Consciousness Reframed '97

Tilting at a Dreamer's Windmills: Gesture-Based Constructivist Interaction with Character

Freedom Baird

In the installation Sashay/Sleep Depraved, a participant uses emotionally evocative gestures to interact with a larger-than-life-sized virtual character, the Sleeper. Research during the installation's construction has explored methods of interactive narrative and traditional cinema in three principal ways. First, the participant is positioned, not as a spectator or navigator, but as a role-player interacting with the Sleeper by altering her subconscious environment. Second, the participant's proximity to, and gestures toward the Sleeper foster a strong sense of immersion and engagement. Lastly, in Sashay's constructivist environment, the participant enjoys the expressive, associative process of constructing an animated, surrealist dream.

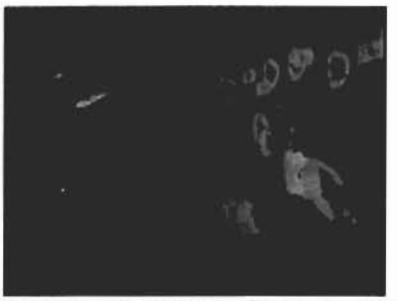
Keywords: Sashay, Sleep Depraved, constructivist, immersive, associative, automated character, gesture, recombinant poetics, engagement

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, like 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[1].



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

Putting her back to sleep.

You are visiting Sashay/Sleep Depraved, an installation in which a visitor can use gesture to interact with an on-screen character by generating an evolving animation. Sashay was created collaboratively during the Spring of 1997, under my direction, by denizens of MIT's Media Lab along with some outside help. Credits are listed at the end of this paper.

I developed Sashay/Sleep Depraved as a Master's thesis project, as part of ongoing research in the Media Lab's Interactive Cinema Group, headed by Glorianna Davenport.[2]

The installation has two components. The first, Sashay, is a tool for sensing and interpreting gesture, and triggering corresponding animated video events. It's comprised of the following:

A Digital Equipment Corporation Alpha workstation

Control code written in the Isis scripting language[3]

An electromagnetic field (EMF) gesture sensing unit[4]

An In-Focus rear projector

A large waxed-canvas projection screen

The installation's second component is its content set, Sleep Depraved, which was developed simultaneously with the soft- and hardware. This content set includes:

- The Sleeper, comprised of 66 digital video clips
- The Sleeper's dream objects, consisting of 17 GIFs
- A musical score comprised of 48 recombinable units
- A set of motion templates that represent potential emotional trajectories of dream objects
- Two indices used to track the Sleeper's state: calmness-to-agitation, sleep-to-wakefulness
- A database in which dream objects and motion templates are ranked affectively
- A database of rules for automated editing of Sleeper clips and music clips, to show the appropriate state of the Sleeper, and preserve cinematic continuity

The purpose of constructing Sashay/Sleep Depraved has been, not to produce a finished installation, but rather to serve as a testing ground for several research paths:

- Personal culture as autobiography
- Development of automated characters
- Modeling (sub)consciousness
- Immersive & constructivist environments
- Gesture as input
- Automated editing techniques
- Isis, the scripting language

I will discuss each of these briefly in this paper, and summarize user experience of the installation. A more detailed account of the project's development and related research are presented in my thesis.[5]

Context and Influences

Of the many installations I've experienced over the years, five have influenced my design of Sashay, due to their particular modes of interaction, and strength of design. These are: Christopher Janney's "Reach" (1996), Bill Viola's "Threshold" (1992), Bill Seaman's "Passage Sets/One Pulls Pivots at the Tip of the Tongue" (1996), Glorianna Davenport et al.'s "Wheel of Life" (1995), and Aaron Bobick et al.'s "KidsRoom" (1996).

Common to these pieces is that they use passive gesture/motion sensing (no gear need be worn or held), and that they allow users to either interact with characters or manipulate/experience an environment, all in large-screen settings.

Sashay/Sleep Depraved is also influenced by my own work as a dancer and choreographer. While working on a dance piece this past year I became very interested in continuous action-reaction (movement feedback) between two bodies.[6] This interest manifested itself in both the dance piece and the installation.

