



## 18 Media Voices: Beyond Talking Heads

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It is not that words are imperfect, or that, when confronted by the visible, they prove insuperably inadequate. Neither can be reduced to the other's terms: it is in vain that we say; what we see never resides in what we say. And it is in vain that we attempt to show, by the use of images, metaphors, or similes, what we are saying; the space where they achieve their splendor is not that deployed by our eyes but that defined by the sequential elements of syntax.<sup>1</sup>

The man-machine relationship, mediated by a voice command, is a recurrent theme in twentieth-century science fiction. The onboard computers of the USS *Enterprise* spaceship in the *Star Trek* television series, which premiered in 1966; the friendship between the robot B-9 and Will Robinson in the series *Lost in Space* (1965–1968); Stanley Kubrick's mythic HAL 9000 (*2001: A Space Odyssey*, 1968); and the robot boy of *AI: Artificial Intelligence* (Spielberg, 2001, who not only speaks but also suffers are some examples of the recurrence of that theme.<sup>2</sup>

In spite of their different plots and narratives, the presence of the voice in the artificial beings those fictions portray manifests the utopia of hybridization of men and machines, which could culminate in an approximation of universes (inorganic and organic) starting from a particularly human trait: the voice.

The interest in investigation of ways to synthesize artificial sound is not new. Synthesized sound has long been explored in the field of music, and has been produced industrially since the late nineteenth century, gaining sophistication during the twentieth century. Landmarks of that process include the invention of the telephone by Alexander Graham Bell (1876); the phonograph patent by Thomas Edison (1877); the creation of the carbon microphone by the Anglo-American musician DavidEdward Hughes (1878); the magnetic recording, whose principle was first demon-

strated by the Danish engineer Valdemar Poulsen in 1900; and the stereo reproduction, in the late 1950s.<sup>3</sup>

In the decade after 1960, the first program to synthesize music was produced at Bell Labs, and in 1984 a set of parameters was established to convey musical information in digital format between a synthesizer and a computer. However, it was only in 2000, with the specification of the VoiceXML standard by the World Wide Web Consortium (W3C) that the desire for human-computer communication through voice emerged from both research labs and science fiction screens and became part of our daily life, making viable the communication not only between humans and computers, but also within a computer network.<sup>4</sup> In this chapter, I will discuss voice and media art within computer networks. I will concentrate particularly on voice and the emergent condition of the networked body in net art, wireless art, and cybrid spaces, spaces between on- and offline networks.

### Voice and Media Art

In the media art field, research directed to the exploration of the voice gained importance in the late 1980s and the 1990s, with emphasis on voice synthesis technologies. Good examples of this tendency include the following: *Huge Harry* by Arthur Elsenaar and Remko Scha (1990 to the present), a speech synthesis machine that presents lectures about algorithmic art; *Inquiry Speech Theatre* (1986) by Stephen Wilson, a drama in which four programmed computer personalities conversed with viewers via synthesized speech and voice recognition; and *I Have Never Read the Bible* (1995) by Jim Campbell, in which the complete text from the King James version of the Bible is whispered, one letter at a time.

The use of the voice in digital art works intensified from the year 2000,<sup>5</sup> with real-time works exploring a combination of different technologies (such as natural language processing and algorithmic translation of sound in other language formats), images, and the possibility of interaction through the Web. Evidence of that process can be found in several projects by Ken Feingold, realized since 2001, such as *If/Then* (2001), among many others; *Messa di Vocce* (2004) by Golan Levin, Zachary Lieberman, Jaap Blonk, and Joan La Barbara; and *Tampopo* (“dandelion” in Japanese), by Kentaro Yamado (2005).<sup>6</sup>

Regarding net-art—that is, projects conceived for the Internet environment—some significant works include *net song* (2000), by Amy Alexander; *Voice Mosaic* (2004), by Brazilian artist Martha Gabriel; and *IP Poetry* (2004), by Argentinean Gustavo Romano. All those projects, which will be discussed in this chapter, explore the Web as an informational space and use the voice to interrogate the emergent condition of the networked body.

In wireless art, I highlight here *Net Aura* (2007), by myself and Mauricio Kusamo, with programming by Rodrigo Cruz, and *Cellphonia* (2006), by Scot Gresham-Lancaster and Steve Bull. Those projects also investigate the networked body through the use of the voice, but, because of their mobile attributes, link the networked body to different social contexts.

