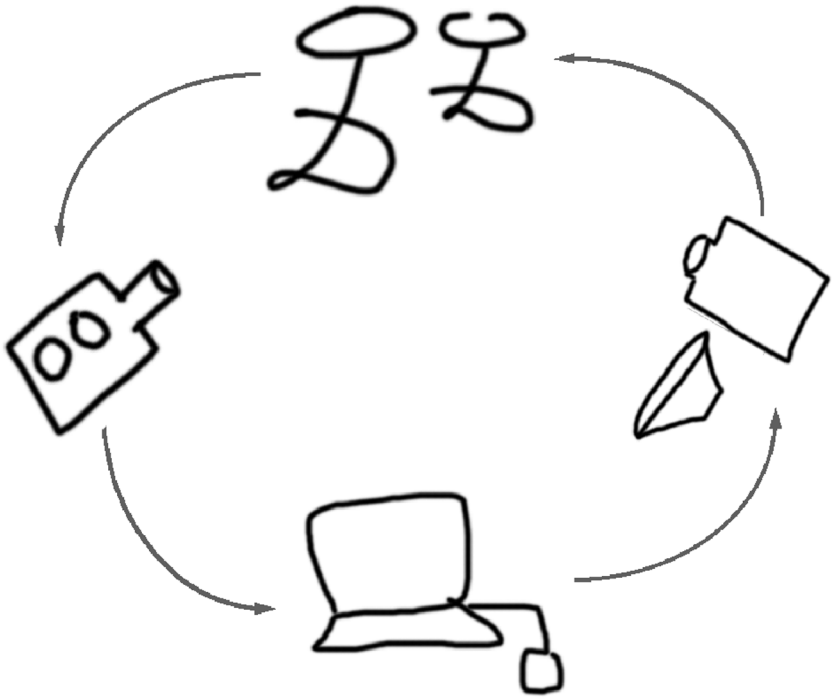

Figure 6. Experientially concurrent loop of players' activity, sensor/camera data

this player feel or perceive and what should happen to the player as he or she moves around? The same protean and alchemical features that made the TGarden so appealing to us also made it difficult to design or converge on a stable image or scenario. For research purposes, to explore possible preconditions for meaning construction in performance, we deliberately excluded prior-to-performance narrative structures, such as scripts and scores.[9] Although it necessarily adapts to the physical surroundings, a TGarden cannot be a normal architectural project, with spatial, stylistic constraints fixed in advance. During the design workshop, one of the realizations that struck me was that there were two kinds of designers at play: those who told stories and those who built worlds whole. The storytellers tried to describe TG2001 via one-dimensional (graphs of) narratives: here you enter and then you see this and then you do that – and then and then and then. The problem, however, was that these multiple narrative threads did not add up to a plausible whole scenario and gave no insight into how the responsive environment should behave. The heart of the problem, then and now, was that innumerable paths of "user-experiences" can be threaded through a continuous world and that one can sample only a

sparse and potentially uninteresting part of the world. Moreover, a set of independently created narrative threads, whether structured as a tree or otherwise, does not naturally add up to a compelling, rich, dense, aesthetic imaginary world that can be played freely by a group of people.

In addition to the storytellers, there were those who envisioned a world as an autopoietic plenum. One other artist, Maja Kuzmanovic, and I saw the TG2001 that way. We imagined a pseudo-physics, a set of continuous, field-like metaphors and heuristics for how the TGarden worked. The heart of such an approach is a compact, finite set of magic principles that provide a scaffold or substrate over which a world with arbitrarily rich aesthetics could grow. The confirmation that this had some promise as a method of collective composition was that the two "autopoietic designers" extemporaneously answered every question about this world with fluid and oracular coherence. This indicated that we had created something with enough intersubjective substance to stand an interrogation that generated as much detail as we needed about how the environment would appear to its inhabitants and how its physics and its synthetic ecology or event structure would work. I do not wish to lay out the design in complete detail, but I will give the flavor of the elements of its metaphorical, potential–dynamic event structure:

1 Each body walks into the room with a finite amount of liquid heat.
2 Initially, beneath your feet, lies a magma covered by a membrane that splits where you walk.
3 Heat equals light: heat generates a magmatic convection.
4 The environment is quiescent as people first enter.
5 The environment evolves at multiple scales of time: gesture, beat, state, session, day.

We also worked from a set of specific images and textural transforms intertwined with the response dynamics.

From such material, we created, in one half day, a rich hyperdimensional *potential* field, denoted in terms of metaphorical states evolving according to symbolically meaningful conditions for the *continuous* as well as discrete *evolution* of state. In other words, we created not a particular fixed sequence or even a graph of discrete activities but a potential field that nudges the evolution of a system's potential "behavior" in response to the contingent activity of the players in it. For instance, the TGarden may compute a numerical index that increases when the camera field is filled with an increased blur of movement. That index may be combined with indices from the sensors measuring how vigorously limbs are swung. This increasing index of activity perturbs the evolution toward a state that may be labeled, "Dancing on the Dinner Table" or "Condensation Point," perhaps, according to the designer's vision. The states of the room and of the individual player are the product of tenden-

