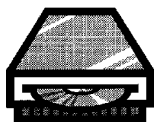# Digits, Discourse, and Documentation

Performance Research and Hypermedia

Steve Dixon

This article accompanies the *Chameleons 2: Theatre in a Movie Screen* CD-ROM. Find it on the inside back cover.

New opportunities will come to pass only if control of the technology is taken from the technologist and given to those who understand human beings, human interaction, communication, pleasure and pain. It is time for engineers to go back to engineering. To develop these new technologies, we need a new breed of creative individuals, most likely those associated with poetry, writing, and theatrical direction […]. Who better understands human interaction than a dramatist?

—*Donald A. Norman (1991:ix)*

Digitizing Drama

The *Chameleons 2: Theatre in a Movie Screen* CD-ROM included in this issue of *TDR* is an example of the use of multimedia technology to document, present, and analyze performance. It is the second CD-ROM produced by the Chameleons Group (see Dixon 1995), a performance company directed by the author, which draws together elements of live performance, video projection, and digital multimedia. It focuses on the conceptual and aesthetic experiments undertaken in devising our latest production, *Chameleons 2: In Dreamtime*. One of our primary research objectives for this performance was to bring about an effective integration of video and live performance to create multiple narratives, associations, and meanings. The stage design combines the two media: a front-projection screen with hidden doors and windows, within which live action takes place—the notion of "theatre within a movie screen" (plate 1).

The CD-ROM incorporates a complete recording of the performance, rehearsal footage, video environments, and critical and conceptual commentaries. It offers an in-depth analysis of the Group's working methods and strategies, and goes on to contextualize this work within contemporary performance theory and practice. A range of ideas and issues are discussed, including detailed sections on Artaudian theory, surrealism, devising processes, and the semiotics of multimedia theatre.
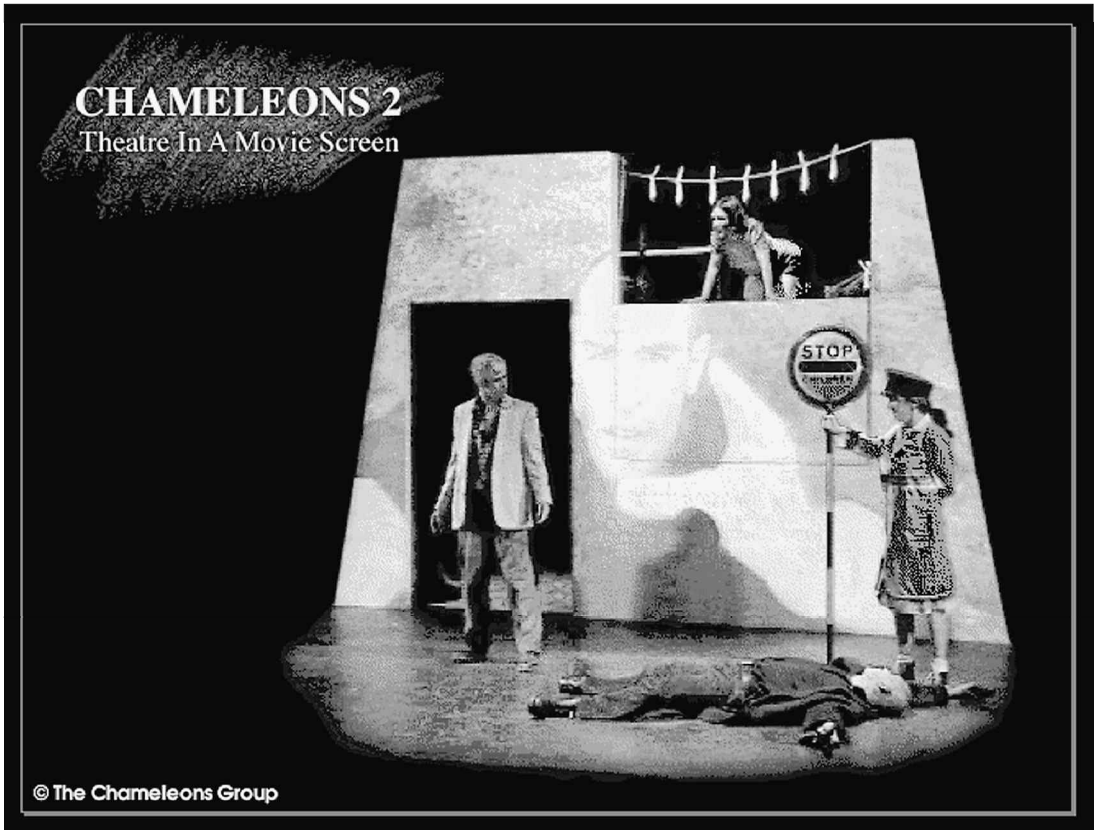
The CD-ROM has three distinct aims:

1. To demonstrate the effectiveness of digital multimedia for archiving, analyzing, and presenting practical performance work.
2. To analyze and explore the working processes of the Chameleons Group, to share methodologies, and to present associated research findings related to our latest performance project.
3. To situate our work within wider performance contexts, theories, and debates.

1. The opening (or "welcome") screen of the Chameleons 2: Theatre in a Movie Screen *CD-ROM. (Screen capture courtesy of the University of Salford, UK)*

In summary, the objective in making the CD-ROM was to harness the hybrid tools of multimedia both to document a piece of practical performance and to present related critical and theoretical discourse in an engaging and illuminating audiovisual form. This rationale and conception is based on an underlying ideology central to many academics and institutions: that there is an intrinsically reciprocal relationship between theory and practice. In simple terms, *Chameleons 2* conjoins theory and practice within the computer to try to test the case. The digital technology is used to attempt a coherent unification of theory and practice through the creation of an artifact which, though largely concerned with academic research and theoretical interrogation, is an artistic and performative expression in its own right.

The CD is intended to offer a comprehensive template for the documentation and analysis of performance using digital multimedia. It also aims to stimulate academic debate on the publication of research articles in hypertextual and hypermedia formats (where pieces of text or media are electronically linked, for example, via highlighted phrases or buttons on World Wide

Web pages). While acknowledging the obvious—that textual descriptions, video recordings, or multimedia remediations can only ever offer pale representations of live events—I will argue the following:

1. Digital multimedia offers a significant new direction for the documentation and critical analysis of performance processes and products.
2. Computer theory and recent discourses on hypertextuality are inextricably linked, both with notions of performance and with parallel debates in the fields of literary and performance theory.
3. Drama is not only ideally suited to hypermedia remediation, but is already an inherent component of the computer-human interface.
4. Academic writing is intrinsically hypertextual, and its remediation into an audiovisual hypermedia form clarifies and contextualizes the critical analysis of visual artforms.

Performance as Multimedia

In *Multimedia: Informational Alchemy or Conceptual Typography?* Evelyn Schlusselberg and V. Judson Harward define key characteristics which "justify" the use of multimedia in educational contexts (1992:96–97). Though the criteria encompass all academic subject areas, their particular pertinence to theatre is striking. As my italics indicate, their criteria unequivocally point to the usefulness of multimedia in the critical study of contemporary performance:

> We look for subjects that are more immediately understandable through video or animation than through text or diagrams *(video describes live theatre more clearly than descriptive text).*
> We look for subjects that are complex in a way that visual reference can simplify *(visual data clarifies "complex"/multiplex postmodern performance)* [...].
> We look for applications that present an experience which the student is unlikely to have had but which we can simulate *(multimedia can re-present a temporal theatrical event seen by relatively few people).* (1992:96–97)

CD-ROM production text that examines performance is in its infancy and has to date been dominated by educational titles exploring Shakespeare or other "classic" theatrical texts, such as Penguin's *The Crucible,* which includes performed extracts, critical commentaries, historical transcripts from the original Salem trials, and an interview with Arthur Miller. The Open University/ BBC's *As You Like It* prototype is a sophisticated educational CD-ROM and includes a number of interactive exercises. One involves studying various camera angles of a scene from the play which foreground specific characters. Users then edit the shots in different ways to affect various dramatic effects, emphases, and interpretations:

> This approach could not teach users of the CD-ROM to be apprentice editors or directors, but it could give them a very clear personal experience of how meaning can be created and altered within certain absolute parameters [...]. Students/users decide for themselves on several points in the scene which seem "pivotal" or particularly important—moments when the action/mood changes significantly. (Goodman, et al. 1998:30–31)

CDs examining contemporary performance practice are rare, and have primarily emerged from performance artists rather than theatre-based performance companies. The CD accompanying Orlan's book *This is My Body...*

This is My Software (1996) includes footage of her operating theatre performances; Stelarc's *Metabody: from Cyborg to Symborg* CD-ROM (1997) offers text, performance clips, and sections of a BBC television documentary on the artist. The *Freak Show* CD-ROM (1996) by the cult band The Residents combines performance art with 3D-animation characters, walk-through environments, original music, and encyclopedic elements examining historical circus "freaks."