Concerning cybrid spaces, it is fundamental to mention and to discuss *Tactical Sound Garden* (2005–present), by Mark Shepard, which combines locative media and sound spatialization processes (3D sound); *The Living Room* (2001), by Christa Sommerer and Laurent Mignonneau, which explores camera tracking, sound, and voice recognition systems; and *Reler (Reread)* (2008) by Raquel Kogan, which combines quadraphonic sound and superposition of prerecorded audio books. In all these art pieces, the voice plays the role of a connecting tool between varied systems and distributed networks.

This discussion will concentrate on these latest areas (net-art, wireless art, and cybrid spaces), seeking to analyze the epistemological implications of the human-machine relationship, mediated by voice command. I will argue that those projects point to new cognitive patterns and sociocultural features because they suggest and make us to deal with an extra-human repertoire (imaginary and aesthetic) that may emerge from that relationship. By doing so, they reverse the market trend and a cultural anthropocentric tradition cultivated since the Renaissance that concentrates only on the reproduction of human features in machines. The point of departure for this latter approach is the assumption that man is and always will be superior to machines forever.

It is a fact that word recognition and text synthesis are today functions that can be performed by any home computer and that the ability to register or produce sounds or words does not give them meaning. However, we cannot forget that “if there are lacks in artificial senses, there are also compensations, because the natural senses have limitations” to which artificial devices offer extra-human abilities, such as infrared vision that penetrates darkness, and the sonar used by submarines to scan the environment.<sup>7</sup>

That evidence indicates two major research trends being applied to the exploration of artificial sound: the search to reproduce human features in interfacing with machines, and the effort to approach the extra-human repertoire (cognitive, imaginary, and aesthetic) that may emerge from the human-machine relationship. On one hand, industrial creativity (from the microphone to VoIP, or Voice-over-Internet Protocol, technology) seems to be mobilized toward freeing us from the baffling “grooming [toilette] of the dead” to which the transcription of words into written text seems to condemn us, and which the muteness of machines tries to consecrate. On the other hand, artistic projects and top-level scientific research—without which industrial creativity does not exist—point to an almost opposite direction, namely the investigation of the extra-human unfolding of the human-machine relationship.

Roland Barthes, who defined the process of transcription under that funereal figure of “grooming [toilette] of the dead,”<sup>8</sup> pointed out that

What is lost in transcription is very simply the body—at least this external body (contingent), that, in a dialog situation, casts towards another body, as frail (or confused) as itself, intellectually empty messages, whose only function is, in a way, to retain the other (even in the prostitute sense of the term), and to keep it in its state of partner.<sup>9</sup>

But it is exactly this status of the body—ever more contingent, as Santaella has pointed out—that recent scientific discoveries and technological inventions (artificial life, robotics, neural networks, and genetic manipulation, among others in the so-called digital revolution) are redefining as the biocybernetic body, which is breaking down the barriers between artificial and natural life.<sup>10</sup> This biocybernetic body demands a questioning not only of the limits between organic and inorganic, but it also calls upon us to expand our thinking on the human-machine vocalic interface beyond trying to reintroduce the biologic body into the scene where the machine makes of us an accessory agent and vice versa.

Otherwise, one would do little more than new attempts to unhaunt, through the voice, the alphanumeric code, hence restoring phonetics and confirming the point of view that subordinates writing (which, to Derrida, is a technology to process ideas in several formats, such as text, painting, photography, films, etc.) to the level of an effect of the original “thought-sound.” A point of view that would have, also according to Derrida, instituted an inside and an outside of language, and condemned writing

(textual, pictorial, cinematographic, etc.) to the condition of mere figuration of speech.<sup>11</sup>

Otherwise, also, one would not advance beyond the twentieth-century ambitions to emulate the sounds of human speech. Unlike eighteenth-century automata and nineteenth-century industrial products, today's projects that include voice try to differ from the processes that generate sounds in the human body and thus counter the idea of being a mere simulacrum of nature, that is, a mechanism of production of undifferentiation between the real and the unreal, the natural and artificial, through the staging of a hyperreality.<sup>12</sup>