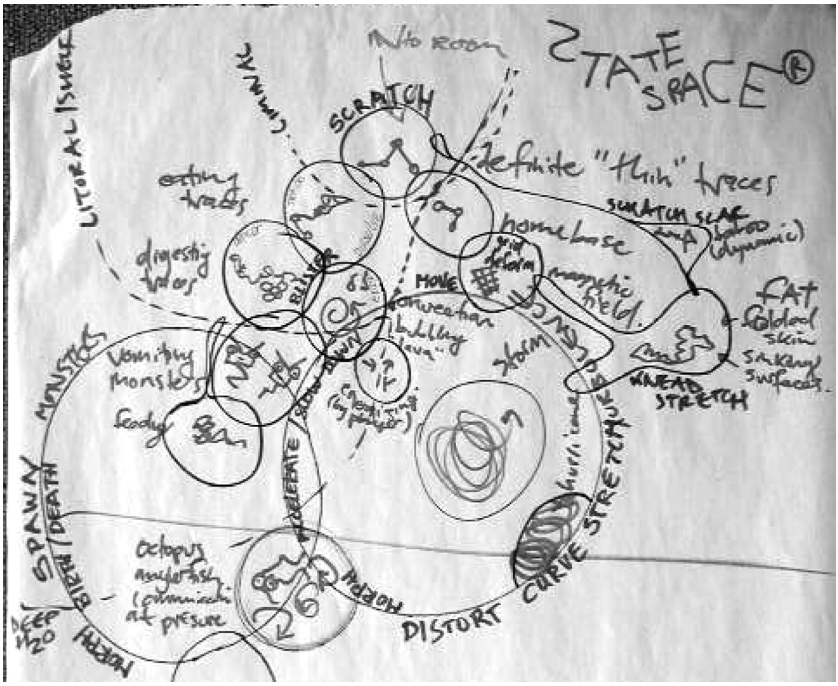

Figure 7. Creators' map of a potential evolution landscape of metaphorical states.

cies built into the TGarden prior to performance and of the concurrent, "real-time" activities of the players in the room. Even if the players do nothing, the states still evolve according to a dynamic that is, in a sense, "authored" by the designer prior to the event. For example, in the absence of player activity, the room may tend to come to a final closure or the individuals be steadily interpreted more and more as "group" players rather than "solo" players. As players move and gesture, they interfere with the states' statically defined evolutionary tendencies and inject contingent agencies of the human performer into the dynamic evolution of the states. The media synthesis engines, in turn, can be written to use, ignore, or resist these states as evolved by the dynamic system. The key is that the software *describes* incoming observables but does not *prescribe* what the room or the people do.[10]

The system dynamics serve as "potential," both in the everyday sense of an imagined event yet to be actualized and in the more strictly scientific sense of an energy field whose differential gradient yields the motion of particles subject to that field. In our "formal" presentation of an event, we view the metaphorical state of the entire room and the state of each individual player as particles in a high-dimensional metaphorical space. The metaphorical space is

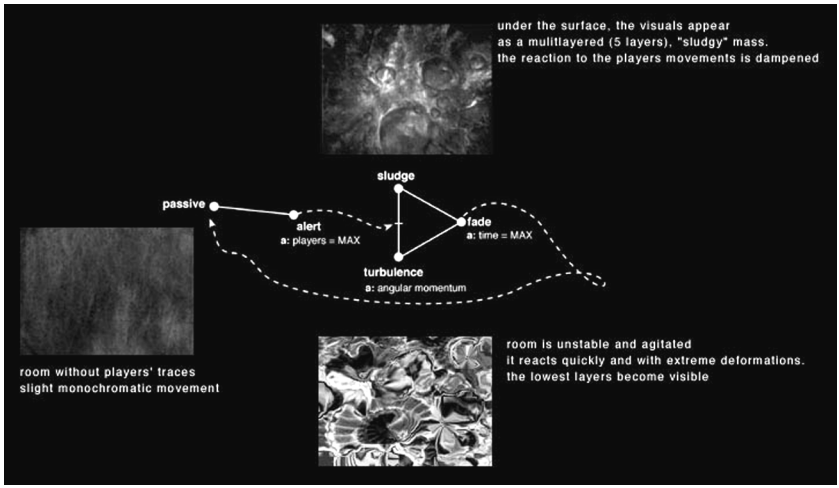

Figure 8. The landscape of metaphorical states for the room's responsive character, drawn as a topological space for a dynamical system.

a *continuous* space of potential states, with as many dimensions as there are provisional, disambiguated metaphorical labels like "spawning," "solo" versus "group," and so forth. I call the software system that operationalizes the evolution of metaphorical state the TGarden's *continuous dynamics media-choreography* system and describe the mathematical and computational aspects of this media-choreography system elsewhere, in a technical paper (see Sha, Visell, and MacIntyre).

I should underscore the practical and conceptual implications of this continuous-dynamics media-choreography system because I think this is one of the TGarden's principal technical contributions. First of all, the topology of metaphorical states is a field of *potential* rather than a set of *actual* media or physical configurations. This typology reflects a conventional distinction between the virtual or imagined and the actual (see Damiris and Wild). The consortium of TGarden engineers built a software mechanism replacing a "script" or a "score," one that allows designers to create potential events in terms of latent fields of dynamic behavior, a mechanism written in a graphical semiotic that is simultaneously legible to the designer literate in the Max/MSP/Jitter visual language and executable by the computer. We can think about the TGarden system by analogy to a musical instrument: the designers use tuning parameters that shape how the states of the environment will evolve in response to contingent performer activity. The media-choreography instrument does not prescribe any universal schema of metaphor or process, and its operation can be tuned to extremely local and contingent human performance.

More precisely, rather than specify in advance what happens in some determined linear or graph ("hypernarrative") logic, the "and then and then and then," the artist designers of a TGarden author the potential fields that nudge the actual state of the room and player code in this or that direction, according to a resultant of energies statically predefined by the designer plus the live, contingent action of the human players in the environment. Of course, this is a well-known challenge to the composer of interactive media, and one of my goals in the rest of this essay is to argue that the TGarden presents a quite different answer to this challenge, based on responsive media. The contingent, even if unpredictable from the computer's point of view, is not random.