> The Residents' real contribution to new media is having humanized the cyberworld of CD-ROM game play by putting the emphasis on characters […]. The Residents were always multimedia artists who were just waiting for multimedia to happen […]. They've never been a band so much as performance artists. (CNET 1998:1)

Chameleons 2 attempts to push back the generic boundaries (educational/ historical, artist documentary) that characterize current CD-ROM publications on performance. It aims to expand the territory of "digital theatre": to offer more comprehensive performance documentation; to examine the genesis of devised performances from multiple viewpoints; to present critical theory in new visual hypermedia forms. *Chameleons 2* differs from "comparable" CD-ROMs in the following ways:

1. In place of edited performance clips, a performance is presented in its entirety.
2. In place of a single perspective, all performers within an ensemble discuss and present their work.
3. In place of an orientation on "product," process is afforded equal weight.
4. In place of simple contextualization, there is engagement in diverse and complex theoretical debates.

Documenting Performance

For some time, there has been a debate concerning performance documentation methodologies. This has spawned numerous articles and conferences, and two journals have been established recently in the U.K. to foreground performance documentation (see *Performance Practice, Studies in Theatre Production*). These are born out of a need both to record, contextualize, and share new approaches and experiments, and to somehow capture in perpetuity a wholly transitory artform.

A number of documentation processes are employed to record live performance: video footage, photographic sequences, audience research projects, and transcribed and annotated texts. But the process leading up to the performance is seldom recorded or evaluated in a coherent and lasting form: the reflections of performers are often absent; there may be no documentation of the genesis of creative ideas; and experiments and improvisations that developed the work may be left out. Because original, devised performances are so process-oriented, the recording and evaluation of these processes should be given as much attention as the viewing and critical analysis of performed "products."

Documenting a process that encompasses the multiple perspectives of individuals in an ensemble is a complex task involving reams of notes, drafts, and/ or endless hours of videotape. As such, the question arises as to how this process can be shared with others, and how the material can be best presented and contextualized within an accessible format.

These questions and concerns initially led me to digital media, both as a performance documentation strategy and as a way of presenting related theo-

retical discourse and research findings. I was interested in trying to work within a form that could present a visual record of the devising process and final performance, and at the same time facilitate a detailed theoretical analysis of both the "process" and the "product."

Within a multimedia program, one is able to document and cross-reference a vast amount of data and then retrieve specific items within seconds. "Multimedia" also amalgamates and connects documentation in multiple formats—text, photographs, video, audio, artwork. In archiving a performance, there is thus the flexibility to input a whole range of material: video and stills of discussions, rehearsals and performances; original music; artwork and designs for costumes and set; reflections, interviews, and statements from performers and audience members. Additionally, a range of different types of written text can be used: notes, source materials, newspaper reviews, and transcripts of the performed text.

Chameleons 2 utilizes video as the primary documentation element. Though video is a notoriously blunt and visually flat instrument with which to record the highly subtle, interactive, and spatially complex medium of performance, it nonetheless offers a method of recording a permanent audiovisual record of an otherwise transitory temporal event.[1] While acknowledging the limitations and distortions of the medium, we must also recognize that well-conceived video recordings document live performances more reliably than written documentation which, however detailed, can only ever provide a description. By incorporating photographic documentation within a text, we can certainly receive a clearer visual sense of a performance and its mise-en-scène, but it is not until we progress to moving pictures (through video, film, or digital media) that we can really get a sense of "how it was."

2. Video of the performance runs parallel with onscreen text. Users can jump from scene to scene using the numbers on the film strip, and can access commentaries by clicking "highlighted" characters. (Screen capture courtesy of the University of Salford, UK)
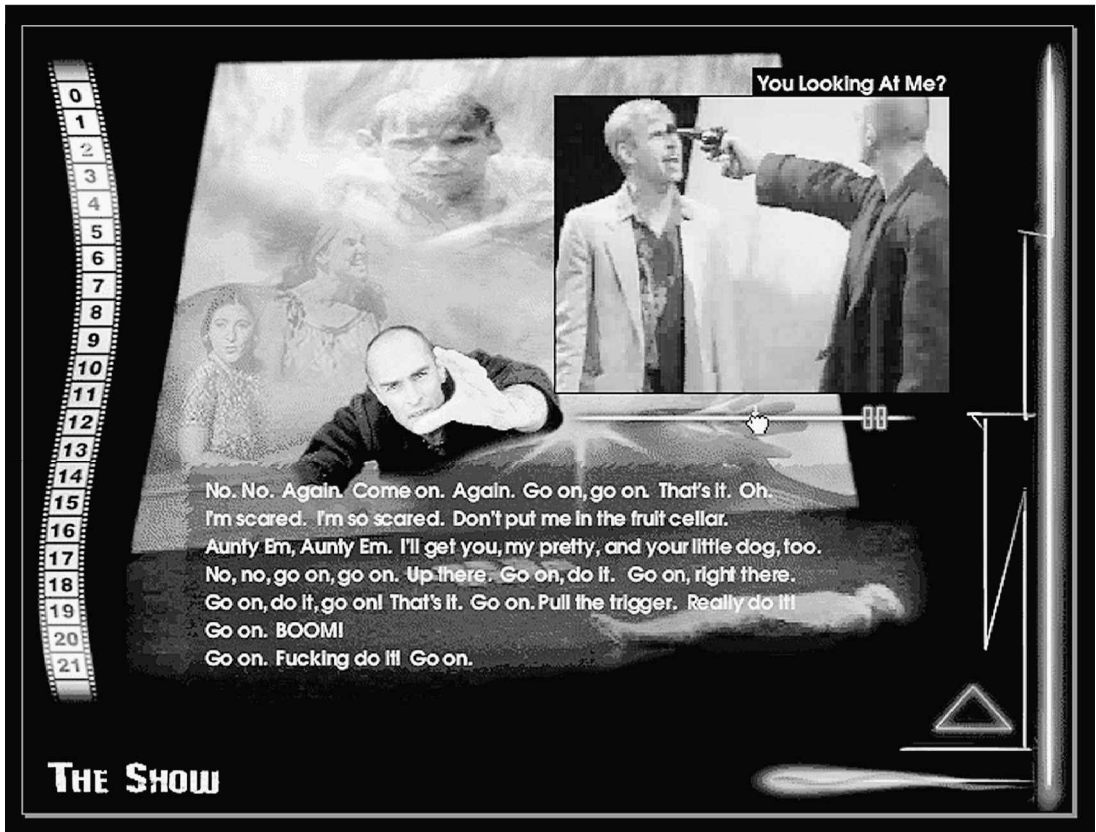
The entire one-hour live performance that the CD examines can be viewed as a video "QuickTime movie," with options to either run it from beginning to end or to jump around from scene to scene using buttons on the filmstrip on the left of the screen (plate 2). As the performance plays, different characters light up on another part of the screen. By clicking on one, the user can hear the performer offering analysis and reflection on the scene that is running. This simple hyperlink structure, running "text" and "commentary" in parallel, has been heralded as a unique and revolutionary feature of hyperdocumentation (Vaughan 1994, Hodges and Sasnett 1993), but is in fact derived from the "footnotes" of conventional writing. The option icon constitutes a "footnote" since it offers the "reader" a choice to continue with the main "linear text," or to move away from it to examine the context of a particular aspect in more detail. The audiovisual (performance) text/commentary synthesis illustrated in *Chameleons 2* also clearly draws on conventional written documentation methodologies such as annotated scripts or column-divided manuscripts which place contextual commentary and analysis alongside descriptions of performance. In *Chameleons 2* the only difference is the media: video of the performance replaces a description or annotated script, and the contextual commentary and analysis is presented as a voice-over.