As the artist and researcher Remko Scha, coauthor of the virtual and interactive speaker *Huge Harry*, has declared:

In the 20th century, we see an entirely different approach: digital technology which calculates the shapes of sound signals and then uses loudspeakers to make them audible. The voice is no longer imitated, but its output is faked. The algorithm computes signals that evoke the image of a physical process that never occurred. The 18th century automaton is a mechanical body, a piece of clockwork claiming the qualities of life. In 20th century computer simulation, the mechanics is abstract, the machine dissolves into mathematics. The body has disappeared.<sup>13</sup>

### Digital Voices and Networked Bodies

It is exactly that dissolution of the body that is announced in projects such as *net song*, *IP Poetry*, and *Voice Mosaic*, and that is rethought as an ambivalence between presence and absence in *Living Room*, *Re-Read*, *Tactical Sound Garden*, *Cellphonia*, and *Net Aura*. These projects also engage with the emerging dynamics between public and private that are revealed with mobile communication.

The project *net song*, as Amy Alexander states on her website, is:

the song of the web, as performed by a web search engine robot. When provided a search term, the net song bot will search for this term in a search engine, then choose a page from the search results and begin following links from that page. It will continue to follow links from the resulting pages indefinitely, backing up and rerouting if it hits a dead end.<sup>14</sup>

The result is "a unique lyricalness and poignant narrative of the web." In sum, "not content to merely surf the information superhighway, the netsong bot makes it music."<sup>15</sup> *net song's* music points to new formats of

agency between human and nonhuman entities that are at the core premises of the actor-network theory (ANT) of Bruno Latour, Michel Callon, and John Law.<sup>16</sup> These new formats also imply new paradigms of interaction and relationship in a “disquieting liminal zone between the living and the dead, the animate and the inanimate,” as Kathy Cleland has pointed out.<sup>17</sup>

In *Voice Mosaic*, Martha Gabriel maximizes that approach, taking as a point of departure a series of dualities (oral/visual, individual/collective, active/passive, and human/machine, among others) that for centuries in western culture have been understood as oppositions, and treating them instead as forces that interpenetrate. The work appropriates speech synthesis and voice recognition technologies—used in electronic call centers by banks, airline companies, institutions, and client attendance services. The website offers some phone numbers that participants must call to receive instructions. Basically, one must choose one color and to record a message. The chosen color will become a tile in the collective mosaic of voices.

By clicking on the colored tiles, it is possible to hear the messages recorded by the people who form the mosaic. People’s tiles can be found in the mosaic via the phone number from which they called to participate. It is possible to find a person’s tile or your own tile by searching for the phone number. It is also possible to search for all people within the same area by searching the area code and leaving the phone number blank.

Although it is possible for the message emitter to recover his or her own participation, the eclectic mosaic of recorded messages, on being heard or viewed by the visitor, erases the traces of its origins, appearing as a diminutive monochrome audiovisual among others. So Gabriel creates an interesting friction between the real, biological persona (the one who conveys the voice), and the virtual, cybernetic persona (the one that mingles with the data offered in the mosaic), enunciating their relationship of complementarity, without creating identities or continuities between the online (public) or offline (private) spaces.

The disturbing character of the liminal zone between the animate and the inanimate to which Cleland refers shows up particularly clearly in *IP Poetry*, by Gustavo Romano, in which a similar process to that of *net song* is realized, with the final result of orally recited poems, created from a real-time text search on the Internet. However, the game between the human and nonhuman elements in the work is distinct. Those texts, defined on the project’s site by interactors, who also choose the parameters of com-

position, are converted into sound that animates prerecorded images of a human mouth reciting phonemes (figure 18.1).

The combination of the interactors' selection of and instructions for text composition along with the processing done by the robotic agent, the "IP Bot," and the video image of a mouth reciting phonemes, to which are attached the recited poems, result in a disturbing portrait of a post-anthropomorphic device that haunts and charms those who see/read/watch the generated IP poems.

