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Presence in a Pocket. Phantasms of Immediacy in Japanese Mobile Telepresence Robotics

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Abstract

The paper addresses prospects of Japanese mobile telepresence robotics where small anthropomorphic devices are designed to act as intermediaries between remote interlocutors. First, an emic perspective of involved scientists and engineers is presented, focusing on example technologies being developed at the Hiroshi Ishiguro Lab in Kyoto (Japan), particularly a „cellphone-type tele-operated android [...] transmitting human presence“ called Elfoid. It represents an attempt to get “behind the veil of the machine” (Sekiguchi/Inami/Tachi 2001, about their RobotPHONE prototype which uses a similar concept) in that it is supposed to act as a solid substitute for a dialog partner through evoking a feeling of presence (*sonzaikan* in Japanese philosophy, the feeling that someone is sharing the same physical space).

In such undertakings, specific utopian ideals of communication become apparent. Paradoxically, the high-tech developments aim at constituting seemingly immediate interactions, preferably bypassing any potentially troublesome interface. The existence of a phantasm of immediacy (Bolter/Grusin 2000) can be traced back to decisive moments in media history and belongs to the central promises of new technological interfaces. Interestingly, the engineers’ statements reveal a latent technophobia, an ambition to overcome the limitations of physical devices altogether and to move on to more direct means of communicative exchange (including the mythical dimension of telepathy).

Two questions are of particular concern:

1. On what different levels does the notion of immediacy operate?

Not only does it refer to a spiritual ideal of unmediated communion, but it also influences practical decisions in interface design. “Natural” and “Tangible” User Interfaces are the result of a practice of disguise in that they mask their factual hypermediacy to allow for a seamless knotting up of real and mediated environments.

2. What is the relationship between media and the immediate?

The concept of immediacy has so far been met with an almost univocal intellectualist disdain on the part of media theorists. The reason for this rejection is simple enough: If one takes ideas of immediacy serious, the self-image of a whole field of study is called into question. The paper thus attempts to provide a contribution to the question of how media build on notions of immediacy. Any theoretical attempt at describing their operations should take into account the intricate relationship between media and the immediate.

Keywords

Media Theory, Telepresence, Robotics, Mobile Phones, Japan, Immediacy, Elfoid, Hiroshi Ishiguro

Cover Page Footnote

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Introduction

The history of the media of telecommunication can be conceptualized as a succession of ever-new ways of negating distance by technological means. While the hand-written letter set out to diminish the dimension of space by connecting two distant interlocutors in mind, telegraphy seemingly made obsolete the dimension of time as well. In fact, early telegraphic messaging outperformed older means of telecommunication so profoundly, that contemporaries (and later media theorists like Marshall McLuhan) described its effects as instantaneous with regard to time and space.¹ But the technological development didn't stop at having reached this supposed maximum of performance. Instead, broadcast media proved that the transmission of sounds (radio) and images (television) offered fertile ground for the emancipation of telecommunication from symbolic exchange systems ultimately based on language. There is no indication that this history has come to an end with the rise of the networked computer and its multimedia capacities.

In the emerging field of telepresence robotics, an (often humanoid) artifact serves as a substitute for a remote operator by offering him or her the opportunity of material embodiment at a distant location.² The technology is applied in different contexts. On the one hand, it provides experts from diverse fields with a device to work in remote settings, e.g. in dangerous environments like disaster sites, oil-rigging platforms or in telemedicine.³ On the other hand, telepresence robotics is an attractive field of research in undertakings of a more social nature, i.e. attending business meetings, visiting relatives in another city or even intimate exchange with a distant partner.⁴ This latter general scenario (social uses) is

¹ Cf. Florian Sprenger, "A theory of media as a history of electricity: How McLuhans thoughts about mediation are thwarted by their negation," in *Understanding media, today: Conference proceedings*, ed. Matteo Ciastellardi, Cristina de Miranda Almeida Barros and Carlos A. Scolari (Barcelona: Editorial Universidad Oberta de Catalunya, 2011), 74-9. For the fundamental paradox involved in this assumption, see below.

² Cf. Ken Goldberg, ed., *The robot in the garden: Telerobotics and telepresence in the age of the Internet* (Cambridge, Mass.: MIT Press, 2001) for a collection of essays on the epistemology of telepresence and Cheryl C. Bracken and Paul D. Skalski, eds., *Immersed in media: Telepresence in everyday life* (New York: Routledge, 2010) for a recent treatment of current telepresence technologies and practices.

³ This use of robots is stressed by Marvin Minsky in his early essay where he framed the term 'telepresence'. Cf. Marvin Minsky, "Telepresence: A manifesto," *Omni*, June 1980: 44-52.

⁴ Science fiction has come up with even more intriguing uses, including the full replacement of everyday human interaction with that of artificial stand-ins (*Surrogates*, D: Jonathan Mostow, USA 2009).

especially popular in Japan, where robotic technology faces none of the *Terminator*-inspired prejudice that is so common in Western narratives.⁵

The purpose of this article is to investigate a Japanese take on telepresence robotics as it can be found in the prototypes built at the Hiroshi Ishiguro Lab (HIL), which is part of the Advanced Telecommunications Research Laboratory International (ATR) near Kyoto. The focus is on the Elfoid model which is a smartphone-size, ‘humanoid’ communications device. Nine expert interviews with leading scientists from the lab and other scientists from ATR conducted in February and March 2012 provide the groundwork for an analysis rooted in media theory. Especially the notion of immediacy is of interest here, both as a stated research goal and as a recurring topos haunting media theory from its very beginnings.