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We pause here to take stock of where we have been. The TGarden was born as a poetic response to a philosophical conversation that made a Wittgensteinian family of its participants. The TGarden originated as an utterance in a long conversation, running over three years – a poetic articulation of a way of thinking about interaction, agency, materiality, pattern, structure, and topology, that started with the Stanford Interaction and Media Group research seminar and continued in the Sponge art-research group. In Sponge's conversations, we "spoke" these scenarios and event structures to each other in characteristically different styles – affective and visual tableaux, action sequences or webs of action dependencies, magical alchemies. Over the four years of ever more ambitious constructions, TGarden became a performance event, then an experiment in which we could videotape and interview casual players, much in the spirit of an ethnographic study.

CONSEQUENCES FOR PERFORMANCE

But how do the conceptual concerns that I have discussed relate to performance? One of the motivations for this essay is the conviction that many of the supposedly new visions in performance and technology are not new and that that is their strength. In *The Empty Space*, Brook identifies four theatres: Dead, Holy, Rough, and Immediate. The Holy Theatre is that envisioned by Artaud, that which is utterly transformative, as inescapable and implacable in its effect on the spectator as the plague. It is the theatre of becoming, of transformation, and of "chaos," as a name for the unbounded and unruled in which, as Brook put it, there is a passionate identification of man with society, with nature, and with objects (42). Brook characterizes Artaud's Holy Theatre as a "theater working […] by infection, by analogy, by magic; a theater in which the play, the event itself, stands in place of a text" (49). Artaud's challenge poses a paradigmatic theatrical research question that is, as Brook articulates it, "Is there another language, just as exacting for the author, as a language of words? Is there a language of actions? Is there a language of sounds – a lan-

guage of word-as-part-of-movement, of word-as-lie, of word-as-parody, of word-as-rubbish, of word-as-contradiction, of word-shock or word-cry?" (49). The plague cuts across all conventions, all rationalizations masquerading as ethics or efficiency, and all artifices of convention or genre. Its infection can be messy or silent, and we call it cruel. But blind cruelty is what humans attribute generally to nonhuman, implacable agency.

On behalf of the Theatre of Cruelty, Artaud sought an incantatory new language that would draw art from the dumb matter of *mise-en-scène*: costume, painting, lighting, sound instruments, set design, vocal inflection, bodily gesture, and movement. But words failed him, in the sense that the language used to depict human conventions was already fatally bound by linguistic frames.[11] So Artaud called for a metaphysical theatre in place of the European theatre of psychology. In such a theatre of "matter as revelation," he wanted to use music and speech not for their representational function but physically. to affect the flesh of snakes and humans alike (59; see also 81).

Rereading Artaud strengthened my confidence in conceiving the TGarden as a phenomenological experiment because there were such resonances with what he glimpsed and sought but never entered for lack of means and temperament. What he called the "language of the stage" (94) is echoed in the TGarden's motion and gesture tracking and media choreography. His musical instruments are echoed by TGarden's "softwear instruments"; that is, composites of costume, wireless sensor hardware, and MSP or Supercollider software. Artaud wrote, "[R]esearch is also required, apart from music, into instruments and appliances which, based upon special combinations or new alloys of metal can attain a new range and compass, producing sounds or noises that are unbearably piercing" (95). Little did he know that the metals themselves would be rare earths injected as microscopic dopants into silicon; glass dusted by metal, powered by electricity, would do the trick. What I call "structured light," light that uses projected video not as a framed image-object but as illumination deployed for its luminous, plastic qualities, echoes Artaud's "new ways of spreading the light in waves, in sheets, in fusillades of fiery arrows […] [in] order to produce the qualities of particular musical tones […] [and] recover an element of thinness, density, and opaqueness, with a view to producing the sensations of heat, cold, anger, fear, etc." (96). Contemporary audio-visual technology (such as DMX-controlled lighting) can do this formally, but in conventional entertainment, it is usually employed according to the demands of the psychologistic and entertainment theatre designed by men Artaud denounced as "positivists" and worse. The TGarden's software logics, written in Max and C, now can control such theatrical lighting systems according to a media choreography whose dynamics exhibit the nonhuman and parahuman agency of a media choreography based on dynamical systems (Sha Xin Wei, Visell, and MacIntyre). As for the physical space, Artaud called for the abolition of the proscenium stage and called for a single space of

action, in which "the spectator, placed in the middle of the action, is physically engulfed and affected by the action" (96). A Virtual Reality CAVE encloses and cages the spectator in a box of screens (see Cruz-Neira et al.). Replacing theatrical action by optical simulation of motion attenuates the performative space's affective power and potential for transformative terror. Johannes Birringer describes the tedious preparation and reduction of the human potential for action to a tiny disciplined range of actions, limited to pointing a wand inside the CAVE. In VR systems of that generation, engineers tried to flesh out a world from scratch, or more accurately from bits, instead of augmenting the one that is already present in and to the flesh. To replace the world, bit for atom, betrays a confidence that exceeds that of Babel's engineers by a breathtaking factor. Instead, why not leverage the physical world already in place, a world that has far greater resolution and far less latency than a network of computers because it already runs at the speed of matter?

Polemically, Artaud wanted to remove all traces of psychological interpretation, so in place of that category, he wrote, "[T]he spectacle will be calculated from one end to the other, like a code (*un langage*). Thus [...] all movements will obey a rhythm; and each character being merely a type, his gesticulation, physiognomy, and costume will appear like so many rays of light" (98). In the TGarden, we projected video over the bodies of the players, but only because we could not (not yet) realize the original dream of patterns bleeding from one body to the next. Of course, even Artaud's vision, however passionate, is itself only a way station. The TGarden extends the dissolution of the psychological subject more radically: there is no longer a spectator who stands in the middle of the spectacle. In fact, not only do we dissolve the proscenium, we dissolve the bodily distinction between spectator and actor altogether: there are no pure spectators and no pure actors in a TGarden, only players.