Personal Culture as Autobiography

In Sashay/Sleep Depraved I've recorded my body, blown it up on screen, catalogued items from my dream vocabulary, represented them photographically, and allowed for their manipulation by others to influence the Sleeping me.

The Sleeper is a digital extension of myself, an avatar of sorts, though its purpose is not to represent me realistically. Rather, I derived what is archetypal about my sleeping/dreaming experiences, and crafted a generic representation of my sleeping self for others to connect to. This is not traditional autobiography, in which I write and you observe, or I portray and you consume.

In this self-portrait I'm inactive and you disturb me. I'm neutral and you throw me off balance. It's not that I'm incomplete and you finish me. Rather, I'm receptive and you engage me. Ultimately, though I'm bits and you're atoms, the result of our pooled activity yields something, an animation, a representation of both our states of mind. This is the externalization of the internal that Michael Joyce (1995) describes, in his discussion of Donna Haraway's "Cyborg Manifesto" as being a result of a cyborgian coupling between organism and machine—in Sashay's case, between participant and Sleeper.

An interesting question is raised when I use the installation myself. What is happening then? It's a sort of masturbatory art experience, endlessly fascinating to me. Why can I stare at myself all day long? Because, though I know it's me up there on the screen, I can't quite believe it. I feel that things are being revealed to me about myself as I continue to watch. I am my own voyeur, and, if I choose, my own manipulator. Just as in masturbation, the installation works best when I'm running it. Anyone else who tries it has to learn how to gesture properly, to get the right responses. This can be frustrating. Often it's more gratifying to watch me use it.

In a sense Sashay/Sleep Depraved is art at it's most personal and selfish, built for the purpose of engaging the artist first, those who know her next, and everyone else last. It's consistent with my other work, stemming from a feminist, post-postmodernist scavenging and weaving together of personal culture.[7]

Development of Automated Characters

In crafting the Sleeper I was guided by Janet Murray's astute advice on generating automated characters. Murray points out that "the most successful characters have been those who are self-absorbed, evasive or obsessive in familiar ways" (1997 p. 219). Self-absorption works because it allows the character to have a limited behavior set, i.e., one which can actually be implemented with the available technology. Familiarity allows the user to register the character's context very quickly, generate a set of accurate expectations, and adopt an appropriate role relative to the character.

A dreaming sleeper proved to be an excellent subject in these ways. The Sleeper's context is immediately clear and familiar: pajamas, pillows and snoring set the stage. She is self-absorbed in the pursuit of sleep. Even when you wake her she's intent on returning to sleep, and frustrated when she can't. Her behaviors are limited to gradations of calm sleeping, pensiveness, insomnia, and dream sleep/nightmare. The fact that she's asleep also eliminates the possibility that you might engage in conversation with her, something that wouldn't be possible with the current technology. The Sleeper, though not realistic, is both believable and engaging. She is what Brenda Laurel (1993 p.144) describes as an agent whose external traits "are often based on the artful orchestration of stereotypes."

Modeling (Sub)consciousness

In choosing the Sleeper's dream objects—a house, an apple, a rope, grandma, a knife, a tooth, etc.—I sifted through my own dream vocabulary, choosing motifs that I felt were archtypical in a Jungian sense, i.e., common to myths and fairytales, as well as "fantasies, dreams, deliria and delusions" (1963). This is the kind of generic imagery that, as Hartmann (1996) describes, allows for a metaphorical revelation of the emotional state of the dreamer.

In dreaming, as Hartmann theorizes (1996), a process of making broad connections among generic imagery is used to "contextualize a dominant emotion or emotional concern." In creating Sashay/Sleep Depraved I wanted to give the user the ability, by using her own emotive gestures, to engage in this recombinant dream construction process as a way of influencing the Sleeper's emotional state. The installation is, according to Bill Seaman's (1997) definition, an "environment [that] enables the user to engage with the 'artifacts' of the consciousness of the author".