The Setting: Hiroshi Ishiguro Lab

A (notoriously) famous robot engineer and creator of the field of android science, professor Hiroshi Ishiguro is the director of Osaka University’s Intelligent Robotics Laboratory.⁶ His vision of telepresence robotics is quite different from that of comparable projects – which often content themselves with creating mobile platforms carrying a selection of sensors, generally oblivious to design – as he is not only an ambitious scientist but sees himself as an artist and a philosopher as well. Ishiguro strives to answer questions like “What is human presence and how can it be represented in remote locations?”, at the same time pursuing even more venerable issues like “What actually *is* a human being?”.⁷ In

⁵ Cf. Frédéric Kaplan, “Who is afraid of the humanoid? Investigating cultural differences in the acceptance of robots,” *International Journal of Humanoid Robotics* 1, no. 3 (2004): 1-16, <http://www.csl.sony.fr/downloads/papers/2004/kaplan-04e.pdf>. Kaplan proposes the existence of a ‘Frankenstein syndrome’ that influences the Western attitude towards technology since the age of Romanticism. In Japan, on the other hand, not even the distinction between nature and culture is so clear-cut, which makes attitudes towards humanoid robots more relaxed. For a recent comparison of Japanese and UK attitudes towards humanoid robots challenging some of Kaplan’s theses, cf. Dag S. Syrdal et al., “Examining the Frankenstein syndrome: An open-ended cross-cultural survey,” in *Social Robotics: Third International Conference, ICSR 2011, Amsterdam, The Netherlands, November 24-25, 2011. Proceedings*, ed. Bilge Mutlu et al. (Berlin, Heidelberg: Springer 2011), 125-34.

⁶ For the foundations of android science, cf. Hiroshi Ishiguro, “Interactive humanoids and androids as ideal interfaces for humans,” in *Proceedings of the 11th international conference on Intelligent user interfaces - IUI '06*, ed. Cécile L. Paris and Candace L. Sidner (New York: ACM Press, 2006), 2-9, doi: 10.1145/1111449.1111451.

⁷ Cf. Peter H. Kahn et al., “What is a human? Toward psychological benchmarks in the field of human-robot interaction,” *Interaction Studies* 8, no. 3 (2007): 363-90, http://www.vsdesign.org/publications/pdf/407_kahn.pdf, and Shuichi Nishio, Hiroshi Ishiguro,

his robot design, he attempts to propose possible answers to such questions. The most well known robots developed at Hiroshi Ishiguro Laboratory – located halfway between Osaka and Kyoto in the premises of ATR where Ishiguro is a distinguished fellow – are the *Geminoid* and *Telenoid* models. They represent two complementary approaches to the common goal of transferring human presence to a remote location. The presence effect shall ideally encompass both partners of a conversation, the operator being embodied in robot shape somewhere else and the human interlocutor interacting with that robot. Both should have the impression of sharing a common space for convincing telepresence to occur.⁸ While the Geminoid models aim to realize this scenario by an impressive realism – they are convincing twin copies of their human role models – the Telenoid model features only a rudimentary humanoid shape. The highly realistic appearance of the Geminoid stands for a top-down approach to the problem of conveying human presence, while the confinement to just a few essential features (roughly human shape, generic face, short extremities) of the Telenoid is basically the attempt to build presence from the bottom up.⁹

The telepresence robots developed at Hiroshi Ishiguro Lab are neither strictly science nor art. They are collaborative efforts to explore aspects of human interaction and communication by the design of ‘human-like’ robots, called androids. In the lab’s mission statement, the group’s – rather unhumble – self-positioning is made clear:

The end of the information age will coincide with the beginning of the robot age. However, we will not soon see a world in which humans and androids walk the streets together, like in movies or cartoons; instead, information technology and robotics will

and Norihiro Hagita, “Can a teleoperated android represent personal presence? — A case study with children,” *Psychologia* 50, no. 4 (2007): 330-42, doi:10.2117/psysoc.2007.330.

⁸ This is not a trivial task. Hubert L. Dreyfus has pointed out that *intercorporeality* (a term by Maurice Merleau-Ponty, signifying a more basic “sense of being in the presence of other people”) is absent from telepresence and that it might not be realizable at all. Cf. Hubert L. Dreyfus, “Telepistemology: Descartes's last stand,” in Goldberg, *The robot in the garden*, 48-63, 61. In Japanese philosophy (and consequently in robotics research), the term *sonzaikan* is used to express precisely this feeling of shared presence.

