The Un/Real Duet

Intimacy & Agency through Interaction with a Virtual Character

by Freedom Baird

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Submitted to the Program in Media Arts and Sciences, School of Architecture and Planning, in partial fulfillment of the requirements for the degree of

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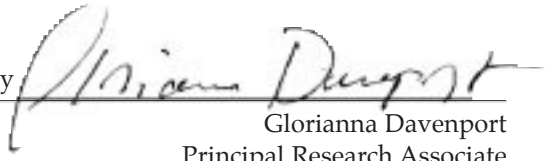
Certified by 
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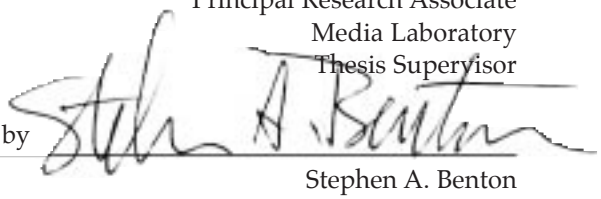
Accepted by 
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Abstract

The duet is a wonderfully appealing mode of interaction between two individuals. Its playful intimacy fosters an environment of shared agency in which expression through a common language yields a creative product. Our experience of art in a host of media primes us to enjoy duets that transpire, not just between two people, but also between a person and a virtual character. These virtual characters are both real in that they have form—visual, aural, mechanical—and make us feel things, and unreal—they're fleshless, bloodless ink on paper, data in chips, scanlines on a screen, collections of logical constructs.

This thesis presents the un/real duet as a useful form for structuring an interaction between a human participant and a virtual character. Theoretical and practical contexts explored are:

- Use of personal portraiture and immersion to establish intimacy
- Crafting character by modeling consciousness
- Gestural language as communication during the duet
- Recombinant poetics as the creative product of the duet

Presented and critiqued is the installation, *Sashay/Sleep Depraved*, in which a participant uses emotionally evocative gestures to interact with a larger-than-life-sized virtual character, the Sleeper, by constructing an animated dream. Media Lab technologies integrated into the installation and discussed here include: automated editors, 'fish' sensors, and the *Isis* scripting language. An accompanying video tape demonstrates the installation in use.

Finally, two strategies for developing an un/real duet are offered: a method for establishing intimacy and agency, and a model for producing virtual characters. The thesis concludes with a consideration of our motives in creating these characters.

Keywords: duet, intimacy, agency, virtual character, automated editing, gesture, immersion, poetics, personal portrait, dreams, dreaming, *Isis*, fish sensors

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For my family,
Ma, Dick, Noah,
Eleanor & Rose

and for Dad for
still being in it

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Credits

Sashay / Sleep Depraved
was made by

Author/Director:	Freedom Baird
Advisor:	Glorianna Davenport
Isis Language:	Stefan Agamanolis
Isis Coding:	Stefan Agamanolis, David Berman, Greg Ballrud, Andrew Duggan, Samuel Spitzer
Gesture Sensors:	Joe Paradiso, Josh Smith
Gesture Research:	Freedom Baird & Arjan Schütte
Sleeper:	Freedom Baird
Stage Direction:	Arjan Schütte
Camera Crew:	Larry Gallagher & his staff
Dream Content:	Freedom Baird, Samuel Spitzer
Audio Aid:	Alex Westner
Musical Score:	Sophia Serghi
Audio & Video Editing:	Freedom Baird

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1 Introduction

In a contact improvisation duet, the dancers focus on sensations of touching, leaning, supporting, counterbalancing, and falling...thus carrying on a physical dialogue.[1] *Each partner...must be ready to give or take weight, to support, to resist, or to yield, as called for by the interaction.*[2]

[1] Novack, C. J. 1990. Sh*aring the Dance: Contact Improvisation and American Culture.* Madison, Wisconsin. University of Wisconsin Press. Paraphrased from p. 8. Image from p. 116

[2] Paraphrased from p. 128

1 Duet, Intimacy and Creativity

"I put my hand up on your hip, when I dip you dip we dip."[3] What's the great appeal of the duet? In it two individuals collaborate to create what they couldn't or wouldn't alone. Whether making dance, music, sonnets or love, engaging in these activities with a partner augments the productive experience in multiple ways. Playfulness arises out of the exchange, making improvisation easier, as ideas and motifs are shared and bounced around. Trust and familiarity set up a secure environment in which the collaborators take risks. Action by one participant yields unexpected reaction by the other, setting a generative cycle into motion. In these ways the intimacy of the duet—whether literal or metaphorical—yields agency and creativity, as one partner elicits, vouches for and supports the other's behavior, whether waltzing on Rollerblades, or drag racing in a parking lot.

[3] Nasty, F. 1996. Da' Dip. Dance single. Triad Recording.

A sense of agency, defined by Janet Murray as "the satisfying power to take meaningful action and see the result of our decisions and choices,"[4] can flourish in the democratic environment of the duet. Jonathan Katz characterizes this kind of tandem creativity in his essay on the works of and intimate relationship between artists Jasper Johns and Robert Rauschenberg. Katz says it's not "that one was a leader, the other a follower, but rather that they reinforced each other's inclinations, gave each other permission to strike out in new directions, supported risk taking, and provided an understanding context for discussion and debate."[5]

[4] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 126

[5] Chadwick, W., de Courtivron, I. Eds. 1993. *Significant Others: Creativity and Intimate Partnership.* London, UK. Thames and Hudson. p. 198

Intimacy—so essential to the duet—is characterized by qualities of closeness, familiarity, and understanding of another's inner nature, all of which arise out of two states, one physical, the other emotional.[6] Externally, proximity is a component of intimacy. People grant an exclusive physical access to one another—someone whispers a secret in someone else's ear; an exhausted boxer clings to his opponent until the referee pries them apart. Internally intimacy involves a motivated choice to express strong feelings toward another, based on one's emotional connection with that person—I wrote to my grandma last week and told her that I miss her. Intimacy, of course, is not all trust and roses. Malicious acts can be doubly potent when conducted with a degree of familiarity—the school bully said to to the scapegoat, "I hate your guts and I'm gonna get you at 3."

[6] Inness, J. C. 1992. *Privacy, Intimacy, and Isolation.* New York, NY. Oxford University Press. p. 90

Although contemplating the creative intimacy of duets may bring to mind celebrated couples—Penn & Teller,[7] Bigelow & Cameron,[8] Donny & Marie,[9] Itchy & Scratchy[10]—duets are found elsewhere as well. In all sorts of everyday situations people pair off in intimate little dances. Within each pair individuals have an understanding of one another and of their respective roles, yet they're on the alert, paying close attention, matching up movements, drawing each other out in either cooperation or adversity. Consider these couples: runway signalman and pilot, coach and gymnast, border guard and smuggler, suicidal jumper and placating detective.

[7] Penn Jillette and his silent partner Teller. Contemporary magical theater performers.

[8] Kathryn Bigelow and James Cameron. Contemporary directors and producers of major Hollywood films, married for a time.

[9] Donny and Marie Osmond. Brother and sister musical duo. Big in the late 1970s.

[10] Itchy™ & Scratchy.™ Bloody cartoon mouse & cat rivals created by Matt Groening. © 1996 FOX Broadcasting Company.

Duets need not only transpire between two of a kind. The form of duet between a *real person* and a *virtual character* has precedence in the traditional media of sculpture and filmmaking,

in which the viewer has an intimate connection to the subject through proximity and a first-person perspective.

Through our experiences of art in a host of media—literature, television, video games, automated teller machines—we have learned to interact with virtual characters that are both real in that they have form (visual, aural, mechanical) and they make us feel things, and unreal—they're data in a memory chip, scan-lines on a screen, a collection of logical constructs.[11] Though these entities are certainly not *persons*, they are distinctly *personae* and affect us as such.[12]

[11] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 214

[12] Janet Murray, in a conversation I had with her in August, 1997.

Newer digital media, with capabilities of sensation (input) and reaction (output), afford us the ability to create environments in which duets between people and un/real characters transpire more dynamically than ever before.

2 Un/Real Characters

In the video game Doom, I can grab my keyboard and mouse, sneak up on my virtual enemy and bonk him on the head, snickering gleefully as he crumples to the ground, then muttering ruefully as he gets up and comes after me again.[13] Or, in a more constructive mood, I can go to the Cybersmith cafe and privately lend my face to a photo/birth/booth,[14] which, after analyzing my features for a few minutes, unceremoniously delivers a wallet-sized snapshot of the virtual offspring conceived by the machine and me.

[13] *Doom.* © 1997. id Software.

[14] *Get Morphed.* Digital photomorph booth. © Panasonic. I used one for $5 at Cybersmith, Cambridge, MA, spring of 1997.

A growing assortment of such virtual characters as these, with whom we engage in a range of odd duets, are appearing more and more frequently in gaming arcades, theme parks, CD-ROM shops, web sites, and many other technological environments. Though these characters lack humanistic physical substance, and are quirkily monomaniacal, we find ourselves getting caught up in their plights. Motivated by what we hope to get out of them, learn from them, or do with them, we bother to learn their stilted languages and engage in interaction with them.

The form of duet, therefore, with its properties of playfulness, feedback and creative product, is a very useful one with which to structure a digitally-based interaction between a human partici-

pant and a virtual character. The makers of digitally mediated interaction can consider duet as they set up appropriate modes and boundaries of interaction: i.e., rules for participation, latitude for play, a language with which participants can communicate, and an intimate space in which the interaction can occur.

3 Experiencing *Sashay/Sleep Depraved*

This thesis presents *Sashay/Sleep Depraved*, an installation created in the Media Lab's Interactive Cinema Group[15] at the Massachusetts Institute of Technology. Credits are listed on page 11. The installation, which allows a participant to engage in an intimate, creative duet with a virtual character as I've characterized it above, has two components. *Sashay* is its gesture-driven animation tool. The name Sashay, meaning a sideways slide or a showy walk, implies the evocative nature of gestures made during the interaction. The second component, *Sleep Depraved*, is the content set that comprises the Sleeper, the virtual character with whom the participant engages by constructing an animated dream for her.

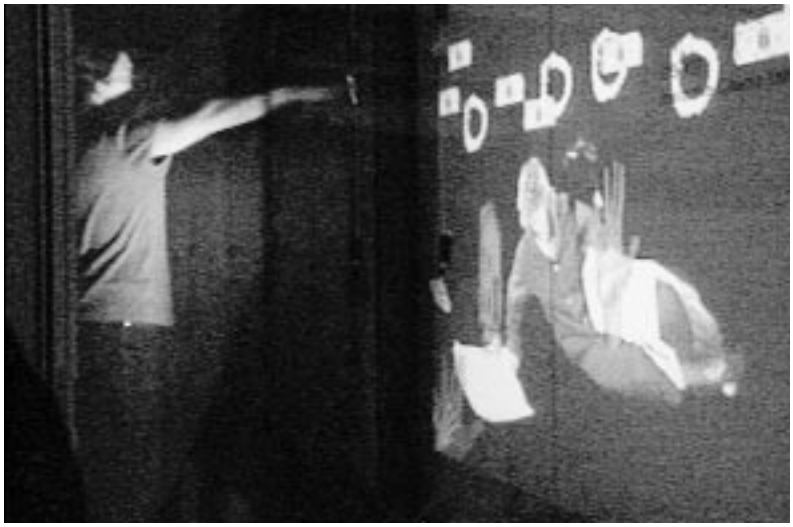
[15] Interactive Cinema Group. MIT Media Lab. Cambridge, MA. http://ic.www.media.mit.edu/

Sashay/Sleep Depraved

A woman is sleeping in the hallway. You approach curiously, recognizing that she's a projection through a glass wall. She's calm—breathing deeply and easily. It's shocking to see her there—childish in her rumpled red pajamas, clutching the white sheet as if for security. You step up before her. It's odd to invade her space. You feel yourself a voyeur. Are you allowed to watch her sleep? Will she mind? Will anyone else?

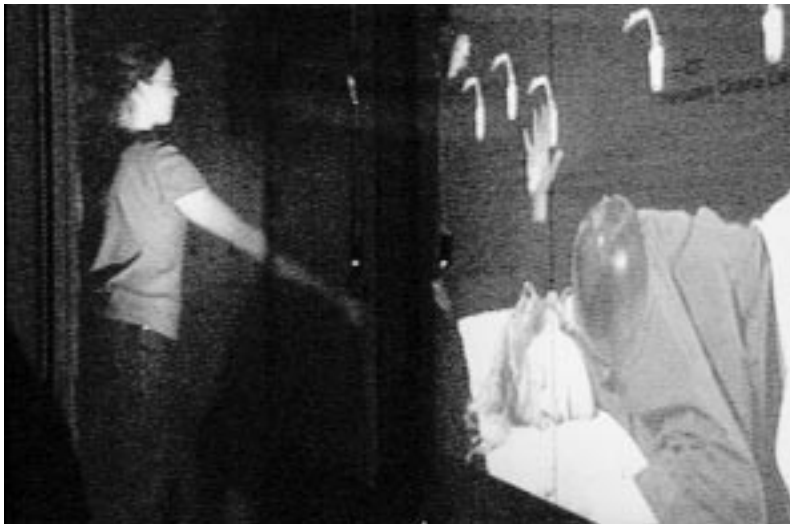
Confronting the Sleeper

The space above the sleeper is blank, black, unperturbed. In the upper left corner small objects appear and disappear slowly, as if in sync with the Sleeper's breath: a rope, a fish, matches, a knife, a house, an old man, an apple... These are her dream objects—they read like a survival kit of her unconscious mind.[16]



Gesturing to make the Sleeper's dream.

You slash your hand among the four wirey sensors dangling in front of the screen. A knife skitters above the Sleeper's head, emulating the movement of your hand. She reacts, tossing and grumbling. The knife continues to skitter in an endless loop. You make another gesture. A ragged man buzzes confusedly around the Sleeper. She pulls the sheet up tight, contorting her brow. You add elements to the dream piece by piece. You wake the dreamer up, screaming.



Putting her back to sleep.

Later, with images of milk and apples drifting in slow circles, you put her back to sleep.

[16] The concept of the Sleeper's dream objects as a survival kit of the subconscious mind came from Samuel Spitzer, an undergraduate Media Lab student.

4 Thesis Structure

In this thesis I consider the form of un/real duet as a basis on which to construct an interaction between a human participant and a virtual character. My thesis project *Sashay/Sleep Depraved* is presented and critiqued as an example of such a work,[17] after which, strategies for creating an un/real duet are proposed, and our motivations in constructing them are examined. The chapters are summarized as follows:

Chapter 2, *Interaction Up Close & Personal*, examines several interactive pieces and considers their intimate, immersive, gestural and recombinant properties in practical and theoretical contexts, as they pertain to the form of the un/real duet.

Chapter 3, *Process of Building* Sashay/Sleep Depraved, details research that led toward making the installation. A theory of dreaming for modeling the Sleeper's subconsciousness is explored. Attention is paid to all aspects of the production process, and to all of the hard- and software used and developed. An assessment of the first version of *Sashay/Sleep Depraved* is offered.

Chapter 4, Sashay/Sleep Depraved - *Final Implementation*, describes how the piece was revised after its first round of use, offers an annotated, illustrated description of the experience, and critiques the final version.

Chapter 5, *Conclusions*, presents two strategies for the digital media maker. The first is a *method* for establishing intimacy and agency in an interactive piece through the form of the un/real duet. The second is a *model* for creating a virtual character for use in such a piece. Finally, the benefits and disadvantages of modeling personality and character are examined, and our motives in creating virtual character are explored.

A video demonstrating use of the installation *Sashay/Sleep Depraved* accompanies this thesis.[18]

[17] In August 1997 I authored a short paper about the installation *Sashay/Sleep Depraved:*

Baird, F. 1997. Tilting at a Dreamer's Windmills: Gesture-Based Constructivist Interaction with Character. *Consciousness Reframed: Art and Consciousness in the Post-Biological Era.* Proceedings of the First International Centre for Advanced Inquiry in the Interactive Arts Research Conference. Newport, Wales. University of Wales College.

[18] *Sashay/Sleep Depraved* demo video. Produced by Freedom Baird. Runtime: 7.5 minutes. Contact the Interactive Cinema Group, MIT Media Lab, Cambridge, MA.

2 Interaction Up Close & Personal

This chapter considers examples of several works that incorporate such elements of un/real duet as: transformation, intimacy, displacement, immersion and recombination. Together these works form the context from which *Sashay/Sleep Depraved* emerged.

5 Works of Interactive Cinema

> *Interactive Cinema reflects the longing of cinema to become something new, something more complex, and something more personal, as if in conversation with an audience.*[19]

At MIT's Media Lab, the Interactive Cinema Group has a long tradition of research in the development of transformational environments. In these performance spaces, public installations and web sites, digital media systems are used to generate story environments in which participants interact with characters during a story event, influencing character behavior and story playout.

[19] From the IC web site. Interactive Cinema Group. MIT Media Lab. Cambridge, MA. http://ic.www.media.mit.edu/

Wheel of Life

The *Wheel of Life*, an immersive participatory theater experience, was created in 1992 by students in the Media Lab's Elastic Movie Time class, under the direction of Glorianna Davenport and Larry Friedlander.[20] The theme of the piece was conceived as "the wheel of life, the cycles of change and continuity that whirl us along in the journeys of our lives."[21] This theme was to be manifested in the piece's physical environments, which were spaces representing three of the four traditional elements: water, earth, and air. Visitors were to "immerse themselves...with their whole body, mind and feelings" into these spaces, exploring them as magical landscapes.[22]

[20-22] Davenport, G., Friedlander, L. 1995. Interactive Transformational Environments: Wheel of Life. *Contextual Media: Multimedia and Interpretation*. Chapter 1, pp. 1-25. Cambridge, MA. MIT Press. All, p. 2, p. 2

There are two ways in which elements of duet occurred in experience of the installation. In the various environments, visitors interacted with characters who gave them information about that world and posed challenges to face within it. Success hinged on the visitor correctly perceiving and communicating with the character to get the right information. For example, in the Water environment, a visitor encountered a large whale with whom she had to communicate by trading lines of a song. Davenport and Friedlander noted a participant's experience of perceiving the whale, with reluctance at first then with comprehension: "one visitor described feeling a little silly walking into the mouth of a whale, but then reflected that 'it is only when you understand the whale as a character, that you understand that the whale is talking to you and think about how to talk back.'"[23] Thus, the participant's comprehension of character, and her own role *vis a vis* character are key ingredients in the un/real duet.

Another form of duet invoked in the *Wheel of Life* was that between two kinds of human participants in the installation: explorers who investigated the spaces, and guides who helped them navigate, not directly, but through a language of imagery and sound. It was the installation designers' intention to "establish a collaborative, democratic partnership between the makers and users of this world by having guides who did not stand above and aloof from the experience, but were as involved and as vulnerable as those they guided."[24] This reciprocity of motivation and assistance, between explorer and guide respectively, contributed to a gratifying experience for both.

[23, 24] Davenport, G., Friedlander, L. 1995. Interactive Transformational Environments: Wheel of Life. *Contextual Media: Multimedia and Interpretation*. Chapter 1, pp. 1-25. Cambridge, MA. MIT Press. p. 17, p. 3

The KidsRoom

Also designed at the Media Lab, in the fall of 1996, was *The KidsRoom*.[25] Directed by Aaron Bobick, and produced collaboratively by the Vision and Modeling, and Interactive Cinema research groups, *The KidsRoom* was designed to be a fully-automated, interactive narrative playspace for children. Four kids at a time experienced the room's magical, transformational nature, which included a scavenger hunt among talking furniture, a bed-turned-canoe which had to be paddled down river rapids, and a giddy dance lesson from two goofy monsters.

[25] Bobick, A., Intille, S., Davis, J., Baird, F., Pinhanez, C., Campbell, L., Ivanov, Y., Schütte, A., Wilson, A. 1996. The KidsRoom: A Perceptually-Based Interactive and Immersive Story Environment. Cambridge, MA. Internal MIT Media Lab paper.

In co-authoring the script, Arjan Schütte and I were determined that the children's experience not be dampened by disappointment

resulting from overpromise in the story. We didn't want them to expect more from the installation's virtual characters than could actually be delivered. We handled this by building an honest communicativeness into the characters—a crucial element in a successful duet. For example, at the end of the experience, children learned a 'monster dance,' by standing on floor rugs, facing the projection screens, and taking cues from dancing monsters. The system's cameras could only see the children if they stayed on their rugs. So, when a child moved off of a rug, a monster would prompt them affably: "hey, please stay on your rug, so's we can see what you're doin'!" When a child did a dance move correctly, as perceived by the system, a monster would praise them accordingly: "Hey, kid on the red rug! You dance like a pro!" to which some of our young participants actually replied, "Thank you!"

What becomes clear in looking at these works of interactive cinema is that, in order for them to provide the visitor with a meaningful experience, the characters that inhabit these worlds must be understandable and engaging, as they would have to be in traditional cinema, and in addition they must be honest about their limitations, and sensitive and responsive to the visitor. The intention of these environments is, as Murray characterizes it, not to "suspend disbelief," as happens in the passive experience of traditional cinema, but rather to "actively create belief" by allowing us to "focus our attention on the enveloping world [of the interaction] and...use our intelligence to reinforce rather than to question the reality of the experience."[26] It is this activation of belief that allowed participants to sing with a whale, and take dance lessons from a monster.

[26] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 110

6 Virtual Duets: Personal & Intimate

> *Max embraces Nikki's enormous smile extended in luscious close-up across, and bulging out from, the TV screen. Identities merge and shift; bodies die and come alive again, appear and disappear; it becomes impossible to distinguish between hallucination and objective reality, between what is spontaneous and what is prerecorded.*[27]

As David Cronenberg predicted in this scene between Max and Nikki in the film *Videodrome*, digital media allow one to re-embody oneself as a virtual/technological entity that is both real (hardware, code, light and sound) and unreal (fantastic fleshless representation of humanness), to be engaged in intimate interaction by others.

[27] Shaviro, S. 1993. *The Cinematic Body. Theory out of Bounds: v. 2.* Minneapolis, MN. University of Minnesota Press. This quote is from Shaviro's analysis of Cronenbergs's *Videodrome*. p. 138

The Electronic Diary

In *The Electronic Diary*, a three-tape video series made in 1988 by artist Lynn Hershman, the author speaks directly to the camera about her childhood and teenage years, preoccupation with her weight, and later about sexual and other abuse she suffered as a child.[28] David James describes the way in which, for the spectator, the video representation of the author, though related to the "real" Hershman, actually becomes "a system of strategies that disrupt the spectator's own self-identity"[29] by making her question what is real and what isn't, and wonder about her own complicity in viewing the video.

[28] Hershman, L. 1988. *The Electronic Diaries*. Three-tape video series. LA, CA. Los Angeles Center for Photographic Studies.

[29, 30] James, D. 1989. The Electronic Self. *Artweek*. February 11. p. 8

James says that, by telling seemingly fantastic stories of suffering and abuse through the honest and raw medium of first-person video, "Hershman gives visible form to the splitting, mirroring and constant refabrication of the self involved in all these fictions by her manipulations of the video image; the video apparatus itself becomes an articulate system of metaphors for the fractured and unstable sensibility it is made to represent."[30]

Hershman has created a displaced representation of herself, so that she and others may have *access* to her, to learn about and from her. This is the kind of displacement through construction of a media persona that Sherry Turkle describes as an act of self-nurturing by providing others with "a sense of structure and control."[31] If our internal lives are strange and chaotic, and Hershman constructs a representation of herself that helps us to understand ours, she will, in the process feel comforted in trying to understand her own.