Half a century removed from *The Theater and Its Double*, the temper of the TGarden is cooler than Artaud's revolutionary ardour. Instead of "break[ing] through language" as Artaud would have it (13), we choose to set language aside, to bracket it with phenomenological dispassion though not to reject it or dismiss its power. In this way, we could conduct, more clearly, a phenomenological experiment with the nonnarrative technologies of the mise-en-scène.

Artaud appeals to a premodern alchemy, in which mind and body, individual and world, are not disjoint ontological categories but in fact immanent in what I would characterize as a plenum that can be nuanced in infinitely many modes. I describe his vision in these terms because, when it is cast in such a light, we see that a similar ontological attitude suffuses and powers the TGarden.

But is this bracketing of narrative a modernist ambition, as some have suggested? I think not. A modernist program would take its norms from formal-

ism, universalism, efficiency, and productivity. Instead, we have built a space for free play unconstrained by discrete goals, rules, or rewards partly because we wish to avoid inducing the puzzle-solving behavior so typical of interactive installations but also because we wish to witness and sustain the emergence of improvised gesture from continuous fields, an emergence that would be hobbled by discrete schema. Moreover, instead of seeking a Kirchnerian or Leibnizian *mathesis universalis* that would offer logic as a science of signs universally encoding human thought (see Kircher; Leibniz), we give up the universality of context and settle for contact languages, creoles that evolve out of coordinated play.[12] However, according to how we have constructed our environment, much of this creole exceeds the category "linguistic." In fact, I use "plenum" and "mode" in their premodern senses of mutation, transformation, and anteriority to species.

HOW IS THIS THEATRE RESEARCH?

Thanks to the farsighted architecture and engineering of the hardware and software apparatus, we now have, not some throwaway, "one-off" piece of media and software, but an instrument that could realize more than one event and, in fact, could sustain a continuous number of different possible scenarios. The TGarden's media-choreography instrument has the practical value of allowing us to realize multiple different artistic visions, but what is most interesting for the purposes of this essay is to situate the TGarden project as performance research. Here, I find it useful to examine Grotowski's exceptional performance research practice, at least as described in the presumably idealized accounts published during his lifetime.

In *Towards a Poor Theater*, Jerzy Grotowski argues that his project was neither art nor science but a form of research. The object of his study was the nature of theatre: what distinguishes it essentially from film and television and all other arts. Its method was a penetration of human nature itself, as he revealingly put it in 1964 (Grotowski 37). Over thirty years, Grotowski extended this research with tremendous refinement, drawing upon the fund of western literature. He and his laboratory group deeply studied traditional acting, movement, and meditation methods from China, Shaker culture, and indigenous African and American cultures, and incorporated them into "action" sequences that they refined over months and years. But Grotowski despised cultural and methodological "tourism" and thoughtless posing in all forms, whether it be the ahistorical, improvised activity of the Happenings of the 1960s, the exoticized urban tribalism popularized around Burning Man in the 1990s, or any fake physical gesture that had not been rigorously worked out by the actor.

With his Poor Theatre, Grotowski abandoned his acclaimed and virtuosic theatre productions to pursue what could be characterized as an investigation

of the essence (*eidos*) of acting, the relation between the actor and the spectator that remains after stripping away or putting in suspension all the external trappings of theatre: costuming, lighting, props, and to some extent, written text. It is revealing that Grotowski describes his theatre laboratory's method as a "*via negativa*" (17), in which extraneous factors are progressively stripped away – a procedure reminiscent of the bracketing procedure of phenomenology. Using props and costumes with little "autonomous value" allows maximal scope for the theatrically performative ascription and construction of meaning between actor and spectator. In Grotowski's research, the germ of the theatre is not the text but the bodily encounter between people that sets up relations between actor and subject, actor and spectator, actor and self (55). In contrast to Artaud's manifesto, what Grotowski established was a method of conducting a sustained phenomenological investigation of performance, but by design, this method could never be a methodology. That is, there could not be a school of Grotowskian principles of acting to be propagated in some invariant form from generation to generation of actors.

Grotowski's insistence on actions by physically co-present humans resonates with my view of the TGarden as a place for embodied collective play. In recent years, some theoretical writing about electronically mediated performance has bestowed attention on diverse combinations of "mediated," "remote," "telematic" presence, and theatre. I do not mean to say that one cannot have a telecommunicated sense of synchronicity – whole industries of telecommunicative sex would contradict that claim – but the subtlest problems and the richest rewards, I believe, lie in the augmentation and nuance of face-to-face encounters. In TGarden, we chose to leverage the powerful coordinative, communicative, erotic, and social dynamics that charge physically co-present human experience. Of course, creating technologies for live performance raises the stakes because our computational and projected media must stand up to the compelling and adamantine presence and resistance of desiring, living matter. In the theatre, this is so obvious that it seems more provocative to adopt the opposite rhetorical position: that "distributed," "remote," "telematic" theatre is where the action is. But the results (among which, the more thoughtful examples of this sort of environment are Myron Krueger's corpus and Char Davies' work[13]) to date largely have been experientially thin compared to experimental performance over the past hundred years.

It is instructive to compare spectator experience in digitally synthesized environments with the corporeal intensity of the facial exercises, breathing exercises, and body-resonator exercises that Grotowski's actors and co-researchers assembled and developed (Richards and Grotowski 52). Beyond those basic exercises, which are found in various degrees of intensity in movement and acting workshops, his student Thomas Richards has described several types of actions, such as "watching," in which movement is accompanied or even constitutes a way of seeing, and "motions," in which the person

stretches from a primal position and arrives at evanescent positions that should be achieved *en passant* but not as "keeping a form" (Richards and Grotowski 122).