⁹ While even more minimalist solutions are being pursued. Cf. Hideaki Ogawa’s series of design experiments titled *SmallConnection* at <http://www.howeb.org/?project=smallconnection> (accessed 05/25/2012). They explore different forms of haptic, non-verbal telecommunication that allow users to feel each other’s presence over a distance, without resorting to any anthropomorphisms at all. The most recent project at HIL is called *Hugvie* and resembles a huggable pillow equipped with a vibration motor into which a user’s cellphone can be inserted, supposedly allowing a more intimate conversational setting. Cf. <http://www.geminoid.jp/projects/CREST/hugvie.html> (accessed 06/11/2012).

gradually fuse so that people will likely only notice when robot technology is already in use in various locations.

Our role will be to lead this integration of information and robotics technologies by constantly proposing new scientific and technological concepts. Toward this, knowledge of art and philosophy will be invaluable. Technology has made art "reproducible"; likewise, artistic sense has contributed to the formation of new technologies, and artistic endeavors themselves are supported by philosophical contemplation and analysis.

Hereafter, human societies will continue to change due to "informationization" and robotization; in this ever-changing setting, artistic activities and philosophical speculation will allow us to comprehend the essential natures of humans and society, so that we can produce truly novel science and technological innovations in a research space which lies beyond current notions of "fields" and boundaries of existing knowledge.¹⁰

Group leader Ishiguro's reputation extends the boundaries of the robot engineering scene. In May 2011 he was listed in the AsianScientist's "Ultimate List of 15 Asian Scientists to Watch".¹¹ He is an internationally renowned conference speaker and the group has participated in art and technology festivals like Ars Electronica in Linz, Austria. Additionally, some of the robots have starred in android-human theatre performances, directed by Oriza Hirata. His fame notwithstanding, Ishiguro's robots are considered by many commentators to have a frightening appearance. The Uncanny Valley theory is often mentioned in scientific and newspaper articles as well as blog posts referring to their design.¹² The model central for this paper is no exception in this regard.

¹⁰ <http://www.geminoid.jp/en/mission.html> (accessed 05/25/2012).

¹¹ Juliana Chan, "The ultimate list of 15 Asian scientists to watch," AsianScientist, May 15 2011, <http://www.asianscientist.com/list/hiroshi-ishiguro/> (accessed 05/25/2012).

¹² The Uncanny Valley theory, originally proposed by Masahiro Mori, "The uncanny valley," *Energy* 7, no. 4 (1970): 33-5, <http://www.movingimages.info/mit/readings/MorUnc.pdf> states that humans tend to react positively towards increases in human-likeness in robots, but only up to a point. When robots look very realistic or approach an almost life-like behavior, they can have an unsettling effect on human observers. Ishiguro reacted to the criticism in Christoph Bartneck et al., "My robotic doppelgänger - a critical look at the Uncanny Valley," in *Proceedings of the 18th IEEE International Symposium on Robot and Human Interactive Communication RO-MAN 2009* (Piscataway, NJ: IEEE, 2009), 269-76, doi: 10.1109/ROMAN.2009.5326351, utterly rejecting the uncanny valley hypothesis in favor of designing highly-realistic androids.

Elfoid: a “Cellphone-Type Tele-Operated Android”

The Elfoid P1 is a miniaturized version of the Telenoid model and was introduced to the public in March 2011. The current prototype version is approximately 20 cm long and resembles a human baby to some extent. It contains no actuators as the implementation proves difficult due to the small scale and limited battery power. Its bigger cousin Telenoid is equipped with such actuators that make it possible to render some facial expressions and gestures that the robot’s operator performs remotely. In the case of the Elfoid, the technical interior is limited to a standard smartphone processor with SIM card (capable of accessing the mobile phone wireless network), a single button located in the chest, an LED light that can switch from red to green to display if a connection is established, a microphone in the leg and speakers in the head. Its texture is made of robust but stretchable urethane gel and resembles human skin. The developers plan to implement a temperature sensor, accelerometer, and image and voice recognition functions.

Strictly speaking, the Elfoid is not an actual robot as it doesn’t have any autonomous movement capabilities. With the given technical specifications in mind, the device at its current state of development can best be described as a curiously shaped mobile phone casing. However, it draws on three genealogies in a unique combination: that of the social robot pet (comparable to popular models like the therapeutic robot seal *Paro*), the children’s baby doll toy and the mobile phone in its function as an enabler of phatic communication. As this article is more concerned with commenting on certain ideas of communication and persistent phantasms surfacing in media development, the inferiority of the investigated device is acknowledged, but bracketed for the time being. Certainly, the Elfoid is no adequate solution to the alleged problems of telecommunication it insinuates. It shall rather be read as the symptomatic addressing of an assumed systematic shortcoming of mediated communication that seems to need fixing.

Reactions by journalists and bloggers were mixed.¹³ The idea of combining smartphones and social robots is not new. It has been proposed by

¹³ Elfoid has respectively been described as “the world’s most terrifying mobile phone” (Gerald Lynch, “Introducing Elfoid: The world’s most terrifying mobile phone,” TechDigest, March 4 2011, http://www.techdigest.tv/2011/03/introducing_elf.html), “an animated sperm-like doll” (Ben Coxworth, “Elfoid: creepy mini-robot meets smartphone,” gizmag, March 4 2011, <http://www.gizmag.com/elfoid-telepresence-mobile-phone-robot/18062/>), an “unholy robo-fetus” (Tim Hornyak, “Unholy robo-fetus Elfoid is your new cell phone,” CNET News, March 3 2011, http://news.cnet.com/8301-17938_105-20038861-1.html) and “a squishy and wiggly cell-phone” (Anonymous, “Elfoid: Telenoid’s unholy, possessed baby,” RobotShop Blog, March 3 2011, <http://www.robotshop.com/blog/elfoid-telenoids-unholy-possessed-baby-1213>). All websites accessed 05/25/2012.