[31] Turkle, S. 1995. *Life on the Screen: Identity in the Age of the Internet*. New York, NY. Simon & Schuster. p. 202

Telematic Dreaming

Another work that allows for an intimate two-way displacement, is Paul Sermon's *Telematic Dreaming*.[32] In this project two individuals can lie down on two queen-sized beds in remote gallery locations. Above each bed are a camera and projector, cross-wired with ISDN videophone lines in such a way that onto each bed a real-time image of the person on the other bed is projected. This set-up allows two people to look at and 'touch' video representations of one another with temporal feedback as nearly immediate as if the other person were physically present.

[32] Sermon, P. 1996. *Telematic Dreaming*. Installation. Ars Electronica Center, Linz. Interview with the artist: http://www.aec.at/feat/paul.html

Sermon and his collaborators summarize the work's impact.

> Our projects, to date, have linked geographically dispersed Gallery locations and audiences into intensely "real" and intimate telepresent locations. *Telematic Dreaming* deliberately plays with the ambiguous connotations of a bed as a telepresent projection surface. The psychological complexity of the bed dissolves the geographical distance and technology involved. *Telematic Dreaming* creates an alarmingly real sense of touch that is caused by an acute shift of senses in this telematic space - and so the televirtual space is manifested.[33]

[33] Sermon, P. 1996. *Telematic Dreaming*. Installation. Artist's statement at: http://www.babelweb.org/virtualistes/galerie/teldrima.htm

Digital and telecommunications media are particularly suited to allowing us to give or obtain intimate access to partial, displaced representations of ourselves and others, for the purpose of exploring new modes of emotional engagement.

7 Immersive Works

> *The desire to turn stone into flesh is the desire to bring sculpture or the product of creativity into life with us. In film and its later mutations into immersive and virtual spaces we are trying to step out of life into the movies. Throwing the body—projection into a virtual space. The longing for oblivion and the alchemies of escape(ism?) that transform material to meaning and back again seem to be at our fingertips as we cross back and forth over the liminal spaces of the virtual frontier.*[34]

[34] Dove, T. 1997. Somatic Ventriloquism: Throwing the Body, Distributing the Self. *Consciousness Reframed: Art and Consciousness in the Post-Biological Era.* Abstracts of the Proceedings of the First International Centre for Advanced Inquiry in the Interactive Arts Research Conference. Newport, Wales. University of Wales College. p. 34

In live theater, there are such things as 'the best seats in the house;' there are audience members toward whom the greatest amount of energy from the actors is focused, because of the layout of the space, the staging of the action, and the actors' own intentions. In cinema, the viewpoint of the camera unifies the gaze of the audience, such that all seats in the house receive the film's impact more or less equally. In immersive installations, the participant's relationship is transformed by their kinesthetic involvement in the action.[35]

[35] Glorianna Davenport, in a conversation I had with her in August, 1997.

Kinesthesia, "the awareness of the body through sensations in the joints, muscles, and tendons, rather than through visual perception,"[36] draws the participant into a physical relationship with a virtual character, heightening her sense of engagement.

[36] Encyclopaedia Britannica. 1997. The Art of Dance. *Britannica Online.* Keyword search on "kinesthesia." http://www-lj.eb.com/

Threshold

In Bill Viola's installation *Threshold*,[37] the visitor passes under a bright LED display of news from a wire service, through a narrow indirect entrance, into a very dark room. On the walls of the room are very large projections of sleeping people. In the quiet intimacy of this space, as contrasted with the relentless publicity of the newsfeed, the visitor is forced into bodily proximity with the sleepers. The result is a mixed sensation of voyeurism—watching the sleepers in the private vulnerable act of sleeping, and invasion—the space in the room is so private and internal that the visitor feels as if she's trespassing in the sleepers' psychological space.

[37] Viola, B. 1992. Threshold. Installation. *Mediascape*. New York, NY. Guggenheim Museum Soho.

Mummenschanz

In live theater and comedy improvisation, not only is the audience physically immersed in the action, but, because the action is live, the actors can adjust their performance depending on what the audience is doing.

When I was about ten years old my grandparents took me to see Mummenschanz, the Swiss performance art troupe.[38] Throughout the show the performers, dressed as bizarre insects and other creatures, played with strange objects and pantomimed hilariously. At one point, when a huge bug was in the middle of its shtick which involved unrolling rolls of toilet paper that were its eyes, my grandmother sneezed very loudly, "Aah *chu!*" The bug stopped suddenly, mid-routine, and stared directly at my grandmother in amazement. The audience broke up laughing, grandma blew her nose, and the bug continued its routine.

[38] Mummenschanz is three performers who do "acrobatics, 'contortionism', dance, mimicry, balancing arts and other 'hijinx.'" They're still active. Press information from ICM Artists, Ltd.

In a digitally mediated environment these attribute of "liveness," and "responsiveness" can be scripted into a virtual character. In this way the character is imbued with its own kinesthetic sense to match the participant's, both of which contribute to the effectiveness of the duet.

8 Recombinant Works

> *By the swiftness of its actions, the imagination separates us from the past as well as from reality; it faces the future. To the* function of reality, *wise in experience of the past as it is defined by traditional psychology, should be added a* function of unreality, *which is equally positive...*
>
> *... it is impossible to receive the psychic benefit of poetry unless these two functions of the human psyche—the function of the real and the function of the unreal—are made to cooperate. We are offered a veritable cure of rhythmoanalysis through the poem, which interweaves real and unreal, and gives dynamism to language by means of the dual activity of signification and poetry.*[39]

[39] Bachelard, G. 1964. *The Poetics of Space.* New York, NY. The Orion Press. p. xxx

Gaston Bachelard promotes an openness of imagination, one that counterbalances the reasonableness of experience, as a way of gaining access to the benefits of poetry. In poetry he finds a positive channel through which the real (the signified) and the unreal (the poetic) are interwoven, improving our language and thought by making them more dynamic.

Digital media are well suited for a particular kind of poetic representation that Bill Seaman calls "Recombinant Poetics."[40] Poetics of this nature, as Seaman describes them, "are characterized by the interaction of a viewer with a system of meaning which carries compressed potential meaning constructed of language, image and sound elements within an engendered technological environment."[41]

[40, 41] Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD. all, p. 1

The Baird Family Ball

A simple example of such poetic recombinance is found in *The Baird Family Ball*, a piece that I made in 1994.[42] The Ball is an interactive animation that grapples with themes of family, masquerade, and motion. In one of The Ball's many 'rooms,' a visitor can play with sections of Baird family members' faces, recombining them into a strange mask.

[42] Baird, F. 1994. The Baird Family Ball. Interactive animation. *New Voices, New Visions 1994 CD-ROM.* New York, NY. Voyager.

Mask made by a user of the Baird Family Ball

This poetically recombinant maskmaking activity serves multiple functions for the participant. She gets to see how different features of Baird family members, plucked out of their temporal and physical contexts, do or don't integrate well into a complete face. The mask is also meant to serve as passage for the visitor into the Ball; it's a mask which she can don (she is invited to print it out, punch holes in the sides and tie it to her face with strings) in order to masquerade as a Baird family member, to see, in a metaphorical sense, what it feels like to be 'inside' the Baird family.

Passage Sets/One Pulls Pivots at the Tip of the Tongue

Bill Seaman's interactive artwork *Passage Sets/One Pulls Pivots at the Tip of the Tongue*[43] is thoroughly characterized by this kind of Recombinant Poetics. In the installation, one wall of a room is occupied by a triptych of projections. The center screen shows an interface to a a very large navigable poem comprised of imagery and superimposed text fragments (800 words/phrases, 150 still photographs). By making choices with a trackball and cursor from among the imagery and texts, a visitor can construct a new poem, which is accompanied on the flanking screens by an autonomous poem generator to the left, and, to the right, video segments of a man and woman making abstract gestures, which relate back to the poem constructed by the user. What struck me about the piece, when I used it during the summer of 1996, is that the media objects are constructed in such a way that, even though the order in which

[43] Seaman, B. 1996. Passage Sets/One Pulls Pivots at the Tip of the Tongue. Installation. *Mediascape*. New York, NY. Guggenheim Museum Soho.

they are put together changes, a rhythm (musical, lyrical, and visual) is preserved in the multimedia poem that emerges during the user/poem engine interaction. This rhythm is the result of Seaman's "slow process of modeling the poetic construction,"[44] by a carefully considered generation and positioning of media objects into appropriate lists, to be accessed by coded procedures.

Seaman points out that, though artmaking is intuitive and intuition is hard to model, there are, nevertheless, ways to use a digital system to "technologically embody the 'intelligent' decisions that an artist makes," thereby allowing for an "intermingling of the knowledge of the viewer with the 're-embodied intelligence of an author."[45]

[44, 45] Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD. p. 3, p. 1

Indeed, I believe that all art making involves a re-embodiment of the artist's knowledge, and all art beholding involves a collaboration between artist and art beholder. As Bill Viola says, "It is important to note that all art is: 1. Based on technology and tied to its development. 2. Interactive—the inseparable essence of what art is and the process by which it stays alive and present throughout historical time."[46]

[46] Viola, B. 1996. The Art of Virtual Reality. *Governor's Conference on Technology: The Role of the Artist in the Digital Age.* February.

Digital media, like other media, serve both artist and art beholder as they engage in an edifying and revelatory interaction. What distinguishes digital media from others, however, is its unique property of allowing us to make art that is sensitive and responsive. It opens up the possiblity of transforming interaction based on beholding into interaction based on action and reaction; into expressive duet whose outcome fuels that "major power of human nature,"[47] the imagination.

[47] Bachelard, G. 1964. *The Poetics of Space.* New York, NY. The Orion Press. p. xxx

3 Process of Building Sashay/ Sleep Depraved

In this chapter the process of building the installation *Sashay/Sleep Depraved* is described in detail. Background research and objectives are discussed, after which the drafting of the virtual character, the Sleeper, is described. The production process is covered, as are the issues of coding, gesture sensing, and translating gestural affect into animation. Finally the first version of the installation is described and critiqued.

9 Initial Objectives

Automated Storytelling Systems

During my first year in the Media Lab's Interactive Cinema group, one strand of the research was focused on developing automated editing systems to tell non-linear stories. These systems use embedded editorial knowledge to organize and present large collections of annotated documentary media. Interfaces in self-contained applications or on the web were crafted to represent the context of the story being told, making it easier for the user to locate herself within it. Such systems as Michael Murtaugh's *Contour* and *Dexter*,[48] and projects as *Jerome B. Wiesner: A Random Walk Through the 20th Century*[49] used these approaches to tell non-linear interactive stories.

[48] Davenport, G., Murtaugh, M. 1995. ConText: Towards the Evolving Documentary. Proceedings of ACM Multimedia '95. San Francisco, CA.

[49] Davenport, G., et. al. 1995. Jerome B. Wiesner: A Random Walk Through The 20th Century. Web site. Cambridge, MA. http://ic.www.media.mit.edu/JBW/

Murtaugh, in his discussion of *Automatist Editing Systems*, describes the ways in which such a system must handle narrative structure in order to be effective. He says, "A crucial function for a storytelling system is the ability to manage the narrative structure as it is constructed, to provide a sense of shape, pace, and rhythm to the experience."[50] In the systems being developed this was accomplished by annotating media with *contextual* information

[50] Murtaugh, M. L. 1996. The Automatist Storytelling System: Putting the Editor's Knowledge in Software. Cambridge, MA. MIT Master's Thesis. p. 25

about its content that could be easily referenced by a digital system, such as date, location, people's names, and other keyword tagged items. Less attention was paid in development to attempting to annotate and edit according to story *dynamics*, i.e. the composition of narrative units that results in the dramatic trajectory of the story: the setup of a practical joke, the unfolding of a mystery, the tragedy of an untimely accident.

An Automated Grammar of Transitions

The seed idea for *Sashay/Sleep Depraved* occurred to me as early as the summer of 1996, when I began to consider whether or not it would be possible to describe a grammar of cinematic transitions that could be applied in an automated way to a non-linear story event, thereby reintroducing drama into the narrative. Murtaugh, in evaluating the systems he worked on, had expressed this need:

> In addition to providing structure, a storytelling system might have special knowledge about how to articulate that structure to the viewer. In cinema, conventions for visual transitions have emerged to represent short temporal ellipses with dissolves, larger ellipses with fade outs, and larger possibly conceptual structural divisions with titles. A storytelling system might be capable of dynamically presenting such conventional transitions to articulate structure while maintaining immersion.[51]

I had been working on a Media Lab project called the *World Wide Movie Map*,[52] a web-tool for creating extensible, navigable representation of locations world-wide. I wanted to add a narrative element into the *Movie Map* project, to allow participants to tell stories about the locations they were documenting. I was hoping, in the tradition of Vladimir Propp,[53] to be able to define a morphology of dramatic story elements—more specifically of visual transitions (cuts, wipes, dissolves), and implement these in a way that would make the map's stories more dramatic. This visual/temporal grammar, as had been developed in cinema,[54] would constitute the "special knowledge" that the automated storytelling systems needed to become dynamic.

In spite of the clear need for it in automated storytelling systems, I found it extremely difficult to come up with such a morphology. The depth and range of story experience, and the complexity of decision making that a human author, director or editor brings to bear when creating a story are rooted in the history and complexity of human language. The amount of this knowledge that can

[51] Murtaugh, M. L. 1996. The Automatist Storytelling System: Putting the Editor's Knowledge in Software. Cambridge, MA. MIT Master's Thesis. p. 26

[52] The World Wide Movie Map. Media Lab web site. Launched 1996. Cambridge, MA. http://wwmm.www.media.mit.edu/

[53] Propp, V. 1968. *Morphology of the Folktale.* Austin, TX. University of Texas Press.

[54] Sharff, S. 1982. *The Elements of Cinema: Toward a Theory of Cinesthetic Impact.* New York, NY. Columbia University Press.

actually be encoded with boolean logic is extremely limited. In retrospect I can see that I was trying to avoid a thought trap described by Jaron Lanier: "The person's act of projecting autonomy onto the computer becomes an unconscious choice to limit behaviors to those that fit naturally into the grooves of the software model."[55] Even the names *automated* storytelling and *automated* editing systems are misleading, and betray an erroneous assumption about what the purpose of these systems really is. The systems, being neither autonomous nor automatic, are actually *tools* that enhance and augment the human storyteller's process. Kevin Brooks, a fellow graduate student in our group, describes his own research as endeavoring "to find new ways in which computational processes can assist in the development and presentation of stories."[56]

[55] Lanier, J. 1995. Agents of Alienation. Article on web site. New York, NY. Voyager. http://www.voyagerco.com/consider/agents/jaron.html

[56] Brooks, K. 1997. Summary of his academic work. Found at http://ic.www.media.mit.edu/people/brooks/academic.html

Frustrated on the research path of trying to teach computers the language of cinema, I began to consider other ways to *supplement* what computer systems lack as expressive storytelling tools. While viewing a range of performances, films and installations over the summer months, it began to dawn on me that it might be more satisfying to return more of the story composition process to the emotionally engaged participants, who could then contribute their own expression and story dynamics to the narrative.

An Intuitive Animation Tool

In viewing several dance pieces during that same summer, I was struck by the way choreographers generate transitions by having a central action unfold, while introducing peripheral actions which move in gradually or suddenly to become central.[57] I thought it would be useful to build an animation tool that allowed people to interweave animated story elements easily and intuitively, in a form of recombinant storytelling. This concept was influenced by my experience with Bill Seaman's Recombinant Poetics,[58] introduced previously in section 8.

[57] Takei, K. 1996. *Nakaniwa.* Dance performance. New York, NY. La MaMa E.T.C. Theater.

[58] Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD.

In searching for intuitive modes of interaction, I was taken with the idea of letting people use gesture to express themselves. Gesture would be useful because of commonalities in gestural language which could be tapped. Also, from my own experience as a dancer and performer, I knew of gesture's ability to engage the participant on a more intense, corporeal, affective level than could be accomplished by mere reading, pointing, or mouse clicking.

A Tangible Interface

At that time I also considered the possibility of letting a physical object serve as interface—especially one that encouraged expressive gesture. This interest grew out of exposure to research in Hiroshi Ishii's Tangible Interfaces group,[59] and from working on *The KidsRoom*[60] in the fall of 1996 (as described earlier in section 5). I was interested in employing an object—magic wand, scimitar, paintbrush—that would allow the user to paint expressively in an animation workspace, in the same way that a movable bed had taken on qualities of a magic vehicle in the KidsRoom, transporting its passengers from one mysterious world to another.

Thus, when I proposed building *Sashay/Sleep Depraved* in the fall of 1996, my primary objectives were to create an installation that would allow for an intuitive gesture-based interaction through the use of a tangible interface. Not unexpectedly, as the research progressed and the installation was built, these objectives proved difficult for reasons discussed ahead in section 15. Thus, some changed shape and others were replaced by new objectives.

[59] Ishii, H. 1997. Tangible Media Group. MIT Media Lab. Cambridge, MA. http://tangible.www.media.mit.edu/groups/tangible/

[60] Bobick, A., Intille, S., Davis, J., Baird, F., Pinhanez, C., Campbell, L., Ivanov, Y., Schütte, A., Wilson, A. 1996. The KidsRoom: A Perceptually-Based Interactive and Immersive Story Environment. Cambridge, MA. Internal MIT Media Lab paper.

10 A First Glimpse of the Sleeper

Non-Linear and Interactive Narrative

The idea of implementing an virtual character grew out of my participation in two MIT classes. In Janet Murray's Theory and Practice of Non-Linear and Interactive Narrative class in the spring of 1996, I began experimenting with simple text-based tools that allowed for the creation of Chatterbots, as Murray calls them.[61] I produced *Brat*, a somewhat demented 6-year old for whom a user must babysit, and who really, really doesn't want to go to bed.[62]

Out of Dream World

In the fall of 1996 the Media Lab's Elastic Movie Time class was cotaught by Glorianna Davenport and Ron MacNeil. The goal of the class was to conceive of a fictitious world to be manifested in multiple media (web, pagers, installations), with which users could interact on a global scale. The environment developed was eventually dubbed DreamWorld[63]—a wacky place where information evaporates and rains like water, where dream texts can be submitted for visual interpretation (like reverse Rorshach blots), and where insomniacs are banished until their condition is cured.

[61] Janet Murray presents an excellent discussion of the characters created in her class, as well as others. Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. New York, NY. Simon & Schuster. Chapter 8. pp. 214-247

[62] Baird, F. 1996. *Brat*. Text-based character. Cambridge, MA. Available by telnetting to: telnet://brat@high-lander.media.mit.edu login as "brat", no password needed

[63] Davenport, G., Agamanolis, S., Bradley, B., Sparacino, F. 1997. Encounters in DreamWorld: A Work In Progress. Cambridge, MA. Internal MIT Media Lab paper. DreamWorld web site: http://jfk.media.mit.edu/dreams/pan.html

Spun out from the process of building and populating DreamWorld was the concept for a virtual character, the Sleeper. The Sleeper, who eventually came to exist separately from DreamWorld, would inhabit a public installation where participants could use gesture to interact with her. The participant would influence her state by creating a dream for her. The language of communication from participant to Sleeper would be a painterly one: gestures would be used to 'paint' animations into the space surrounding the Sleeper, comprising layers in an ever-evolving surrealist dream that continually effected her. The installation that housed the Sleeper would have two components: *Sashay* - the gesture-driven animation tool, and *Sleep Depraved* - the content, i.e. the Sleeper and her dream objects.

Choreographic Interest

The concept for *Sashay/Sleep Depraved* was also influenced by my work as a dancer and choreographer. Dance throughout its history has produced many methods of spatial/temporal phrasing and transition which I hoped to tap in generating dream animations for the Sleeper.

In addition, while choreographing a duet this past year, I became very interested in continuous action-reaction (movement feedback) between two bodies.[64] This interest manifested itself in both the dance piece and the participant-Sleeper interaction in the installation.

Integrating Technologies

When I began plans for constructing *Sashay/Sleep Depraved* I was interested in combining several hard- and software systems that were in development at the Media Lab. In this way, I'd have access to both the technologies and their developers, and in using them I'd provide a testing ground and forum for continued research. The three principal Media Lab technologies I used were: gesture recognition with fish sensors,[65] the *Isis* scripting language,[66] and automated editing systems.[67,68]

Self-Discovery

Also, ever curious about the human condition, and particularly my own (how did I get this way?!), I was drawn, as I often am in my artmaking, to the kind of self investigation that comes from self-

[64] Baird, F. 1997. Tether/Strop. Dance duet. *Choreographers' Ink Annual Dance Concert*. Cambridge, MA. Harvard-Radcliffe Dance Department.

[65] Paradiso, J.A., Gershenfeld, N. 1996. Musical Applications of Electric Field Sensing. *Computer Music Journal*.

[66] Agamanolis, S. 1997. Isis: A Multi-Level Scripting Environment for Responsive Multimedia. Cambridge, MA. Internal MIT Media Lab paper. http://isis.www.media.mit.edu/projects/isis/

[67] Evans, R. G. 1994. LogBoy Meets FilterGirl: A Toolkit for Multivariant Movies. Cambridge, MA. MIT Master's Thesis.

[68] Murtaugh, M. L. 1996. The Automatist Storytelling System: Putting the Editor's Knowledge in Software. Cambridge, MA. MIT Master's Thesis.

portraiture. In rendering myself as a virtual Sleeper, I expected to learn something about myself. I also hoped, not living entirely in a narcissistic vacuum, that I would provide an opportunity for others to learn, not so much about sleep or about me, but about their own psyches, as revealed by their interactions with the Sleeper. These are the techniques of self-representation and displacement mentioned earlier in section 6.

11 Modeling (Sub)consciousness

Psychological Models

When digital media authors represent consciousness in virtual characters, we often turn to psychological models as guides.[69] This is not surprising, since, though it may not be our intention to recreate ourselves entirely, if our characters are to resemble us at least partially, and if we are to communicate with them, it makes sense that we study our own makeup.

[69] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 69-74, 222-226.

Janet Murray describes in detail authors' strategies for modeling the inner life of virtual characters. She uses the example of Kenneth M. Colby's text-based character Parry, a paranoid stock clerk who was to be interviewed by therapists as a test case.

> Colby gave his creature a "belief system" in which fairly innocuous beliefs about bookies lead to a core of emotionally charged delusions about gangsters. He gave Parry a model of a state of mind, including monitors for anger, fear, and mistrust. He instructed Parry to construct a model of his interviewer on the basis of each question and to decide if the interviewer's intent is malevolent, benevolent or neutral. If Parry thinks a question is malevolent and his fear level is high enough, he clams up and stops talking about his delusions. He therefore has an inner state and a repertoire of behavior with which he can reflect it. Interactors can tell an "upset" Parry from a calm Parry, and the things they say can make a difference in the mood of this "patient."[70]

By providing Parry with "an inner state and a repertoire of behavior with which he can reflect it,"[71] Colby created a character who was able to *activate the belief* (as described earlier in section 5) of psychiatric interviewers, who did not guess that he was a machine, but rather classified him as a paranoid patient when compared to control patients.

[70, 71] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 224, p. 225

A Personal Model

In modeling the Sleeper in Sashay/Sleep Depraved, I considered my own habits and rituals of sleep and dreaming, as well as my formal understanding based on an undergraduate study of the neurobiology of sleep,[72] and more recent readings on the subject.

[72] Dement, W. C. 1980. *Some Must Watch While Some Must Sleep*. W. W. Norton & Co.

My dreams are extremely vivid and quite realistic, in that all my senses are engaged as they are when I'm awake. The content of my dreams is what distinguishes them from waking life. I find that, in my dreams, I tend to combine mundane, abstract and fantastic events, weaving them together into coherent (for the most part) experiences, which, once dreamt, I attempt to analyze so I can figure out what's been bugging me, either lately or for years, and do something about it.