It is precisely the presence of telematic entities—partially human, but not at all anthropomorphic—that is at the center of Christa Sommerer and Laurent Mignonneau's *The Living Room*. As the artists describe on the project website:

*The Living Room* is an intelligent, interactive image, sound and voice environment. It becomes "alive" and starts to "sense" when users enter and interact with this room. Like in a perfect surveillance system, all sounds, voices, gestures and motions of the users are detected through state-of-the-art camera tracking, as well as sound and voice recognition systems. When the various users start to interact and communi-



**Figure 18.1**

*IP Poetry* installation view at MEIAC, Badajoz, Spain, 2008.

cate with each other within this room, they will also start to communicate with *The Living Room*.<sup>18</sup>

*The Living Room* interprets the speech data collected on the Web and displays it in form of images in the exhibition space and uses those data to generate and broadcast new sound and voices. By doing so, the project creates a dynamics of multiplied doubles within which the limits between natural and artificial, on- and offline are undone, to consolidate the reality of networks that, according to Bruno Latour's definition, don't have an inside and an outside, but rather points of connection.

And it is exactly this deep approach to the networked experience that guides the *Reread* project by the Brazilian artist Raquel Kogan. The installation is composed of one wood bookstand filled with fifty untitled books, otherwise similar to any traditional library. All the books are apparently the same, same color, all of the same width and height, identified solely by the golden number engraved on the spine. But they are not usual books. They are books to be heard and not read. Moreover, they are not mere audio books. Each volume is filled with short excerpts of the favorite books of fifty people invited to participate in the execution of the installation, with each book having an owner and a voice.

In the exhibition space, visitors choose a book and upon opening it have their faces illuminated by a small LED installed in the traditional page place. Simultaneously, a built-in audio recording system with integrated circuit plays back the prerecorded voice of the one who selected that excerpt reading from his favorite book for a maximum of four minutes.

At the same time, all of the texts being "read" from the opened books are added one to another by one interface connected with a computer, forming the quadraphonic sound of the ambient in real time and creating a palimpsest of voices, timbres, and languages that continually changes as new books are removed and returned (figure 18.2).

By doing so, the project transforms the presence of the "reader" in the room into a player of a discrete orchestra of fluid personal memories that will compose the ephemeral voice of the installation, situating it in a unique cybrid experience. There, while listening to other people's voices, the individual dissolves itself and becomes a temporary node in a network of different spaces (like the private space of each of the fifty people invited to participate in the books' recording and the public space of the reading room), temporalities (like the narrative temporality of each audio record



**Figure 18.2**

*Reread* installation at the 4th Art and Technology Biennial, Sao Paulo, Brazil, 2008.

and the machine reading time of each audio book), and textual individual memories translated into collective “databodies” voices of a delicate dataspace.

### **Digital Voice and Data Bodies**

Today, with the multiplication of connected and connectivity spaces through the growing presence of Wi-Fi systems and the popularization of mobile devices, such as cell phones and PDAs, dataspace is confused with the very urban space and the human body. As a matter of fact, we can say that the proliferation of iPods, cell phones, and mobile technology in general has transformed the human body into part of a circuit of connections integrated to global telecommunications networks.

The project *Tactical Sound Garden* (2004–2008) by Mike Shepard explores this emerging dataspace creating a relationship between the city’s inhabitants with the sound that surrounds and permeates them. As the artist explained in an interview with Marcus Bastos, *TSG* “is not a specific sound composition or a sound art work, but a technology that allows the public participation in the creation of a collaborative sound sculpture.”<sup>19</sup> In a certain sense, one can say that *Tactical Sound Garden* is an exercise of giving voice to the city through the “audio selections” operated by the project’s participants.

Shepard explains:

The TSG Toolkit enables anyone living within dense 802.11 wireless (Wi-Fi) hot zones to install a sound garden for public use. Using a Wi-Fi-enabled mobile device (PDA, laptop, mobile phone), participants plant sounds within a positional audio environment. These plantings are mapped onto the coordinates of a physical location by a 3D audio engine common to gaming environments—overlying a publicly constructed soundscape onto a specific urban space. Wearing headphones connected to a Wi-Fi-enabled device, participants drift through virtual sound gardens planted by others as they move throughout the city.<sup>20</sup>

At the project's website, one can access the conceptual and technical documentation and also download the software needed for the urban interventions (figure 18.3). In addition, the site has interactive maps that document the experiments done and that work as virtual gardens, adding new public dimensions to the personalized urban experiences.