Video Documentation in the Digital Future

The advent of CD-ROM technology has expanded the capabilities of domestic-end computers to play video; in addition, the internet offers downloadable or online "streaming" video. Although video playback in both online and CD-ROM modes is currently choppy and pixilated, quality will steadily improve as compression and networking technologies develop. CD-ROM drives are currently the prevalent hardware devices running video on domestic computers, and *Chameleons 2* contains around 90 minutes of footage (QuickTime movie files), which virtually fills the disc's 660-megabyte capacity. It was therefore difficult to decide what to eliminate from the 30 hours of video shot during the project.

The recent advent of DVD (Digital Versatile Disc) system is certain to have a significant impact on the future of performance documentation, since it multiplies the storage equation by 26.[2] Where CD-ROMs offered encyclopedic-scale archives of text and stills (e.g., Microsoft *Encarta*), DVDs now offer similar archiving capabilities for moving pictures and audio. Each disc has a total capacity of over 20 hours of video, with sound and picture quality superior to VHS.

DVD technology now allows storage on the same disc of, for example, a number of complete performance recordings covering different times and venues; a number of different productions by the same company; lengthy rehearsal, exercise, and training footage; and performances dubbed in a range of languages. Material can be catalogued for access in different ways: menu options could include clustered hyperlinks to video clips around specific foci, or users could opt to examine the evolution of a single scene by selecting to view rehearsals and performances at progressive stages of development. High-speed visual shuttling through the video material further enhances the user's ability to control and select material for viewing.

This feature of digital video is demonstrated in "The Show" section of *Chameleons 2*. A slider below the video window can be moved from side to side to shuttle through sequences onscreen at speeds varied by the user (from slow-motion to a pace faster than the eye can see), in contrast to the frustratingly slow and uniform pace of linear videotape searching.

Software is being developed to provide complex annotation, segmentation, and tagging of video archives.[3] New iconic visual language systems, such as

the MediaStreams prototype, are also being developed to provide multipurpose content analysis for the search and retrieval of digital video (Davis 1997).[4] These provide sophisticated cataloging and retrieval systems for performance documenters and researchers.

Critical Perspectives

Though historically the arts and sciences have remained polarized and deeply suspicious of one another, new computer technologies have become an interface for their mutual coexistence: "in the realm of electronic image production the boundaries between art, science and entertainment are quite blurred" (Schwarz 1997:35). Within computing, drama theory has been afforded a special place, and the importance of theatre as a model for software program design has been widely discussed by critics in the computer sciences (Heckell 1982; Norman 1986; Norman and Draper 1991; Laurel 1990, 1991).

Paul Heckell (1982) maintains that dramatic art forms such as theatre and film offer the most effective models for software conception and design. He goes on to suggest that a clear transition is in process and will transform traditional computer science and engineering into a creative, evocative, and dramatic artform. This view is echoed by Donald Norman:

> The key word in finding an illuminating path through the technological maze is "interaction." These new technologies all have one thing in common: They can aid our interaction with others, with knowledge, information and experience […]. When we look toward what is known about the nature of interaction, why not turn to those who manage it best—to those from the world of drama, of the stage, of the theatre? […] There is much to learn from theatre. (Norman 1991:xi)

In *User Centred System Design: New Perspectives on Human-Computer Interaction* (1986) Donald Norman and S. Draper emphasize the computer interface as a place of "action" (rather than simple dialogue), where both the human and the computer have a "role." The centrality of this notion of "action" within Norman's thesis, as well as in the work of Brenda Laurel, has clear parallels with the primacy "action" afforded by Stanislavsky, though neither Norman nor Laurel make the connection explicit. Laurel nonetheless reflects that Norman's analysis: "supports the view that interface design should concern itself with representing whole actions with multiple agents […which is] precisely the definition of theater" (1991:7). Laurel's influential *Computers as Theater* (1991) uses Aristotle's *Poetics* as a starting point to explore the conceptual links between theatre and human-computer interfaces. She defines an interface as a shared context for action where both person and computer are "agents" in the Aristotelian sense of "one who initiates action," and goes on to define clear relationships between human-computer activity and the "four causes" and "six qualitative elements of structure in drama" of Aristotelian theory. Her analysis of the links between theatre and computers is exhaustive and persuasive, drawing varied comparisons: a computer program is analogous to a script, complete with stage directions; plays and computer programs are both "closed universes"; teams of designers and programmers have similar creative roles to personnel in theatre companies (writers, directors, designers, stagehands); software and circuit boards operate like the "backstage" activity in a theatre to support representations and to create "magic"; the Aristotelian notion of enactment ("The imitation of an action […] enacted in real time, as if the events were actually unfolding" [Laurel 1991:94]) is intrinsic to multimedia because of its multisensory and interactive nature.

A drama graduate who chose a career in software design and CD-ROM authoring, Laurel argues that theatrical metaphors pervade software applications, since both are mimetic, multisensory experiences and their prime objectives of representing action with multiple agents fundamentally overlap. Both domains employ "representations of action in virtual worlds" which act as contexts for thought and attempt to amplify and orchestrate experience. Laurel provides a framework of dramatic theory that can be applied to designing human-computer experiences, advocating the adoption of theatrical modes and models which are "familiar, comprehensible, and evocative" (1991:21), and which reflect Aristotle's notions of enactment, engagement, empathy, and catharsis. She suggests that the notion of theatre can be applied to multimedia not simply as a metaphor, but as a way to conceptualize human-computer interaction itself.

The work of Heckell, Norman, and particularly Laurel (who specifically defines "computers *as* theater" in her book title) suggests not only that multimedia may be an appropriate medium with which to examine and remediate performance, but that the notion of performance is already embodied within the technology itself. The suitability of the medium and the strength of its bond with performance can be validated further when, as in the case of *Chameleons 2*, the computer is used to examine a piece of so-called postmodern theatre characterized by fragmentation, multimedia, nonlinear narrative, split-focus, and "multiplex signals" (Schechner 1979:14)—precisely what hypermedia is designed for.

The links between multimedia technologies and postmodernity have been discussed extensively by critics such as Edward Barrett, who emphasizes the contingent relationships between hypertextuality and contemporary poststructuralist, deconstructive, and postmodern theory. Using a quasi-mathematical formula, Barrett extends the thesis to argue that the electronic publication of scholarship and research in hypermedia forms becomes entirely natural:

> The equation: power of the computer to dish out information in many different combinations + "traditional" approaches to textual scholarship + academic enthusiasm for the French school of thought which de-centers, deconstructs, and interleaves the text with other texts and readings = deep involvement with the concept of hypertext. (1992:8)

Others have drawn similar analogies between hypertext and recent literary and critical theory. Jay Bolter (1990) and Mark Poster (1990) relate electronic writing to Derridean deconstruction, and George Landow (1992, 1994) describes hypertextuality as "the embodiment of the Derridean text" (1992:59), arguing its close relationship with poststructuralist thought, which has grown out of a dissatisfaction with "the related phenomena of the printed book and hierarchical thought" (1994:1). Diana Gromala (1996) cites Lyotard's notion of technology as a language game in which myths and metanarratives are reconfigured, and goes on to say that virtual reality technologies embody notions of the reconstruction of the schizophrenic subject described by Deleuze and Guattari, as well as the "Lacanian mirror of misrecognition" (1996:226). Gregory Ulmer (1994) relates hypertextuality to the work of Derrida, Lacan, and Wittgenstein, and Landow widens the net to take in no less than seven leading critical theorists:

> Like much recent work by poststructuralists, such as Roland Barthes and Jacques Derrida, hypertext reconceives conventional, long-held assumptions about authors and the texts they write and read. Electronic linking, which provides one of the defining features of hypertext, also embodies

> Julia Kristeva's notions of intertextuality, Mikhail Bakhtin's emphasis
> upon multivocality, Michel Foucault's conception of networks of power,
> and Gilles Deleuze and Felix Guattari's ideas of rhizomatic, "nomad
> thought." (1994:1)

However, a number of writers have begun to probe and question the veracity of such analyses. Robert Markley is skeptical of what he perceives as the "uncritical" and "unproblematical" theory propounded by the developers and advocates of new technologies. His own analysis is in stark contrast to the romantic and progressivist idealism of its proponents: "a radically constructivist technology that celebrates an undisguised essentialism" (Markley 1996:58). Richard Grusin argues that writers such as Bolter and Poster too easily relate poststructuralist/postmodern/deconstructive theories to electronic writing without recognizing that:

> the force of the Derridean critique is to demonstrate the way in which
> thought and speech are always already forms of writing. Deconstruction
> does not need to be instantiated or embodied in new technologies; for
> Derrida, writing is always a technology and already electronic. (1996:45)

Grusin observes a similar misreading in relation to Barthes's poststructuralist distinctions between "work" and "text," or between the "readerly" and "writerly" texts, both distinctions having been cited as theoretical anticipations of hypertextuality. He notes that for Barthes, as for Derrida, the "writerly" "text" is always "already immaterial, allusive, and intertextual—even in print […]. The force of the deconstructive and poststructuralist critiques is to illustrate the way in which this destabilization is true of all writing" (1996:45). Grusin also takes issue with the uncritical generality of William Paulson's (1989) contention that the translation of texts into digital code to enable them to appear onscreen in the same format means that electronic technologies are inevitably decontextualizing technologies:

> In so arguing, however, he reproduces the technological fallacy by as-
> cribing agency to the technology itself. To imagine that digitally repro-
> ducing texts from two different historical contexts would decontextualize
> them is to fetishize technology by making an idol of the "form" in which
> writing is commodified, and to fetishize the particular historical context
> in which those texts were reproduced. Electronic information technolo-
> gies do not *de*contextualize the texts of Western culture, they
> *re*contextualize them. (Grusin 1996:52)

I remain contentedly equivocal in these debates, as with others currently raging over cyberspace, since both critiques have some validity. This position reflects the yes-no, on-off, love-hate relationship one establishes when working closely with a dualistic medium which is in itself conceived and programmed as binary. The distinct polarization of critical thought in relation to new technologies and cybernetics has been inevitable, faced with a medium that is at once art and science, rational (mathematical, computational) and irrational ("mystical, performative, and cognitively dissonant" [Kendrick 1996:143]). The technologies are also revolutionary (synergetic, globally rhizomatic) yet conventional (essentially reliant on previous media: text, video, telecommunications).

While proponents celebrate the impact of "the first metamedium" (Schwarz 1997), "the beginning of something big, something like the invention of the wheel" (Conklin in Carlson 1988:105), skeptics observe that it merely subsumes and recodes previous media: "Concepts and artifacts are never invented

out of whole cloth; rather they embody a sedimented history that exerts an inertial pull on the new as it modifies the old" (Hayles 1996:37).

Benjamin Woolley (1993:155) traces hypertextuality to the cut-up poetry and collage techniques of Tristan Tzara and the dadaists, and Richard Gooderick (1996) argues that digital multimedia technology should not be considered a medium at all, but rather a tool that serves many separate media and cross-disciplinary art forms. The dialectical tension at play in this debate is demonstrated by writers such as Sheldan Renan who, rather than objectively balancing the two perspectives, appear to fluctuate radically between the two "camps." In discussing online social and game-playing environments such as MUDs (multiple-user dungeons/domains/dimensions) and MOOs (MUDs, object-orientated) he begins by adopting the skeptics' line:
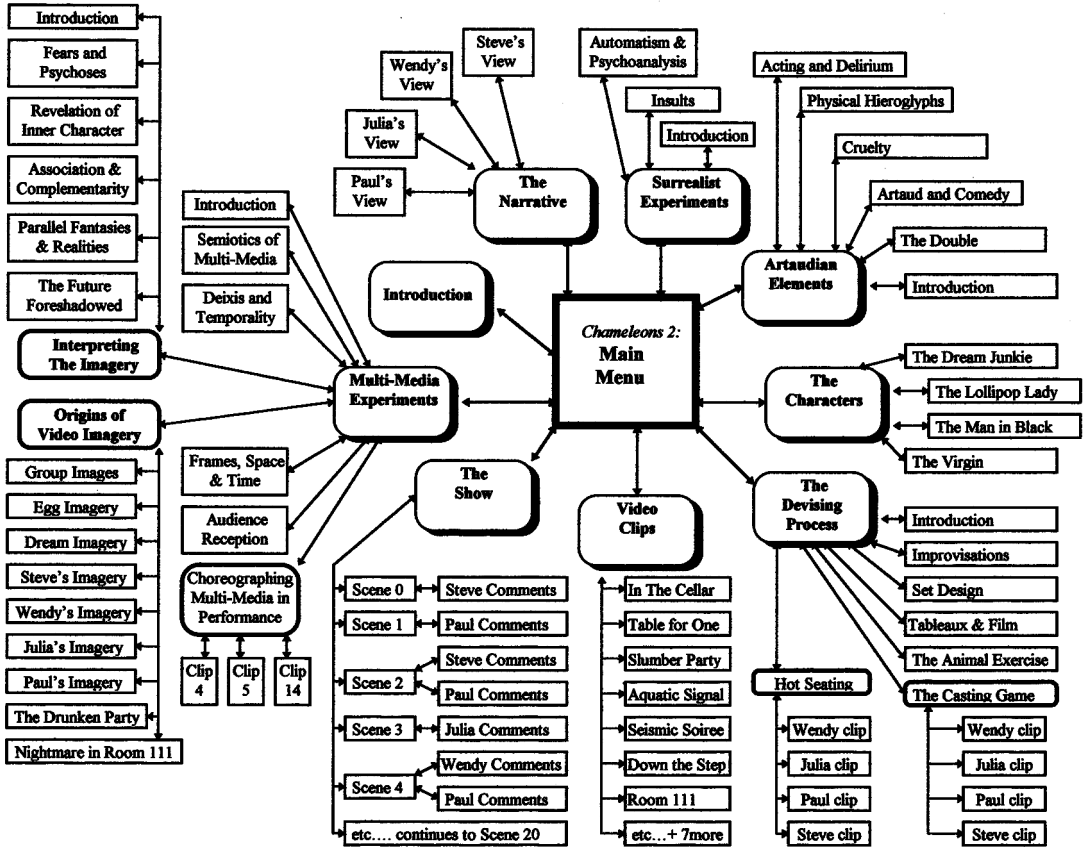
> Absolute change in narrativity and art is mostly illusionary. De Kooning is part of the same arc or journey as Giotto. He struggles with similar problems. Homer begins an arc that Woolf continues. Shakespeare is on the road to Pinter. Pinter, with his characters that change on stage as we watch them, points the way to Lambda Moo and beyond. (1996:68)

He then goes on to project a millenarian vision of the transformation of human identity and the metamorphosis of art and society, adopting the hyperbole that epitomizes many utopian writers on cyberspace:

> The Network creates new relationships between being fictive and being real(ized). Being fictive becomes seen as an integral part of being real. It deepens understanding by creating multiple perspectives, made possible by existing as multiple personas […]. Normal dramatic structure will, like time in Einstein's relativity, become deeply compromised, radicalized, and certainly complex […]. Fiction will deepen so that one may fall in and never emerge […]. We may see a retribalization of social structures through new fictive forms and spaces. […] Our online identities may become more important to us than our "real life" (RL) identities. Fictive VR may become more useful than personal RL. (1996:62–69)

Navigating Chameleons 2

Renan's metamorphosed identity, multiple personas, and new fictive spaces parallel primary themes within the Chameleons performance examined on the CD-ROM. The CD explores and celebrates decentered identity, operating as a psychological jigsaw constructing the divided selves of the performers as they engage with both the theatre piece they create and with the self-reflexive remediated digital documentation. In this way the *Chameleons 2* CD becomes another form of "performance" which, like Renan's depiction of MUDs and MOOs, adopts computer technology to explore and analyze the nature of fictive spaces and decentered identities. However, the site of this work on the computer platform does not mean that our theme of transformed identities (hence the title *Chameleons*) is influenced by or contingent upon new technology. Similarly, it can be argued that the MUDers Renan describes as favoring fictive personas might in any case elevate fantasy above reality in their lives, whether the internet existed or not. Equally, while *Chameleons 2* utilizes hypertextuality and the "revolutionary" synthesis of different media afforded by computer technology, my conceptual approach was initially conservative and conventional: writing and organizing material into coherent "chapters" and subheadings like a book. These were then configured with programmable links to create the "navigation map" for the CD (plate 3).