A Theory of Dreaming

My own sense of my dreams meshes with a current psychiatric theory of dreaming, authored by the psychiatrist Ernest Hartmann. He holds that dreaming produces "more generic and less specific imagery"[73] than waking thought, and that in dreaming connections are made more broadly than they are in the awake mind. Hartmann goes on to say that the connections made are not random, but rather are "guided by the emotion of the dreamer" such that they "contextualize a dominant emotion or emotional concern."[74] The dream can then serve to "explain metaphorically the emotional state of the dreamer."[75]

[73-76] Hartmann, E. 1996. Outline for a Theory on the Nature and Functions of Dreaming. *Dreaming*. Vol. 6, No. 2. p. 9 http://fred.outreach.org/gmcc/asd/outline.htm

Hartmann also describes dreaming as a "thin boundary state,"[76] i.e. one in which perceptions, thoughts and feelings merge, and in which associative serendipitous connections among them are made more often than in a waking state. This enhanced associativity can allow for a more creative contextualization of emotion, and better problem solving during dreaming.

In making *Sashay/Sleep Depraved*, technological limitations (see section 14) prevented me from making a sophisticated Sleeper capable of metaphorical dream interpretation from her own perspective. I was only able to represent her exterior state as she reacts to the dream that is constructed for her. It was my hope, however, that, by allowing a participant to associatively construct a dream for the Sleeper, the participant, at least, would derive meaning from the dream she'd made and from her resulting engagement with the Sleeper.

This associative process would arise from providing the user with units of dream imagery, and allowing her to animate them in the space representing the Sleeper's subconsciousness. To heighten the user's associative process the imagery was to be accessible and archetypal. Her choices from among this imagery, and the way she juxtaposed them in the space, would serve as an expression of the associations she'd made among them.

Dream as Montage

The visual device I used to represent the Sleeper's dream, that of montaged animated elements, is rooted in techniques of cinema and animation.[77] Gilles Deleuze describes this method of representing dream-images in cinema as "working by clear cuts or montage-cut, making progress simply through a perpetual unhinging which 'looks like' dream, but between objects that must remain concrete."[78]

[77] I'm particularly influenced by the surrealist, comical Monty Python school of film/animation, pioneered by Terry Gilliam.

Deleuze also points out that, in the cinematic representation of dreams, the dream-image "does not...guarantee the indiscernibility of the real and imaginary... The dream-image is subject to the condition of attributing the dream to a dreamer, and the awareness of the dream (the real) to the viewer."[79] In *Sashay/Sleep Depraved* this condition is easily met, since any action on screen that is not the Sleeper herself is dream activity. The installation takes the additional step, however, of bringing the experience out of the passivity of the cinematic realm. The participant, in her own distinct space in front of the screen, is not only *aware* of the dreamer's dream, but actually *constructs* it.

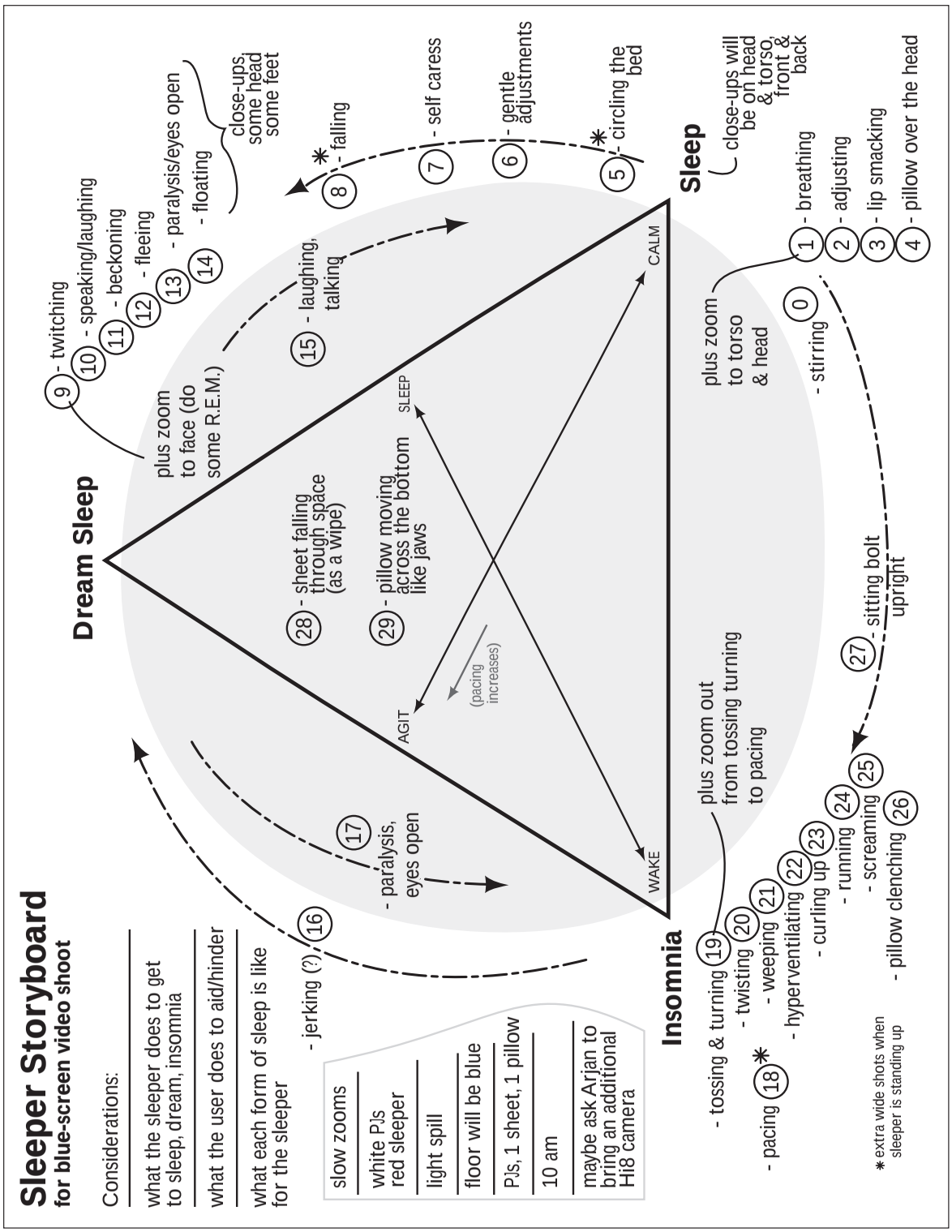
[78, 79] Deleuze, G. 1989. *Cinema 2: the Time Image.* London, UK. The Athlone Press. p. 58

12 Storyboard, Shoot, Edit, Script, Rank

Storyboard

The Sleeper began her life in February of 1997 as a sketched diagram, shown on page 37, which served as a storyboard for the upcoming video shoot. In drawing up this storyboard I considered my own sleep habits. I sketched out the extremes of each of three states: Dream Sleep, Non-Dream Sleep and Insomnia, and the transitions among these states. I came up with a total of twenty seven states to be videotaped, indicating what physical traits would characterize each one when I acted them all out.

This diagram was generated directly from a notebook sketch.

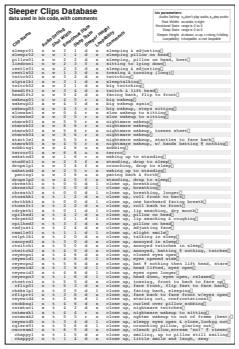


Shoot

The shoot (onto beta videotape) took place in a blue-screen studio on the MIT campus run by Larry Gallagher and crew. Arjan Schütte provided stage directions and Stefan Agamanolis gave advice as I acted out the storyboarded Sleeper states. We worked through the storyboard once, for wide shots, then again for close-ups, adding in improvised material where needed. Before wrapping up we took a couple of shots that could potentially serve as transitions during playout. Dream object imagery was acquired later in a separate series of still photography shoots conducted by Samuel Spitzer.

Edit

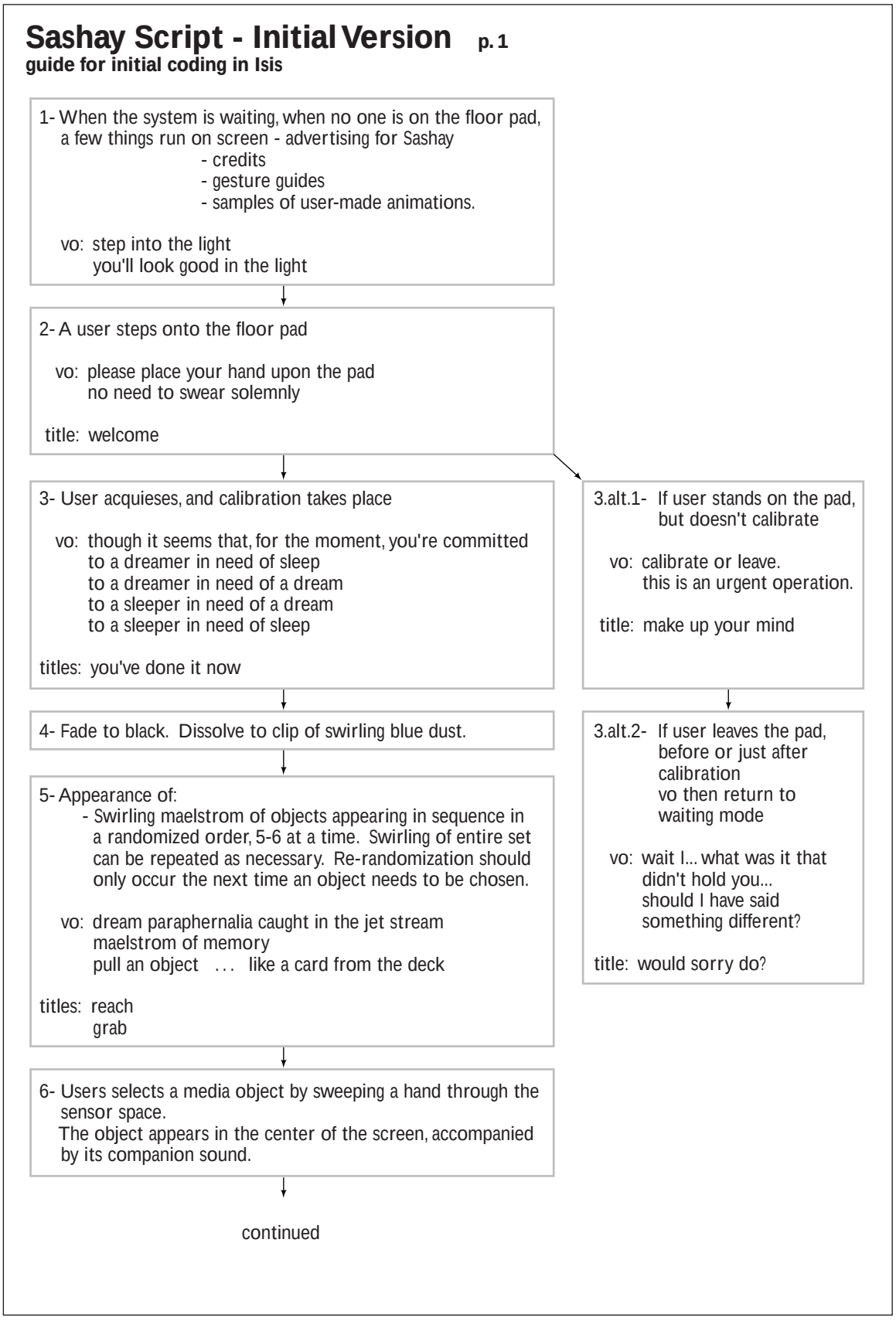
Editing and digitizing video clips of the Sleeper was quite straightforward. During the shoot we'd acquired clearly defined takes, which were easy to separate out into sixty-six discreet clips. During this process I made notes about the state of the Sleeper in each clip. Clip names and notes are shown in the chart on page 45. Once digitized, the clips' blue backgrounds were keyed out and replaced with black, though they could have been replaced with other still or moving imagery.


Sleeper Clips Database
data used in isis code, with comments
Full sized chart on p. 45

The composer, Sophia Serghi, provided three pieces of music to represent three overall states of the Sleeper—serenity, irritation, and nightmare. The three songs added up to seven minutes of music, which I parsed by hand and ear into forty-eight discreet clips, each averaging nine seconds in length. My method of subdividing the music is based on my music composition and engineering experience, and involved finding motifs and phrases in the music—sections with clear beginnings and endings, which, when played contiguously, would still sound fluid. The result was a large collection of recombinable sound clips which were to provide a dynamic, musical ambiance reflective of the Sleeper's state at any moment.

Script

In order for *Isis* coding to get under way, I prepared a script for the programmers which described in detail how a participant's *Sashay/Sleep Depraved* experience was to unfold. The initial script is shown on pages 39-41.


Sashay Script - Initial Version p. 1
guide for initial coding in Isis
1- When the system is waiting, when no one is on the floor pad,
a few things run on screen - advertising for Sashay
- credits
- gesture guides
- samples of user-made animations.
vo: step into the light
you'll look good in the light
2- A user steps onto the floor pad
vo: please place your hand upon the pad
no need to swear solemnly
title: welcome
3- User acquieses, and calibration takes place
vo: though it seems that, for the moment, you're committed
to a dreamer in need of sleep
to a dreamer in need of a dream
to a sleeper in need of a dream
to a sleeper in need of sleep
titles: you've done it now
3.alt.1- If user stands on the pad,
but doesn't calibrate
vo: calibrate or leave.
this is an urgent operation.
title: make up your mind
4- Fade to black. Dissolve to clip of swirling blue dust.
3.alt.2- If user leaves the pad,
before or just after
calibration
vo then return to
waiting mode
vo: wait I... what was it that
didn't hold you...
should I have said
something different?
title: would sorry do?
5- Appearance of:
- Swirling maelstrom of objects appearing in sequence in
a randomized order, 5-6 at a time. Swirling of entire set
can be repeated as necessary. Re-randomization should
only occur the next time an object needs to be chosen.
vo: dream paraphernalia caught in the jet stream
maelstrom of memory
pull an object ... like a card from the deck
titles: reach
grab
6- Users selects a media object by sweeping a hand through the
sensor space.
The object appears in the center of the screen, accompanied
by its companion sound.
continued

Sashay Script - Initial Version p. 2

guide for initial coding in Isis

7- Text at the screen's top says: MOVE
Hostess whispers encouragement and hints.

vo: make this object feel what the dream lacks
a gesture sets it spinning across the space
it might feel like this
or perhaps this
maybe it feels like this

it's a more formal dreamscape than your own,

it reminds you of your personal culture,
but is oddly impervious to the nuances of your body language

please acclimate yourself to its quirky jargon
it's worth it. I know.
here's how some things feel
.
. [samples of gestures, digitized video]
.
where were we
yes, set your thought to reeling with a gesture

8- User makes a gesture. System perceives and interprets the gesture and chooses an animation template. Sytem plays out template with chosen object in it and accompanying sound (this object/template/sound event is a "sprite").
When playout is done, object reappears in center of screen.

vo: you've made something happen here
does this occurence meet with your approval?
will you keep it?
or scrap it?
(up the middle for YES)
(down the middle for NO)
(dead center for HELP)

8.alt. - If the user doesn't APPROVE then don't save the sprite return to step 5 and start over on a new sprite.

9- User sets a loop or not.

vo: loop or singularity
should this event cycle till the dreams death?
or play out once and be done with itself?
these *are* yes or no questions
(up the middle for YES)
(down the middle for NO)
(dead center for HELP)

10- User chooses YES or NO by gesturing at either.
Depending on their choice, that sprite, when played back, will be looped or not.

continued

Sashay Script - Initial Version p. 3

guide for initial coding in Isis

11- The screen clears, then the whole animation plays back, showing all sprites that have been created at this point (also, a sound score, chosen by the system from an available group, is played back as accompaniment).

Notes:
- Multiple non-looped sprites should be played out semi-simultaneously, as follows: They should be played out in the order in which they were created, with a 3-second delay starting time for each succesive sprite. I.e., each sprite starts 3 seconds after the previous one started.

- Looped sprites play for the whole time, and stop when the last non-looped sprite stops.

- No more than 5 things should play at once. If the user has made more than 5 sprites, the first 6 should comprise one "phrase", then the next 5, etc.

↓

12- Continuing building the animation

vo: play it again?
shall we continue our construction?
so you're quite done dreamweaving?

↓

13- If the user chooses AGAIN, play the entire animation again.
If the user chooses CONTINUE, save the state of the animation, and go to step 5 to work on a new sprite.
If the user chooses DONE, show the entire dream, and the sleeper and the score. Grand finale.

↓

14- If at any time the user chooses HELP, some very simple help info plays out on screen.

When the help playout is over, the screen asks OK?
- If the user says YES, then animation-making continues.
- If the user says NO, additional help info gets played, after which animation-making continues.

↓

15- If at any time the user chooses QUIT (by throwing down the pillow) the Hostess thanks them and plays their animation as a grand finale. Finally, it fades to black, rolls credits, and returns to waiting mode.

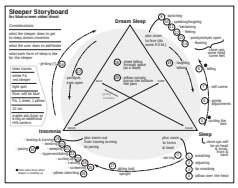
vo: thank you for your associations
any resemblance to actual events is purely coincedental
any resemblance to actual dreams may not be coincedental

end

The essence of the experience was to be that the participant would use gestures to set dream imagery into motion. Each moving dream object would become one strata of a multi-layered animation. Once the user was done constructing this animated dream, she would observe the Sleeper reacting to it as it took place in the space above and around her, representing her subconscious mind. A voiceover would guide the user through the entire process, and a musical score would accompany the Sleeper and her dream, augmenting the emotional state depicted.

Rank

Once the script was established, a set of rules needed to be drawn up that would govern the playout of Sleeper and music clips. This playout was to be determined by the particular combination of dream objects and motion templates that the participant had invoked. I thought about the Sleeper states, as represented in the original storyboard (p. 37), and came up with two indices (represented as intersecting axes in that diagram) which crudely described two traits of the Sleeper, and according to which each clip could be ranked.



Full sized sketch on p. 37

The two indices are: Sleep State (sleep to wakefulness), and Emotional State (calmness to agitation). Both range from 0 to 6 in increments of 1. So, for example, a 'pensive' clip is played when the Sleeper is wide awake (Sleep State = 6) but calm (Emotional State = 0), where as a 'nightmare' clip is played when she's asleep (Sleep State = 0) but highly agitated (Emotional State = 6).

My next task was to develop a way for the participant's choice of dream objects and motion templates to influence these indices. I decided to rank the objects and templates with two variables, named sleep-wake and calm-agit, corresponding to the Sleep State and Emotional State indices, respectively. When a clip or object was called, its two values would be added to two running tallies continuously reflecting the Sleeper's sleepiness and calmness, respectively. The two variables both range from -3 to +3 in increments of 1. So, for example the dream object 'milk' tends to soothe the Sleeper (sleep-wake = -3, calm-agit = -1), whereas a 'stress' motion template will make her wakeful and pensive (sleep-wake = 2, calm-agit = 1).

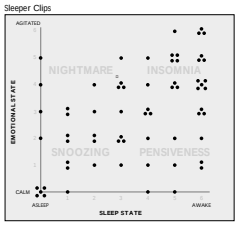
I've represented the *Sleep Depraved* content data in two ways. First, on page 44, two scatter plots show how the Sleeper clips are distributed according to the two Sleeper state indices, and how dream objects and motion templates are ranked with the two corresponding variables that affect those indices.

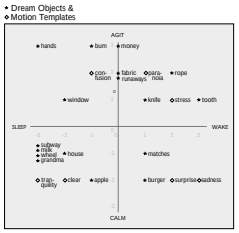
Also, on page 45, is a chart of each Sleeper clip's data, as it is used in the coded procedure that searches for the next most appropriate clip to play out. In addition to showing Sleep State and Emotional State indices, the chart shows two other variables used to preserve cinematic continuity by avoiding jump cuts during clip selection. These are shot width (the system tries to alternate between tight and wide shots) and Sleeper height (if the Sleeper is lying down, the system tries not to cut to her standing up, etc). Shot width is given slightly greater priority by the system than Sleeper height during clip choice. Also shown on the chart are two on-off variables, set by hand and used by the system during playout: audio setting and loopability. In addition I've included my original comments, jotted down as I digitized the material.

The editing rules and annotation methods I developed for *Sashay/Sleep Depraved* are derived from my own moviemaking experience, and from the Interactive Cinema group's long tradition of research and development of automated editing systems.[80-83]

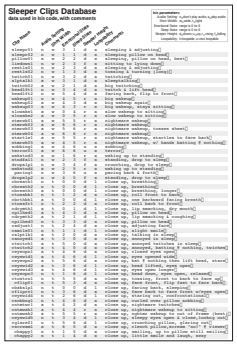
The process of ranking and annotating the Sleeper content was extremely important for the installation to respond well. It was a highly subjective process through which I attempted to imbue the Sleeper with a quick responsiveness, a dynamic emotional range, and a cinematic coherence based on an established cinematic language of inter-shot cutting.

Stefan Sharff notes that "Cinema,...alongside language, [is] the only other form of communication which exists on a syntactic continuum: a sequence of signs that 'make sense' when arranged grammatically and convey meaning on both a literal and emotional level."[84] It is this method of syntactic construction—the language of authors, camerapeople and editors, that digital media makers attempt to program into automated editing systems with varying degrees of success.





Full sized plots on p. 44



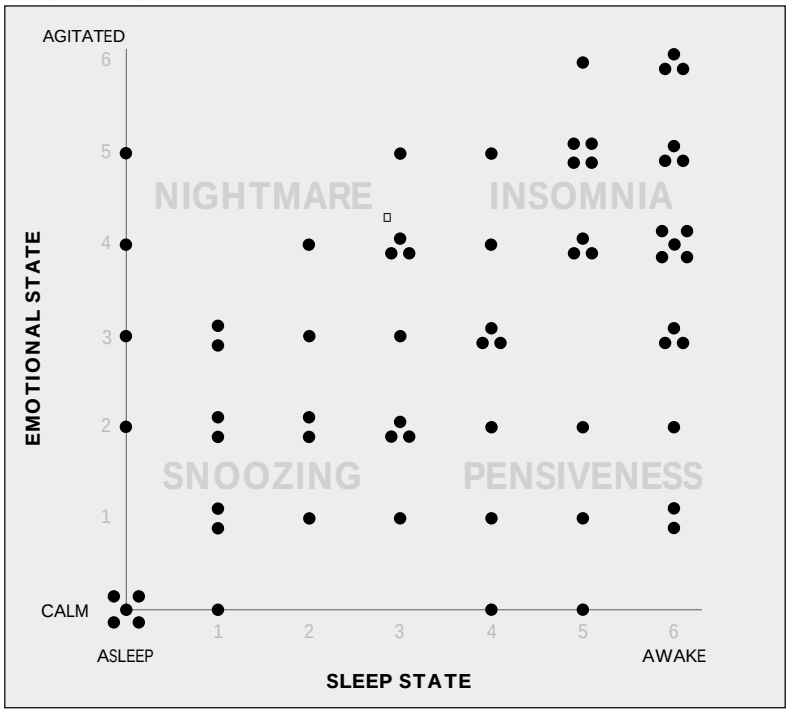
Full sized chart on p. 45

[80] Davenport, G. 1987. New Orleans in Transition, 1983-1987: The Interactive Delivery of a Cinematic Case Study. *The International Congress for Design and Planning Theory, Education Group Conference Proceedings.* May.

[81] Davenport, G., Brøndmo, H. 1989. Creating and Viewing the Elastic Charles-Hypermedia Journal. *Hypertext: State of the ART.* July, chapter 5, pp. 43-51.

[82] Evans, R. G. 1994. LogBoy Meets FilterGirl: A Toolkit for Multivariant Movies. Cambridge, MA. MIT Master's Thesis.