The relation between intimacy/individuality and the voice is approached with irony in the amusing work *Cellphonia* by Scot Gresham-Lancaster and Steve Bull. This work promotes the collective composition and performance of "operas" on daily themes, such as the threat of exhaustion of the planet's water and the avalanche of news, that result in intriguing "mobile karaokes." In *Cellphonia in the News*, launched in San Jose during the First Zero One Festival (2006), for example, the public would access the project's voice interface by phone and would hear a robot singing the main headlines of the day. The song lyrics were taken from an RSS newsfeed provided by the *San Jose Mercury News*. To the prerecorded voices, interactors would add their words. The soundtracks available on the site record the choir formed by the junction of machine and human voices, by the integration of an automatic libretto—based on RSS news feeds—music precomposed and algorithmically generated by the news feeds with the real-time recording of the voices. This multimedia and multilanguage system—real people's voices and programming languages—results in an intriguing biocybernetic opera that transforms the mobile phone caller in a post-human performer.

The stimulus to the creative use of mobile phones, which are more and more popular, is the justification of *Cellphonia* and was also that of *Net Aura*, a project based in voice synthesis and recognition that allows the participant to record an audio message by phone or any VoIP system and to receive an animation that translates the message sent into an image.

When calling the project's phone, the participants' voices are recorded in Waveform Audio Format (WAV) converted to Musical Instrument Digital

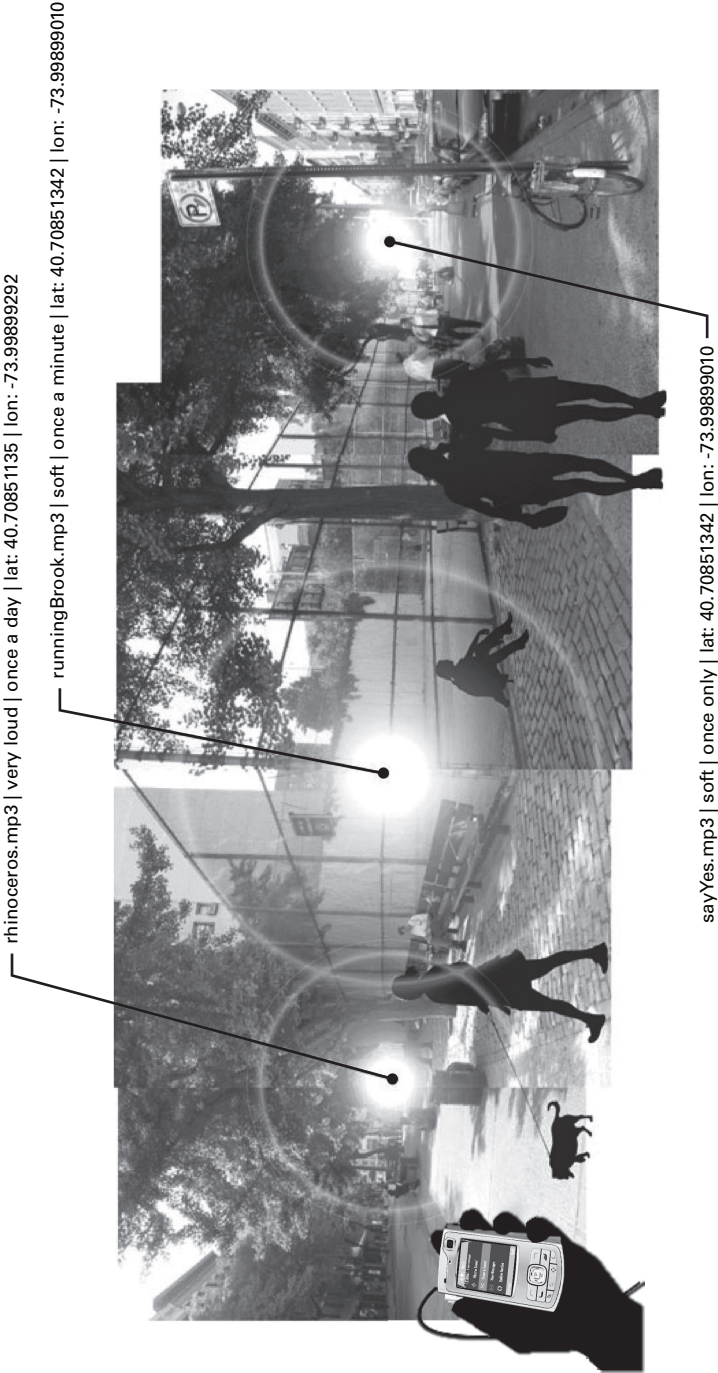


Figure 18.3  
TSG concept diagram.