Left branch (Multi-Media Experiments):

Introduction | Fears and Psychoses | Revelation of Inner Character | Association & Complementarity | Parallel Fantasies & Realities | The Future Foreshadowed | Interpreting The Imagery | Origins of Video Imagery | Group Images | Egg Imagery | Dream Imagery | Steve's Imagery | Wendy's Imagery | Julia's Imagery | Paul's Imagery | The Drunken Party | Nightmare in Room 111

Introduction | Semiotics of Multi-Media | Deixis and Temporality | Frames, Space & Time | Audience Reception | Choreographing Multi-Media in Performance | Clip 4 | Clip 5 | Clip 14

Multi-Media Experiments — **Introduction**

The Narrative: Paul's View | Julia's View | Wendy's View | Steve's View

Surrealist Experiments: Automatism & Psychoanalysis | Insults | Introduction

Artaudian Elements: Acting and Delirium | Physical Hieroglyphs | Cruelty | Artaud and Comedy | The Double | Introduction

Chameleons 2: Main Menu

The Characters: The Dream Junkie | The Lollipop Lady | The Man in Black | The Virgin

The Devising Process: Introduction | Improvisations | Set Design | Tableaux & Film | The Animal Exercise | The Casting Game

The Show: Scene 0 — Steve Comments | Scene 1 — Paul Comments | Scene 2 — Steve Comments / Paul Comments | Scene 3 — Julia Comments | Scene 4 — Wendy Comments / Paul Comments | etc.... continues to Scene 20

Video Clips: In The Cellar | Table for One | Slumber Party | Aquatic Signal | Seismic Soiree | Down the Step | Room 111 | etc...+ 7more

Hot Seating: Wendy clip | Julia clip | Paul clip | Steve clip

The Casting Game: Wendy clip | Julia clip | Paul clip | Steve clip

3. Hyperlinks as chapter headings: the Chameleons *2 navigation map. (Screen capture courtesy of the University of Salford, UK)*

The *Chameleons 2* navigational structure is essentially "hierarchical,"[5] opening with a main menu (plate 4) which branches off into nine different subject-specific sections (e.g., plates 5 and 6) that further diverge into over a hundred different subsections, clips, and commentaries (e.g., plates 7 and 8):

The "Introduction" explains how to navigate through the CD-ROM and describes features such as printing out texts and switching between multimedia and onscreen text versions of sections.

The "Show" section (22 scenes, 21 commentaries) enables the user to move quickly around a video recording of a performance by clicking scene numbers, and by visually "shuttling" the digital video by dragging the slider immediately below the "movie." Text "subtitles" run in synch with the video, and commentaries and reflections on each scene can be activated by clicking on any of the illuminated "portraits" of the performers.

"Multimedia Experiments" is the longest section on the CD with a total of 21 subsections. It includes the performers' own analyses of the video texts they conceived and explores a range of practical and theoretical issues related to multimedia theatre.

"Video Clips" runs 15 different clips of video projections used in the performance.

"Surrealist Experiments" (3 sections) charts the surrealist influences on the Chameleons Group, including a section examining the use of automatic writing in the creation of the script.

In the "Narrative" (4 sections) each performer offers a personal view and interpretation of the key narrative events.

"The Devising Process" (7 sections and 8 video clips) archives the group's devising and rehearsal methodologies, and includes video footage of key training and devising exercises.

In "Characters" (4 sections) each performer offers background and analysis of individual aims and methodologies in devising characters.

The "Artaudian Elements" section (6 sections) critically analyzes and explores a number of issues relating to Artaudian theories of performance as well as the Group's practical experiments in this area.

Specific sections address not simply different content, but different audiences. Options dealing with practical aspects, such as the "Devising Process" section, primarily address the user as a fellow practitioner, offering detailed training and devising exercises and sharing ideas and approaches that may be of concrete practical value. Physical and character-based exercises are presented within subsections: some are idiosyncratic variations of conventional exercises (The Animal Exercise, Hot Seating), others, such as the Movie Posters Game (Tableaux and Film Stills subsection) have been conceived by the Group. These practical subsections are then expanded upon in other sections to address fellow academics, engaging in complex debates exploring, for example, multimedia semiotics, deixis, frame analysis, and Artaudian theory. These sections are "theoretical" in conception but relate back to practice through the discussion and evaluation of audience reception, presented via research findings that have come out of the Group's audience research methodologies (using focus groups and questionnaires).

Chameleons 2 also provides multiple perspectives on the Group's work. The performers discuss at length their individual approaches to devising characters ("Characters" section) and video material ("Multimedia Experiments" section), and provide contextual commentaries on a range of scenes from the performance ("Show" section). In the "Narrative" section, the performers offer diverse readings and interpretations of the narrative elements within the piece, each casting himself as the central protagonist in the drama. The CD is consciously multiperspectival, addressing its subject from a number of angles, and drawing on diverse recorded commentaries and analyses from each performer. While a similar approach could be taken using written text, the frag-

4. The Main Menu offers a choice of nine major sections. Moving the cursor over each icon reveals its title. (Screen capture courtesy of the University of Salford, UK)

5. The "Artaudian Elements" menu offers six subsections (clockwise from top left): Introduction; Physical Hieroglyphs; The Double; Artaud and Comedy; Acting and Delirium; Cruelty. (Screen capture courtesy of the University of Salford, UK)

mented and nonlinear nature of hypermedia ideally reflects the conceived polyphonic documentation structure, and enables the user/reader to map her own route through the material.

Whereas the traditions and protocols of academic writing are essentially fixed, the hybrid codes and semantics of multimedia/hypermedia allow more freedom, in particular by enabling the author(s) to speak in different voices through the different navigable levels and environments. The hypertextual codification provides a diversified documentation system, which allows for a range of different modes of address. *Chameleons 2* operates on many levels: as performance documentation; as performance per se; as critical and theoretical discourse; as deconstruction; as re-construction; as psychological/sociological document; as visual art; as "edutainment"; as manifesto.

Marrying Theory with Practice

The "Automatism and Psychoanalysis" section (a subheading of "Surrealist Experiments") provides an example of how different multimedia elements are conjoined and layered to construct a dynamic audiovisual discourse. As with a number of sections ("Artaudian Elements," "Multimedia Experiments") it attempts to effectively draw together and interrelate theory and practice. The section opens with a black screen and a voice-over commentary begins with a quotation from André Breton's Surrealist Manifesto. Selected words flash up and hold onscreen in synchronization with the reading (automatism; real; dictation; independent). These visually emphasize key elements within the quotation relating to the thesis of the section, while at the same time suggesting surrealist notions of cut-up poetry and montage. The commentary continues by discussing the theoretical links between automatism, spiritualist mediums, and Freudian psychoanalysis. In parallel onscreen, twelve muted "cut-out" images of the performers (naked and asleep) gradually build up to form a photographic collage (plate 9).

The commentary then moves from a theoretical stance to address practical and pragmatic aspects of how automatic writing techniques were used by the

group to create dialogue for the performance. Another layer of imagery appears onscreen: animated stills of the performers in rehearsal. More "word montages" accompany a return to theoretical debate examining how our use of automatic writing "in character" relates to Barthes's distinction between "figuration" and "representation" of the author within a text, and postmodern notions of "the self as text" as discussed by Bonnie Marranca (1979) and Richard Schechner (1979).[6] A video extract from the performance is then played to illustrate and evidence a number of "research findings" observed through our automatic writing experiments.[7] The commentary concludes by arguing that this technique can effectively bypass our impulse to repress and to censor taboos, and give overt expression to the Freudian "id": "the pure drive for pleasure, uncontrolled by cultural prohibition" (Reinelt 1992:383). A video extract—a piece of "practice"—from the performance, featuring another automatic writing speech, is played to manifest, embody, and "prove" the theory:

> Julia: I've swallowed enough cum to sink the Titanic. There's enough spunk inside of me to set up my own spunk bank. I've done it loads of times. I've fucked hundreds, thousands of men, sometimes ten at a time, one after the other. Father and son and grandfather and uncle, whole families of men and I love it. And I can't get enough of it, and I want more of it, till I've cum pouring out of me, out of my cunt, out of my mouth, out of my arse, out of my fucking ears and nose, till I cry spunk tears and piss cum.