Sleeper Clips

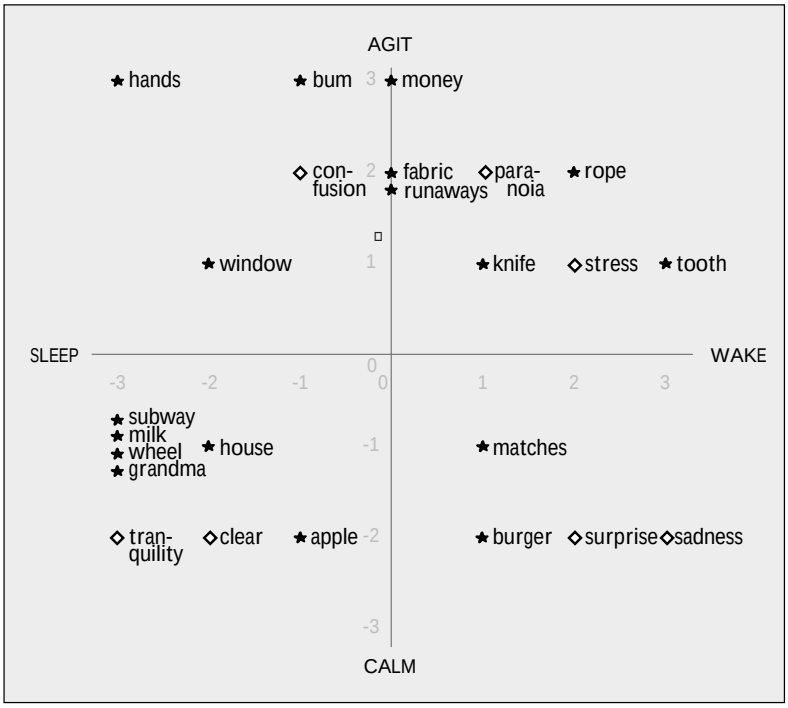


The first plot shows the distribution of Sleeper clips among her possible states. Each clip is indexed with two values. Sleep State, on the horizontal axis, indicates her depth of sleep, or extent of wakefulness. Emotional State, on the vertical axis, shows her state of calmness or agitatedness.

When the installation starts up or if the user clears all dream objects, the Sleeper is in a neutral state, i.e. fully calm and fully asleep—0,0 on the axes shown. The five fully calm and asleep clips clustered at the origin were acquired to avoid repetition when the Sleeper remains in a neutral state for some time.

The plot illustrates how the Sleeper clips are quite well distributed among the many possible states of the Sleeper (though with a tendency toward insomnia). This is the intentional result of shooting and editing in such a way as to represent a broad range of Sleeper behavior.

★ Dream Objects &
◇ Motion Templates



The second plot shows the ranking of dream objects and motion templates according to two variables, sleep-wake and calm-agit, which effect the Sleeper's Sleep State and Emotional State (on the upper plot) respectively.

Here's an example of how these items effect the Sleeper. Consider the Sleeper in a fully asleep and calm state, at 0,0 on the plot above. If a participant uses the "confusion" motion template (-1, 2) to set the "money" media object (0,3) into motion (as an animated dream layer), a total of -1 and 5 points get added to the Sleeper State and Emotional State indices respectively. The Sleeper's state becomes -1,5. The most appropriate clip, at 0,5 on the plot above, will be played out if it meets other playout conditions. If not the nearest available clip is chosen.

Dream objects and motion templates ranked at 0,0 would have no effect on the Sleeper. This explains the second plots distribution of these objects in a circle, avoiding the plot's origin. Each object is ranked relatively strongly so that it can "pull" the Sleeper's state in a specific direction.

Sleeper Clips Database

data used in Isis code, with comments

Isis parameters:

Audio Setting: n=don't play audio, a=play audio
Shot-Width: w=wide, t=tight
Emotional State: range is 0 to 6
Sleep State: range is 0 to 6
Sleeper Height: d=down, u=up, r=rising, f=falling
Loopability: l=loopable, x=not loopable

Clip Name	Audio Setting	Shot Width	Emotional State	Sleep State	Sleeper Height	Loopability	Comments
sleepr01	n	w	3	1	d	x	sleeping & adjusting
sleepr02	n	w	1	1	d	x	sleeping pillow on head
pillow01	a	w	2	2	d	x	sleeping, pillow on head, best
liedown1	n	w	2	3	f	x	sitting to lying down
restls01	n	w	2	3	d	x	sleeping & adjusting
restls02	n	w	1	3	d	x	tossing & turning (long)
twitch01	n	w	3	2	d	x	twitching
slptalk1	a	w	3	1	d	x	sleeptalking
twitch02	a	w	2	1	d	x	big twitching
headlft1	n	w	3	4	d	x	twitch & lift head
headlft2	n	w	5	4	d	x	facing back, flip to front
wakeup01	n	w	4	5	r	x	big wakeup
wakeup02	a	w	4	3	d	x	big wakeup again
wakeup03	a	w	4	3	r	x	big wakeup, stays sitting
slowake1	a	w	0	4	r	x	slow wakeup to sitting
slowake2	a	w	0	5	r	x	slow wakeup to sitting
ntmrwk01	a	w	5	5	r	x	nightmare wakeup
ntmrwk02	a	w	6	6	r	x	nightmare wakeup
ntmrwk03	a	w	5	6	r	x	nightmare wakeup, tosses sheet
ntmrwk04	a	w	6	6	r	x	nightmare wakeup
startle1	a	w	5	5	r	x	nightmare wakeup, startles to face back
ntmrwk05	a	w	4	5	r	x	nightmare wakeup, w/ hands batting @ nothing
sobbing1	a	w	4	6	u	x	sobbing
terror01	a	w	6	6	u	x	terror
wakstnd3	a	w	1	6	r	x	waking up to standing
stndfal1	n	w	2	3	f	x	standing, drop to sleep
dropslp1	n	w	3	4	f	x	crouching, drop to sleep
wakstnd4	a	w	2	5	r	x	waking up to standing
pacing1	n	w	3	6	u	x	pacing back & forth
dropslp2	n	w	4	5	f	x	standing, drop to sleep
cbreath1	n	t	0	0	d	l	close up, breathing
cbreath2	n	t	0	0	d	l	close up, breathing
cbreath3	a	t	0	0	d	l	close up, breathing, longer
ctossbk1	n	t	1	2	d	x	close up, roll front to back
cbrthbk1	a	t	0	0	d	l	close up, one backward facing breath
ctossfr1	n	t	2	2	d	x	close up, roll back to front
cdrymth1	a	t	0	1	d	l	close up, lip smacking, dry mouth
cpilhed1	a	t	4	3	d	x	close up, pillow on head
cdrymth2	a	t	2	1	d	l	close up, lip smacking & coughing
cpilhed3	n	t	3	3	d	x	close up, pillow on head
cadjust1	n	t	2	4	d	x	close up, adjusting face
csmile01	n	t	1	1	d	l	close up, slight smile
cslptlk1	a	t	2	0	d	x	close up, talking in sleep
canoyed1	a	t	3	0	d	x	close up, annoyed in sleep
ctwitch1	a	t	5	0	d	x	close up, annoyed twitches in sleep
ctwitch2	a	t	4	0	d	x	close up, annoyed, batting @ nothing, twiches
ceyeopn1	a	t	4	6	d	x	close up, closed eyes open
ceyewid1	a	t	4	6	d	l	close up, eyes opened wide
ceyeopn2	a	t	5	6	d	x	close up, bat @ nothing then lift head, stare
ceyewid2	a	t	3	6	d	l	close up, head lifted, eyes open
ceyewid3	a	t	4	6	d	l	close up, eyes open longer
ceyeopn3	n	t	1	6	d	l	close up, head down, eyes open, relaxed
ctostrn1	n	t	5	5	d	x	close up, tossing, front to back to face up
cflip01	n	t	5	3	d	x	close up, face front, flip fast to face back
cbakslp1	n	t	0	0	d	l	close up, facing back, sleeping
cfliprv1	n	t	3	6	d	x	close up, face back to face front w/eyes open
ceyewid4	n	t	2	6	d	l	close up, staring out, confrontational
csobbng1	n	t	4	6	d	x	close up, curled over pillow sobbing
cntmtwc1	a	t	4	2	d	x	close up, nightmare twitches
cntmwak1	a	t	4	4	r	x	close up, nightmare wakeup to sitting
cntmwak2	a	t	5	5	r	x	close up, nghtmr wakeup to out of frame (best)
ceyewid5	n	t	3	4	d	l	close up, sleepy eyes open & close,lookng out
cglare01	n	t	5	6	d	l	close up, crunching pillow, glaring out
cscream1	a	t	6	5	d	x	close up, clench pillow,scream "no!" @ viewer
chappy1	n	t	1	5	d	x	close up, smiling, up to pillow still smiling
chappy2	n	t	1	4	d	x	close up, little smile and laugh, sexy

13 *Isis*, the Scripting Language

Modular Organization

Sashay/Sleep Depraved's software engine was written in the scripting language *Isis*, authored by Stefan Agamanolis.[85] In choosing a language, three features of *Isis* attracted me. First, it lends itself well to a modular organization of its coded procedures, which can be called as needed, running independently of one another. This meant, for example, that we could have a procedure maintaining a steady pulse of dream objects in one corner of the screen, running independently of the procedures that governed playout of the animated dream layers.

Speed

Second, *Isis* is optimized for data access, which makes it excellent at handling simultaneous input of gestural information, and playout of multiple media objects, including video, stills and audio. *Isis* proved to be faster at these tasks than other comparable scripting environments which I had evaluated in preparing my thesis proposal. *Isis*' speed is a very important feature in *Sashay*, because it minimizes the lag time between making a gesture and seeing the resultant Sleeper clip. This results in the Sleeper seeming highly responsive and dynamic from the participant's perspective, fostering her sense of agency, and helping to maintain her interest in the interaction.

Author Access

Another significant advantage to using *Isis* was that its author was on the premises. He was generous with his assistance in developing the *Sashay* engine, and benefited from seeing *Isis*' multimedia functions tested to their extremes by the installation.

Isis is Multilevel

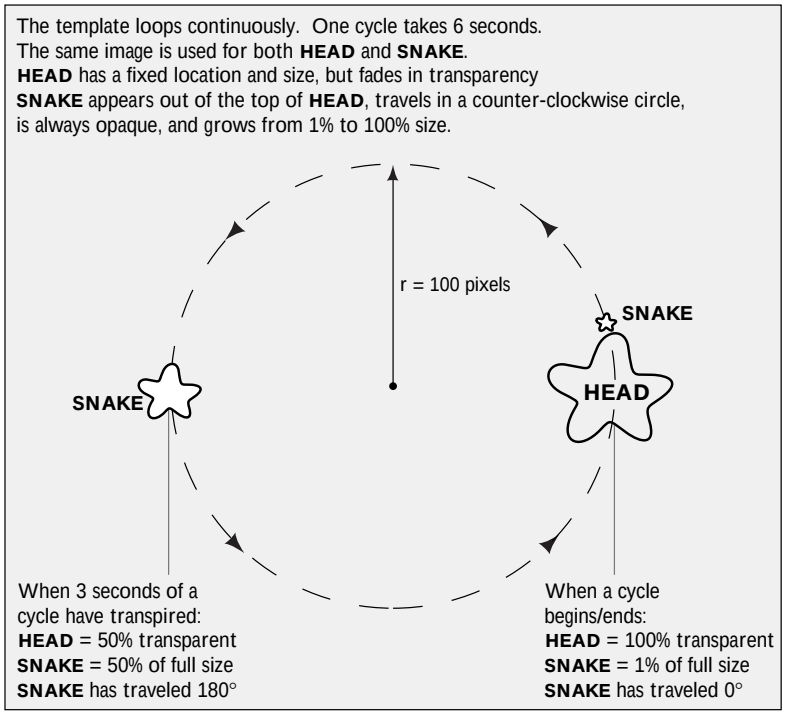
Agamanolis has designed *Isis* to be multilevel in that there are multiple levels of abstraction that can be invoked during coding, which allows for its use by programmers at multiple skill levels. This was an advantage, as some of the coding was done by programmers with no *Isis* experience and some was done by expert *Isis* hackers.

[83] Murtaugh, M. L. 1996. The Automatist Storytelling System: Putting the Editor's Knowledge in Software. Cambridge, MA. MIT Master's Thesis.

[84] Sharff, S. 1982. *The Elements of Cinema: Toward a Theory of Cinesthetic Impact*. New York, NY. Columbia University Press. p. 2

[85] Agamanolis, S. 1997. Isis: A Multi-Level Scripting Environment for Responsive Multimedia. Cambridge, MA. Internal MIT Media Lab paper. http://isis.www.media.mit.edu/projects/isis/

Tranquility Motion Template



The screen dimensions in *Sashay/Sleep Depraved* are 320 x 240 pixels, blown up to fill a 640 x 480 screen. This lower resolution was used to achieve a better video frame rate and smoother playout of motion templates.

Isis code for tranquility template:

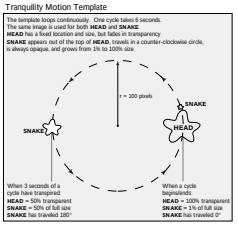
```
# "snake" template

(set snakeradius 40)
(set snakepostl (new-timeline))

(set counter 0.0)
(while (<= counter 6.3)
  (begin
    (snakepostl counter
          [(+ 160 (* (real snakeradius)
                     (cos (/ (* counter 2 pi) 6.0))))
           (+ 120 (* (real snakeradius) -1.0
                     (sin (/ (* counter 2 pi) 6.0)))) ]
          'c')
    (set counter (+ (real counter) 0.2))))
(snakepostl 'w' 6.0)

(set snakesctl (new-timeline))
(snakesctl 0.0 0.1)
(snakesctl 6.0 1.0 'l')
(snakesctl 'w' 6.0)

(set headsctl (new-timeline))
(headsctl 0.0 1.0)
(headsctl 6.0 1.0 'l')
(headsctl 'w' 6.0)

(set headvistl (new-timeline))
(headvistl 0.00 1.0)
(headvistl 6.0 0.3 'l')
(headvistl 'w' 6.0)

(set headpostl (proc (t) [(+ 160 snakeradius) 120]))

(set snake-anim
  (proc ()
    [ [ snakepostl snakesctl opaque stillframe ]
      [ headpostl headsctl headvistl stillframe ] ]))
```

Initial *Sashay* Script

Sashay's first *Isis* engine was based on the initial script shown on pages 39-41. In it a collection of procedures were created to handle such tasks as: polling the sensors for calibration and sensor data, playing out Sleeper clips, playing out voiceover and music score files, displaying dream objects, interpreting gestures, and playing out motion templates.

Iterative Script Refinement

During the development of *Sashay/Sleep Depraved* I worked closely with the programmers in an iterative production process. I first gave them scripted, illustrated instructions for implementing procedures. Once they had coded these, we evaluated them together. I then rewrote the script as needed, and returned it to the programmers along with sketches, to guide them in modifying the code. The diagram on page 47 shows an example of a sketch and directions I drew up for the 'tranquility' motion template (nicknamed 'snake' because I envisioned it as a serpent eating its tail), and the *Isis* code with which the template was finally implemented.



Full sized diagram on p. 47

In making the installation we attempted to conduct the kind of research that P. J. Rankin characterizes as focusing "on the evolution of ideas through rapid prototyping."[86] Rankin points out that in such research "efficiency should...be measured by the rate of discard of inferior designs."[87] In retrospect I can't truthfully say that our process was extremely rapid (people were often pulled in other directions by other projects), but communication among the various makers of *Sashay* was consistently very good, and progress continued steadily over the course of eight months, with high bursts of productivity coming right before conferences, consortia, and poster sessions.

[86, 87] Rankin, P.J. 1995. Research into Content Generation - Interactive Drama. *IEEE Colloquium on Interactive Television*. October 2. p. 2, and again p. 2

14 Sensing Technology & Gestural Language

Sensing Technology

Three things were foremost in my mind when deciding on gestural input for the installation. First, I didn't want the user to be encumbered by any sort of gear, worn or held, so the sensing had to be done passively. Second, I wanted the lighting in the space to be quite dark, to set a tone of intimacy. This precluded the use of

cameras for visual gesture detection. Third I wanted the system to be capable of a translation of affect between the user's movement, and the Sleeper's dream animations occurring on screen.

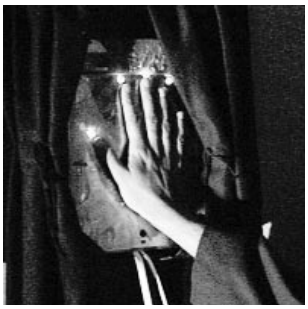
I decided to use a set of electromagnetic field sensors, developed by Joe Paradiso and Josh Smith at the Media Lab.[88] These sensors detect motion by passing an extremely low voltage from a copper mesh floor pad through the user's body, in order to detect her body's proximity to a set of copper sensing electrodes arranged in front of the projection screen. Since differently soled shoes provide varying amounts of insulation, the user must first calibrate by standing on the floor pad and placing her hand on a panel which sends information about her conductivity to the sensor unit. Once calibration is complete, the user can gesture in the space among the electrodes. The calibration panel and one of the sensors are shown here. These are dubbed 'fish' sensors, because they work in the same way as a sense organ in a certain fish.[88]

A sketch of the arrangement of screen, speaker, sensors, calibration panel, and participant is shown on page 50.

The entire sensor unit was originally designed in 1996 for use in the *Gesture Wall*, an installation that was part of the Media Lab produced *Brain Opera*,[89] a performance and interaction event. In the *Gesture Wall*, on whose physical layout *Sashay* was based, a user was able to use hand gestures to trigger musical events. The Gesture wall accomplished this by dividing the space among the sensors into a grid of hot spots. When a particular spot was 'touched', a certain musical sample was played. The music samples tended to be long, and when played they overlapped, which resulted in a fluid, evolving soundscape.

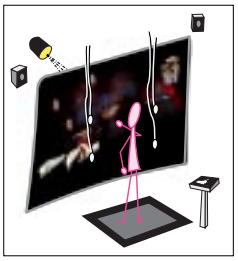
It was my hope that, by using the same sensor arrangement in *Sashay/Sleep Depraved*, I'd be able to capture the affective qualities of the participant's gesture—what Scott McCloud would call their "expressive potential"[90]—and translate these into visually represented emotional qualities on screen. This would provide a mode of communication from participant to Sleeper, and would also enhance the participant's kinesthetic involvement with the Sleeper. We were now presented with the difficult task of developing a form of gesture recognition, since it would not suffice to simply trigger animated actions by touching certain spots in the space.

[88] Paradiso, J.A., Gershenfeld, N. 1996. "Musical Applications of Electric Field Sensing." *Computer Music Journal.*



Calibration panel.

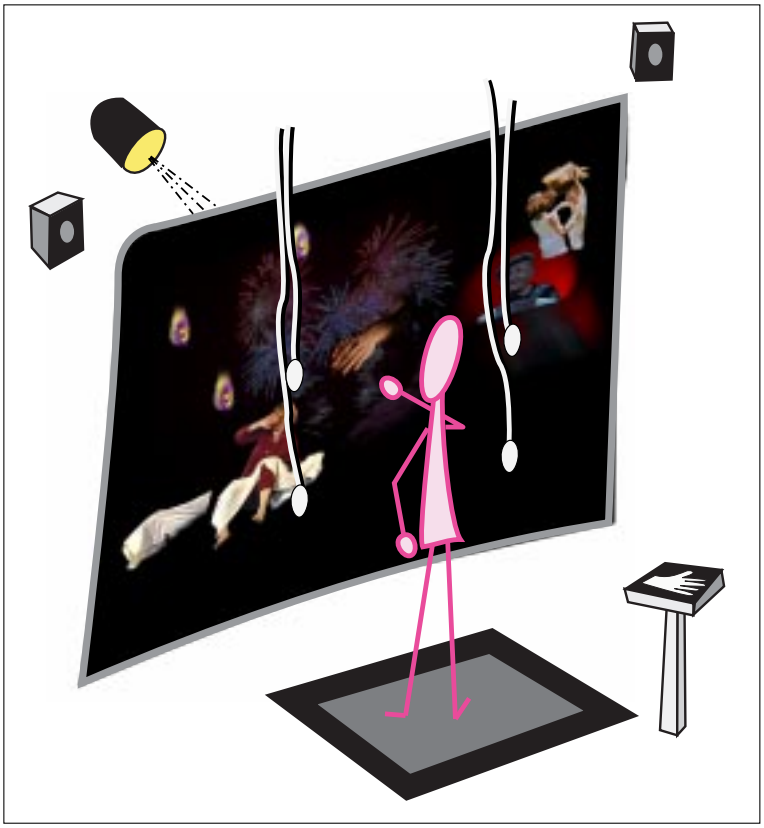
One of the four fish sensor electrodes. Each was comprised of a 3" copper disc connected to a 'fish' circuit board.



Full sized sketch on p. 50

[89] Machover, T., with the Hyper Instruments and Physics Research groups. 1996-97. *Brain Opera.* Interactive installation and performance. World tour.

[90] McCloud, S. 1993. *Understanding Comics: the Invisible Art.* New York, NY. HarperCollins. p. 124



The projection screen was mounted against the glass wall of our lab. Images were rear-projected onto it from inside the lab. Participants stood out in the hallway, where they first calibrated themselves to the sensor array by placing their hand on a small panel, which was at first on a pedestal, and later mounted on the wall opposite the screen. A tiny voltage passes through the user's body from the covered copper floor panel toward the dangling copper electrodes.

The hallway is about six feet wide. The sensors were suspended on four wires from a cable tray above. They hung about 1.5′ forward from the screen, in a 2′ x 2′ square, relative to one another. This square was about 2.5′ up from the floor at its bottom edge.

Speakers resting on the cable tray broadcast sounds of the Sleeper and her accompanying musical score.

A narrowly focused spotlight suspended from the ceiling shone sideways across the user's body casting dramatic shadows on her hands and torso in the otherwise darkened hallway.

Shown on the screen is a nightmare under construction by the user. Note the Sleeper's fearful reaction to it.

Gestural Language

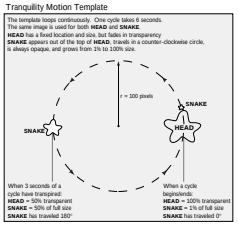
The gestural language I developed, through which a participant would communicate with the Sleeper in *Sashay/Sleep Depraved*, has two components. First a gesture vocabulary was derived. Next a set of corresponding motion templates was developed. Ultimately the gestural vocabulary served as a set of expressive symbols whose effectiveness had serious limitations.

Gesture Vocabulary

In developing a gestural language for *Sashay/Sleep Depraved*, Arjan Schütte and I conducted informal video research on twenty subjects, all MIT students, from a range of cultural backgrounds. We spent a few minutes with each subject, none of whom had any prior knowledge of our intentions, asking them to illustrate certain emotion with gesture, but no speech. From this data I derived what I considered to be fundamental affective aspects of fourteen emotive gestures. For example, the gesture for confusion was characterized by hands flung up, palms up, shrugging, head tipped to one side, body swiveling.

These fourteen gestures were to be the foundation of a rudimentary sign-language for the installation. However, complex gesture recognition with the fish sensors proved prohibitively difficult to accomplish within our production schedule. Stefan Agamanolis was, however, able to code a simple procedure that could detect upward, downward, leftward and rightward motions.

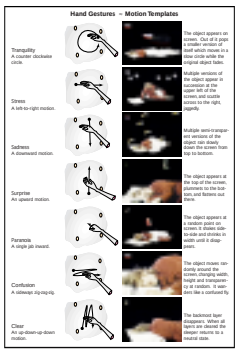
The gesture vocabulary was therefore reduced to six options, each of which was choreographed using various combinations of up/down/left/right movements. The six gestures stood for: sadness, stress, paranoia, tranquility, confusion, and surprise. Since it was not possible to turn complex user movements into on-screen motion paths for the animated dream objects, I developed a set of six motion templates, each of which corresponds to a gesture. For example, when the user makes a slow circle, representing tranquility, a dream object is set into motion along a circular path, as prescribed in the "tranquility" motion template (p. 47). A seventh gesture was designed to clear layers of dream animation when necessary. The set of seven gestures and their corresponding motion templates is shown on page 52.