Superficially, there is an obvious difference between Grotowksi's performance research and the TGarden project. The TGarden draws from the full spectrum of contemporary audio-visual and digital technologies, whereas Grotowski's Poor Theatre eschews all stage machinery and strips theatre down to its essence of the actor's body, with minimal, freely repurposable props. At this point, I should emphasize that the TGarden sharply distinguishes itself from "augmented" or "virtual" reality media-art projects in that it does not aspire to prescribe user experience. Disney does it better, and so does Hollywood. TGarden is a phenomenological research experiment rather than a particular narrative in the form of an installation.

But there is also a more subtle difference between TGarden and Grotowski's physical-action research: our bracketing procedure does not follow the usual "vertical" metaphysics that divides black-boxed machine from spiritually and symbolically permeable fleshy body. In fact, the point of the investigation is that, when we bracket narrative, we suspend (but do not forget) our expectations about the body, the subject, the actor, the spectator, and in fact, the object. By retaining all the thickness of experience, we conduct an embodied investigation that is phenomenological but not essentialist.

Nonetheless, given these differences from Grotowski's project, there remains the shared aspiration to conduct a sustained, studio-laboratory study of the phenomenology of performance. There is no rigid constraint to produce particular instances of performance for a paying audience. This is an important point because it is one of the main warrants for sustaining this sort of research in an academic research institution. Grotowski, himself, remarks on this in his essay at the end of Thomas Richards' book, where he laments the impossibility of actors' deepening their understanding and their craft under the constraints of producing public performance (Richards and Grotowski 113). But is this a form of research generating *knowledge*?

Does such work, if it is to be labeled research, generate knowledge, with its attendant claim to objective, supra-individual knowledge? I would say that Grotowski found, at the end, only a partially satisfactory answer to this. Over the last few years of his life, Grotowski's centre in Pontadera, Italy, met or brought in sixty theatre groups in intimate, joint, and nonpublic exercises.[14] Aesthetically and ethically, Grotowksi's nonmethodology has enormous appeal, and his idea of anonymous diffusion along the spectrum between art-as-performance and art-as-vehicle recalls Foucault's rhetorical modesty in the discursive field. But the TGarden research has an additional social motivation, which is to mediate among the different discourse communities of philosophy, art, performance, and dance, and of people who do not practice art for a living. Not all our players are experts/builders of the event; nor are they spectators –

instead they are in-between sources of behavior "data" as well as active co-creators of their own experience – "doers" – to use Grotowski's term, but not disciplined doers. In our case, my colleagues and students do not rely on anonymous diffusion because they choose to work in very different material conditions. We intercalate our work's documentation into videos, essays, cultural publications, techno-scientific reports, and demonstrations in scientific, engineering, or media symposia.

CADENCES

So what have we learned? Which concerns shall we lay to rest and which shall we carry on? I think there are four areas in which we can articulate some intuitions about new modes of performance afforded by contemporary technologies of performance: (1) an alinguistic semiology of performance; (2) the notion of substrate; (3) the question of how to be human; and (4) a pragmatics of building responsive media spaces, media choreography, and real-time instruments.

The technologies of performance-based computational media open a window for exploring the possibility of a nonlinguistic semiology of performance, or in less media-centric and more historical terms, a new take on the alchemical mise-en-scène that Artaud envisioned fifty years ago. I believe that the synthesis we have constructed of real-time, time-based audio and video instruments, a media-choreography system that evolves metaphorical states as a continuous dynamical system, and the statistical filters that generate indices of gesture and movement from our sensor data constitutes a new genre of performance technology that we can use to explore co-present expressive, poietic activity.

In order to carry on this sort of performance research, we cannot make do solely with technology, as it comes, shrink-wrapped, from the market or even from other labs. The TGarden consortium's relationship with technology is quite different from that of Diller + Scofidio, for example, who have their own strong conceptual agendas concerning gender and surveillance and architectural gaze.[15] Diller + Scofidio use technology in the form of readymades, whereas we intervene deeply in the interior of the technology and conduct the techno-scientific research and development necessary for our own production. No readymade instrument is yet available to realize a TGarden responsive space as envisioned, and perhaps one may never exist. In the approach of my colleagues and myself, the design and construction of new technology is itself reflexively part of the *research* project, if not of the performance. Diller + Scofidio exquisitely design their compositions from a position exterior to the technology, whereas our practice is interior to, or better, immanent in the co-evolution of instrument and expression. We modify and extend technologies in order to build our performance-installation experiments, which considerably raises the stakes in performance practice. Contrast this with conventional

opera and theatre production, in which the standard technology of mise-en-scène is *not* invented in tandem with the director's, designer's, and actor's relationships to the subject in rehearsal.[16]

Aspects of Artaud's visions for theatrical craft now seem less rhetorical and more materializable, given the media-choreography system that I described earlier in this essay. The TGarden responsive space, considered as an instrument, does not rely on a script or a timeline. Instead, it maps generally from continuous corporeal movement to continuously time-varying fields of sound and visual textures, based on the method of continuous energy-minimization. "Cruelty," in the context of TGarden's production process, is manifested in the complex of engineering trade-offs and the constraints of matter that must be learned by the collective of artists and engineers who create a responsive space.[17] To give one example, for concreteness, designers who had never worked with tracking systems believed that it was enough to make the costumes "look different" – for example, of a different color or different material. But due to variations in incident light, a surface presents many variations in color as the body moves under the computer camera, and very different materials or shapes may appear to be identical when projected onto the imaging place of the camera. In other words, designers who came fresh to the world of computer vision had to learn that Derrida and Saussure were right after all: there is no absolute color, no intrinsic identity in the appearance of a sign, and difference is what yields meaningful pattern. Conversely, the tracking engineer had to understand that there could be no constraint on how people moved in a play space – that they might roll on the floor or somersault. Players might even wish to hide or disappear and deliberately lose or confuse their identities. Therefore, our tracking algorithms could not assume that people's poses had heads over heels or that their bodies would always be distinguishable from background video.

