
Robotany: Breeze

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figure 1. *Breeze's* eye.

Abstract

This paper describes *Breeze*, a live roboticized tree. Visitor interaction with *Breeze* is interpreted through a series of narratives. These narratives yield results with implications for human-computer interaction research.

Keywords

Art, technological art, embodied interaction, interpretation, hermeneutics, totem, techno-totems, phenomenology, metaphor

ACM Classification Keywords

H.5 Information interfaces and presentation (HCI)

General Terms

Documentation

Introduction

Breeze is a roboticized live Japanese maple. *Breeze* senses and responds to human presence and movement through a variety of technological mechanisms. Its eye is a 360 degree, catadiotrophic lens positioned above the canopy. Its compound ears are a custom-built ultrasonic sensor array below the canopy. Shape memory alloys form gross and fine muscular systems. *Breeze* is part of an art research program titled *Robotany*, which uses techno-organic artifacts to understand human interaction with technology.

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Breeze's robotic mechanisms were designed to accommodate the radial morphology of a tree as opposed to the bilateral symmetry of many android robots. Because its entire canopy is active, *Breeze* can conduct several physical conversations at once. *Breeze's* many limbs move silently and smoothly, without the mumbling and grumbling of motor-based actuation.

Breeze was commissioned by the Belluard Arts Festival in Fribourg, Switzerland and was exhibited there for two weeks in 2006. It was funded by Fondation Nestlé pour l'Arte and the Canton of Fribourg. Later in 2006, *Breeze* appeared at the first Zer01 art festival in San Jose. *Breeze* was created with the help of John Taylor, who programmed the Max/MSP/Jitter video motion capture system, and Daniel Bauen, who aided in the production of the actuation mechanism. Joe Martin designed and built the ultrasonic sensor components. *Breeze* will appear at CHI 2010.

Visitor interaction with *Breeze*

In Fribourg

Consistently collaborators, festival administrators, and I witnessed and documented visitors engaged in ongoing physical interaction with the tree. Through direct observation, we noted a range of spontaneous, unscripted behaviors and movements such as dancing, waving, and even kissing, petting, and toasting *Breeze* with wine. It was common to witness passersby greeting and saying goodbye to *Breeze*. These behaviors were exhibited across genders and at age groups from one year through roughly seventy years old. Video documentation is available at <http://dm.gatech.edu/~jill/robotany>.



figure 2. Visitors interacting with *Breeze* in Fribourg. The image is cast in red because we used limited spectrum lighting at night to keep the tree on its diurnal schedule.

We can distill four characteristics of visitors' interaction with *Breeze*:

- The interaction was *engaged*. Visitors centered their attention on a back and forth dialog with the tree. While they did engage in social interaction with each other, their participation was primarily concentrated on the tree for the duration of their visit.
- The interaction was *affectionate*. Visitors were very friendly toward *Breeze*, dancing, waving, kissing, petting, toasting, and greeting the animated tree.
- Visitors seemed *familiar* with the tree. We did not observe any hesitation in interacting with *Breeze*. There were no signs that a visitor felt the tree was uncanny.
- The interaction was *embodied*. The activity between visitors and *Breeze* was physical. More importantly, the sustained attention and gestures of the visitors suggest that meaning was emerging through their participation.

In San Jose

At Zer01, we accepted a donated mountain laurel to replace the Japanese maple that was the original *Breeze* 1.0. Unfortunately this large tree did not have physical characteristics amenable to the piece. The high, stiff canopy rose above people's heads and foregrounded the technological mechanism. Also, the shape memory alloy muscles strained against the high stiff branches and did not produce the same quality of response as they had in Fribourg. Most visitors spent their time looking at the piece and discussing the robotic mechanisms instead of interacting with the tree. They commented on the design and engineering craft. Even so, at one point a group of visitors joined hands around the tree and sang to it.