Full sized diagram on p. 47

Motion Templates

In making the motion templates I considered each gesture and the emotion it was supposed to convey. I then used my intuitive sense of animation and composition to devise a pattern of motion that, when it took place on screen, would reflect the affect of the gesture made. So, for example, the motion template for sadness was to be a slow, somber rain of objects down the screen. The process of actually implementing the motion templates was less direct than I would have preferred. Generally it worked as follows: I drew up a sketch and verbal description of the template, which I then gave to one of the *Isis* programmers, who would implement it in code (see the diagram on page 47 for an example of a sketch and its resulting code). This meant that the template was developed according the programmers interpretation of my sketch, and usually led to several rounds of revision.

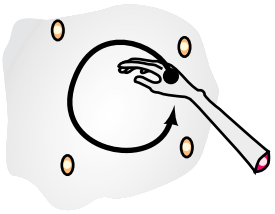


Full sized chart on p. 52

In implementing some of the motion templates myself using *Isis*, I found it difficult and non-intuitive to generate them abstractly as lines of code, without a visual interface. I had started out wanting to provide users with a more intuitive, gesture-driven animation tool, and found that I had need of such a tool as well, like the

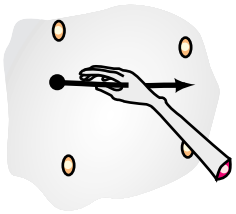
Hand Gestures ≈ Motion Templates

Tranquility
A counter clockwise circle.



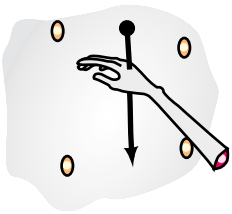
The object appears on screen. Out of it pops a smaller version of itself which moves in a slow circle while the original object fades.

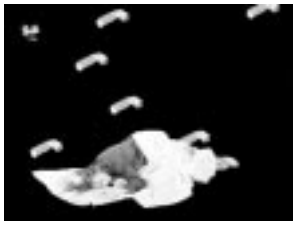
Stress
A left-to-right motion.



Multiple versions of the object appear in succession at the upper left of the screen, and scuttle across to the right, jaggedly.

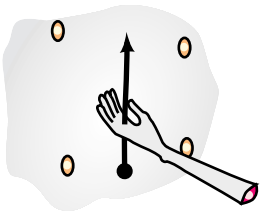
Sadness
A downward motion.





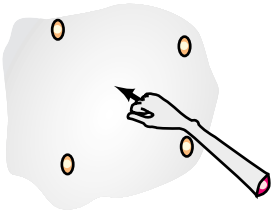
Multiple semi-transparent versions of the object rain slowly down the screen from top to bottom.

Surprise
An upward motion.



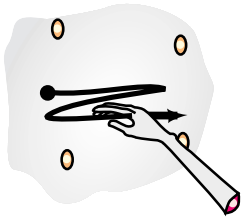
The object appears at the top of the screen, plummets to the bottom, and flattens out there.

Paranoia
A single jab inward.



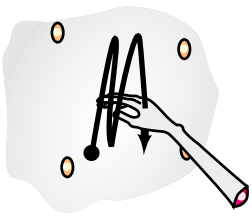
The object appears at a random point on screen. It shakes side-to-side and shrinks in width until it disappears.

Confusion
A sideways zig-zag-zig.



The object moves randomly around the screen, changing width, height and transparency at random. It wanders like a confused fly.

Clear
An up-down-up-down motion.



The backmost layer disappears. When all layers are cleared the sleeper returns to a neutral state.

blacksmith who needs a better hammer to build herself a better hammer. This isn't surprising, since my desire to build the tool in the first place was motivated in part by my own need for it, .

Gestures as Symbols

In effect, each of these seven gestures is a *symbol* meant to stand for a particular emotional quality that the participant wishes to express. These symbols, though I derived them from generalized information about gesture, lack any universality because their choreography has been so radically simplified. For example, the gesture I had originally derived for confusion, as I mentioned at the beginning of this section, was characterized by hands flung up, palms up, shrugging, head tipped to one side, body swiveling. This complex and evocative gesture was unrecognizable by the system, and so had to be reduced to a single hand making a sideways zig-zag-zig motion, which doesn't look, seem, or feel like confusion at all.

For the same reason that the gestures lack universality—i.e. oversimplified choreography—they also are not necessarily evocative of the emotional qualities they are meant to represent. What complicates matters is that a gesture can be *performed* evocatively or not, and the system will recognize it regardless. For example, a horizontal slash is meant to signify "stress." If I perform the slash quickly and nervously, it might feel something like stress, and when I see the corresponding motion template play out, with objects jittering sideways across the screen, it seems to resembles the movement I just made. If, however, I perform the horizontal movement slowly and mellowly, the system will still perceive it as "stress," and play the jittery motion template, which won't feel connected to the gesture I just made, weakening my sense of expressive agency within the installation.

Not surprisingly, a participant's best sense of expressive cause and effect is achieved if she *acts out* the emotional qualities that the gestures are meant to represent while performing them. For example, if in making the downward gesture for sadness, I perform it sorrowfully, I feel a stronger connection to the resulting slow rain of images down the screen. Roz Picard describes the way in which professional actors use this ability to communicate more powerfully with an audience: "When the body's emotional expression, e.g. an angry face and posture, agrees with the cognitive emotion,

'my character is now angry,' the combined emotional experience is enhanced, 'I feel angry.'"[91] In the context of *Sashay/Sleep Depraved*, this acting ability requires a strong familiarity with the system and an uninhibited personality, or, for a reserved or novice participant, a lot of training and prompting.

As I mentioned, I would have preferred it if no choreographed gesture set was required, and if the affective qualities of the participant's emotionally motivated gestures (angularity, speed, direction, location) could have been interpreted by the system yielding expressive animated patterns. That way the user would experience a direct, intuitive connection between the evocativeness of her gestures, and the dream animations occurring on screen.

As Picard reminds us "affect recognition and expression [are] necessary for sympathy and communication of understanding, the latter of which is considered one of man's [sic] greatest psychological needs. ...A quantum leap in communication will occur when computers become able to recognize and express affect."[92] Until that quantum leap is made, the participant-character duet is hobbled by digital systems' inability to perceive affect.

[91, 92] Picard, R. W. 1995. Affective Computing. Cambridge, MA. MIT Media Lab Technical Report No. 321. p. 9, p. 4

15 First Use & Critique

First Use

Sashay/Sleep Depraved was first run during a demo session for the Media Lab's Digital Life research consortium in March of 1997. During that and the following three weeks I observed about twenty people using the installation.

This first round of use was highly problematic because of script and sensor problems. The initial script (pp. 39-41) was linearly organized into three modes: Calibrate, Choose, Move, Grand Finale. Although there were voiceover instructions, I often had to offer additional advice to users.

Calibrate Mode
To begin using the installation, the participant, prompted by voiceover instructions, had to calibrate by standing in the center of the floor mat, and placing her hand on the calibration panel. The panel has diodes that flash satisfyingly from red to green when the

process is complete, after which the user was told to face the screen. There was a timing problem here. Often the voiceover instructing the user to calibrate was still playing though she'd already finished.

Choose Mode

Next, in the Choose mode, a swirling set of dream objects appeared on screen. The user was instructed to reach for one. Whichever object was foremost on screen when they reached out became the chosen object. This was straightforward though the sensors didn't always pick up the reaching motion, which meant the user often had to try several times, and sometimes failed to get the object she'd first chosen.

Move Mode

Next, in the Move mode, the user was instructed to make a gesture with a certain feeling to it. If the user balked (or fell asleep), after a timeout the system demonstrated the gesture set to the user, with tutorial clips of a hand moving across the center of the screen, a still image of which is shown at right. When the user did actually make emotive gestures, the system had a lot of difficulty reading them. It often took five or more attempts before the dream object was set moving with a motion template. Once the object had moved, the user could specify if it was to be looped or not. This was accomplished with a 'yes' (upward) or a 'no' (downward) hand motion. As with the other gestures, the system had trouble reading these.

A still frame excerpted from the tutorial clip for the "tranquility" gesture.

Grand Finale Mode

At the end of the Move mode the user could decide to return to the top and create another layer for the animation, or not. If they returned to the top they went through the Choose and Move modes again. If they were done making individual layers, they entered the Grand Finale mode. In this mode, all layers of the animation played out, and at last the Sleeper was shown reacting to the dream that had been constructed.

First Critique

Poor System Response

Overall, participants' experience of the initial version of *Sashay/Sleep Depraved* was characterized by frustration and a sense of futility. The main problem was that the system did not try hard enough to interpret a gesture as having any kind of meaning at all, but instead waited until it recognized something before taking action. The participant's interest was lost as soon as they made a motion and got no response from the system, which happened frequently. In fact, it was often physically tiring to use the installation, because it required repeating gestures so many times to get the system to do anything at all.

Rigid Script Structure

The first version's other major flaw was in the way the script was structured. Its linearity made the participant's experience much too rigid. She had to go through each process step-by-step, and nowhere could she back up to change or delete something she'd done. Another problem was that the script only allowed the participant to see one layer of animation at a time as she built the Sleeper's dream. It was only at the very end, in Grand Finale mode, that she got to see all the animated dream layers play out simultaneously, and witness their effect on the Sleeper.

Flat Dream Objects

There were three other problems with the first version worth mentioning here. First, the dream objects used, which were a set of fourteen digital images, had not been carefully chosen. They had been taken from the DreamWorld[93] web site mentioned at the beginning of this chapter. Although each image was interesting on its own, as dream objects they were flat, overly specific, and uselessly cryptic, and, as a group they did not form a coherent vocabulary of dream imagery for the Sleeper.

[93] Davenport, G., Agamanolis, S., Bradley, B., Sparacino, F. 1997. Encounters in DreamWorld: A Work In Progress. Cambridge, MA. Internal MIT Media Lab paper. DreamWorld web site: http://jfk.media.mit.edu/dreams/pan.html

Narrow Sleeper and Score

Another problem with the first implementation was that very few of the Sleeper and music clips were available. Hence the Sleeper and score were not very dynamic regardless of participant input.

Expert vs. Novice User

The last significant problem with the first version was the discrepancy between how I and others were able to use it. Because I was extremely familiar with the system, and had choreographed the gestures, I had a pretty high success rate with them, and was able to trigger motion templates of my choosing. When, however, I demoed the system to someone else, who then tried to use it, they found that their gestures were fairly ineffective, and they needed lots of prompting and encouragement to continue through the entire dream-construction process. The installation, sadly, was clearly not intuitive.

4 Sashay/Sleep Depraved *Final Implementation*

16 Revision

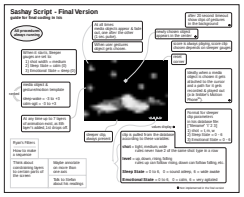
After the first round of use of *Sashay/Sleep Depraved*, I wrote the following email to *Isis* author Stefan Agamanolis and programmer Andrew Duggan.

> Hey Andrew and Stefan
>
> Based on student and sponsor feedback at last week's poster and demo sessions, and on input from Glorianna, Scott Snibbe, John Oswald and Bill Seaman, I've decided to restructure Sashay.
>
> I want the experience to be less of a linear progression of events that need to be executed in sequence, and more of an immersive play experience, where one's hand's are "in the paint" all the time, moving it around, making things happen.

We were spurred by the first round of reviews and testing to make a dramatic course change in the development of *Sashay/Sleep Depraved*, which included restructuring the script, adding new content, and improving the gesture recognition and editing methods.

Modular Organization

When I overhauled the script, I changed its linear structure to one that was non-linear and modularly organized. This would mean that, rather than having to plough through the experience step-by-step, the user would be able to access any of the available procedures at any time, to make things happen in the installation. A diagram of the new script is shown on page 61. This restructuring was influenced by my experience using Scott Snibbe's *Motion Phone*,[94] a simple playful animation tool that allows a user to intuitively drag geometric shapes around on a screen, creating multiple layers of abstract animation. Motion Phone has a highly accessible



Full sized sketch on p. 61

[94] Snibbe, S. 1997. Motion Phone. *Modernity: Critiques of Visual Culture.* Vol. 1, no. 1. Article on the web. http://www.ux1.eiu.edu/~cfsje1/snibbe.html

paint-box like interface, where all tools are available all the time, and the animation under construction is always present and always playing. This was the quality that I wanted to instill into *Sashay/Sleep Depraved*. When the participant made a gesture, I wanted her to immediately see the resulting motion template and Sleeper reaction.

Rounding out the Sleeper and Score

Another improvement was in making available the entire database of sixty-six Sleeper clips and forty-eight music clips. This vastly improved the behavioral range of the Sleeper, and the responsiveness of the ambient musical accompaniment.

Improved Gesture Recognition

The gesture recognition procedure, which had been frustratingly inconsistent, was overhauled in *Isis* by Stefan Agamanolis. The new procedure worked much better. It erred on the side of interpreting any gesture made and playing out a motion template. Even if the gesture-template match-up wasn't always correct (which it wasn't), at least the user got feedback from her gesture in the form of a new animation layer and instantaneous Sleeper reaction—a new Sleeper clip was chosen and played according to the newly updated Sleeper indices, even if it meant interrupting the current clip.

Use of Split Edits

An adjustment was also made in the way the musical score clips played out, relative to the Sleeper clips. Rather than updating the Sleeper and music clips at the same time, which would have resulted in simultaneous cuts in the video and audio, the current audio clip was allowed to play out completely before the next most appropriate audio clip was chosen and played. This resulted in split edits, in which video and audio cuts are offset from one another, resulting in a more fluid playback, and a stronger sense of cinematic continuity.

Better Dream Objects

In another modification, the Sleeper's old dream objects were replaced by a coherent new set, listed at right. Fourteen of these new objects were photographed by Sammy Spitzer to be included in the final implementation. In generating this set of dream objects

The Sleeper's dream objects:

teeth
a tooth
swirling water
a dive into water
a pursuer
the sun
mother
a huge hand juxtaposed on a small hand
a knife
a cigarette butt
2 bodies
a baby
grandma
money
fabric
rope
food
milk
a rain drop
a hamburger
whiskey
a fried egg
a snarling dog
a dead cat
a road kill
an apple
a book of matches
a toilet
a fish
a dead fish
a gun
a house
a window
a subway car (exterior)
a bum/homeless guy

Sashay Script - Final Version

guide for final coding in Isis

All procedures always running

At all times:
media objects appear & fade out, one after the other (1 sec. pulse).

When user gestures object gets chosen.

after 20 second timeout show clips of gestures in the background *

newly chosen object appears in the center *

score is always playing, score clip chosen depends on sleeper gauges

reset corner

When it starts, Sleeper gauges are set to:
1) shot width = medium
2) Sleep State = calm (0)
3) Emotional State = sleep (0)

Ideally, when a media object is chosen it gets attached to the cursor and a path for it gets recorded & played out (*a la* Snibbe's Motion Phone[94]). *

ranked

media object & gesture/motion template

sleep-wake = -3 to +3
calm-agit = -3 to +3

At any time up to 7 layers of animation exist, as 8th layer's added, 1st drops off.

values display *

Format for sleeper clip parameters in Isis database file:
["filename" 't' 2 3]
1) shot = t, m, w
2) Sleep State = 0 - 6
3) Emotional State = 0 - 6

sleeper clip, always present

clip is pulled from the database according to these variables:

shot = tight, medium, wide
rules: never have 2 of the same shot type in a row

level = up, down, rising, falling
rules: up can follow rising, down can follow falling, etc.

Sleep State = 0 to 6, 0 = sound asleep, 6 = wide awake

Emotional State = 0 to 6, 0 = calm, 6 = very agitated

Ryan's Filters

How to make a sequence

Think about constraining layers to certain parts of the screen

Maybe annotate on more than one axis

Talk to Stefan about his readings

* Not implemented in the final version

This diagram was generated directly from a notebook sketch.

for the Sleeper, I sifted through my own dream vocabulary, choosing motifs that I felt were archetypical in a Jungian sense, i.e., common to myths and fairytales, as well as "fantasies, dreams, deliria and delusions."[95] This is the kind of generic imagery that, as Hartmann describes it, allows for a metaphorical revelation of the emotional state of the dreamer.[96]

[95] Jung, C.G. 1963. *Memories, Dreams, Reflections*. New York, NY. Random House. p. 392

[96] Hartmann, E. 1996. Outline for a Theory on the Nature and Functions of Dreaming. *Dreaming*. Vol. 6, No. 2. http://fred.outreach.org/gmcc/asd/outline.htm

Cursor with a Comet Tail

It had been my hope from early on that we would be able to implement a visual cursor in Sashay/Sleep Depraved. The original idea was that the participant would make dreams for the Sleeper as if using "brushes of comet's hair."[97] The trail left by the comet would become the path along which the dream object was animated. Though we were unable to implement the motion tracking element, a cursor would be useful, to allow the user to locate her hands in the screen space, offering a sort of haptic feedback. Greg Ballrud implemented a cursor which, though not included in the final version because it was too visually obtrusive, tracked user movements extremely well.

[97] from Rudyard Kipling's poem "When Earth's Last Picture is Painted." From the last turn of the century. Brought to my attention by Glorianna Davenport in September, 1996.

17 The Final Version

The final version of *Sashay/Sleep Depraved* was presented at a Media Lab Consortium meeting in May of 1997, and was demoed and refined throughout June and July.

The Tool

The final version, like the first version, is comprised of two components, an animation tool, and a content set. The tool, *Sashay*, used for sensing and interpreting gesture, and triggering corresponding animated video events, is comprised of the following:

- A Digital Equipment Corporation Alpha workstation
- Control code written in the *Isis* scripting language[98]
- An electromagnetic field (EMF) gesture sensing unit[99]
- An In-Focus rear projector
- A large waxed-canvas projection screen

[98] Agamanolis, S. 1997. Isis: A Multi-Level Scripting Environment for Responsive Multimedia. Cambridge, MA. Internal MIT Media Lab paper. http://isis.www.media.mit.edu/projects/isis/

[99] Paradiso, J.A., Gershenfeld, N. 1996. "Musical Applications of Electric Field Sensing." *Computer Music Journal.*

The Content

The content set, *Sleep Depraved*, is comprised of the Sleeper, dream objects, motion templates, and musical score, includes:

- The Sleeper, in the form of 66 digital video clips
- The Sleeper's dream objects, consisting of 17 digital images
- A musical score comprised of 48 recombinable units
- A set of 7 motion templates that represent emotional trajectories of dream objects
- Two indices used to track the Sleeper's condition: Sleep State, and Emotional State
- A database in which dream objects and motion templates are ranked with two variables: sleep-wake and calm-agit
- A database of rules for automated editing of Sleeper clips and music clips, to show the appropriate state of the Sleeper, preserve cinematic continuity, and provide ambience

18 Final Use & Critique

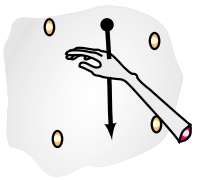
Final Use

A participant's experience of the final version of *Sashay/Sleep Depraved* is represented below with an annotated series of still frames. These frames were taken in sequence from a recording of my use of the installation, which can be seen on the videotape that accompanies this thesis.

Sashay/Sleep Depraved demo video. Produced by Freedom Baird. Runtime: 7.5 minutes. Contact the Interactive Cinema Group, MIT Media Lab, Cambridge, MA.

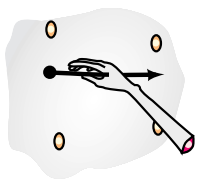
After calibrating, the user faces the Sleeper who is in a neutral state. No dream animations are present. Dream objects pulse on an off in one second intervals in the object well in the upper left-hand corner of the screen.

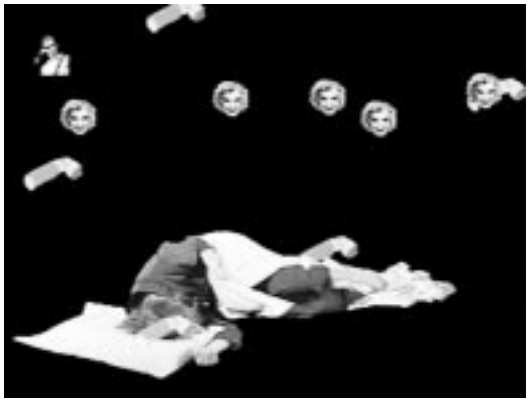
Sadness



The user makes a gesture for *sadness* at the moment the cigarette butt is showing in the object well. Cigarette butts rain down in the Sleeper's dream space. She moves a little.

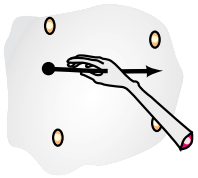
Stress





With a left-to-right slash, the user signals *stress*. Small images of grandma skitter sideways above the sleeper. She grows uncomfortable, pulling the sheet around her.

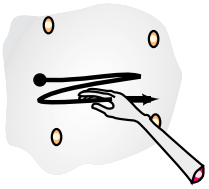
Stress



Another *stress* motion from the user sends James skittering after grandma. The user has now saddened and stressed the Sleeper enough to wake her up. She stares morosely out at the user.

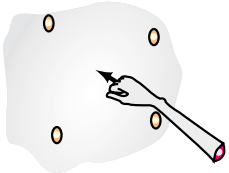
The user waits to see what the Sleeper will do next. The Sleeper, irritated by her insomnia, rubs her face in tired frustration.

Confusion



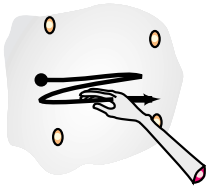
The user decides to make things worse for the Sleeper by making a *confusion* gesture. An image of two women fleeing buzzes around the space. The sleeper, still awake, reacts fearfully, clutching her pillow and curling into a fetal position.

Paranoia



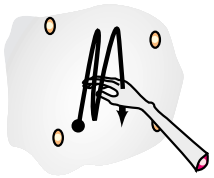
The user heightens the tension with a punch toward the screen—signifying *paranoia*. A corona of fireworks appears, shakes and disappears, and does this over and over. The Sleeper, futilely trying to deflect the worsening nightmare with her outstretched arms, screams "NO!"

Confusion



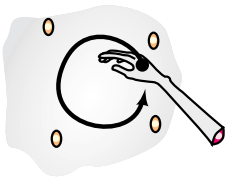
Another gesture of *confusion* from the user sends a cartoon image of a man clutching a child buzzing around the space. The Sleeper tosses, frightened.

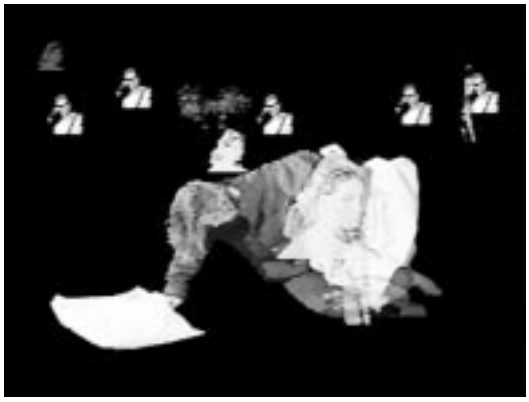
Clear



The user lets up a bit, using the signal for *clear*. The back-most layers of cigarette butts and grandma disappear. The Sleeper is still upset, but not flailing. She sits anxiously clutching the sheet.