The interdisciplinary nature of multimedia enables new forms of expression and synthesis impossible in other nondigital media. One such example occurs in the section analyzing the group's experiments with Artaud's notion of "physical hieroglyphs" (Artaud 1970). The opening screen shows a still photomontage of two of the performers frozen in poses redolent of "oriental" dance. As a voice-over commentary progresses, six new photographic images of performers appear sequentially around the screen, some large, some small (plate 10). These are photographic stills[8] that have been digitally animated to

6. In this section the four performers offer personal (and at times conflicting) views of the twists and turns of the show's narrative. (Screen capture courtesy of the University of Salford, UK)

repeat gestures or "hieroglyphs." Though these animations have derived from video recordings of the performance, the effect created onscreen cannot be replicated using video alone, without computer intervention.

Such techniques and effects are relatively simple to achieve. The diversity of available digital tools and their potential for communicating ideas in new ways suggests a radical reappraisal of how one best conveys critical theory in relation to artworks. Conceptual and critical work can itself adopt an artistic form, drawing inspiration from a sophisticated and complex palette of new syntactical forms and codes.[9]

Words versus Pictures

Multimedia elevates symbols and images over text. Although *Chameleons 2* has a menu option for a text-only version (and the script and commentaries can be printed out), in normal mode the CD virtually dispenses with visible text. The analysis and theoretical discourse is instead presented as voice-over commentary, linked and synchronized to changing visual images, environments, animations, photomontages, and video extracts. Although the critical commentaries were originally written in a traditional textual form, the aim was always to synthesize these with visual imagery and sound, moving the CD as far away as possible from the notion of a "book." This is in line with current thinking on "user-engagement" in educational and commercial multimedia production (Barrett 1992; Hodges and Sasnett 1993), as Greg Roach's (1998) McLuhanesque table suggests:

Format:	TEXT	GRAPHICS	VIDEO
Psychological Temperature:	COLD	WARM	HOT

The visual elements of multimedia have long been argued by the proponents of new technology to be the future of interactive communications me-

7. This subsection branches into nine further subsections (the smaller icons) which examine the genesis of video imagery from differing personal viewpoints and critical perspectives. (Screen capture courtesy of the University of Salford, UK)

dia and education, since the brain comprehends images far more quickly than lines of text: "the human being is an intensely visual animal" (Pimentel and Teixeira 1995:xv). Nan C. Shu offers the following premises:

1. Pictures are more powerful than words as a form of communication. They can convey more meaning in a more concise unit of expression.
2. Pictures aid understanding and remembering.
3. Pictures may provide an incentive for learning [...].
4. Pictures do not have language barriers. (1992:7–8)

Others cite the visual processing power of the human eye-brain system (Vaughan 1994; Hodges and Sasnett 1993). When, for example, we watch a 30-second television commercial our eye-brain system can read and interpret dozens of images and mini-narratives, absorbing and contextualizing millions of "bits" of information; in the same time, we can only read around 200 words.

However, this stance oversimplifies the issue. We also live in an image-saturated culture, and in response, our eye-brain mechanisms also seem to have developed their own image-disposal units. Even before the age of television, Marcel Duchamp mourned "the exchange between what one puts on view [...] and the glacial regard of the public (which sees and immediately forgets)" (Duchamp in Davis 1993:119).

The use of multimedia in academic contexts has led to a critical battle pivoting around the relative values of the image versus the written word. Writers such as Ronald Ragsdale and Alnaaz Kassam have fiercely challenged the validity of the "picture paints a thousand words" theory of multimedia:

> We may absorb a billion bits of data, but we process and interpret only what "makes sense" to us. This means that from an entire view of a forest, we may only choose to experience the smell and texture of a tiny leaf. Thus the eye may be exposed to all the data available but it is the total human being that chooses to interpret what he/she wishes. (1994:568)

They go on to argue that "a need of images is a falsehood" since technological mediation of an image distorts and alters its meaning, ultimately affecting one's interpretation of reality. In moving away from the abstract toward the visual, "we are not only discussing issues of content, but rather also our perception of ourselves as human beings" (1994:568). They conclude that certain ideas can only be explored in the abstract, and in text form, and that multimedia's reliance on image supports the ultimately philistine rationale that it is worth retaining and expanding upon only the visual aspect of our cultural heritage.

Multimedia Academia

The presentation and publication of academic research in audiovisual form has aroused controversy (see Cotton and Oliver 1992) and prompted adverse criticism from some traditional academics, whose main arguments may be summarized as follows:

1. The nonlinear, fragmented nature of the form is inappropriate to academic discourse, which should develop a structured and coherent argument.
2. Visual imagery and attention-grabbing graphics can only trivialize or distract from serious conceptual ideas.
3. The most significant ideas are by nature abstract, and to juxtapose these with concrete images not only changes their meaning, but suppresses the

8. In a subsection of "The Devising Process" users can access video clips of each performer in a "Hot Seat" improvisation. (Screen capture courtesy of the University of Salford, UK)

"reader's" own intellectual and imaginative responses to the ideas presented (the "film is never as good as the book" argument).

4. Multimedia is simply a gimmick; another manifestation of information-overloaded television "zap" culture; a medium "full of sound and fury, signifying nothing."

In principle, these arguments have some validity, and serve as cautionary reminders to academics publishing multimedia documents that style and form should never subsume content.[10] However, in relation to performance research, I believe one simple and fundamental argument eclipses all others. Digital technology enables practitioners and researchers working in the visual medium of performance to archive their work and demonstrate their findings in a visual medium, which is nothing if not logical. The visual record of a practical performance contextualizes and clarifies analysis in a way that a written article can never do. Most crucially, the audiovisual performance data illuminates and imposes specificity upon the documentation. The argument for publication of performance research in multimedia form is neither revolutionary nor iconoclastic. It simply elevates video above descriptive text as a more concrete documentation medium, and proposes the use of digital technology to present this in parallel with traditional theoretical and analytical commentary.

Yet no "middle-path" of rational and objective theory has yet emerged which recognizes the essential interdependences of traditional and hypertextual scholarship, and the discourse remains entrenched in dialectics. Barrett believes this is a result of hypertextuality being categorized as an "assault on a central concept of Western culture—the book itself: a linear narrative moving in time, occupying real space, with a beginning, middle, and end" (1988:xv). However, this fails to recognize that traditional academic texts are not always read from cover to cover: they are scanned and dipped into just as hyperdocuments are. Similarly, chapter headings, indexes, and bibliographies are used to determine points of interest and exploration in precisely the same way that links and search engines are used in hypermedia. Scholarship has always been hypertextual. The key difference—and advantage—is the speed that digital technology now affords the cross-referencing and retrieval of data.
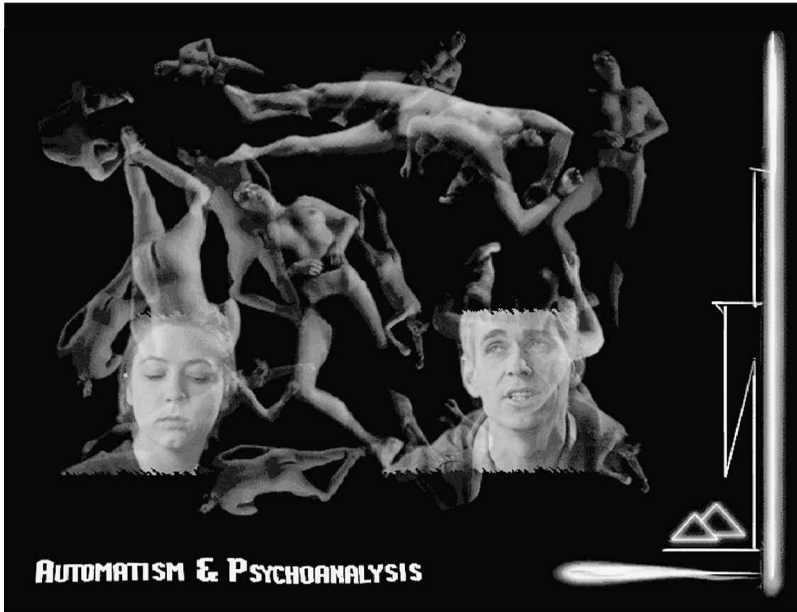
9. Visualizing theory and theorizing visually: photo-montages and animations are used to visually reinforce concepts and themes, and to attempt to draw together the two "poles" of theory and practice. (Screen capture courtesy of the University of Salford, UK)

Yet millenerian visions of the "unbounded creation" of hypertextuality attempt to reconfigure our very notions of information and knowledge, as articulated by writers such as John Perry Barlow:

> Freed of its containers, information is obviously not a thing […]. Information is a verb, not a noun […]. Information is an activity […]. Information is experienced, not possessed […]. Information is a life form. (1996:157–58)

Firstly, such readings distort the facts: hypermedia is not "freed" of its containers. On the contrary, it necessitates a minimum of three containers (data folder, software program, computer screen) in contrast to the quite singular containment of a book or piece of text. Secondly, if information can be conceptualized as transforming from noun to verb by mere virtue of accessing data from multiple sources, this has nothing to do with the advent of hypertextuality, since for centuries academics have been studying with more than one open book on the desk. Academic research has always been an "activity" whereby multiple "texts" (in whatever form) are read, evaluated, and placed in relation to one another. While it can be argued that new technologies potentially ease, speed up, or enliven this process, they do not transform the essential paradigm.