Peter Brook writes about how essential it is, in developing a performance, to maintain flexibility, looseness, and roughness of concept and to retain the ability to change throughout the design process: "the later he makes his decision, the better" (102).[18] Brook calls such a rehearsal process an "open form" (102). What Brook requires is the seemingly paradoxical privilege of cutting dynamic material into shapes before this material has yet come into being. This approach to design contradicts the engineering norm of progressively narrowing the cone of possibilities to converge on a design "solution" as the project approaches its terminal date. This deep contradiction in method motivates the need for an entirely different way of thinking about the technology of media. Rather than work with specific media objects, or even specific "instruments," or pieces of hardware or software with specific sets of functions, why not work with media as material? Our research work is analogous to that of creating new textiles instead of designing specific items of clothing. In fact, this approach to computational media parallels, in spirit, the theatre's

stripping away of the over-coded machineries of representation and leaving in place simple props that actors can instantaneously shift from one metaphorical field to another. Instead of making a complicated piece of software that waits to "recognize" a specific hand sign or body movement and then react by playing a recorded sound or video, the TGarden provides textural, time-based media processes that we can overlay and cut together like live, calligraphic fluid. Instead of assembling media objects like edited video clips, we make materials that have interesting behavior and appearance, which we can then mix and remix as we please in crafting a responsive experience.

It is essential to keep in mind that these media could be of all kinds: breath, a body's resonators, facial muscles, calligraphic video, calligraphic sound, and so forth. Such topological media allow a player to shape nonmimetic forms because the projected media are not created or used as representational schema, as symbols, but as gesturally shapable stuff, as pseudo-living material. In his memoir of work with Grotowski, Richards describes how, for an action sequence exercise, he bent himself into a yoga position in order to represent a passage into the dream world: "I lay on the floor (indicating sleeping) […] started to sing, then I got up (indicate entering dream world) […] I fell into a hole and screamed. I did not know how to create this fully physically, so I replaced it with a symbol: I let out a scream and arched backward into a yoga 'bridge'" (Richards and Grotowski 59). But his spectators did not understand his private symbolism and saw only a calisthenic movement that, being unconnected with the field of other physical actions, only confused them. Richards used symbols in place of motivated physical actions. "Do the action, do not use symbols for actions" was one of Grotowski's core lessons. To represent is to symbolize.

Where Grotowski challenged actors to use their own bodies as their expressive medium, I take as my challenge creating computationally mediated matter for expressive *presentation*.[19] For *Apocalypsis cum Figuris* (1967), Grotowski trained his actors to fashion facial masks – based on their personal histories and their intensely disciplined physiognomies they created set faces – masks made of their own muscle – through which they could deliver a torrent of physical speech. To sustain such a reshaping of performative substance at that level of virtuosity, a technology of performance would have to aspire not only to the order of responsivity of the actors' exquisitely trained flesh but also to the plastic freedom from predesigned mapping of action and gesture that Grotowski's actors enjoyed. Grotowski could have asked his actors to carve their own masks out of wood as they dove deeper into an investigation of their roles, but no material was as pliable and as sensitive to these actors' own imaginations as their own disciplined bodies. But to re-engineer bodily preconceptions and to free the actors' flesh from predesigned "mappings" took years of a kind of effort that was exceptional in professional theatre in the west in the latter half of the twentieth century.

From the beginning, Sponge's installations were designed to perturb the participant–observer in an *entfremdung* ["alienation"] experiment constructed to displace or defamiliarize his or her received expectations for analytic or dramatic or alchemical purposes. Remember that the TGarden's costumes were designed to encourage you to corporeally improvise yourself.[20]

WHAT HAVE WE BUILT? WHAT COULD A TGARDEN BE?

In sum, TGarden is a performance machine, an instrument, a space in which people can playfully improvise gestures to create, collectively or individually, meaningful patterns out of fields of dynamically varying light, sound, fabric, and bodies. The responsive software evolves continuously according to a magic physics, free of rules, schema, and symbolic computation. The media fluidly evolve both autonomously and in *concurrent* response to the players' activities, so that the dynamic patterns are co-constructed simultaneously across the entire experience. The dynamics are designed by composers of the TGarden not as a specific sequence of actions but as a topology of substrate fields of latent potential action.

Since every person in a TGarden is a performer, could it merit characterization as a space for what Brook called ART-as-vehicle? Perhaps, provided the social membrane around the event is drawn large enough to include not only those who play in a TGarden but also we who create it. However, the TGarden installation-events comprise an unbounded set of events, permeable to the open world in a way that a closed workshop of actors or "doers" cannot be. It would be presumptuous to posit a substantive similarity between the actual experiences of our own responsive spaces or of those in the engineering areas of so-called virtual and artificial reality and the utterly transformative experiences of living in a theatre company such as Grotowski's. Contemporary economics makes such an isolated collectivity impossible, but so does the contemporary ethos. For better or for worse, the ethos latent in the TG2001 consortium's work came from a radically different mode of working – that of the swarm, the parasite, the nomad, rather than that of the think tank or the closed-world laboratory (the modern norm).[21] Some of the intensity of a lab obtains, but it is a collective epiphany that the creative group enables, not merely individual ones.

Grotowski succinctly characterized the difference between art-as-performance and art-as-vehicle in terms of the locus of the montage, by which I understand meaning making or, more modestly, sense making. In art-as-vehicle, this montage is located in the performer–doer himself. For Grotowski, ritual is not characterized by ceremony or improvisation but by the "objective." "The elements of the 'Action' are the instruments that work *on the body, the heart, the head of the doers*" (Richards and Grotowski 122; emphasis added).