Interpretation

The hermeneutic structure of interpreting meaning-making on the part of visitors interacting with art is similar to the hermeneutic structure of the HCI enterprise. Visitors to an art piece, if engaged with the piece, are actively involved in interpretation. This "inner" hermeneutic layer is nested within the "outer" hermeneutic activities of the researcher trying to interpret the visitors' meaning-making. Similarly, in HCI, researchers interpret how participants interpret a system. This is especially true in third paradigm HCI projects where an understanding of meaning constructed through interaction with technology is important. When researchers are also the creators of the art piece or technology at the center of the experience, they are in dialog with the visitors/participants through the artifact as well as through their inquiry into the visitors'/participants' interaction with the artifact.

Interpretation of visitors' interaction with *Breeze* is challenged by the following constraints:

- Using language to describe the embodied realm can be problematic. For example, a visitor to *Breeze* in Fribourg asked us, "So the tree moves when I move, so what?" This statement indicates that he understood the interaction proposed by the tree, was not particularly affected, and did not find much more to the experience. As he was saying this, however, he was dancing actively around the tree, indicating that there was another experience he was having but not describing. People do not usually dance around trees in everyday social situations.
- The arena of the art experience is different than that of the textbook HCI investigation. As the artist of the piece, I am reluctant to interrupt a visitor's art experience. This interruption would override my goals as an artist providing the experience. Also, the end of the art experience cannot be specified. Is the experience over when the visitor steps away from the piece? Leaves the premises? Goes to sleep at night? Many people repeatedly visited the tree during the three weeks of the Belluard festival and festival setup. Was some aspect of the art experience continuous between visits?

Given these constraints, I decided to write a series of exploratory narrative descriptions about visitor interaction with *Breeze*. This strategy recalls the methodology of Geertz [4] whereby direct observations are described and redescribed in narrative form by the researcher to hone in on the story being told by subjects and their actions within their milieu.

Interpretations develop through reflection on and dialog with these narratives, with the original data always in mind. The following sections represent condensed versions of three of these exploratory narratives.

First narrative: the cultural imaginary

Animated trees are embedded in our cultural imagination. Trees that are physically responsive to the actions of humans include the apple trees in *The Wizard of Oz* [3], the Ents in *The Lord of the Rings* [10], and the camphor trees in *My Neighbor Totoro* [11]. With the exception of the apple trees which fought Dorothy because she picked their apples, the relationship of human(oids) and trees is portrayed in a way consistent with the characteristics of the Fribourg visitors' interaction with *Breeze*: engaged, affectionate, familiar, and embodied.



figure 3. Series of still images from *My Neighbor Totoro*.

Trees are often anthropomorphized in our culture. Children talking to trees and tree-huggers are familiar tropes. When a tree comes into such a relationship with a human, it becomes a hybrid being that can be characterized as a totem. Totems are plant and animal beings familiar within a culture's mythology. Totems have a lived relationship to the individuals within that culture, and it is possible to engage in communication with them. They form "necessarily abstract and metaphorical relations to humans" [12]. They are "familiar and congenial to man, yet outside the circle of

specifically human things and activities, thus not being subject to the disturbing agencies that abound within that realm" [6, p. 293; 12, p. 172]. As a totem, an animated, even roboticized tree would not appear uncanny. While the appropriateness of the Western idea of totems as applied to other cultures is controversial in anthropology, we cannot deny that the totem concept originated in and has meaning in *our* culture.

Cultural anthropologist Bradd Shore discusses "techno-totemism" as "cross-species participation in the age of technology" [12, p. 181]. This includes robots, human-machine hybrids, and *Breeze*, all of which participate in the ambiguities of what is human and what is not. Human communication uses categories to reduce ambiguity, though categorization will never exhaust meaning or experience. Totems permit categorical cross-over and challenge logical rationality by reorganizing everyday classification [12].

Totemism exists in a system of anthropological metaphors that may be of interest to HCI. For example, we could consider the cell phone as a talisman. Talismans are small, special objects, often on the scale of the hand, which hold promise and/or protection. Some talismans transmit their power to the bearer.

Second narrative: phenomenological interpretation

The clearing

There is a field of possibilities around any tree. Some trees show up as climbable. Some show up as bearing something to eat. Some show up as timber. Phenomenologist Martin Heidegger likens this field of possibilities to a clearing, as in a forest [7]. The light and space of a clearing allows the phenomena within it

to be intelligible, while the clearing, as the substrate of the possibilities of the phenomena, disperses into the background. Meaning is determined by the actors, entities, contexts, and contingencies within that space as seen in the light of the clearing.