Japanese scientists in 2001¹⁴, and researchers at Simon Frazer University in Vancouver have developed prototypes of “dancing cellphones” capable of expressing various emotions by simulated gestures and a video display.¹⁵

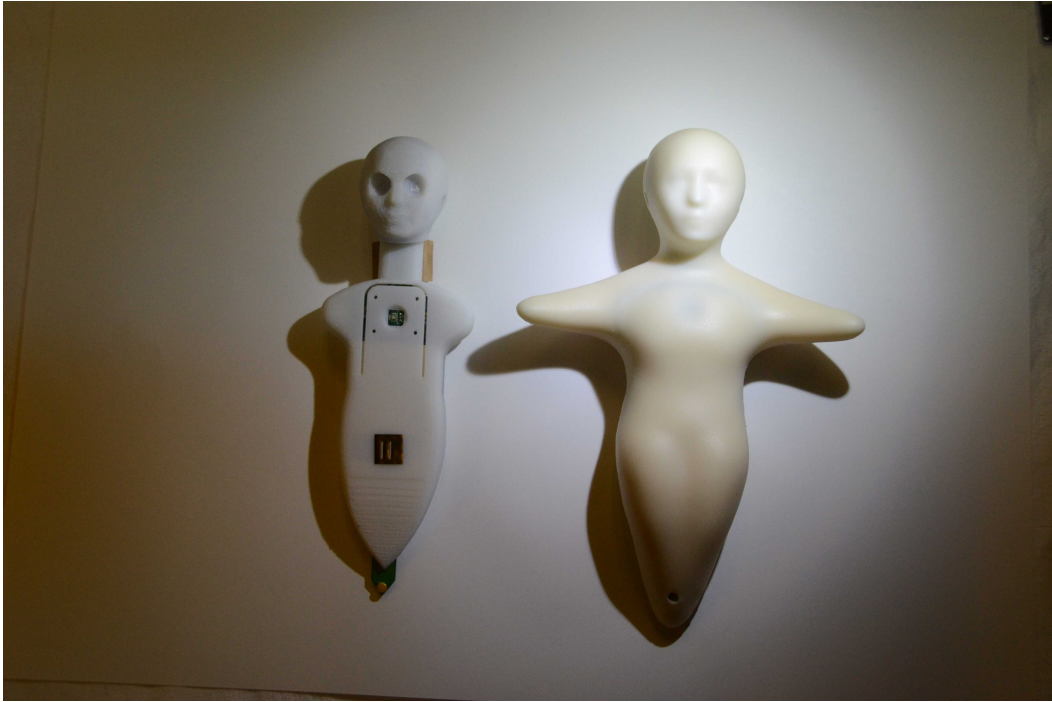


Figure 1: Elfoid prototype. “Elfoid P1 was developed by ATR Hiroshi Ishiguro Laboratory.”

The Elfoid project website summarizes the design goals:

The Elfoid we have currently developed is *an innovative communication medium which conveys individuals' presence to remote locations* using voice, appearance, touch, and motion. Its

¹⁴ Dairoku Sekiguchi, Masahiko Inami, Susumu Tachi: “RobotPHONE: RUI for Interpersonal Communication,” CHI2001 Extended Abstracts, 2001, 277-278, <http://www.star.t.u-tokyo.ac.jp/projects/RobotPHONE/robotphone.html> (accessed 05/25/2012). The motivation for building a teddy-bear like mobile phone with motion capabilities is described as follows: “With traditional communication methods such as telephones and videoconferencing systems, a user can only feel the existence of the person behind the veil of the machine. In contrast, a user of RobotPHONE can feel the existence of the person as if he was directly in front of her.” (ibid., 278).

¹⁵ Ben Coxworth, “Avatar technology is here – in the form of a dancing cellphone,” *gizmag*, May 12 2010, <http://www.gizmag.com/cellphone-robots-relay-users-movements/15078/> (accessed 05/25/2012).

design --easily recognizable at first glance to be nothing but a human, capable of being interpreted equally as male or female, old or young-- and soft, pleasant-to-the-touch exterior have been implemented in cellular phone size. By combining voice-based conversation with appearance and touch capable of effectively communicate [sic!] an individual's presence, the user of this technology can feel *as if they were conversing in a natural fashion with someone directly in front of them*. Furthermore, the developed system eventually departs from the button pressing approach now used in cellular phones, in favor of image and voice recognition technology, with the goal of realizing *an interface which anyone can use*. Just as the Internet and cellular phones has [sic!] greatly affected our life styles, this new form of presence-conveying communication medium, Elfoid, will further change our lives in the near future.¹⁶

The italicized passages in the quote highlight the central utopia of telecommunication that is expressed in the design of the Elfoid android phone.¹⁷ An “interface which anyone can use” promises to provide an even more trivialized interaction than the current smartphone generation with its touchscreens and app infrastructure. The goal of creating “natural” conversational settings leans on the old-fashioned face-to-face encounter which still seems to set the benchmark for many new media technologies. By “conveying presence to remote locations”, the Elfoid phone is supposed to offer its users the possibility to – literally – get in touch more often and more directly than with other telecommunication media. It evokes the scenario of carrying your partner or close friend around with you in your pocket and promises to add a haptic dimension to the interaction that mobile phones fail to deliver to date.