The hyperbole associated with the metaphysicians of computer technologies is also reflected in the distorting semantics of popularized computer language. The use of the word "virtual" to refer to anything produced or accessed via computer is a misnomer, even when applied to the most advanced immersive "Virtual Reality" (VR) systems.[11] "Virtual" implies a precision of replication that is barely distinguishable from its referent, and is a particular overexaggeration when applied to representations on a conventional computer screen, where objects (even 3D graphics) exist in two dimensions. We may as well talk of van Gogh's "virtual sunflowers" or the "virtual animals" painted in the cave dwellings of our prehistoric ancestors. As Hans-Peter Schwarz observes, the electronic transport of works of art, "which are intended to have a predominantly tactile and visual impact […] still amounts to one thing, i.e. repro-

duction" (1997:43–44). There are numerous other examples: "Real-time" has become digital jargon for "live," as if to suggest that time may also exist in a unreal form; "interactive" is casually applied to a vast number of computer applications which offer the user no tangible control or give-and-take, only push-button multiple choices.

The actual properties of computer technologies should be disentangled from the inaccurate, obfuscating, and to many, alienating language used to describe them. Though this language has turned into convention, the rhetoric is fanciful, conjured by the proponents of new technology who see a life-changing phenomenon heralding a brave new world. But it is simply a new communications medium which, like film and television before it, opens new possibilities for discourse, art, and entertainment. For the performance researcher and academic, as I have argued, it constitutes an ideal medium for the documentation and analysis of performance, for the study of the interface between theory and practice, and for new ways to approach and present academic writing:

> The development of hypermedia represents a return to richer, pre-print modalities of expression, as if we are "coming to our senses" after the anaesthetic of monochrome words. The opportunity it offers to reason, to think, to debate and to learn in more concrete, multi-sensory terms may have a deep significance [...as] a move away from the peculiar abstraction of written or mathematical expression. (Cotton and Oliver 1992:88)

Conclusions

While contemporary performance practice has progressively liberated itself from the dominance of text since the 1960s, little has changed in the academic paradigm. The divergence and hybridity of postmodern performance is not reflected in the forms and critical tools that analyze and celebrate it. The increasing affordability of hardware and software for designing multimedia programs offers academics, researchers, and performers a new intertextual and audiovisual medium and publication form to present their work.

10. Animating Artaud: Stylized physical gestures are broken down into four stages, then digitally reanimated to suggest Artaudian notions of "physical hieroglyphs." (Screen capture courtesy of the University of Salford, UK)

Chameleons 2 offers a template for comprehensive hypermedia documentation and analysis of performance, a model that can be significantly extended using new data storage and retrieval technologies such as DVD. As a documentation medium, digital archiving has more versatility and more technical and intertextual capabilities than annotated texts or linear video recordings.

Current debates within computer interface theory, as well as discourses in the fields of literary and cultural studies, attest to the relevance of experiments that reconfigure performance texts in hypermedia form. Extending Brenda Laurel's thesis that theatrical metaphors pervade and enrich human–computer communication, *Chameleons 2* seeks to enrich and improve human–human communication *about* theatre *via* the computer. The human–computer interface becomes the digital proscenium where theatrical processes are visually concretized and critically analyzed.

Chameleons 2 goes beyond the scope of current performance CD-ROMs by virtue of its depth of video documentation; its multiperspective ensemble conception; its detailed scrutiny of devising processes; and its range and forms of contextual debate. The CD-ROM uses a hypermedia program to fuse theory with practice, and to hint at new forms of performative discourse. Multimedia technologies can present performance research more aesthetically, more concretely and, in our technological age, perhaps more credibly than on a printed page. New technologies offer a transformed topography and a new poetics of performance theory and criticism.

Notes

1. Video is an inevitably distorting representation (or re-presentation) of performance which can never accurately replicate the live experience. For this reason many practitioners, such as Grotowski, have refused to allow recordings of their work. Video records of live performance also highlight key differences in scale between the two media; for example, theatrical acting appears physically and vocally over-expanded in comparison to the internalized performances prevalent in conceived-for-camera film and television drama.

2. DVDs can store 4.7 gigabytes of information, around seven times the capacity of CD-ROMs. However, with packaging tricks that combine two-sided discs with an additional data layer, this provides a 17-gigabyte disc, which is 26 times the capacity of a CD-ROM.

3. See Davis (1997). These include the parsing and recognition of diverse video elements: algorithmic annotation of shot breaks, pans, and zooms (Teodosio 1992; Ueda, et al. 1993); object recognition and tracking (Nagasaka and Tanaka 1992); voice recognition and audio parses for specific sounds such as music and laughter (Hawley 1993).

4. Cataloging and retrieval systems for digital video require the development of new iconographic templates and metaphors to represent video to provide multipurpose content analysis. Traditional "keyword" searches, for example, are largely inadequate and inappropriate in describing the audiovisual and temporal content and structure of the medium. "It is not simply a matter of cataloguing reels or tapes, but of representing the content of video so as to facilitate the retrieval and repurposing of video according to these representations" (Davis 1997:1). Davis and colleagues at the Massachusetts Institute of Technology (MIT) are developing new iconic visual language systems for the search and retrieval of video from large archives. They aim to develop a video annotation language that is "durable," "sharable," and "global" and makes use of a structured, semantic, and searchable vocabulary of icons. Their MediaStreams prototype system utilizes a conventional "Time Line" (used in video editing) combined with multilayered, iconic annotations of video data which are represented by a range of visual metaphors encompassing pictorial, color, shading, anti-aliasing, and animation forms. Users can visualize, browse, annotate, and retrieve video content, and go on to dynamically resegment and resequence material on the fly.

5. Navigation maps are conceived in one of four structures: *linear*, where users progress sequentially through a prescribed route; *hierarchical*, where more and more optional

routes appear and spread out like tree branches as the user progresses; *nonlinear*, allowing the user to move freely around without any predetermined routes; and *composite*, allowing generally free navigation, but also incorporating some linear or hierarchical structures (see Vaughan 1994:390).

6. As Bonnie Marranca (1979) has discussed in her article "The Self as Text," the exploration of the artist's autobiography or personal mental space is a characteristic feature of postmodern performance. She terms it "a dialogue with the self," a description equally applicable to automatism. However, prior to our experiments with automatic writing, we "go into character"—thus combining surrealist theories of the unconscious with traditional Stanislavskian practice. The inner dialogue with the unconscious is thus significantly mediated through a replacement/displacement of the personal self with the fictional self (the character), which actually *does* the writing. Automatic writing "in character" is a quite different use of the self as source material from that described by Marranca. It is also at odds with Richard Schechner's assertion that the postmodern use of autobiography as text is an articulation of the performer's "consciousness of his own consciousness" (1979:16). Rather, our experiments are concerned with the articulation of the *un*consciousness of a character, mediated through the unconsciousness of an actor, which is finally *made conscious* in performance.

7. A highly confessional style and content was found to be in evidence in many of the automatic writing experiments. Language tended to have a strongly visual and physicalized quality, and often contained distinctive and repetitive rhythmical patterns, such as one finds in the work of Samuel Beckett.

8. For each of the figures, four frames mapping different stages of the movement have been "captured" as stills and put into the computer ("digitized"). Using a software program (Adobe Photoshop) the outlines of the figures are traced and cut out from their background. The four stages of each of the figures' movements are then programmed using the main authoring software (Macromedia Director) to alternate in rapid sequence on the screen, creating animation.