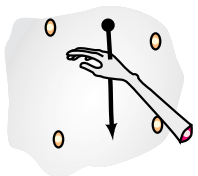
Tranquility





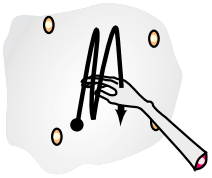
The user now makes the sign for *tranquility*, setting an ancient matronly figure into a soothing circular motion. The Sleeper moves from sitting to lying down, flinging the sheet across herself, impatient to sleep.

Sadness



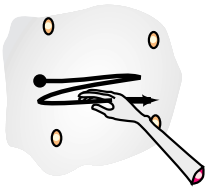
Another gesture of *sadness* from the user sends little cyber-centaurs raining down in the space. The Sleeper stares out grimly.

Clear



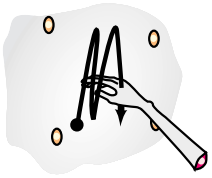
The user *clears* more layers, leaving only four objects in the space. The Sleeper, though quieting down, still fidgets restlessly.

Confusion



Another gesture of *confusion* keeps the Sleeper tossing and turning, by setting a surly James buzzing around the space.

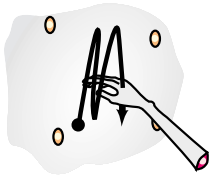
Clear



The user *clears* another layer. The Sleeper flings herself down in an attempt to return to sleep.

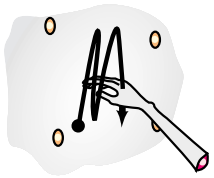
As the user waits, the Sleeper appears to actually sleep unquietly for a few moments.

Clear



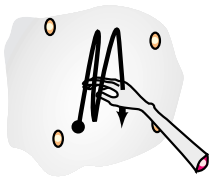
Another *clearing* motion from the user returns the Sleeper to an even calmer state.

Clear



More *clearing* of layers and she's calmer still.

Clear



Finally, by *clearing* all remaining dream layers, the user has returned the Sleeper to a relaxed state of uninterrupted slumber.

And on she sleeps.

Final Critique

During the three months that the revised version was running, I watched more than twenty five people using *Sashay/Sleep Depraved*. My overall observation is that, given some advice and encouragement, people generally enjoy using the piece. They adopt a range of attitudes towards the Sleeper: mischievous, maternal, or simply curious. They observe what's happening as they agitate her by building a scary dream, yet are often surprised when she actually flings her arms toward them, crying out in distress. Many people, particularly women, feel guilty when this happens, and quickly try to calm the Sleeper down.

A final critique of the installation is offered here in four sections: 1 - Roles of Participant and Character, 2 - What *Didn't* Work, 3 - Optimization, and 4 - What *Did* Work.

Roles of Participant and Character

The participant's role when using *Sashay/Sleep Depraved* is an unusual and unfamiliar one. The installation is located in a well used public hallway with moderately bright lighting. In this non-private, non-intimate space the participant is asked to stop in the middle of the traffic flow area, and interact with the character on screen. Under these conditions, most people do not adopt a dramatic role and *act* opposite the Sleeper. Rather, motivated by curiosity and coaching, they tend to *play* with gesture in an exploratory mode, to see what will happen.

Most people who used the installation have some gaming experience, from arcades or home systems. I believe it is from the perspective of gaming that they first tend to position themselves *vis a vis* the Sleeper. In gaming, however, a player is generally focused on a task—fight to the death, ski down the mountain—and doesn't get emotionally involved with the flat characters they meet. In *Sashay/Sleep Depraved*, in spite of the difficulties of the installation's location and lighting, the Sleeper is complex enough that when the circumstances are right, a participant can get emotionally drawn into her situation. This usually happens when the participant has spent enough time with the installation to get good at making the gestures, and feels that the Sleeper's behavior is a direct result of her gestural intentions.

The interaction is at its best when the participant does get involved in an actorly mode, imagining herself, with sensitivity and motivation, to be the sandman, a wizard, a ghost, or mom. When this happens the duet really blooms, because the two characters, one virtual, one acted, really react to each other, and the participant's sense of responsibility and culpability is engaged.

What *Didn't* Work

Intuitiveness. The installation, in spite of revision, never became intuitive to use, and so required a handout explaining the gesture set, and some training, particularly for new users. With a few minutes of training people enjoy the installation more and spend more time with it than do those with no training. In the *Wheel of Life* installation,[100] Davenport et. al. integrated this kind of guidance into the interactive experience itself (as described earlier in section 5). In an ideal version, *Sashay/Sleep Depraved* would be completely intuitive, requiring no training whatsoever.

[100] Davenport, G., Friedlander, L. 1995. Interactive Transformational Environments: Wheel of Life. *Contextual Media: Multimedia and Interpretation*. Chapter 1, pp. 1-25. Cambridge, MA. MIT Press. p. 3

Cursor. An expressive, comet-tailed cursor (described previously in section 16), which was in development for the final implementation, but was not completed, would have improved the intuitiveness of the piece by providing the user with visual feedback, allowing her to more easily sense the effect of her gestures in the screen space.

A Tangible Interface. Though no tangible interface[101] was developed for *Sashay/Sleep Depraved*, the installation may well have benefited from one. There is an advantage to providing the participant with a magical or transformative object that helps transport her into the narrative experience. These threshold objects are discussed in more detail in section 19. In the case of *Sashay/Sleep Depraved* an object, such as fabric to touch, or a pillow to cradle or shake, could have provided a more palpable way of engaging with the Sleeper.

[101] Ishii, H. 1997. Tangible Media Group. MIT Media Lab. Cambridge, MA. http://tangible.www.media.mit.edu/groups/tangible/

The Sleeper's Subconsciousness. The installation also has a significant flaw in the way it models the Sleeper's subconsciousness. A crucial aspect of dreaming is in retrieving objects of thought and memory, then making connections among them.[102] In *Sashay/Sleep Depraved* images are retrieved, and move around past

[102] Hartmann, E. 1996. Outline for a Theory on the Nature and Functions of Dreaming. *Dreaming*. Vol. 6, No. 2. http://fred.outreach.org/gmcc/asd/outline.htm

one another, but no real connections are ever made among them from the Sleeper's perspective. While the user of *Sashay* can benefit from observing and interpreting these visual juxtapositions, it would be even better if the dream's bearing on the Sleeper could also be interpreted and expressed by the system. Imagine if, in an ideal extension of the installation, once you've created a dream for the Sleeper, she wakes up and says, "yeesh, I had the weirdest dream," and tells you about it, trying to understand it from her *own* perspective. Or, imagine she wakes up and screams: "what did you do to me!?" *really* implicating you as the source of her distress.

Recombinant Dream Construction. The participant in *Sashay/Sleep Depraved* engages in the causally linked activities of constructing a dream for the Sleeper, thereby effecting her behavior. Making the dream is a Recombinant Poetic activity[103] (as described in section 8), in which the user "paints" animations into the space, using pre-scripted templates and visual objects provided by the author. The animations that result are extremely primitive (see images at the beginning of this section), due to technological and time constraints during development. Because of their simplicity the animations are iconic, and don't represent the richness of actual dream landscapes. As a result, the dreams constructed by the user don't really serve to help her comprehend anything significant about the nature of dreaming. Rather, the dreams serve as an expressive visual medium with which she can experiment as a means of communicating with the Sleeper.

[103, 104] Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD. p. 1

Re-embodied Intelligence. Seaman posits that, "in creating new computer mediated works of art, models of poetic construction can be applied which enable the work to potentially embody 'intelligent' interactive responses to viewer involvement."[104] In the case of *Sashay/Sleep Depraved*, I would agree that the intelligence and skill of the co-authors, programmers, and composer have been *re-embodied* in the installation's media objects and scripts, and as such are made available as tools and techniques to the participant. I am, nevertheless, reluctant to say that the system's behavior, as it interacts with a participant, is *intelligent*.

Seaman notes Kurtzweil's notion of a "domain specific Turing test"[105, 106] which Kurtzweil describes this way: "A narrower concept of the Turing test is for a computer to successfully imitate a

[105] The Turing test, named in 1950 for its author, British mathematician Alan Turing, is summarized by Stephen Holtzman as follows:

"The test was to establish a dialog between a person acting as judge and, both hidden in another room, a computer and a second person. In both cases the judge received typed responses to his typed questions. ... If the judge could not differentiate between the computer and the person, the conclusion could only be that the computer behaved in an intelligent fashion and would have to be said to be acting like a thinking intelligent being."

Holtzman, S. 1994. *Digital Mantras: the Languages of Abstract and Virtual Worlds.* Cambridge, MA. MIT Press. p. 134

human within a particular domain of human intelligence."[107] I don't believe that *Sashay/Sleep Depraved*, in the dreams that it constructs, or in the behavior of its Sleeper, is exhibiting even a domain-specific intelligence that mimics human intelligence. In truth, I think that imitation of intelligence is not the point of the installation at all.

[106, 107] Kurtzweil, R. 1990. *The Age of Intelligent Machines.* Cambridge, MA. MIT Press. p. 374, as cited by: Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD. p. 4

In *Sashay/Sleep Depraved*, unlike in Seaman's and other works with sophisticated poetic engines, the emphasis is not on construction of complex dreams, but rather on *playing* with simple dream animations as a *crude language* through which to communicate with the Sleeper. As with characters we encounter in books, plays and movies, the Sleeper is a *fiction*—richly detailed in some way, impoverished in others. We are supposed to perceive and accept her as such, in order to engage with her, and enjoy our interaction.

Optimizing *Sashay/Sleep Depraved*

There are a host of ways in which *Sashay/Sleep Depraved*, or a work like it, could be improved given more time and better technology.

First of all, the piece shouldn't be in a hallway. Like in Bill Viola's *Threshold*, which I described in section 7, the encounter with the Sleeper should take place in a dark, protected room, one that evokes the sense of being in a realm of sleep, and of passing into the Sleeper's subconsciousness. It might help if the user didn't have to stand in front of the Sleeper during the interaction. Perhaps she could sit across from her on something soft and comfortable—an armchair. As I mentioned earlier in this section, a tangible interface, something that the participant holds or touches during the interaction might improve her sense of engagement with the piece.

The lighting, which was variable and often bright in the hallway, should be uniformly dark. The only light in the space should come from the projector falling onto the screen, and from one pin spotlight angled to dramatically illuminate the participant's hands as she gestures in the space. This light should avoid the participant's face for two reasons: because light shining in her eyes hinders viewing the action on screen, and also to allow her to feel safe, perhaps even anonymous, making it easier to adopt a role relative to the Sleeper.

The way the user creates animations should be overhauled. No choreographed gesture set should be required. The participant's intuitively made gestures should be recognized by the system and turned into paths for the dream objects. These paths should then be interpreted according to their affective qualities to determine their effect on the Sleeper (as described in section 14). The dream objects themselves should also be more advanced. Rather than just being still images, these objects could also contain text, sounds, and moving imagery. Each object, rather than being a flat, frozen icon, should have motion and transition *within* it, so that ultimately the dream objects act as story primitives, which, when animated in concert by the participant, add up to a narratively coherent dream for the Sleeper. In addition, full-screen scenes could be added in behind the Sleeper to illustrate the evolving context of her dream.

Finally, once constructed the dream should be subject to interpretation, not just by the participant as she views it, but also by the Sleeper. Her reaction to the dream would become part of the feedback that is the lifeblood of the participant-character duet.

What *Did* Work

Coherence of the Sleeper's Performance. As a character, the Sleeper performs quite coherently. Her motivation is apparent and her behavior is consistent. She wants to sleep restfully, and when she can't she is openly and dramatically frustrated and anxious. She has a wide range of behaviors which give her character a good deal of depth. For example she can be sullenly insomniac, pacing around quietly, or she can be sleepy and terrified, sobbing exhaustedly. All of these qualities of the Sleeper serve to "actively create"[108] the participant's belief in her situation.

The Sleeper is also a sensitive character, responding instantly to changes in her subconscious environment. Murray points out that, "what we look for in a created character is not mere surprise but revelation."[109] I believe the Sleeper succeeds on this level, in that she can "surprise the interactor by acting in a new way that is consistent with [her] known behavior, but takes it to a new level."[110]

[108-110] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. New York, NY. Simon & Schuster. p. 110, p. 243, p. 243

Sensuality of the Sleeper. Although the installation has a distinctly sensual quality, stemming from the participant's kinesthetic involvement with the Sleeper, it's not really a technologically mediated sexual experience (as *Telematic Dreaming*,[111] described in section 6, can sometimes be). The Sleeper, clad in baggy mannish pajamas and plain bedlinens, comes across as appealing, even childlike at times, rather than sultry or seductive (see images at the beginning of this section). This was an intentional portrayal of the character, as I wanted participants to feel that she was approachable, and at times to pity her, rather than feeling shy around her or attracted to her.

[111] Sermon, P. 1996. *Telematic Dreaming*. Installation. Ars Electronica Center, Linz. Interview with the artist: http://www.aec.at/feat/paul.html

Cinematic Techniques. Part of what makes the Sleeper's performance work well are the cinematic rules implemented in her code (described earlier in section 12). These rules keep her behavior fairly fluid by maintaining a degree of continuity in her physical disposition (standing up or lying down), and by alternating between tight and wide shots. Although every cut between successive Sleeper clips is a jump cut (i.e. her expression or position may change abruptly), as viewers we accept this because of the way the Sleeper is portrayed, not in a normal bedroom, but iconified on a featureless black background. We understand that what we are seeing is not documentary footage, but rather a *fragmented*, expressionist, reconstructed portrait of the Sleeper.

Toni Dove raises the notion of using "gas and mutation...as models for storytelling structure," and of alternative representations for "fluid experience—the cut versus the continuum."[112] Although I chose to use traditional cinematic methods of intershot cutting to establish continuity in the Sleeper, there are other methods of transition that will be interesting to experiment with in representing virtual character. Dissolves, such as those Dove uses in her own work, are an option. They tend to suggest mutation and time changes, as one body or landscape blurs into another. Another possibility would be to use choreographic transitions (mentioned earlier in section 9), in which a main action in one part of the screen is supplanted by peripheral actions.

[112] Dove, T. 1997. Somatic Ventriloquism: Throwing the Body, Distributing the Self. *Consciousness Reframed: Art and Consciousness in the Post-Biological Era*. Abstracts of the Proceedings of the First International Centre for Advanced Inquiry in the Interactive Arts Research Conference. Newport, Wales. University of Wales College, Newport. p. 34

Alternative Content for *Sashay*. As was our original intention in building *Sashay*, the tool component of the installation, several other content sets were developed and tested in it.

These content sets, developed by two of the undergraduate collaborators, Greg Ballrud and Samuel Spitzer, were very successful because the interactions were structured very simply to work well in the context of the hallway. In developing their characters—a mime, a flock of pigeons, an angry man, and a kissing couple, the students considered the example of Jayshree, another virtual character developed in the Interactive Cinema Group for use in the Dream World project[113] described in section 10.

[113] Davenport, G., Agamanolis, S., Bradley, B., Sparacino, F. 1997. Encounters in DreamWorld: A Work In Progress. Cambridge, MA. Internal MIT Media Lab paper. p. 2

The interaction with all five of these pieces is based simply on where the participant is located physically relative to the screen. No intermediate step of expression or communication (e.g. dream construction for the Sleeper) is required. Both Jayshree and the Mime are theater oriented. With no audience they simply wait. When someone enters the space in front of the screen they begin their routines, and if interrupted they react with comic annoyance. The pigeons and kissing couple raise anthropological questions, since they offer the participant a peripheral glimpse of something which when she gets near it is disrupted—the pigeons fly away, the couple stops kissing. The angry man illustrates a primal territoriality. As a participant approaches the stoop on which he's sitting, he becomes infuriated and shoos her away with a hail of threats and epithets.

Ultimately, it was extremely gratifying to see the installation we'd worked so hard to set up in use as a testbed for developing interactions with virtual characters.

The Me-Me Interaction. An interesting and singular participant-character interaction occurs when I myself use *Sashay/Sleep Depraved*. Because I authored the installation, and tested and demoed it more than anyone else, I actually became best at using it. Perhaps this is because, in knowing myself I also know the digital version of myself that I created. I enjoy using the piece, and am perpetually fascinated by my own portrayal of this un/real Sleeper. When I watch her I get a chance to see myself, in part at least, as others see me. I get to see myself as "other"—as having a set of mannerisms and an awkward disposition of limbs that don't look from the outside how they feel from the inside.

I believe, in interacting with the Sleeper, I'm engaged in what Sherry Turkle describes as "people doing what they have always done: trying to understand themselves and improve their lives by

using the materials they have at hand."[114] It is through digital media in particular, as Turkle points out, that I can "experiment with the constructions and reconstructions of self that characterize postmodern life."[115]

[114, 115] Turkle, S. 1995. *Life on the Screen: Identity in the Age of the Internet*. New York, NY. Simon & Schuster. p. 231, 180

Engagement with the Sleeper. Digital media are particularly suited to these kinds of fractured, highly personal refabrications of self (mentioned earlier in section 6). The Sleeper I created in *Sashay/Sleep Depraved* is fascinating, to me and to others who may or may not know me because she both is and isn't me; she both is and isn't a person asleep. Digital media have also given rise to a new art form, one that is not just observable, but is responsive to the participant's actions. The Sleeper both *senses* and *responds* to what we do, giving us a sense of agency during our interaction with her.

Participants given the opportunity to manipulate this sleeping figure by constructing an emotionally weighted dream for her feel a sense of *responsibility* for the Sleeper that, although she isn't real, makes the interaction emotionally engaging. Indeed, the fact that the Sleeper is *not* real facilitates this engagement, by ameliorating the participant's sense of guilt when experimenting with extreme and manipulative intentions toward the Sleeper—giving her nightmares then insomnia, putting her back to sleep, waking her up again.

This ability to draw a participant into emotional engagement in an un/real duet is what lies at the core of a successful virtual character. In the final chapter I've outlined several strategies for construction of such characters.

5 Conclusions

In researching, building, and finally documenting *Sashay/Sleep Depraved* in this thesis, I've striven to articulate what I've learned about authoring and producing an un/real duet between a person and a virtual character. In this final chapter I offer two approaches based on my experiences. The first is a method for establishing the kind of intimacy and agency that yield a truly engaging interaction with a character. The second is a model for the construction of such a character. Finally, the thesis concludes with an examination of our motivations and their impact in creating a virtual character.

19 A Method: Establishing Intimacy & Agency

Sally Mann, Black Eye, 1991[116]

Intimacy

One couple's *Lambada*[117] is another's walk in the park. Intimacy is a highly subjective phenomenon. Nevertheless, there are some definable qualities of intimacy that can be tapped in creating an interaction with a virtual character. As I described in the introduction, intimacy has two components, one physical, the other emotional.

[116] Mann, S. 1992. Black Eye. Photograph. *Immediate Family.* New York, NY. Aperture. Image from: http://www.ltab.se/usr/konsthallen/SMann/sally-mann.htm

[117] *Lambada,* the forbidden dance.

Physical

The physical components of intimacy listed here describe the character's physical makeup and traits, as well as her context: *proximity, shelter, darkness, whispers, eye contact, focused attention (either out or inward), tight frame, revelation of interior spaces (literally or figuratively).*

These components of physical intimacy can be established with the following techniques: choice of a physical space for the installation, set design, camera work (visual and temporal composition of frames), sound design, and, most importantly, disposition of the character being portrayed. This portrayal of character can be obtained by documentary means (some of the most intimate portraits I know of have been drawn by those closest to the subject, i.e. self or family), or created through acting or rendering, which will depend on the directing and acting skills of those involved.

[118] Mann, S. 1992. *Immediate Family.* New York, NY. Aperture.

The photographer Sally Mann's intimate portraits of her three young children as they grew up during the 1980s[118] are characterized, in various combinations, by the qualities I've described above. When Mann published them in 1992 they became extremely controversial. Some thought they were fiercely beautiful and painfully nostalgic, others thought they were sadistically detached.[119] It is the photographs' ability to confound fact with fiction and fantasy that makes them so engaging.

[119] Dieckmann, K. 1992. Review of Sally Mann's "Immediate Family." *Voice Literary Supplement.* November.

Noah with tattoos and Daisy[120]

Emotional

The emotional component of intimacy is equally subjective, yet can be derived from the following sources for investment into a virtual character: *tapping the personal (revealing inmost nature), establishing trust, telling secrets, being sensitive, respecting or violating boundaries.*

[120] Baird, F. 1994. The Baird Family Ball. Interactive animation. *New Voices, New Visions 1994 CD-ROM.* New York, NY. Voyager.

In general, emotionally intimate portraiture depends on the concept and instantiation of the character and its context. These representations can, of course, be accomplished in myriad ways. In my own artmaking, I have often tapped my memory, and my idiosyncratic family history and archives, to make intimate portraits which, though they often have a very specific and therapeutic meaning for me, have also resonated with others. One such piece is the Baird Family Ball,[121] an interactive animation I made about themes of family, masquerade, and motion (introduced earlier in section 8). In the piece, members of the family can be engaged, and their relationships explored, by clicking on various parts of images. Revealed by this exploration are: personal poems concealed in the space, intimate actions among the family members, and psychological and physical interiors.

[121] Baird, F. 1994. The Baird Family Ball. Interactive animation. *New Voices, New Visions 1994 CD-ROM*. New York, NY. Voyager.

In addition to scavenging among personal memories and artifacts, I also find it helpful to consume other highly personal opuses (Woody Allen's film's, Virginia Wolfe's novels) in their entirety if possible. It's useful to see how a single author develops their own set of character and context representations over the course of a lifetime.

Agency

Here I outline my own strategy for establishing agency during interaction with a virtual character (as opposed to other sorts of interactions). I would also like to direct your attention to both Janet Murray's and Brenda Laurel's thorough coverages of agency in interactivity, which have influenced me considerably.[122, 123]

To give the human participant agency in the un/real duet, i.e. a way to genuinely connect with a virtual character, requires the following ingredients:

- Context
- Intuitiveness
- Feedback
- Flexibility
- Engagement
- Constructivism

[122] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. Chapter 5: "Agency," pp. 126-153

[123] Laurel, B. 1993. *Computers as Theater.* USA. Addison-Wesley. Sections titled: "Interactivity and Human Action," pp 19-22. "Characteristics of First-Person Experience," pp. 116-117. "Represent Sources of Agency," p. 142

Context

Laurel says, "The experience of interactivity is a thresholdy phenomenon, and it is also highly context-dependent."[124] When a person approaches the installation, if they are to understand what the character is all about, and quickly get a sense of their role, the context in which the character exists must be clearly established right from the start.

[124] Laurel, B. 1993. *Computers as Theater.* USA. Addison-Wesley. p. 21

Context, expressed with imagery, setting, props, and sound, doesn't have to be elaborate, but should be strong. It should depict the world of the virtual character, and also provide an entrance into that world for the participant. Murray describes this as "a threshold object, with which to pass into the narrative."[125] This can be accomplished in several ways: with a literal threshold in space—a room entered, a platform mounted; through contact with a special object—a talisman, a weapon etc.; through engaging in a ritual activity— raising the hands high, shouting, etc. In the *KidsRoom*, context was quickly established with set and audio.[126] Simple, brightly colored furniture immediately established the space as a child's room, in addition to which, as soon as the kids passed through its doorway the furniture started talking to them, indicating the room's magical, transformational nature. The kids had literally and figuratively crossed into a special world inhabited by magical creatures.

[125] Janet Murray, in a conversation I had with her in the spring of 1997.

[126] Bobick, A., Intille, S., Davis, J., Baird, F., Pinhanez, C., Campbell, L., Ivanov, Y., Schütte, A., Wilson, A. 1996. The KidsRoom: A Perceptually-Based Interactive and Immersive Story Environment. Cambridge, MA. Internal MIT Media Lab paper.