The following analysis of interviews with several involved scientists at ATR shall provide a summary of the emic perspective. Scientists were asked about the wider research and design goals and their respective visions about the Elfoid prototype and telepresence robotics in general. Quotes are anonymized, as agreed upon with the dialog partners. Several statements contain colloquial expressions and/or mistakes that were not corrected.

¹⁶ <http://www.geminoid.jp/projects/CREST/elfoid.html> (accessed 05/25/2012, emphasis added T. K.).

¹⁷ Not to be confused with the current smartphones running on an Android operating system. Though the fact that the latter uses a small robot as a mascot is remarkable in itself.

The Material: Evaluation of Expert Interviews

The main purpose of the Elfoid research project was consistently seen as providing a further component in the endeavor to figure out the best means of conveying human presence, in a mobile variant of “presence in a pocket”¹⁸. Simultaneously, it was regarded as innovative insofar as it opens up potential user groups and usage scenarios that the other telepresence robots developed at HIL were excluded from. Several scientists named old people as the main target group as this part of the population purportedly has a genuine interest in easy-to-use technology that provides them with a means to engage in social interaction, e.g. with their grandchildren, but also in doctor-patient relationships. Pre-teenage girls were also named as a potential target group as they supposedly like holding hands and hugging each other, which is generally uncommon behavior in Japan. As an Elfoid is “more human-like, natural, a living kind of creature should be better”¹⁹ suited for this phatic communication function than conventional mobile phones with their brick- or box-shaped exterior.

The Elfoid phone was generally seen to be a more ‘natural’ means of communication as it is intuitively usable and resembles a small human being, thereby creating fewer cognitive burdens than mobile phones with their diverse functionalities. “By identifying the way people act, I’m hoping to create these natural interfaces, very natural, seamless, invisible interfaces with robot technology ...”²⁰ Several scientists (including Professor Ishiguro) proposed the theory that the human brain is wired to face-to-face social interactions and therefore poorly equipped for cell phone communication.

In some cases [...] we don’t get easily adapted to those new technologies, it’s kind of a splitting (or how should I say?) a divide between the body rules or the physical nature and what we are actually using. So I think it should be much better for the basic human stresses or comfortableness to use a different kind of device that is more closely situated to the original logic of [unintelligible].²¹

Physical, face-to-face interactions are users’ true native machinery for dealing with the world.²²

¹⁸ Personal interview with scientist 1 at ATR, February 2012.

¹⁹ Personal interview with scientist 2 at ATR, February 2012. The scientist explicitly categorized different communication goals, e.g. information transmission, receiving or sending instructions and social bonding.

²⁰ Personal interview with scientist 3 at ATR, February 2012.

²¹ Scientist 2.

²² Personal interview with scientist 4 at ATR, March 2012.

This is mirrored in statements by Professor Ishiguro:

Actually, the smartphone is just a small computer. But we don't need to have so many functions for the mobile phone. So my question is: What happens after this? [showing a smartphone]

[...] The smartphone is going to have a voice recognition function. Then we don't need to have an interface. At that time, my question is: Do you want to talk to this, this black box? [pointing to smartphone] Or do you want to talk to something more human-like?

[...] We don't like to talk to a black box. We want to talk to a human because our brain is designed so.²³

The skin-like surface of the Elfoid model was seen as one of the big advantages compared to conventional smartphone technology. While touchscreens are widely available, the tactile experience doesn't differ much across devices. One artistic collaborator to the Elfoid project suggested that in the digital era people may be missing the deep haptic satisfaction and inspiration that is related to touching various physical surfaces. The often neglected sense of touch is able to convey very detailed ('high-resolution') information, which – so far – hasn't been technically implemented successfully. A skin-like texture is supposed to be far superior in this respect, especially in the creation of presence effects, "because essentially the touching is also giving and getting, really something in depth of the presence of a person."²⁴ Touching is unique among the senses as it necessarily establishes a reciprocal relationship – touching and being touched are inseparable and even undermine the subject-object division to some extent.

When asked if the Elfoid could hypothetically be equipped with some sort of artificial intelligence (AI) – in that way following the virtual assistant model pursued by Apple with its iPhone 4S *Siri* concept – most interviewed scientists couldn't provide any detailed answers, partly due to non-disclosure agreements. What could be gathered though, was that a new, semi-automatic version of Elfoid is being developed that could operate as an intermediate agent, e.g. between people suffering from dementia and their caretakers. Equipped with advanced voice recognition software, this robot could act as a supportive system, interpreting the often idiosyncratic ways of expression of demented people and

²³ Personal interview with Hiroshi Ishiguro, 24 February 2012. This evolutionary line of reasoning – with the consequence that the human brain is somewhat antiquated in relation to modern media – is prominently featured in Byron Reeves and Clifford I. Nass, *The media equation: How people treat computers, television, and new media like real people and places* (Stanford: CSLI Publ., 1998), 12.