Interface (MIDI) format, and archived in a database that communicates with another server. In this second server, the audio is read by an algorithm, from instructions that associate the tones to a palette of thousands of colors and to vertical, horizontal, and sinusoid lines. Those parameters are included in a video file that is generated in Windows Media Video (WMV), converted into Flash Video (FLV) and 3GP (a cell phone video format), published on the project's site, where one can view the recorded aura (and all the others), send the aura to someone by e-mail, and download it to a computer or to a mobile phone. A third database identifies the mobile number used in the recording (when it is done through mobile) and sends a text message (SMS) to the emitter, notifying the availability of his or her "Net Aura."

In Brazil, according to data collected in 2006, there are around ninety million mobile phone users—with 87 percent being from class A (the richest class), 85 percent from B, 69 percent from C, and 43 percent from D and E (the poorest classes)—whose activities are still mainly speech (74.5 percent) and text messaging (47 percent).<sup>21</sup>

Starting from this information, the project has tried to design an accessible system (using the mobile phone's main functions from the Brazilian public's point of view—speech and text message) that would stimulate the formation of a cycle in which the emitted message in an ordinary phone call could return, artistically, to the emitter, to be published and circulate among other devices. Beyond that investment in the possibility of creation of message migration cycles, the project tried to explore the relationship between the voice individuality and its algorithmic translation into an image artificially created by the different conversions of media and format.

In this way, *Net Aura* dialogs with the other projects analyzed in this chapter. Like them, it is concerned with voice interface as a reflection on the human/machine relation, focusing on the possibility of hybridization of the human body with the machine, merging organic and inorganic universes without denying their differences, but considering them as fluid territories in temporary connections. As Felix Guattari states: "We need to free ourselves from a solitary reference to technological machines and expand the concept of machine so as to situate the machine's adjacency to incorporeal Universes of reference."<sup>22</sup> From that perspective, the projects presented in this chapter stress the necessity of understanding the digital voice not merely as an upgraded version of the human voice or its translation into a

technological device, but as a more complex approach to technology and the presence of the networked body in our daily life.

## Notes

1. Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*, (London: Routledge, 2002), 10.
2. For an interesting history of artificial beings in literature and in films and examples of their human attributes, including voice, see Sidney Perkowitz, *Digital People—From Bionic Humans to Androids* (Washington D.C.: Joseph Henry Press, 2004), 17–50.
3. *Ibid.*, 79–80, and *Encyclopaedia Britannica Online*, s.v. “Hughes, David,” <http://www.britannica.com/eb/article-9041424> (accessed July 29, 2008).
4. Martha Gabriel, “Interfaces de Voz em Ambientes Hipermediáticos” [Voice Interfaces in Hypermediatic Environments] (MA diss., University of São Paulo, 2006), 15. For the VoiceXML specification at the time it was released (2000), see “Voice eXtensible Markup Language (VoiceXML) version 1.0,” (W3C, 2000), <http://www.w3.org/TR/2000/NOTE-voicexml-20000505/> (accessed July 29, 2008).
5. Those explorations are contemporary of important projects related to sound art that involve experiments in the area of electroacoustic music, installations, and performances that evade the scope of this work. Among others, nonetheless relevant, one could indicate *OP\_ERA: Sonic Dimension* (2005–2007), from Brazilian artists and researchers Daniela Kutschat and Rejane Cantoni, an immersive and interactive installation designed as a music box. The box is a black, open cube filled with hundreds of visually identical violin-like strings. Tuned with the specific tension, each virtual string vibrates with a visual-sound frequency (light and sound waves) that varies according to its relative position and mode of interaction. See <http://www.op-era.com> (accessed July 29, 2008).
6. For a detailed and encompassing scrutiny of artistic projects related to the theme, I recommend the links compiled by Stephen Wilson at “Intersections of Art, Technology, Science & Culture—Links,” <http://userwww.sfsu.edu/~infoarts/links/wilson.artlinks2.html#speech> (accessed July 29, 2008).
7. Sidney Perkowitz, *Digital People—From Bionic Humans to Androids* (Washington D.C.: Joseph Henry Press, 2004), 81.
8. I refer here to *The Grain of the Voice*, a volume that gathers most interviews given by Barthes between 1962 and 1980, and that includes, in the opening, the introduction written by him in 1974 to the transcription of the *Dialogues*, produced by Roger Pillaudin for France-Culture, and published by Presses Universitaires de Grenoble.
9. Roland Barthes, *O Grão da Voz [The Grain of the Voice]*, trans. by Teresa Meneses and Alexandre Melo (Porto: Edições 70, 1982), 11.

