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Dream-like Interfaces and Computational Dreaming

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ABSTRACT
In considering interactions that occur during the nighttime and in the dark, it may be beneficial to also consider the most common use of darkened hours: sleep. While it may not be immediately apparent that a great deal of interaction occurs while asleep, the dreams that most people experience during those hours can have drastic, lasting impacts on their waking lives. At various points in history, dreams have been considered images from the gods, portents of the future, indications of physical or mental health, or a spurious artifact of our brain's functioning. Given our current historical moment, how might computation provoke new ways of thinking about dreams, and how might dreaming provoke new ways of thinking about computers?

Author Keywords
Dreams, dreaming interface, computational dreams.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

"How can you extract user requirements from dreams?" - [2, p. 55]

Through much of recorded history, people have sought to understand and explain the role, purpose, causes, effects, and significance of human dreaming. Even though not everyone may remember it, all human beings dream [4]. Despite various explorations into the subject, there is little if any consensus about why or how we dream, though there is no shortage of possible explanations. Dreams may be a way of reviewing recent events to understand them differently. It may be the brain reorganizing and associating different memories with one another. Dreams might allow the mind to cull out alternate possible arrangements of the world. These are just a few of the myriad proposed functions that dreams may perform (and these draw mostly on western scientific thought about dreaming).

We see these and similar lines of thought about dreaming not as a problem to be solved in HCI (i.e., what is the purpose of dreams), but rather as a jumping off point for thinking about possible relationships between computers and dreaming.

COMPUTATIONAL DREAMING

How can computers and computation provide us with new ways of thinking about dreaming? People have often used advanced technology as one metaphor for the mind [3], with current research using a computer as the model for the mind. How does dreaming fit into a computational model? What would a dreaming algorithm look like?

As an exploration of this idea, we used an n-gram frequency table to generate what might be a chat transcript of a dream (or a dream about a chat transcript). An n-gram is a phrase consisting of n-words; here we used n=3, or trigrams. Given the first two words of a trigram, the algorithm (a version of which is available as the Dissociated Press feature in Emacs) will generate a third word, based on probability distributions of trigrams calculated from the corpus. Using logs of chats between the two authors generated a dream chat including following excerpt. It should be remembered that the trigram probability distributions were generated for the entire chat log, so the words that follow one handle may not have actually been spoken by that individual. Nonetheless, the handles are here pseudonymized.

> Carl: George
> George: the dream stuff?
> Carl: yes, I sometimes talk about "world views", and I can see having sound production is JOAL, we don't have any hard-and-fast agreements with these places, but they're moving the kiosk at 2
> Carl: kiosks
> Carl: I bet simon would let you know, in case I don't know how Sharon did
> Carl: as I see them
> George: hrm
> Carl: I think Simon and I just got back last night
> Carl: I mean, I think it's just a single metaphor but rather as a transformation from one set to another
> George: Simon's probably got the most similar, tell me what they are, and where you're filling in (or how your approach is

better), I don't suppose it's before 10am, is it?
Carl: cuz I'm about to say, George, can I get past the abstract, but I'll rephrase it, just to be an issue
George: sounds good
George: it's like 50:1

On the one hand, this algorithm has appeal as a "dream" algorithm, not only due to its pseudo-nonsensical output, but also because of the way it juxtaposes words and phrases that might be only tenuously associated, perhaps as in a dream. Furthermore, varying n can affect the coherence of the dreams, where larger n lead to more coherent dreams, and smaller more incoherent. On the other, however, it might even be asked if any algorithm at all could be compared to dreaming, or if an algorithm could be expected to generate anything that would be considered dream-like. The very question of how dreams fit into the computational model of mind is exactly the type of question this exploration sought to encourage.

DREAMING ABOUT COMPUTATION

We want to ask not just how dreams might (or might not) be computational, but also how computing and interacting with computers might be made dream-like. One example of this was a system that used dreaming as a metaphor to help users understand an adaptive interface [6]. Another example is the Night Journey [1], which attempts to immerse the player in the mystic experience of spiritual enlightenment. The actual interface of the video/game, though, is highly reminiscent of the experience of dreaming, ephemeral images and sounds passing over the senses with the sense of unfamiliarity as only found in dreaming. Looking to these projects as inspiration, we want to ask not how potential users' dreams may inform system design, but how we might design a system that would be dream-like. Could we make using an interface resemble dreaming?, and . How might such a system encourage the user to reflect on the experience of dreaming?

One important aspect of dreams is that the dreamer is not always in full control, if in any control. Another system in which the user has limited or minimal control is the situationist agent [5], which presents users with a series of text and images drawn from a virtual dérive of various websites. The purpose of this particular project was to encourage users' reflection and to challenge the uptake of situationist art practice in the HCI community. A similar approach, perhaps combined with the algorithm described in the previous section, could lead users to feel as if they were dreaming or watching someone else's dream, perhaps even watching the computer dream. This paper advocates exploring the creation of such interfaces and systems.

BIOGRAPHY

Eric Baumer is a Ph. D. student in the Informatics Department of the University of California, Irvine, where his research includes computational approaches to conceptual metaphor in written text, explorations of the practices of blog readers, and theoretical approaches and frameworks in HCI. In general, he is interested in using computers to encourage critical reflection and different ways of thinking. Eric's undergraduate degree from the University of Central Florida included an honors thesis on an affect model for a robotic office assistant.

Bill Tomlinson is an Assistant Professor of Informatics at the University of California, Irvine. He studies the fields of multi-agent systems, human-computer interaction, real time graphics and environmental technologies. His interactive projects have been shown in the Emerging Technologies program at ACM SIGGRAPH ('97, '98, '99, '01, '05), at the Game Developers Conference, and at Ars Electronica. In addition his animated film, Shaft of Light, screened at the Sundance Film Festival and was distributed by the Anti-Defamation League in its Anti-Bias/Diversity Catalog. He holds an A.B. in Biology from Harvard College, an M.F.A. in Experimental Animation from CalArts, and S.M. and Ph.D. degrees from the MIT Media Lab.

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