²⁴ Personal interview with artistic collaborator to the Elfoid project, March 2012.

translating them to the nursing staff. Another scenario that was mentioned by Ishiguro is that of the Elfoid as a conversational agent, being able to have simple autonomous conversations with people by accessing databases via cloud computing services. In specific situations, this would prove to be a feasible if somewhat ethically questionable scenario: “[...] if we record the conversations of elderly people, they are just talking the same things every day.”²⁵ This model would in fact diverge greatly from the current version, as it would no longer act as a telepresence platform, but rather become an active entity in a social interaction. It raises the “problem of who does it represent: Are you talking to the robot or are you talking to a person through the robot? You have to resolve that ambiguity.”²⁶

Interestingly, the robots were generally seen as merely the most suitable available device to create telepresence effects. But they are not an end in themselves. Several scientists stressed the circumstance that eventually “we want to get rid of those devices, that is one idea.”²⁷ A general discomfort about mediated social interaction, especially with mobile devices in public spaces, is expressed as a very specific concern:

It’s not so smart to have something in your hand, always holding it, looking at it and being in danger of bumping into other people. It’s very dangerous. I don’t think it’s a good idea to have such devices.²⁸

In this context, brain-to-machine and even brain-to-brain communication solutions were mentioned as a possible future of interpersonal mobile telecommunication. As all emotions and sensual experiences are essentially reducible to neuronal activity, these could hypothetically be simulated, rendering any physical device obsolete. It comes as no surprise then, that a separate department at ATR, the Brain Information Communication Research Laboratory Group, is developing ‘interfaces’ – while, of course, “the ultimate interface is interfaceless”²⁹ – in exactly this area.

We take signals from the brain, try to translate them, we try to decode the brain language, but we don’t know how to show it. Okay, let’s use machines as something that expresses them. Of course it would be perfect for us, if we wouldn’t even need something in the middle to communicate, but we just don’t know

²⁵ Hiroshi Ishiguro, 24 February 2012.

²⁶ Scientist 4.

²⁷ Personal interview with scientist 2 at ATR, February 2012.

²⁸ Ibid.

²⁹ Personal interview with scientist 5 at ATR, March 2012.

how to put the signals back into other persons' brains. That's something we don't know. [...]

For now, we use something as a medium. Later, when we could reach the other part, then we omit this medium.³⁰

The abovementioned artistic collaborator even goes further imaginatively:

So far, Telenoid [...] or whatever, everything is using media as physical objects. It means, we are interacting with something. Then, something is transmitting the information. But if telepathy is realized, [...] we are losing interaction ecology. It's going to be a big paradigm shift.³¹

The idea of telepathy has usually taken the place of a mythically inspired ideal of communication³², but proves worrisome from a designer's point of view. "[T]elepathy or brain transmission is totally destroying the creativity of human beings."³³ Notwithstanding this objection, an ideal of unmediated communication has accompanied the history of media from its very beginnings and has inspired some scholarly initiative into a fundamental paradox which will be scrutinized in the following chapter. It will finally shed some light on the strange congruence of topoi that at first glance seem connected only by their prefix – telepresence robotics, telephony and telepathy.

Media and Immediacy: An Intricate Relationship

The problem of immediacy has been treated from a variety of angles in media and communication theory. At least three discursive fields are noteworthy:

- 1) the discourse on (tele)presence³⁴,

³⁰ Personal interview with scientist 6 at ATR, March 2012.

³¹ Artistic collaborator.

³² As an essentially unmediated form of communication, telepathy (at least hypothetically) avoids the distortion of messages caused by noise that has troubled the mathematical theory of communication. This is evident in Warren Weaver, "The mathematics of communication," (first edition 1949) in *Communication theory*, ed. C. David Mortensen, 2nd ed. (New Brunswick, NJ: Transaction Publ., 2008), 27–38, where Weaver explains: "When I talk to you, my brain is the information source, yours the destination; my vocal system is the transmitter, and your ear with the eighth nerve is the receiver." (ibid., 29). In this understanding, each and every medium (including natural language) is not only a channel, but a potential source of noise in an exchange of information between brains.

³³ Artistic collaborator.

³⁴ In the presence discourse, the problem of immediacy is only treated implicitly. The older philosophical and poststructuralist discourses on (the metaphysics of) presence are not the subject of this paper. Rather, presence is framed as the perceptual absence of mediation which

- 2) remediation theory,
- 3) recent contributions from German media theory, centered around an anaesthetics of media.