9. When working in this medium, new conceptual ideas and approaches constantly come into play. As Ben Davis has observed:

> The inspiration for a work of art […] often comes when one sees things put together in new ways […]. The multimedia computer is a new expressive medium, with the potential to support new expressive formats. The processes of inspiration in the face of this new medium are especially interesting. (1993:118)

10. This is an important factor in multimedia authoring, where the technical aspects of programming can become all-consuming and lead to what has been termed "analysis paralysis," whereby "the means become the ends as you forget what you wanted to get out of the computer and become wrapped up in the process of getting it out" (Shu 1992:6).

11. Despite the sophistication of the three-dimensional tracking capabilities of Virtual Reality systems, VR objects and environments visually remain graphical and "cartoony" simulations rather than photo-realistic depictions.

References

Artaud, Antonin
1970   *The Theatre and Its Double.* London: Calder and Boyars.

Barlow, John Perry
1996   "Selling Wine without Bottles." In *Clicking In: Hot Links to a Digital Culture,* edited by Lynn Hershman Leeson, 222–37. Seattle, WA: Bay Press.

Barrett, Edward, ed.
1988   *Text, ConText, and HyperText: Writing for the Computer.* Cambridge, MA: MIT Press.
1992   *Sociomedia: Multimedia, Hypermedia and the Social Construction of Knowledge.* Cambridge, MA: MIT Press.

Bolter, Jay
1990   *Writing Space: The Computer in the History of Literacy.* Hillsdale, NJ: Lawrence Erlbaum.

Carlson, Patricia Ann
1988   "Hypertext: A Way of Incorporating User Feedback." In *Text, ConText, and HyperText: Writing for the Computer,* edited by Edward Barrett, 93–110. Cambridge, MA: MIT Press.

CNET: The Computer Network
1998   <http://www.cnet.com/Content/Voices/Movers/residents.html>

Cotton, Bob, and Richard Oliver
1992   *Understanding Hypermedia.* London: Phaidon Press.

Davis, Ben
1993   "Man Ray." In *Multimedia Computing,* edited by Matthew Hodges and Russell Sasnett, 117–25. London: Addison-Wesley.

Davis, Marc
1997 [1995] "Media Streams: An Iconic Visual Language for Video Representation." <http://web.interval.com/papers/mediastreams> Originally published in *Readings in Human-Computer Interaction: Toward the Year 2000*. San Francisco: Morgan Kaufmann.

Dixon, Steve
1995   *Chameleons: Theatrical Experiments in Style, Genre and Multimedia*. CD-ROM. Published by *Studies in Theatre Production* 12 (December).

Gooderick, Richard
1996   "The Computer as Violin: Assessing Artistic Criteria" In *Assessing Quality: Artistic Quality in the Publicly Funded Arts*. Manchester: North West Arts Board.

Goodman, Lizbeth, Tony Coe, and Huw Williams
1998   "The Multimedia Bard: Plugged and Unplugged." In *New Theatre Quarterly* 14, 1 (February):20–42.

Gromala, Diana
1996   "Pain and Subjectivity in Virtual Reality." In *Clicking In: Hot Links to a Digital Culture,* edited by Lynn Hershman Leeson, 222–37. Seattle, WA: Bay Press.

Grusin, Richard
1996   "What Is an Electronic Author? Theory and the Technological Fallacy." In *Virtual Realities and Their Discontents*, edited by Robert Markley, 39–53. Baltimore, MD: Johns Hopkins University Press.

Hawley, Michael
1993   "Structure out of Sound." PhD thesis, Massachussets Institute of Technology.

Hayles, Katherine
1996   "Boundary Disputes: Homeostasis, Reflexivity, and the Foundations of Cybernetics." In *Virtual Realities and Their Discontents*, edited by Robert Markley, 11–37. Baltimore, MD: Johns Hopkins University Press.

Heckell, Paul
1982   *The Elements of Friendly Software Design*. New York: Warner.

Hodges, Matthew, and Russell Sasnett, eds.
1993   *Multimedia Computing*. London: Addison-Wesley.

Kendrick, Michelle
1996   "Cyberspace and the Technological Real." In *Virtual Realities and Their Discontents*, edited by Robert Markley, 143–60. Baltimore, MD: Johns Hopkins University Press.

Landow, George P.
1992   *Hypertext: The Convergence of Contemporary Critical Theory and Technology*. Baltimore, MD: Johns Hopkins University Press.

Landow, George P., ed.
1994   *Hyper/Text/Theory*. Baltimore, MD: Johns Hopkins University Press.

Laurel, Brenda, ed.
1990   *The Art of Human-Computer Interface Design*. Reading, MA: Addison-Wesley.

Laurel, Brenda
1991   *Computers as Theater*. Reading, MA: Addison-Wesley.

Markley, Robert, ed.
1996   *Virtual Realities and Their Discontents*. Baltimore, MD: Johns Hopkins University Press.

Marranca, Bonnie
1979   "The Self As Text: Uses of Autobiography in the Theatre." *Performing Arts Journal* 4, 1–2 (PAJ10/11):85–105.

Nagasaka, Akio, and Yuzuru Tanaka
1992   "Automatic Video Indexing and Full-Video Search for Object Appearances." In *IFP Transactions: Visual Database Systems II,* edited by E. Knuth and L.M. Wegner, 23–37. Oxford: Elsevier Publishers.

Norman, Donald A.
1991   "Foreword." In *Computers as Theater* by Brenda Laurel, ix–xiii. Reading, MA: Addison-Wesley.

Norman, Donald A., and S. Draper, eds.
1986   *User Centred Systems Design: New Perspectives on Human-Computer Interaction*. Hillsdale, NJ: Lawrence Erlbaum.

Paulson, William
1989   "Computers, Minds and Texts: Primary Reflections." In *New Literary History* 20, 2 (Winter):291–303.

Pimentel, Ken, and Kevin Teixeira
1995   *Virtual Reality: Through the New Looking Glass*. New York: McGraw-Hill Inc.

Poster, Mark
1990   *The Mode of Information: Poststructuralism and the Electronic Context*. Chicago: University of Chicago Press.

Ragsdale, Ronald, and Alnaaz Kassam
1994   "The Magic of Multimedia in Education: Promises of the 21st Century." In *Multimedia Computing: Preparing for the 21st Century,* edited by Sorel Reisman, 558–94. London: Idea Group Publishing.

Reinelt, Janelle
1992   "Psychoanalysis." In *Critical Theory and Performance*, edited by Janelle Reinelt and Joseph R. Roach, 383–89. Ann Arbor: University of Michigan Press.

Renan, Sheldan
1996   "The Net and the Future of Being Fictive." In *Clicking In: Hot Links to a Digital Culture,* edited by Lynn Hershman Leeson, 61–72. Seattle, WA: Bay Press.

Roach, Greg
1998   "Possibilities of Interactive Storytelling." Lecture delivered 9 March 1998 at SAGAS Writing Interactive Fiction, Hochschule Fur Fernsehen und Film, Munich.

Schechner, Richard
1979   "The End of Humanism." *Performing Arts Journal* 4, 1–2 (PAJ10/11):9–22.

Schlusselberg, Evelyn, and V. Judson Harward
1992   "Multimedia: Informational Alchemy or Conceptual Typography?" In *Sociomedia: Multimedia, Hypermedia, and the Social Construction of Knowledge*, edited by Edward Barrett, 95–106. Cambridge, MA: MIT Press.

Schwarz, Hans-Peter
1997   *Media-Art-History*. Munich: Prestel-Verlag.

Shu, Nan C.
1992   *Visual Programming*. New York: Van Nostrand Reinhold.

Teodosio, Laura
1992   *Salient Stills*. MS thesis, Massachusetts Institute of Technology Media Laboratory.

Ueda, Hirotada, Takafumi Miyatake, Shigeo Sumino, and Akio Nagasaka
1993   "Automatic Structure Visualization for Video Editing." In *Proceedings of CHI '91 Conference on Human Factors in Computing Systems in Amsterdam, The Netherlands,* 197–41. Amsterdam: ACM Press.

Ulmer, Gregory
1994   "The Miranda Warnings: An Experiment in Hyperrhetoric." In *Hyper/Text/ Theory,* edited by George P. Landow, 345–78. Baltimore, MD: Johns Hopkins University Press.

Vaughan, Tay
1994   *Multimedia: Making It Work.* Berkeley, CA: Osborne McGraw-Hill.

Woolley, Benjamin
1993   *Virtual Worlds: A Journey of Hype and Hyperreality.* London: Penguin.

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