Breeze's manifestation as a totem occurs in such a clearing, through which various possibilities for interaction and meaning emerge and some retire. Innumerable aspects contribute to possibilities and meaning in the clearing. For example, *Breeze* is computationally built upon a simple stimulus-response model instead of a procedural model. This computational model creates possibilities for interaction that incorporate open-ended response instead of scripted dialog. A different computational model would contribute to a different field of possibilities.

Fribourg experience vs. San Jose experience

Perhaps some of the most familiar of Heidegger's central concepts are *ready-to-hand* and *present-at-hand* [7]. These phrases describe two modes that a being can relate to tools, technology, and other artifacts. In the clearing, possibilities can emerge through an encounter with things whereby the boundaries between being and technology are diminished. In this sense, the being experiences through the technology, a situation Heidegger calls *ready-to-hand*. *Ready-to-hand* possibilities emerged during visitor interaction with *Breeze* at Fribourg. Visitors experienced a totemic tree through the technology. Experience with the technology itself was minimized. On the other hand, in San Jose, the clearing around *Breeze* presented possibilities for revealing *Breeze* as an interesting technological object available for inspection and aesthetic appreciation, but not for

engagement. Here *Breeze* manifested as *present-at-hand*. In this case, meaning could be pointed to, named, and articulated. Heidegger considers this to be a derivative form of meaning compared to experiencing or participating with the artifact in an embodied sense.



figure 4. Visitors interacting with *Breeze* in Fribourg.

Heidegger was concerned with engaged action embedded in the milieu of everyday lived experience. The emphasis is not on representing the human actor, but on possibilities in the space of interaction, the clearing. Human-centered computing/user-centered design exists for good historical reason, i.e. to take the emphasis from humankind serving the machine to the machine optimally serving the needs of humankind. An ontological problem with this characterization is that it explains everything in relation to the human at the center. A Heideggerian interpretation of interaction takes emphasis off the human actor and places it on interaction in an ecology of meaning. This shift places our caring, as we design and build, into a wider sphere of concerns. Such an interpretation becomes compelling in an age of increased competition for resources, climate change, and as computing proliferates in our

environment, osmoses into our bodies, and transmogrifies from electronics-based systems to biological, chemical, genetic, pharmaceutical and hybrid systems.

Third narrative: *physis* and *poiésis*

Breeze is one of many engagements with the techno-organic. Examples in the ACM community include Ken Goldberg's *Telegarden* [5], Marc Böhlen and Michael Mateas' *Office Plant #1* [1], and Carl DiSalvo's *Huggable Garden* [2]. Why is there an interest in combining interactive electronics with flora and, in the case of artist Shih Chieh Huang [8,9] for example, fauna?

The ancient Greeks, whose tradition is considered to be a foundation of our culture, constructed understandings upon a fundamental distinction between *physis* and *poiésis*. *Physis* is that which emerges from or creates itself, i.e. nature. *Poiésis* is the human activity of creating artifacts. *Techné*, the root of *technology*, is the understanding necessary to achieve a type of *poiésis*. For example, there would be a *techné* for painting, a *techné* for writing poetry, a *techné* for electrical engineering, etc. What does it mean to use *techné* to join *physis* and *poiésis*? What desires are represented by these artists, engineers, and the public (here represented by visitors to *Breeze*)? Are these desires echoed in AI research, cyborgs, and biotechnology?

Conclusion

As a way to understand meaning expressed in the interaction of visitors with *Breeze*, I constructed several exploratory narratives. The condensed versions of three of these narratives appear in this paper. Reflection on the first of these narratives uncovered a metaphorical system of anthropological tropes, such as totems and talismans, that may inform human interaction with

technology. The second, phenomenological narrative presented two ontological models: one of humans proceduralized at the center of the human computer interaction schema, and the other a responsive field of possibilities for interaction within an ecological milieu. The third narrative interprets the desire to unite nature with interactive electronics as a desire to unite *physis* and *poiésis*.

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