And finally, TGarden is simultaneously an installation-performance-event

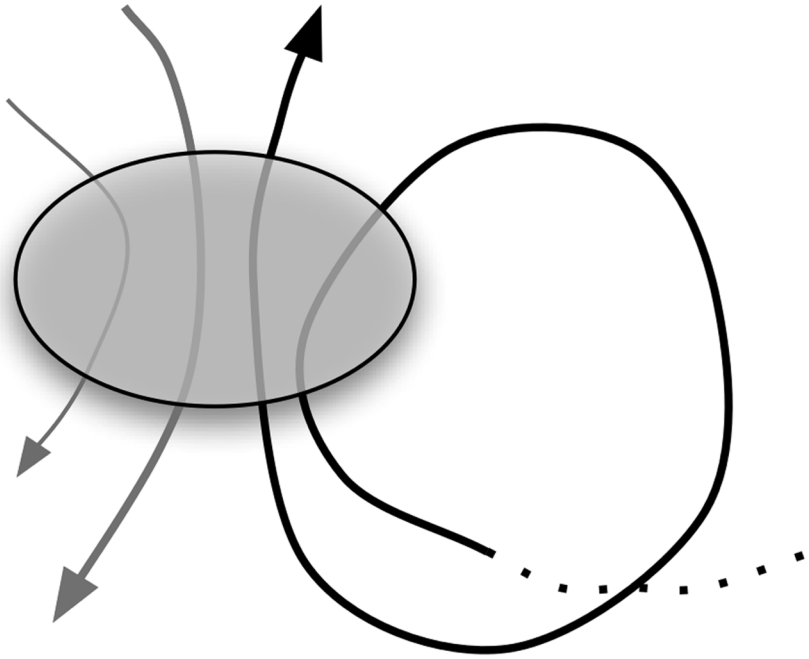

Figure 9. Orbits of creators and visitors transiting the event of creating and playing in a TGarden.

and a symbolic utterance, one expressed according to a coherent and deeply felt set of concepts but not articulated in language like a philosophical text. So instead of stating questions, beliefs, conjectures, and arguments in textual form, TGarden instantiates and makes them palpable. TGarden is not a cognitive, puzzle-solving game but a media-rich play space sustaining collective creative gestures in a shared imaginary. At the end of the day, we can only absorb these forms of life and engage these arguments in the mode of play. And as Brook said of theatre, so we say of experimental phenomenology, the play is the play.

NOTES

1 In this essay, I borrow the type–token distinction: "TGarden" will refer to the concept and the research project, and TG2001 will refer to the particular installation-events that were exhibited in 2001 in Austria and the Netherlands. See videos linked to http://sponge.org/projects/m3_tg_intro.html (Salter, Sha Xin Wei, and Farabough, "Projects"), http://www.gvu.gatech.edu/people/sha.xinwei/topological-media/tgarden/index.html (Sha Xin Wei), and http://f0.am/tgarden ("TGarden").

2 I adopt the "bowing" notion from Joel Ryan and Chris Salter. Ryan was the principal designer and creator of the sound instruments for TG2001, and Salter codesigned the sound environment.

3 Sponge (http://sponge.org) is an art-research group founded in 1997 by Laura Farabough, Chris Salter, and Sha Xin Wei in San Francisco to construct public experiments in perception, phenomenology, and desire. FoAM FoAM (*or foAM*) is an art-research collective formed in 2001 by Maja Kuzmanovic, Evelina Kusaite, Nik Gaffney, and other artists, in Brussels.

4 That dynamic of social epistemology is interesting and is the subject of another study.

5 TGarden's exhibition venues included Siggraph 2000 in New Orleans; MediaTerra 2000 in Athens, Greece; Ars Electronica 2001 in Linz, Austria; V2 Las Palmas in Rotterdam, The Netherlands; and BIG Festival 2002 in Torino, Italy. Extending the TGarden instruments, FoAM created a series of responsive play spaces named txOom, which was capped by a large circus installation in the Hippodrome in Great Yarmouth, UK, in December 2002. In 2003, TimesUp created a distinct event, also using the core media-choreography instrument, a kinetic/haptic/visual playground called Moob (*TimesUp*).

6 I remember how Maja Kuzmanovic was crestfallen when Chris Salter showed Artaud's essay about alchemy and virtual reality to her and have thought about her reaction. Under a traditional Chinese ethos, one can derive a different response to seeing one's work as an echo of prior art. To have an insight that echoes something that was recognized as important by an artist you admire means that you are on fertile ground. To work in a theme, on a problematic, that was explored by master artists and thinkers means that you are doing something worth doing. If to create is to vary from what exists, then any art work will sound, as a matter of course, in its development, in a register of its own. This is inevitable, given time.

7 In March 2001, the Banff Centre hosted the TGarden team of eight creators for a two-week long creative session. By then, we had already had two years of conversations about the vision, about the metaphorical and symbolic charge with which we wanted to infuse our space. And we had the benefit already of spiky experience with technologies. We started afresh by offering each other a series of talks about topology, about particle systems and computer graphics, and about electronic music performance. We went through the exercise of inventing and relating dreams and stories to one another. And then we mapped scenarios together.

8 We built six significantly independent generations of hardware/software. We used, in the most recent generations, Analog Devices' accelerometers and wireless pocket computers and custom-programmed microprocessors. We wrote our software in Max (time-based logic authoring), MSP (real-time sound), SuperCollider (real-time sound), NATO (real-time video), and Jitter (real-time video). We used and wrote extensions in C for critical operations, such as network communications and camera-based tracking (simple computer vision). We projected sound using special-effects hardware and sound-reinforcement audio equipment and projected

video using VGA-resolution, digital video projectors. Our computers at the time were about two to five times too slow for the combined video and 3D-graphics programs.

9 To be precise, I should say that "precondition" is merely an analytic, not a performatively prior, category. Later in this essay, I introduce the notion of performance substrate with the same proviso.