Immersive & Constructivist Environments

Murray (1997 p.98) reminds us that Cervantes' character "Don Quixote...still stands for the part of each of us that longs to leap out of our everyday life into the pages of a favorite book, or...to 'go into the screen' of a thrilling movie." Sashay/Sleep Depraved takes a step toward satisfying this longing.

The installation, though it provides for some of the engulfing, overwhelming masochism that Steven Shaviro (1993 p.155) describes as being an outcome of the cinematic experience (the Sleeper does scream and flail at you occasionally), doesn't carry a user into a state of abject ecstasy that he claims is the result of that masochism. This mode of excessive absorption into the spectacle is disrupted because, in order to experience the Sleeper in action, the user must *act*.

She must paint circles and zig-zags into the short gap between her and the Sleeper, in an abbreviated form of sign-language. This crude communication comprises what Laurel (1993 p.116) describes as a first-person experience: the user has an ability to do things in the Sleeper's world, she has *agency* . Ultimately, it is this agency and its resulting dream construction, that provide the *engagement* that is the satisfying outcome of interacting with the Sleeper. The user makes signs of confusion and stress, and so the Sleeper has a nightmare. Then, feeling remorseful, she makes signs of sadness and tranquillity, and the Sleeper wakes up staring out at her thoughtfully.

Laurel (1993 p.209) points out that, "given a multisensory environment that is good enough, people engage in projective construction that is wildly elaborate and creative.... Rather than figuring out how to provide structure with pleasing emotional textures, the problem becomes one of creating an environment that evokes robust projective construction." I feel that Sashay/Sleep Depraved takes a step in this direction. It provides a constructivist art environment in which the user can expressively generate what Resnick (1994) describes as "personally meaningful artifacts", in this case dreams, which resonate with the user, and teach her something about the Sleeper and about herself.

Gesture as Input

In Sashay/Sleep Depraved, the user crafts a dream for the Sleeper by making one of a set of six gestures, each of which has a certain affective quality. This gesture is used to set a dream

object into motion across the screen. Each object's movement reflects the tone of the gesture that invoked it: sadness, stress, paranoia, tranquillity, confusion, and surprise.

It was my initial preference, in pursuit of a synesthetic user experience, to track the user's gestures and translate these directly into motion paths for the dream objects. This kind of gesture recognition turned out to be prohibitively complex using available sensors. As an alternative I developed a set of six motion templates, each of which corresponds to a gesture, such that, for example, when the user makes a slow circle, representing tranquillity, a dream object is set into motion along a circular path, as prescribed in the "tranquillity" motion template.

Gesture sensing in Sashay is accomplished passively, and in a low-light setting, with "fish" sensors developed by Joe Paradiso and Josh Smith at MIT's Media Lab.[4] These electromagnetic field sensors detect motion by passing an extremely low voltage through a user's body in order to detect their proximity to a set of copper sensing units.

If, as Shaviro (1993 p.45) posits, cinema assaults and deceives the body, bombarding the retina with images, and confounding the difference between the Real and the Unreal, then Sashay takes the assault to a new level. By forcing proximity to the Sleeper, by encouraging physical engagement with her, and by passing a current through the user's body, the user becomes *part* of the body of this Real/Unreal character. As the Sleeper's nervous impulses pass through the body of the user, the two bodies become linked into a synesthetic cyborg construction.

Automated Editing Techniques

When Sashay/Sleep Depraved runs, the installation's software engine uses information from its annotated database of Sleeper and music clips, and a set of cinematic rules, to play the next most appropriate clip. I derived these editing rules and annotation methods from my own editing experience, and from Michael Murtaugh's research on Automatist Storytelling Systems, developed as engines for interactive documentaries (1996).

The annotation process is extremely important for the installation to respond well. It's a highly subjective process in which I carefully consider each Sleeper clip, dream object, motion template, and music clip, and rank them accordingly with information about their calmness-to-agitation, and sleep-to-wakefulness indices, as well as shot-width, and loopability if applicable. Through this process I 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.