While the threshold object serves the special purpose of bringing the participant *into* the narrative, context also must be maintained *throughout* the experience. As Murray reminds us, "Ideally, every object in a digital narrative, no matter how sophisticated the story, should offer the interactor [a] clear sense of agency and [a] direct connection to the immersive world."[127]

[127] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 146

Intuitiveness

Though possibly a complete stranger, the virtual character must give away something about herself from the start, so the participant has a sense of what to expect from her and how to behave toward her. This can be accomplished by using a character who has, as Laurel puts it, external traits which are "based on the artful orchestration of stereotypes."[128] In the video game *Street Fighter*,[129] for example, virtual characters come after you with fists and feet flying, so you pretty much know what you have to do to deal with them.

[128] Laurel, B. 1993. *Computers as Theater.* USA. Addison-Wesley. p. 144

[129] *Street Fighter.*™ Video game. © 1997 Nintendo of America.

An inversion of this role establishment can also work, where the participant's role is laid out from the start, so she can easily figure out her relationship to the virtual character. In the video game *Postal*,[130] for example, the human player is cast as a disgruntled postal worker, returning to the office to violently vent her frustrations in the direction of any virtual character who makes the mistake of crossing her path.

[130] *Postal.*™ Video game. © 1997 RSP, Inc.

The characters in the two games I've mentioned above are, of course, absurdly one-dimensional. As Murray points out, "Stereotypical thinking is both useful and pernicious."[131] It's important to balance stereotyping with individuation, to avoid the often boring and sometimes destructive flattening of virtual characters. This issue is addressed in detail in the concluding section, 21.

[131] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 199

Feedback

As in a dance duet, if one partner has twinkletoes, but the other is a clod, the Rumba[132] won't go well. It's important for the participant to know, at all times during the interaction, what effect her actions are having on the other character. Thus, the user's own sensitivity and alertness should be at least matched, if not bettered by the character's.

[132] The Rumba is an early 20th century ballroom dance of Afro-Cuban origins also known as the "the dance of love."

Dmitry and Katia dance the Rumba at the at University of Illinois, Champain-Urbana dance competition. 1997. http://arch.housing.wisc.edu/~tree/pics/pics.html

Feedback can come in the form of a spoken or physical reaction from the character, or a change in the character's environment. It should be quick, to give the user a sense that her actions really make things happen, and to maintain her attention. Feedback should also be non-repetitive, so the user, making the effort of interacting well, gets more than the same cheesy smile over and over again.

The more elaborate the interaction, the more difficult it becomes to maintain a quick feedback loop. When a system has to do gesture recognition, followed by playout of large digital files, latency can really detract from the experience, as participant gestures are mismatched with character response, causing her to lose her sense of consequence.

In such interactions as text-based conversation, turn taking is built into the interaction, and lag time is quite low because the objects being retrieved from memory are small. These are prime conditions for good feedback.

An excellent example of feedback from a virtual character is found in the CD-ROM game "You Don't Know Jack."[133] In this comical, fast-paced game show, the participant has to answer lots of silly trivia questions and solve strange puzzles. The host is never seen, but only heard as an affable, sarcastic hipster. He gives the player concise directions for approaching each of the game's many wacky tasks, and, because the system is always monitoring her reaction time and choices made, he comments on her sluggishness or speediness, and her bizarre taste in game show fare. Because the host only exists as a voice, and draws comments from a vast collection of sound files, his responses are immediate, and he's rarely repetitive during a game.

[133] *You Don't Know Jack.* CD-ROM game. © 1996 Berkeley Systems Inc.

Flexibility

Flexibility, an essential feature during interaction with a virtual character, is one of the hardest to implement. If a user and character are to creatively collaborate, the character and its environment must provide the user with a range of expressive options that still fall coherently within the scope of the experience. This ability is at the core of co-improvisation. If, in a blues jam, a trumpet player trills a motif that the trombone player can't or won't pick up on, the trombone player can still participate by playing with that motif, simplifying it, inverting it, or referencing it to something else.

Instilling flexibility into a virtual character is problematic because of digital systems' lack of complex reasoning and linguistic abilities (discussed up ahead in section 21). In fact, Murray reminds us that, in order to work within the constraints of these systems, "the most successful characters have been those who are self-absorbed, evasive or obsessive in familiar ways."[134] The solution then, is to develop a character narrow enough so as not to provoke too many expectations from the participant, but provide her with a depth of knowledge in a specific domain, and a specific responsiveness, so that, if the user chooses to enter that arena, the exchange between them can be dynamic.

[134] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 219

An example of one such character is a text-based three-year-old named Max, developed by a student in Janet Murray's Theory and Practice of Non-Linear and Interactive Narrative class. Max is very social and talkative, but, because he's only three, his vocabulary is acceptably limited. He's an expert on his toys, which he likes to

talk about, and he also knows a certain amount about himself. If you're willing to speak with him on his level, you can talk with Max for quite a long time, and the conversation can go in a variety of directions.

Engagement

Laurel describes engagement in a human-computer interaction as something analogous to the suspension of disbelief that we experience at the movies. "Pretending that the action is real affords us the thrill of fear; knowing that the action is pretend saves us from the pain of fear."[135] Fear need not be the only strong emotion involved of course. The key to generating a sense of engagement in the user is to create a character whose plight or situation provokes a sense of *consequence* and a strong *emotional involvement*, yet not one so strong that the participant will no longer interact because they got scared, disgusted or actually died laughing.

[135] Laurel, B. 1993. *Computers as Theater.* USA. Addison-Wesley. p. 113

An example of an engaging character is a virtual cow I bred and kept for a while on the internet.[136] I picked my cow's parents, of sound stock naturally, and when she was born I named her myself: "Angelbreath." She matured quickly, after which I'd visit her on the web, milk her, and sell the milk money to feed and wash her. After the first week of milkings I became busy and forgetful. I received email from the system where she lived.

[136] The Internet 1996 World Exposition's Cow Simulator. Now defunct. Formerly at: http://adelaide.park.org/Netherlands/pavilions/typical_dutch/cows/cowSim/

```
>From daemon Thu Sep 12 01:06:55 1996
Date: Thu, 12 Sep 1996 07:07:08 +0200 (MET DST)
From: WWW Admin <wwwadmin@amsterdam.park.org>
To: baird@media.mit.edu
Subject: Angelbreath
Status: RO

Freedom Baird

MOOooo, I need to be milked.
Please, hurry, I'm bloating!

 Angelbreath
```

Sheepishly, I went to the web site and milked her. When I wasn't visiting her, as I did less and less often, I felt a vague sense of guilt about my neglectful ownership. She kept sending me email saying she needed to be milked. She got mangy because I forgot to wash her. The guilt was getting worse, I had to do something about the situation. Finally I decided to spend all the remaining milk money on one last round of milking and veterinary care, so she'd be in decent enough shape to sell. It was only then that I realized,

with an icky feeling in my stomach, that no one would buy her. I don't even think there was any way to sell cows in that system. I wrote to the web site managers.

```
Date: 20 Sep 1996 15:42:55 -0400
To: WWW Admin <wwwadmin@amsterdam.park.org>
From: Freedom Baird <baird@media.mit.edu>
Subject: Re: Angelbreath
Cc:
Bcc:
X-Attachments:

Dear cow people,

Can I sell my cow or put it up for adoption?

- Freedom Baird
```

I got no reply. It was then, with a creepy, remorseful feeling, that I let the plaintive emails accrue over the next two weeks, until I got one final email from the system:

```
>From daemon Tue Oct  1 02:06:51 1996
Date: Tue, 1 Oct 1996 07:07:07 +0100 (MET)
From: WWW Admin <wwwadmin@amsterdam.park.org>
To: baird@media.mit.edu
Subject: Angelbreath

 Freedom Baird

MOOooo, I'm dying!
.....MOOooo, I'm history!

 Angelbreath
```

A shudder shook me slightly. I went to the web site one last time, and sure enough, Angelbreath's name was no longer among the list of living cows. So ends the strange and sad tale of the consequences of my actions towards, and my emotional engagement with a virtual cow.

Constructivism

The real joy of agency is felt in the constructive process of the person-character duet. This construction can be quite literal, as in the *pas de deux* between child and Monster at the end of the KidsRoom experience,[137] or poetic, as in the trading of lyrical secrets by singing in a huge whale's ear in the "Wheel of Life" installation.[138]

The key to a successful construction process lies in its ability to yield what Mitch Resnick describes as "personally meaningful artifacts."[139] Whatever arises out of the collaboration—a song,

[137] Bobick, A., Intille, S., Davis, J., Baird, F., Pinhanez, C., Campbell, L., Ivanov, Y., Schütte, A., Wilson, A. 1996. The KidsRoom: A Perceptually-Based Interactive and Immersive Story Environment. Cambridge, MA. Internal MIT Media Lab paper.

[138] Davenport, G., Friedlander, L. 1995. Interactive Transformational Environments: Wheel of Life. *Contextual Media: Multimedia and Interpretation*. Chapter 1, pp. 1-25. Cambridge, MA. MIT Press.

[139] Resnick, M. 1994. Learning About Life. *Artificial Life.* Vol. 1, no. 1-2

a dance, a dream, a recipe for disaster—must have some meaning, some personal resonance for the participant who helped bring it about.

Scott McCloud, in his remarkable description of the process of art-making, describes the uses of art as threefold: providing stimulus for body and mind, providing a self-preservative emotional outlet, and for exploration and discovery in the pursuit of truth.[140] The un/real duet's ability to yield these things is rooted in the makeup of the virtual character with its qualities of depth, dynamism, and sensitivity. Suggestions for modeling such a character are presented in the next section.

[140] McCloud, S. 1993. *Understanding Comics: the Invisible Art.* New York, NY. HarperCollins. Chapter 7, "The Six Steps." pp. 162-184

20 A Model: Character Construction, Deconstruction, Annotation & Reconstruction

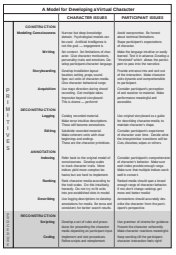
After the ball was over
Katy took out her glass eye
stood her peg leg in the corner
hung up her wig to dry

put her false teeth in the water
hung her false arm on the wall
what was left of poor Katy after the ball?
Nothing at all.[141]

[141] traditional song I learned at summer camp in Harriman State Park, NY, in the early 1980s.

Murray summarizes the components of an engaging character as being: a set of sensations, a set of motivational priorities, a set of emotions, and a set of personality traits.[142] She also describes the procedural method by which an author constructs a character. A set of *primitives*—the basic units of character—are developed, which are then organized and presented *procedurally*, i.e. according to a script and in accordance with a set of rules and conditions.[143]

[142, 143] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 240, Part III "Procedural Authorship." pp. 185-247



Full sized diagram on p. 86

On page 86, I diagrammatically summarize my own virtual character development process as one of *construction*, *deconstruction*, and *annotation*, which yields the primitives, which are then procedurally *reconstructed*.[144] This strategy is based on my own experience with developing virtual characters, and on Bill Seaman's method of "composition, decomposition and recomposition," as he applied it to creating the installation *Passage Sets/One Pulls Pivots at the Tip of the Tongue*.[145] The model is presented in two halves: character issues, and participant issues, because roles of both must be considered in constructing a worthwhile duet.

[144] Note: in this phrase I don't mean to imply theoretical deconstruction, but rather the act of disassembly.

[145] Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD. p. 3

A Model for Developing a Virtual Character

		CHARACTER ISSUES	PARTICIPANT ISSUES
PRIMITIVES	**CONSTRUCTION**		
	Modeling Consciousness	Narrow but deep knowledge domain. Psychological models can be used. Artificial Intelligence is not the goal — engagement is.	Avoid overpromise. Be honest about technical limitations. Shape participant's expectations of character.
	Writing	Set context. Set limitations of character. Give character motivations, personality traits and emotions. Develop participant-character language.	Make the language intuitive or easily learned. Test it in advance. Develop a "threshold" which allows the participant to pass into the narrative.
	Storyboarding	Develop installation layout: location, setting, props, sound. Spec out units of character-media. Give character behavioral range.	Provide entrance into and exit out of the interaction. Make character units dynamic and comprehensible to participant.
	Acquisition	Use stage direction during shoot/recording. Get multiple takes. Improvise beyond storyboard. This is drama — perform!	Consider participant's perception of and reaction to material. Make performance meaningful and accessible.
	DECONSTRUCTION		
	Logging	Catalog recorded material. Make terse intuitive descriptions. These will become annotations.	Use original storyboard as a guide for describing character-media, to maintain character's shape.
	Editing	Subdivide recorded material. Make coherent units with clear beginnings and endings. These are the character primitives.	Consider participant's experience of character over time. Decide what the interprimitive transitions will be: Cuts, dissolves, wipes or others.
	ANNOTATION		
	Indexing	Refer back to the original model of consciousness. Develop scales to track character traits. More indices yield more complex behavior, but are hard to implement.	Consider participant's comprehension of character's behavior. Make sure each index provide enough range. Make sure that multiple indices work well in concert.
	Ranking	Rank character media according to the trait scales. Do this intuitively, honestly. Do not try to fit units into pre-established slots in model.	Ranked media should span a broad enough range of character behavior. If not, don't change rankings, get more and better media!
	Describing	Use logging descriptions to develop annotations for media. Be terse and consistent, for better search results.	Annotations should accurately describe the character from the participant's perspective.
PROCEDURE	**RECONSTRUCTION**		
	Scripting	Develop a set of rules and procedures for presenting the character media depending on participant input.	Use grammar of cinema for guidance. Present the character coherently. Make character reactions meaningful.
	Coding	Implement and test procedures. Refine scripts and reimplement.	Keep working till the participant-character interaction feels right!

To anyone experimenting with virtual character development, I would also recommend *Character-Maker/Conversation*, an application designed by Janet Murray, and programmed by Jeffrey Morrow and Matthew Gray.[146] It's a simple but effective tool (with either a Hypercard or HTML interface) that provides an excellent introduction to procedural authorship of text-based interactive characters.

[146] Murray, J. 1995. *Character-Maker/Conversation*. Chatterbot authoring tool. Cambridge, MA. http://www.mit.edu/people/jhmurray/JanetsHP.html

21 A Look at Our Motivations

In this thesis I've explained in detail my experience with creating a virtual character, and presented what I hope is a useful set of strategies, based on the form of the un/real duet, for guiding authors of related work.

In conclusion, having covered *how* digital media makers do what we do, I want to stop and consider *why* we do it. What are our motivations? The answer is important, since it's our motivations that determine if our authorship serves productive or destructive ends. In order to answer the question, I want to briefly discuss the fundamental difference between people and computers, to frame the issues of what computers do, what we think they do, and what we wish they could do.[147]

[147] this concluding section came out of an examination of my own concerns, articulated in conversations with Arjan Schütte, Alex Westner and Glorianna Davenport, and galvanized by Jaron Lanier's article:

Lanier, J. 1995. Agents of Alienation. Article on the web. New York, NY. Voyager. http://www.voyagerco.com/consider/agents/jaron.html

The Difference Between People and Computers

We Speak the Language

Consider human beings' unique capacity for language which sets us apart from other species in our world.[148] Our brains have evolved intricate biochemical structures over millions of years to let us represent objects and ideas as symbols and organize these symbols into syntaxes and grammars. Our language has evolved simultaneously along with our brains over those millions of years and is extraordinarily complex and dynamic. Our language, by allowing us to generalize and improvise, enables us to create uncountably many representations of meaning.

[148] Chomsky, N. 1995. *Language and Thought*. Moyer Bell Ltd.

Now consider computers' structure and function.[149] They're much simpler than brains. They're based on binary-state transistors and boolean logic and procedure. In computers we represent things as strings of bits that can be compared to other strings for similarity, but no generalizable meaning is actually built into these strings,

[149] Tocci, R.J. 1988. *Digital Systems: Principles and Applications*. Englewood Cliffs, NJ. Prentice-Hall.

as it is into human words. Computers can store large quantities of information encoded with bits, but don't have any sort of universal syntax or grammar. Thus, though very limited localized syntaxes and grammars can be implemented in code, computers lack the ability to represent generalized meaning; they are extremely literal.[150]

[150] Reeke, G.N., Sporns, O. 1991. Selectionist Models of Perceptual and Motor Systems and Implications for Functionalist Theories of Brain Function. *Emergent Computation.* (Forrest, S. Ed.) MIT Press. pp. 347-364

Computers are Tools & Media; People are Smart

Computers are excellent at being tools and media. We use them to construct, compose, compute, paint, format and display. Because computers are tremendously useful in helping us do these things, and because we long for intelligent assistance in doing them, digital tool- and media makers and users have a tendency to dub their systems "intelligent." The way *QuarkXPress*,[151] the application that I used to format this thesis, puts "Smart Quotes"[152] around things as I type is quite helpful. But this helpfulness is light-years away from the truly *smart* help I get from my friends when I give them a draft of this thesis to read, and they return it peppered with circles, arrows, questions and exclamations. *QuarkXPress* running on my Macintosh is *helpful*. Alex and Arjan are *smart*.

[151] *QuarkXPress*. Electronic publishing software. © 1994 Quark, Inc.

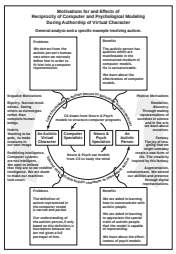
[152] Smart Quotes is a feature in *QuarkXPress* that automatically figures out whether an "open" or "close" quote is needed when the quote key is typed.

Other developers, as mentioned earlier in sections 8 and 18, have described the process of re-embodying intelligence with sophisticated computer engines. Here I want to point out that all tools and media, digital or otherwise, contain the re-embodied intelligences of their makers. In this thesis I've re-embodied my thoughts, as myriad words, images and diagrams via digital tools and the medium of ink on paper, to make them available to you, the reader who supply your own intelligence in reading them. Of course, digital media are different than inert ones, because they respond to user activity, allowing for an action-reaction cycle that I've defined metaphorically in this thesis as an un/real duet. Nevertheless, the intelligence (or lack thereof) of the digital system's response is the intelligence of the people who designed the interaction, not the machine's.

Though computers facilitate the interaction (or as Bill Seaman would say the "intermingling"[153]) of intelligence among human beings, they themselves are not intelligent. My intention in making this point is not to deny the unique assets of digital media, but rather to caution us against confounding these assets with intelligence, because if we do, we run the risk of making damaging representations of ourselves, as I'll explain shortly.

[153] Seaman, B. 1997. Models of Poetic Construction and their Potential Use in Recombinant Poetic Networks. Received through correspondence. Baltimore, MD. p. 1

The Reciprocity of Psychological and Computer Modeling



Full sized diagram on p. 91

Here I consider the general reciprocity that exists between computer scientists and scientists of the mind, and its bearing on procedural authorship of virtual character. I include a specific example of that reciprocity to illustrate what good and bad may come out of constructing virtual characters as a result of the constructors' motivations. This discussion is summarized in the diagram on page 91.

Consider these two reciprocal phenomena: 1. - computer scientists use neurobiological and psychological models on which to base computer systems,[154-156] 2. - neurobiologists, psychiatrists and psychologists use computer models to describe what's going on in the brain and mind.[157, 158]

This is a double-edged reciprocity. It's useful, because we need metaphors and models to help us think about and understand these complex systems. It's damaging, because computer systems are less sophisticated and handle information differently than human brain/mind systems, and using the former to model the latter serves to constrain the way we think about ourselves. In order to truly perceive, describe and understand ourselves, we need the complexity of our human language, which computer systems lack.

We must, therefore, question our tendency to anthropomorphize our machines, and question our tendency to mechanize ourselves.

Authors of virtual characters are particularly susceptible to the undertow of this cycle, since we use both psychological and computer models to develop and implement character. In our procedural authorship process, as I've described it earlier in this chapter, we first do a variant of what psychologists and psychiatrists do when they evaluate personality. As part of their examination, they observe a patient, break her personality traits down into components, and rank them with various indices in a personality inventory, to come up with a statistical portrait of the person—a model of personality.[159]

Similarly, in procedural authorship of character we model personality by describing a character that we'd like to represent (construction), then by parsing our character into components which we rank and describe (deconstruction and annotation). Finally, we

[154] Beer, R., Chiel, H.,J., Sterling, L.S. 1991. A Biological Perspective on Autonomous Agent Design. *Designing Autonomous Agents: Theory and Practice from Biology to Engineering and Back.* (Maes, P. Ed.) Cambridge, MA. MIT Press.

[155] Schaffer, D., Caruana, R.A., Eshelman, L.J. 1991. Using Genetic Search to Exploit the Emergent Behavior of Neural Networks. *Emergent Computation.* (Forrest, S. Ed.) MIT Press. pp. 244-248

[156] Harnad, S. 1991. The Symbol Grounding Problem. *Emergent Computation.* (Forrest, S. Ed.) MIT Press. pp. 335-346

[157] Keeler, J.D. 1991. A Dynamic System View of Cerebellar Function. *Emergent Computation.* (Forrest, S. Ed.) MIT Press. pp. 396-410

[158] Mitchell, M., Hofstadter, D.R. 1991. The Emergence of Understanding in a Computer Model of Concepts and Analogy-Making. *Emergent Computation.* (Forrest, S. Ed.) MIT Press. pp. 322-334

[159] I have included an example of one such inventory in the appendix on pp. 96-99. It's the Minnesota Multiphasic Personality Inventory (MMPI), a standard inventory for evaluating a patient's psychiatric condition, and generating a clinical profile.

use computer modeling methods to generate a script and set of rules to recombine the inventoried parts into a virtual character (reconstruction).

It was in considering this computer science-mind science cycle, its relevance to character authorship, and my own experience of it's currents illustrated by the following example, that I was prompted to write this conclusion.

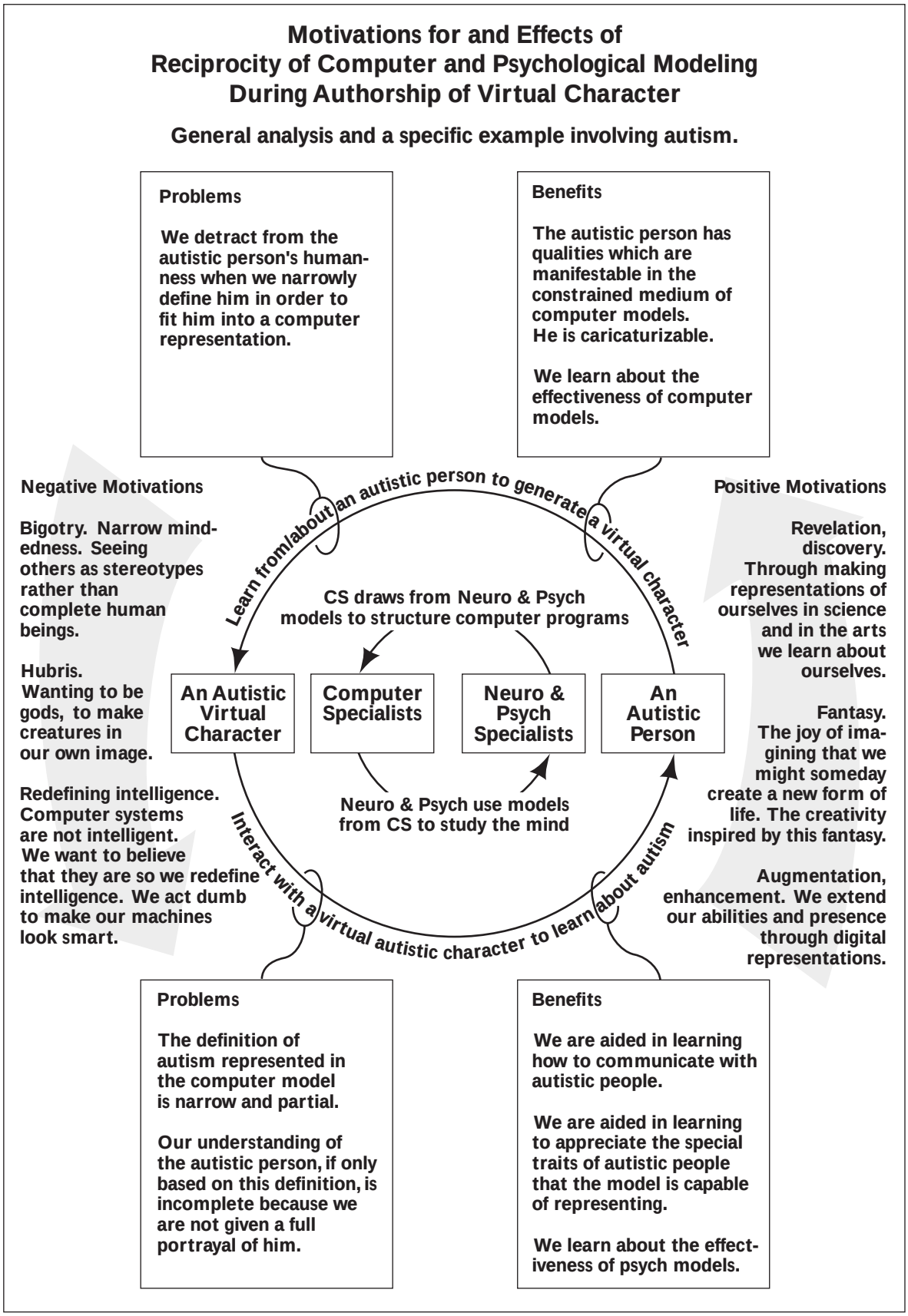
Following work on the Sleeper, I began thinking about another interesting character to build. In wondering what sorts of characters could be digitally represented, I was reminded of a person I met in 1988 when I was working at a hospital. This young man, a patient at the hospital, was autistic, and was a math savant. He found it very difficult to talk to people in an ordinary conversational way. If, however, you approached him gently, and asked him questions that were essentially complex math problems, he would answer you quickly and enjoy the exchange. If you were willing to converse with him in this way, you could talk to him for a while, and feel a connection with him in spite of his disability.