10 I say that the room responds to players' gestures and movements when, in fact, data merely percolates from sensors in costumes and cameras, through layers of electronics and computational software functions. It would be inflating language to say that the software formally recognizes gesture. My point is that this would be true of any autopoietic system.

11 This condition prompted Deleuze and Guattari to remark that linguistics was not abstract enough because the terms of linguistics were themselves constants but not variables.

12 I have in mind Peter Galison's analogy between the coordination of theoretical, experimental, and instrument-building practices in the physical laboratory sciences and trading zones, with the attendant emergence of creole contact languages.

13 See Krueger. Char Davies' major VR installations include Osmose (1995) and Ephémère (1998) (Davies).

14 One of the most interesting contemporary examples of this sort of lateral diffusion is fOAM's series of workshops with peer groups of artists (*fOAM*).

15 Elizabeth Diller and Ricardo Scofidio are a pair of artist–architects who have built some of the most incisive, elegant, and high-profile experimental architecture in the past ten years. See, for example, the companion book to their exhibition at the Whitney, *Scanning: The Aberrant Architectures of Diller + Scofidio* (Betsky, Hales, and Andersen).

16 Sewing machines are not invented, prototyped, subcontracted, and tested while the costumes are designed and created for a show.

17 Seen in this light, one sees a strong resemblance between Andrew Pickering's notion of material resistance and Artaud's material cruelty. See Pickering.

18 Brook relates his own experience directing a large company of forty actors. He prepared obsessively and planned his blocking and staging to the last inch and second, modeling all the actors by moving slips of paper around on a diagram. But when he arrived, he threw out the instructions because it would have been deadly to direct people as if they were objects. "The poverty of thinking to replace people by models" (Brook 102).

19 Thanks to Helga Wild for the opposition.

20 I acknowledge the rigorous creative work by the artists who designed the costumes for TG2001: Evelina Kusaite, Cocky Eek, and Peggy van Eyck, in concert with Maja Kuzmanovic of fOAM.

21 I do not mean to claim that the norm of the swarm, the parasite, and the nomad, so popular in western cultural circles at the end of the twentieth century, worked for us. Quite the contrary, some of us suffered under this experimental challenge to the

cultural market economy. The metaphors and modes of production and the dynamics of epistemic culture in such collaborative new-media projects are the subject of another essay.

WORKS CITED

Artaud, Antonin. *The Theater and Its Double*. Trans. Mary Caroline Richards. New York: Grove, 1958.

Betsky, Alan, K. Michael Hays, and Laurie Andersen. *Scanning: The Aberrant Architectures of Diller + Scofidio*. New York: Whitney Museum of Art, 2003.

Birringer, Johannes. *Media and Performance*. Baltimore: Johns Hopkins UP, 1998.

Brook, Peter. *The Empty Space*. New York: Simon, 1995.

Cruz-Neira, C., D.J. Sandin, T.A. DeFanti, R.V. Kenyon, and J.C. Hart. "The CAVE: Audio Visual Experience Automatic Virtual Environment." *Communications of the Association for Computing Machinery* 35.6 (1992): 65–72.

Damiris, Niklas, and Helga Wild. "The Internet: A New Agora?" *Conference Proceedings of the IFIP,* Norwell, MA: Chapman, 1997.

Davies, Char. *Immersence*. 2 June 2005 <http://www.immersence.com/>.

Deleuze, Gilles, and Felix Guattari. *A Thousand Plateaus*. Minneapolis: U of Minnesota P, 1987.

fOAM. *fOAM*. 25 April 2005 <http://fo.am/>.

——— "TGarden." *fOAM*. 25 April 2005 <http://fo.am/tgarden>.

Galison, Peter. "Trading Zone, Coordinating Action and Belief." *The Science Studies Reader*. Ed. M. Biagioli. New York: Routledge, 1999. 137–60.

Grotowski, Jerzy. *Towards a Poor Theater*. New York: Routledge, 2002.

Kircher, Anathasius. "Ars magna sciendi." *XII libros digesta, qua nova et universali methodo per articiosum combinationum contextum de omni re proposita plurimis et prope infinitis rationibus disputari, omniumque summaria quaedam cognitio comparari potest*.[M1] Amsterdam, 1669.

Krueger, Myron W. *Artificial Reality 2*. Reading, MA: Addison-Wesley, 1991.

Leibniz, Freiherr von Gottfried Wilhelm. *Dissertatio de Arte Combinatoria (Discussion about the Combinatoric Art)*. 1666. Paris: A. Blanchard, 1986.

Pickering, Andrew. *The Mangle of Practice: Time, Agency, and Science*. Chicago: U of Chicago P, 1995.

Richards, Thomas, and Jerzy Grotowski. *At Work with Jerzy Grotowski on Physical Action*. New York: Routledge, 1995.

Ryan, Joel, and Chris Salter. "TGarden: Wearable Instruments and Augmented Physicality." *Proceedings of the 2003 Conference on New Interfaces for Musical Expression (NIME-03)*. 25 April 2005 <http://www.music.mcgill.ca/musictech/nime/onlineproceedings/Papers/NIME03_Ryan.pdf>.

Salter, Chris, Sha Xin Wei, and Laura Farabough. *Sponge*. 25 April 2005 <http://sponge.org>.

———. "Projects." *Sponge*. 25 April 2005 <http://sponge.org/projects/m3_tg_intro.html>.

Sha Xin Wei. *TGarden*. 25 April 2005 <http://www.gvu.gatech.edu/people/sha.xinwei/topologicalmedia/tgarden/index.html>.

Sha Xin Wei, Yon Visell, Blair MacIntyre. "Choreographing Responsive Media Environments Using Continuous State Dynamics on a Simplicial Complex." Unpublished essay, 2004.

TimesUp. 25 April 2005 <http://www.timesup.org>.