Isis, the Scripting Language

Sashay/Sleep Depraved's software engine was written in the scripting language Isis, authored by Stefan Agamanolis (1997). In choosing a language, three features of Isis attracted me. First, it lends itself well to a modular organization of its coded procedures. Second, it 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. Another huge benefit 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.

User Response

Over the course of the past six months I have watched about thirty people using Sashay/Sleep Depraved. My main observation is that, after a little encouragement and advice, people generally enjoy using the piece. They adopt a range of attitudes towards the Sleeper: mischievous, maternal, or simply curious. They see what's happening as they build a scary dream which agitates the Sleeper, and yet are often surprised when she actually flails toward them and cries out in distress. Many people, particularly women, feel guilty when this happens, and quickly ask to be coached as to how to calm the Sleeper down.

The installation is not very intuitive, and so requires 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, Davenport et. al. (1995) integrated this kind of tutorial into the interactive experience itself. Ideally, I would prefer that Sashay/Sleep Depraved be intuitive enough to use with no training at all.

The installation also has a significant flaw in the way it models the Sleeper's subconsciousness. A crucial aspect of dreaming is in retrieving images, then making connections *between* them (Hartmann, 1996). In Sashay images are retrieved, and move around past one another, but no real connections are ever made among them *from the Sleeper's perspective*. While it's extremely valuable that the user of Sashay can observe these visual juxtapositions, consider the kind of dream she has constructed, and make an interpretation of it's meaning regarding herself, it would be even better if an interpretation of the dream and it's bearing on the *Sleeper* could also be made.

Future Directions

I am particularly excited about two avenues of digital mediamaking, each of which I feel Sashay/Sleep Depraved makes progress along.

Firstly, I'm captivated by the way digital media allow people to develop highly personalized, interactive representations of themselves. Folks who never considered themselves artists are digitally plucking up snapshots, home movies, answering machine messages, etc. and with these they're constructing screensavers, web sites and all sorts of personal, interactive representations. This is the dawn of a personal cyborg art culture. Crude, revealing and engaging.

The other compelling direction I find myself heading toward is the development of automated characters. In researching, building and documenting Sashay/Sleep Depraved I've striven to articulate what I've learned about this authoring process, and its peculiar components: construction, deconstruction, annotation and reconstruction.

Murray (1997 p.240) summarizes the components of an engaging automated character as being: a set of sensations, a set of motivational priorities, a set of emotions, and a set of personality traits. These attributes, if implemented in code by a complex enough set of distributed processes, would allow for a character to show a familiar yet revelatory behavior. If/when we get this far we'll be able to say that our character—doing surprising yet recognizable things—is displaying emergence.

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Sashay / Sleep Depraved Credits

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

Notes

1 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.

2 Interactive Cinema Group. MIT Media Lab. http://ic.www.media.mit.edu/ This web site contains descriptions of past and present IC research projects and publications.

3 The Isis scripting language was written by Stefan Agamanolis, a graduate student at MIT's Media Lab. See: "Isis: A Multi-Level Scripting Environment for Responsive Multimedia." Cambridge, MA: *Internal MIT Media Lab paper.* http://isis.www.media.mit.edu/projects/isis/

4 Fish sensors were constructed by Joe Paradiso and Josh Smith at MIT's Media Lab. See: Paradiso, J.A., Gershenfeld, N. 1996. "Musical Applications of Electric Field Sensing." *Computer Music Journal.*

5 A more detailed account of Sashay/Sleep Depraved's development and construction than can be presented in this paper can be found in my thesis: Baird, F. 1997. "Zzzzp! Whazzat?!: Interaction with Character Through Gesture-Based Animation." *Masters Thesis in Media Arts and Sciences.* Cambridge, MA. MIT Media Lab.

6 I choreographed "Tether/Strop" during the Spring of 1997. Performed with Clay Lacefield. Cambridge, MA. *Choreographers' Ink Annual Dance Concert.* Harvard-Radcliffe dance department.

7 See my website for descriptions of some of my work: http://www.media.mit.edu/~baird/

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