I was intrigued by the prospect of using this person as a basis on which to model a virtual character, especially since he has some features in common with digital systems: poor language and social skills, powerful computing skills, need for a limited verbal and body language, limited but deep knowledge domain. On the other hand, the extent of this person's humanness, though he was disabled, was much more than could be represented by a virtual character. My talks with him were marked by a quality of realness that can only be found in conversation with a human being (this was a *real* as opposed to an *un/real* duet).

Thus, as I began to consider using this man as a model, I began to wonder about the morality of that act. I felt it was important to consider the advantages and disadvantages of doing so, and to understand my motivations.

Problems with Reciprocal Psych-CS Modeling

In basing a virtual character on our knowledge of a real person (Psych → CS), we end up severely narrowing our definition of the person to fit him into a computer representation. This is because, in making virtual characters, we are attempting to instantiate not one but two language systems in the inadequate substrate of boolean logic.


Motivations for and Effects of
Reciprocity of Computer and Psychological Modeling
During Authorship of Virtual Character
General analysis and a specific example involving autism.
Problems
We detract from the autistic person's humanness when we narrowly define him in order to fit him into a computer representation.
Benefits
The autistic person has qualities which are manifestable in the constrained medium of computer models. He is caricaturizable.
We learn about the effectiveness of computer models.
Negative Motivations
Bigotry. Narrow mindedness. Seeing others as stereotypes rather than complete human beings.
Hubris. Wanting to be gods, to make creatures in our own image.
Redefining intelligence. Computer systems are not intelligent. We want to believe that they are so we redefine intelligence. We act dumb to make our machines look smart.
Learn from/about an autistic person to generate a virtual character
CS draws from Neuro & Psych models to structure computer programs
An Autistic Virtual Character
Computer Specialists
Neuro & Psych Specialists
An Autistic Person
Neuro & Psych use models from CS to study the mind
Interact with a virtual autistic character to learn about autism
Positive Motivations
Revelation, discovery. Through making representations of ourselves in science and in the arts we learn about ourselves.
Fantasy. The joy of imagining that we might someday create a new form of life. The creativity inspired by this fantasy.
Augmentation, enhancement. We extend our abilities and presence through digital representations.
Problems
The definition of autism represented in the computer model is narrow and partial.
Our understanding of the autistic person, if only based on this definition, is incomplete because we are not given a full portrayal of him.
Benefits
We are aided in learning how to communicate with autistic people.
We are aided in learning to appreciate the special traits of autistic people that the model is capable of representing.
We learn about the effectiveness of psych models.

First, there's our verbal language which we try to instill in our virtual characters, making them perceptive and conversant. Then there's our visual language (as Sharff reminds us, cinema is our *other* language, comprised of visual grammar and syntax[160]) which we try to encode in our editing/presentation systems. What we end up with is a twice-compounded impoverished use of two languages, which often make for very stilted, limited interactions.

[160] Sharff, S. 1982. *The Elements of Cinema: Toward a Theory of Cinesthetic Impact.* New York, NY. Columbia University Press.

In interacting with virtual characters in order to learn about the people on whom they're modeled (CS → Psych), the danger lies in not getting a rich enough portrait of the person, because the models are so narrow and partial. Thus, if I make a model of the autistic man I met, I run the risk of detracting from his humanness by defining and portraying him too narrowly.

Benefits of Reciprocal Psych-CS Modeling

An advantage of creating a virtual character based on a real person (Psych → CS) is that the person's stereotypical traits can be capitalized upon in portraying him digitally. Another benefit is that we can learn about the effectiveness of our computer models by studying the resulting character, and seeing how well it represents the person. As can be seen in such historical virtual characters as Eliza the psychoanalyst,[161] Parry the paranoid patient[162] and Lyotard the cat,[163] there is an established tradition of using psychological approaches, and cognitive science schema for "the computer modeling of personality."[164]

[161-164] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 68-74, p. 222-225, p. 227-233, p. 230

The advantages of interacting with virtual characters (CS → Psych) are that they help us learn how to appreciate the special traits of the person that the virtual character is actually capable of representing, and they teach us about the effectiveness of psychological models. Thus, in making and interacting with a model of an autistic man, I can learn something about how to communicate with him through appreciating his unique gifts, and I can also evaluate the efficacy of both my original model of his personality, and the computer model I used to represent him.

As I mentioned a few paragraphs ago, procedural authorship of character has some features in common with psychologists' and psychiatrists' inventorying of personality. I think, as a future direction of virtual character research, it would be fascinating to experiment with using professional, statistically oriented

personality indices as bases for virtual characters (keeping in mind that personality inventories are not meant to define the patient, but rather to serve as an aid in describing her condition). These inventories are promising as models, because of their fine level of detail in deconstructing elements of personality, and because of their mathematical orientation.[165] As an example, in the appendix on pages 96-99, I've included the first half of the The Minnesota Multiphasic Personality Inventory (MMPI), a standard inventory for evaluating a patient's psychiatric condition, and generating a clinical profile.[166] It may be that these inventories are too complex, too saturated with the nuances of language to adapt in their entirety. Yet, it's possible that with professional help (we can all use a little of that) such an inventory could be deciphered and repurposed as a model for use in virtual character authorship.

[165] A large collection of these inventories, and information about them, can be found at the International Mental Health Network (IMHN) web site: http://www.ptan.com/index.htm

[166] Found at the IMHN web site: http://www.ptan.com/clinass/samples/mmpi1a.htm

It's Our Motivations that Matter

Take a look at these two lists. On the left are words we use to describe digital entities when we expect them to imitate human intelligence. On the right are words we use to describe the same entities when we expect them to be fictitious representations.

Artificial	Virtual
Primitive	Illusory
Stilted	Idiosyncratic
Flawed	Dramatic

It's our motivation in creating and perceiving virtual characters, and our expectations of them, that determine if we will do a good or bad job building them, and if the end results will be constructive or destructive.

Negative Motivations for Character Authorship

Bigotry, narrow mindedness. Any time we make a representation of a person, and especially if we use stereotyping as a technique in our process, we run the risk of choosing to see and portray the person only as our representation of them rather than as a complete human being. Though we can do this in any medium, digital media are uniquely suited to the task, since they require us to make narrow characters.

Hubris. We want to be gods, so we pursue the grail of emergent computation. We want to make creatures in our own image to control, to be kind to, to be served by and loved by. For the first time digital systems allow us to make complex responsive entities that seem to resemble us in some ways. As of now, however, our machines are dependent, servile, stupid and volitionless. We long for them to be intelligent and independent so that we may test our mettle as gods.

Redefining Intelligence. Computer systems are not intelligent. Because we long so profoundly for them to be, we redefine intelligence. We act dumb to make our machines look smart. Jaron Lanier has described this process as it pertains to our interactions with computer agents,[167] though it also applies to our perception of virtual characters. A paraphrasing of Lanier's description is:

1 - person defers to computer because she thinks it's autonomous

2 - person, projecting autonomy, starts to think of the computer as a person

3 - person starts to think of herself as being like the computer

4 - person starts to limit herself to categories and procedures represented in the computer without realizing what has been lost

5 - person's act of projecting autonomy becomes an unconscious choice to limit her behaviors to those that fit the computer model.

[167] Lanier, J. 1995. Agents of Alienation. Article on web site. New York, NY. Voyager. http://www.voyagerco.com/consider/agents/jaron.html pp. 2-3

In making the Sleeper in *Sashay/Sleep Depraved* I used a computer system to try to model functions of subconsciousness, and to represent the behavior of a person. If in doing these things I were to insist that I had made the Sleeper intelligent, then I would have to ignore the fact that she can't perceive the true range of expression of a participant's intelligence during interaction with her. By insisting that communicating to her with six simple hand gestures was an intelligent use of language, I would make a mockery of the participant's intelligence and of human language in general.

Positive Motivations for Character Authorship

Revelation, discovery. In using a digital system to make the Sleeper, my intention was not to make a flawed clone of myself, but rather a poetic representation from whom I and others could learn through interaction with her in an un/real duet. As Murray reminds us, "Every expressive medium has its own unique patterns of desire; its own way of giving pleasure, of creating beauty, of capturing what we feel to be true about life; its own aesthetic."[168]

[168] Murray, J. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace.* New York, NY. Simon & Schuster. p. 94

Digital media allow us, through making responsive scientific and artistic representations of ourselves, to better understand and enjoy our lives.

Fantasy. There may be a day when digital entities leave the realm of procedures, media and tools, and become organic somehow. There might be a new substrate (perhaps the web, perhaps beryllium ions in a quantum computer) in which digital creatures, motivated by their own will to thrive, evolve expressive abilities of thought and language, becoming peers to human beings. As of now this possibility is consigned to the realm of science fiction, but the fantasy itself keeps our minds open to thinking beyond the boolean-based systems so entrenched in our culture, and inspires our imaginations and creative processes.

Augmentation. I remember a time, during the hard candy-eating phase of my childhood, when my buddies and I would gripe about how artificial flavors—cherry, grape, watermelon—were so different from their natural counterparts; they didn't match up at all. Picking bits of Jolly Ranchers[169] out of our molars, we berated the candy makers who presumed to give fake flavors the same names as real ones. I also remember, after months of grousing, having an epiphany about artificial flavors. It dawned on me that if we perceived of them as entirely new and different flavors, they were actually quite tasty (though lacking the nuances of their natural brethren), and served to expand our palette of yummy things to eat and with which to rot our teeth.

[169] Jolly Rancher candy. © 1997. Jolly Rancher company. http: //www.jollyrancher.co.uk/

There's an analogy here in how we perceive the virtual characters we create with digital media. If we don't expect them to imitate life, but rather allow them to be their own quirky un/real entities, then we can enjoy and benefit from the ways they allow us to extend our presences, our abilities, our experience and our understanding.

– Freedom Baird

September 1997
Cambridge, MA

Appendix

MMPI Standard Clinical Profile (partial)
Taken from the web site: http://www.ptan.com/clinass/samples/mmpi1a.htm

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THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY

STANDARD ADULT CLINICAL PROFILE

Scoring and interpretation by:

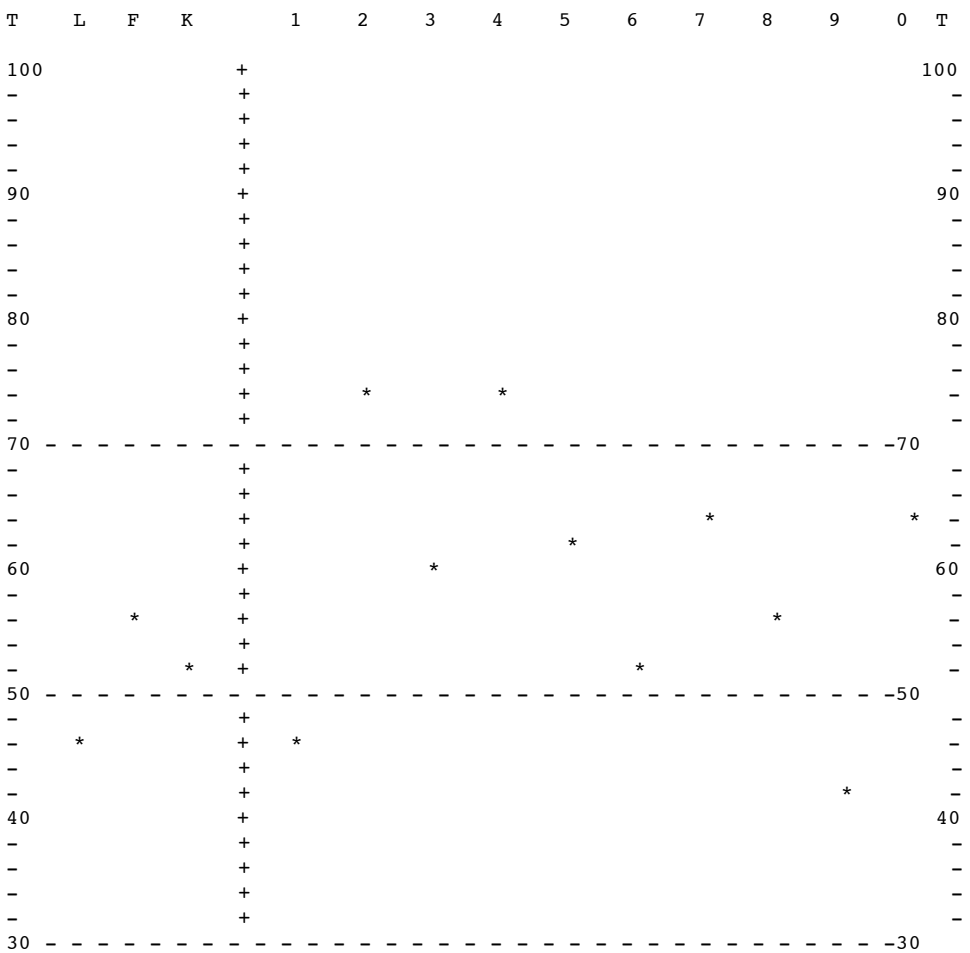
PAIN AND TRAUMA ASSESSMENT NETWORK - PTAN™
P.O. Box 578
Poway, CA 92074-0578

PATIENT ID:	01324-47
SEX:	Male
AGE:	45
RACE:	White
HIGHEST GRADE:	14
MARITAL STATUS:	Married
EMPLOYMENT STATUS:	Employed
INPATIENT ADMISSIONS:	1
OUTPATIENT ADMISSIONS:	3
YEARS OF ALCOHOL USE:	
YEARS OF DRUG USE:	
PROFILE DATE:	01/01/1997
REFERRAL BY:	Department of Mental Health

THIS CLINICAL PROFILE IS A CONFIDENTIAL ASSESSMENT REPORT INTENDED FOR USE BY PROFESSIONAL STAFF ONLY. ITS PURPOSE IS TO PROVIDE CLINICIANS WITH A COMPREHENSIVE CLINICAL PICTURE OF PATIENTS UNDER THEIR CARE, AND TO HELP MAXIMIZE THERAPEUTIC EFFECTIVENESS THROUGH CAREFUL ASSESSMENT, TREATMENT PLANNING, RELAPSE PREVENTION, AND AFTERCARE. RECOMMENDATIONS MADE IN THIS PROFILE DO NOT IMPLY THAT EXISTING CLINICAL APPROACHES SHOULD BE REPLACED OR MODIFIED. THEIR INTENT IS TO FURTHER PROMOTE INDIVIDUALIZATION OF PATIENT TREATMENT PLANNING, MULTIDISCIPLINARY APPROACH TO TREATMENT OF EACH PATIENT, PATIENT'S PARTICIPATION IN OWN RECOVERY PROCESS, AND CONTINUOUS MONITORING AND REASSESSMENT OF THE THERAPEUTIC PROCESS FOR MUTUAL BENEFIT OF BOTH THE PATIENT AND THE CLINICAL STAFF. STATEMENTS IN THIS PROFILE ARE CONSIDERED AS HYPOTHESES FOR FURTHER CONSIDERATION IN COMBINATION WITH ALL OTHER CLINICAL FACTORS UTILIZED IN THERAPY.

_____	_____	_____
REVIEWING PROFESSIONAL	TITLE	DATE

ADULT PROFILE



/#				1	2	3	4	5	6	7	8	9	0
SCL	L	F	K	HS	D	HY	PD	MF	PA	PT	SC	MA	SI
RAW	3	6	14	11	32	25	29	31	9	33	27	14	38
TSC	47	57	53	46	75	61	74	62	53	63	57	43	64

RANKING	SCALE	2	4	0	7	5	3	8	6	1	9
	T SCORE	75	74	64	63	62	61	57	53	46	43

This person answered 564 items and the validity configuration indicates a valid profile. Subject understood items, was conscientious, and presented self in a realistic manner. Configural analysis of the patient's responses and studies of adults with similar response patterns suggests that these individuals are impulsive and have acting-out tendencies which may contribute to patterns of substance abuse, arrest and to job or marital difficulties. They harbor a great deal of anger and resentment towards others & are frustrated by their own lack of accomplishment. Depressive reactions in response to frustration are common. A cyclical pattern of acting-out, followed by situational anxiety and remorse is characteristic. Self punitive, depressive tendencies may underlie a facade of extraversion. Evaluate risk of suicide. Common diagnoses : personality disorder, depressive reaction. Although a good initial response to therapy can be expected, this behavior pattern is persistent and likely to recur. The patient may terminate treatment when situational depression / guilt feelings subside. Support, firm limits in a structured environment and frequent professional contacts are needed. Avoid the use of psychoactive medications due to potential for abuse or addiction. The prognosis for significant improvement is guarded. Goldberg sign = neurosis.

CLINICAL, O/S, AND HARRIS & LINGOES ANALYSIS		SCALE	RAW	T / T
Reports significant depression. Is apathetic & worried over minor issues. Good prognosis. Depressive symptoms are present. The response pattern is suggestive of clinical depression. Client is mildly unhappy and lacks energy. Is sensitive to criticism/lacks self-confidence. Describes self as lethargic & uninvolved. Has difficulty starting things & gives up easily. Usually feels physically healthy and denies chronic psychosomatic complaints or symptoms. Has difficulties in concentration, comprehension, & memory. Lacks energy needed to cope. Probably feels incompetent and inferior. May brood and ruminate excessively. Easily hurt.	**	DEPRESSION	32	75
		Ob/Sub T-scores	67/	65
	*	Subjective Dep	15	66
	**	Psymotor Retard	11	76
		Phy Malfunction	3	48
	**	Mental Dullness	8	77
	*	Brooding	5	61
Rebelliousness, limited frustration tolerance are present. Impulsive acting-out probable. Evidence of an uncontrolled behavior disorder is present. Patient is probably unsocialized. Expresses mild discontent with family relations and tends to see family as unsupportive. May resent societal & parental restrictions. Is independent & expresses definite opinions. Experiences discomfort and anxiety in social situations. Quiet, avoids expressing opinion. Does not experience feelings of alienation from social environment or from other people. Depicts self as unhappy and dissatisfied with daily life. Expresses some regret about past.	*	PSYCH DEVIANCY	29	74
		Ob/Sub T-scores	72/	55
	*	Family Discord	5	68
	*	Authority Prob	5	62
		Soc Imperturb	1	28
		Soc Alienation	5	49
	*	Self Alienation	7	63
Person will be somewhat reserved with people. Tends to be shy and may lack self-confidence.	*	SOC INTROVERSION	38	64
Perfectionistic & self-critical attitudes can be expected. Exhibits excessive worry/anxiety	*	PSYCHASTHENIA	33	63
Reports masculine interests & preference for action. Assertive and competitive approach. The person usually feels confident & does not admit to unusual concerns about sex matters. Possibility of attraction towards members of own sex and interest in reversal of sex role.	*	MASCULINITY	31	62
		Sensitivity (P)	7	51
	*	Sexual Id. (P)	2	62
Hysteroid personality traits present. Often exhibits somatic symptoms when under stress. Hysterical personality traits are present. Obtained scores accurately reflect symptoms. Admits to social inadequacies and describes self as introverted, socially uncomfortable. Probably too trusting, sees others as honest Needs affection & will avoid confrontations. Feels weak, fatigued, & generally uncomfortable. Reports poor appetite, sleep disorder. Does not report multiple somatic symptoms. If any are present, they are probably realistic. Is not overly sensitive or apprehensive about violence and aggressive content in the media.	*	HYSTERIA	25	61
		Ob/Sub T-scores	57/	54
		Deny Soc Anxiety	1	38
	*	Need Affection	9	69
	**	Lassitude	8	70
		Somatic Probs	3	46
		Inhibit Aggress	2	40

CLINICAL, O/S, AND HARRIS & LINGOES ANALYSIS	SCALE	RAW	T / T
Expresses interest in both practical & abstract matters. Has normal level of conformity. Reports having adequate emotional involvement with others, does not resent family members. Usually feels that life is worthwhile & does not feel unnecessarily depressed/ despairing, Does not admit to having strange thought processes/loss of control, feeling of unreality. Believes that life is interesting and has the energy to cope with most everyday problems. Feels in control of emotions & impulses. Not unusually restless, irritable or hyperactive. Has not experienced body changes, feelings of depersonalization, or psychomotor problems.	SCHIZOPHRENIA	27	57
	Soc Alienation	4	51
	Emotional Alien	2	50
	-Ego Mastery Cog	2	53
	-Ego Mastery Con	4	59
	Defect Inhibit	0	41
	Sensory Exper	0	39
Has a flexible, adaptable approach to interpersonal contacts. Cooperative with others. This person does not appear to experience any significant problem with suspicious thinking. Respondent has an appropriate amount of trust in others. Is not overly suspicious or angry. Does not describe self as sensitive & reports feelings of being understood and accepted. Normally has as accepting attitude towards others. Cooperative and willing to do favors.	PARANOIA	9	53
	Ob/Sub T-scores	46/	57
	Persecute Ideas	2	51
	Poignancy	0	35
	Naivete	5	57
Has realistic concern about body functions. A few specific somatic symptoms may be present.	HYPOCHONDRIASIS	11	46
Expect a low energy level with listlessness and apathy. Often difficult to get motivated. This individual does not show evidence of an abnormally high level of energy at this time. Does not view self or others as selfish/ dishonest and is not manipulative or exploitive. Has a normal need for change, but able to adjust to routine when necessary. Not restless. Generally feels comfortable around others. Is not overly impatient or irritable w/ people. Realistically evaluates own self-worth and is neither overly self-critical nor egotistical.	HYPOMANIA	14	43
	Ob/Sub T-scores	46/	42
	Amorality	2	55
	Psymotor Accel	3	47
	Imperturbability	3	51
	Ego Inflation	3	52

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Index by Chapter

A PLAID BATHTUB PRODUCTION
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