10. Lucia Santaella, *Culturas e Artes do Pós-humano. Da cultura das Mídias à Cibercultura* [Post-human Arts and Culture—From Media Culture to Cyberculture] (São Paulo: Paulus, 2003), 180–199.
11. Jacques Derrida, *Gramatologia* [Of Grammatology], trans. by Renato Janine Ribeiro and Miriam Chnaiderman (São Paulo: Perspectiva, 1973), 38.
12. Jean Baudrillard, "Simulacra and Simulations," in Mark Poster (ed.), *Jean Baudrillard, Selected Writings* (Stanford: Stanford University Press, 1998), 166–184, [http://www.stanford.edu/dept/HPS/Baudrillard/Baudrillard\\_Simulacra.html](http://www.stanford.edu/dept/HPS/Baudrillard/Baudrillard_Simulacra.html) (accessed July 29, 2008).
13. Remko Scha, "Virtual Voices," *Mediamatic* 7, no. 1 (1992), <http://www.mediamatic.net/article-8340-en.html> (accessed July 29, 2008).
14. Amy Alexander, *net song*, 2000, <http://www.netsong.org> (accessed July 29, 2008).
15. Ibid.
16. Bruno Latour, "On Actor Network Theory: A few clarifications," *Nettime mailing list archives*, 1997, <http://www.nettime.org/Lists-Archives/nettime-l-9801/msg00019>, and John Law, "Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity," Centre for Science Studies, Lancaster University, 2003, <http://www.lancs.ac.uk/fass/sociology/papers/law-notes-on-ant.pdf> accessed July 29, 2008).
17. Kathy Cleland, "Talk to me: getting personal with interactive art," *Proceedings of the Interaction Systems, Practice and Theory Symposium*, University of Technology Sydney/ Powerhouse Museum, Sydney, November 16–19, 2004, [http://research.it.uts.edu.au/creative/interaction/papers/interaction04\\_43.pdf](http://research.it.uts.edu.au/creative/interaction/papers/interaction04_43.pdf). (accessed July 29, 2008).
18. Christa Sommerer and Laurent Mignonneau, *The Living Room*, 2001, <http://www.interface.ufg.ac.at/christa-laurent/WORKS/CONCEPTS/TheLivingRoomConcept.html> (accessed July 29, 2008).
19. Marcus Bastos, "Jardins sonoros da bit-lônia (entrevista com Mark Shepard)" [Sound Gardens of Bit-lon—interview with Mark Shepard], *arte mov—revista*, no. 7 (August, 2007), <http://www.artemov.net> (accessed July 29, 2008).
20. Mark Shepard, "Tactical Sound Garden [TSG] Toolkit," *306090-09: Regarding Public Space* 9 (2005): 64–71.
21. Regarding the use of mobile phones to access music and video, excepting ringtones, Internet, and multimedia messages, the numbers drop sharply—respectively, to 10 percent, 5 percent, and 8.75 percent. For all the information related to the use of cell phones in Brazil cited here, see: *Survey on the Use of Information and Communication Technologies in Brazil ICT HOUSEHOLDS and ICT ENTERPRISES 2006* (São

Paulo: Brazilian Network Information Center, 2007), <http://www.cetic.br/usuarios/tic/2006/rel-semfio-01.htm> (accessed July 29, 2008).

22. Felix Guattari, *Chaosmosis: an ethico-aesthetic paradigm*, trans. by Paul Bains and Julian Pefanis (Bloomington and Indianapolis: Indiana University Press, 1995), 31.

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