The presence discourse starting in the late 1990s brings together researchers from various nationalities and fields to investigate theoretical concepts and technological applications, leaning towards empirical operationalization.³⁵ Central resources including a large bibliography and a list of researchers are gathered on the website of the International Society for Presence Research (ISPR).³⁶ A comprehensive attempt at conceptualization by Matthew Lombard and Theresa Ditton resulted in an understanding of presence as “the perceptual illusion of nonmediation”³⁷. This preliminary definition has been discussed and extended to put together an explication statement. The first paragraph reads:

Presence (a shortened version of the term “telepresence”) is a psychological state or subjective perception in which even though part or all of an individual’s current experience is generated by and/or filtered through human-made technology, part or all of the individual’s perception fails to accurately acknowledge the role of the technology in the experience. Except in the most extreme cases, the individual can indicate correctly that s/he is using the technology, but at *some level* and to *some degree*, her/his perceptions overlook that knowledge and objects, events, entities, and environments are perceived as if the technology was not involved in the experience. Experience is defined as a person’s observation of and/or interaction with objects, entities, and/or events in her/his environment; perception, the result of perceiving, is defined as a meaningful interpretation of experience.³⁸

This approach relies heavily on a subject position and is suited for use in experimental psychology, neuroscience and interface design. From the viewpoint

can be effected by certain media technologies, and its implications for a theory of the media is discussed.

³⁵ The discussion about terminology has taken place in Matthew Lombard and Theresa Ditton, “At the heart of it all: The concept of presence,” *Journal of Computer-Mediated Communication* 3, no. 2 (1997), <http://jcmc.indiana.edu/vol3/issue2/lombard.html>, Giuseppe Riva, Fabrizio Davide and W. A. Ijsselstein, eds., *Being there: Concepts, effects and measurements of user presence in synthetic environments*, (Amsterdam, Washington D.C, Tokyo: IOS Press; Ohmsha, 2003) and Kwan M. Lee, “Presence, explicated,” *Communication Theory* 14, no. 1 (2004): 27-50, among others.

³⁶ <http://ispr.info/> (accessed 05/25/2012).

³⁷ Lombard and Ditton, “At the heart of it all”.

³⁸ International Society for Presence Research. (2000). *The Concept of Presence: Explication Statement*. Retrieved 4/29/2012 from <http://ispr.info/>.

of media theory it is less useful than the original proposition as it is of a rather technical nature and oversimplifies matters when, for example, resorting to notions like “the true nature of the physical world”³⁹ in exemplifying the concept. Returning thus to the original concept explication, Lombard and Ditton continue:

The illusion of nonmediation can occur in two distinct ways: (a) the medium can appear to be invisible or transparent and function as would a large open window, with the medium user and the medium content (objects and entities) sharing the same physical environment; and (b) the medium can appear to be transformed into something other than a medium, a social entity.⁴⁰

These are quite accurately the major goals of successful interaction design in telepresence robotics. The robot’s operator should ideally have the subjective experience of physically being present at a remote location (transparency of the interface), while his surrogate self is transformed into a social entity in its own right (with the development of AI possibly creating some confusion as to who it is that you are actually talking to). Presence apparently can come in many different shapes – the article outlines six possible dimensions of the phenomenon – which makes it hard to theorize. So far, the word *immediacy* hasn’t been used in the discussion. It remains to be seen if it can add something to the debate around presence.

Jay David Bolter and Richard Grusin proposed their theory of remediation in 2000 that operates according to two different logics or “strategies of representation”⁴¹. One is transparent immediacy, the other hypermediacy. Whereas the first logic attempts to efface the medium and hide the process of remediation (the way ‘new’ media refashion ‘old’ media on their own terrain), the second one underlines the medium and exposes that same process. However, both logics build on and trigger a “desire for immediacy”⁴², resulting in a thorough contradiction:

Our culture wants both to multiply its media and to erase all traces of mediation: ideally, it wants to erase its media in the very act of multiplying them.⁴³

³⁹ Ibid., paragraph 2.

⁴⁰ Lombard and Ditton, “At the heart of it all”.

⁴¹ Jay D. Bolter, “Remediation and the desire for immediacy,” *Convergence: The International Journal of Research into New Media Technologies* 6, no. 62 (2000): 62-71, 62. doi: 10.1177/135485650000600107. Remediation theory is developed fully in Jay David Bolter and Richard Grusin, *Remediation: Understanding new media* (Cambridge, Mass: MIT Press, 2000).

⁴² Bolter, “Remediation and the desire for immediacy”, 62.

⁴³ Ibid., 63.

If Bolter and Grusin are correct in their assumption that a desire for immediacy is a major driver of media development, media are contradictory in that they both fuel this demand by providing ever more convincing immersive experiences and at the same time achieve this by ever more sophisticated interface solutions – resulting in long chains of mediation. Bolter and Grusin apply their theoretical framework to a plethora of historical phenomena, therein demonstrating its empirical usefulness. Their model is a dialectic one in which new media are frequently discussed in terms of their unprecedented degree of immediacy, until the initial enthrallment makes room for the unavoidable insight that the specific qualities (and limitations) of any medium reinstall themselves on closer scrutiny. But the two logics also necessarily interoperate: The “amazement” about a seemingly immediate media experience requires an awareness of the medium:

If the medium really disappeared, as is the apparent goal of the logic of transparency, the viewer would not be amazed because she would not know of the medium’s presence.⁴⁴

In the 1990s, virtual reality (VR) seemed to be the pinnacle of this two-faced endeavor: a fully artificial high-tech environment that creates the illusion of ‘being there’. Grusin, in his 2010 book *Premediation. Affect and Mediality after 9/11*, proposed an update of this observation:

Immediacy after 9/11 materializes itself as an unconstrained connectivity so that one can access with no restrictions one’s socially networked mediated life at any time or anywhere through any of one’s media devices.⁴⁵

This revised version of the idea of immediacy is vital for an understanding of mobile telepresence robotics. It points to the circumstance that immediacy can and does operate on many different levels, e.g. as an approximation to realism in representation, as an authentic feeling of being there, as direct access to content (exemplified in the fascination with ubiquitous touchscreen interfaces) and as unrestricted connectivity (anytime-anywhere rhetoric). On all these layers, immediacy operates as a central promise and driver of technological change. Mobile telepresence robotics presents an interesting case where several kinds of immediacy intersect in a hybrid device that draws on multiple genealogies (as explicated above).

In the last decade, the notion of immediacy in and through the media has been touched upon by several authors in German media theory. Compared to the first two discourses discussed here, their focus is purely on theory and a

⁴⁴ Bolter and Grusin, *Remediation*, 158.

⁴⁵ Richard A. Grusin, *Premediation: Affect and mediality after 9/11* (Basingstoke, New York: Palgrave Macmillan, 2010), 2.

fundamental thinking in terms of media. Here, immediacy has come to occupy a position as a productive ‘other’ of media theory, although a comparative summary of the single contributions is still due. Florian Sprenger, in a talk given in Bochum in 2008⁴⁶, has pointed to the dispersed publications that are concerned with the circumstance that the processuality of media often remains invisible – and that it is indeed essential for it to remain so to guarantee an undisturbed operation. This constitutive invisibility – respectively described in terms of a negative media theory⁴⁷, ‘asthetische Neutralität’⁴⁸ and an anaesthetics of media⁴⁹ – is intricately connected to the phenomenon of immediacy.

Media make readable, audible, visible, perceptible, but all this with the tendency to erase themselves and their constitutive participation in these sensualities, to become, as it were, imperceptible, anaesthetic [...].⁵⁰

If a mediated experience often appears as unmediated, if media strive to hide their mediality, then the notion of immediacy is crucial for any attempt to theorize ‘the media’. An act of withdrawal in performance might actually be their defining characteristic. Immediacy can also serve as an analytic concept connecting media theory to empirical instantiations of media, as practices and visionary anticipations are often directed by notions of immediacy. But the relations between media and immediacy are even more complicated.

As Tobias Wilke has shown⁵¹, media are involved in the shaping of discursive conceptions of immediacy altogether. What comes to be regarded as the epitome of immediacy at any given historical moment, is partly determined by the specific performances of contemporary media technologies. In other words: There is no immediacy outside the media. Any definition of immediacy can only be given in a gesture of demarcation (as is evident in the fact that the word itself

⁴⁶ Florian Sprenger, “Was wissen Medien darüber, dass es sie gar nicht gibt?,” lecture at the annual conference of the *Gesellschaft für Medienwissenschaft* “Was wissen Medien?” October 2008 2-4, Institut für Medienwissenschaft, Ruhr-Universität Bochum, http://redax.gfmedienwissenschaft.de/webcontent/files/2008-abstracts/Sprenger_WasWissenMedienDarüber_GfM2008.pdf.

⁴⁷ Cf. Dieter Mersch, “Medialität und Undarstellbarkeit: Einleitung in eine ‘negative’ Medientheorie,” in *Performativität und Medialität*, ed. Sybille Krämer (München: Fink, 2004), 75–96.

⁴⁸ Cf. Sybille Krämer, *Medium, Bote, Übertragung: Kleine Metaphysik der Medialität* (Frankfurt/M.: Suhrkamp, 2008), 25-33.

⁴⁹ Cf. Joseph Vogl, “Medien-Werden: Galileis Fernrohr,” *Archiv für Mediengeschichte* 1, no. 1 (2001): 115-23.

⁵⁰ *Ibid.*, 122 [translation T. K.].

⁵¹ Cf. Tobias Wilke, *Medien der Unmittelbarkeit: Dingkonzepte und Wahrnehmungstechniken 1918 - 1939* (München: Fink, 2010).

is composed of the root ‘mediacy’ plus the negative prefix ‘im’). Referring to Walter Benjamin’s essay *The Work of Art in the Age of its Technological Reproducibility*, Wilke concludes that immediacy is not simply obliterated by media – this would be the argument made by a majority of media scholars⁵² – but rather undergoes a process of sublation (‘Aufhebung’) in the Hegelian sense. The immediate becomes the dreamchild of a mediated world.⁵³ It is discursively addressed again and again and greatly influences the anticipatory horizon of any media utopia. The “will to immediacy manifests itself as a productive and organizing impetus”⁵⁴. In the next section, the discourse(s) on immediacy will be related to the project of mobile telepresence robotics, as it was laid out in the first half of this paper.

Immediacy and Mobile Telepresence Robotics

As was indicated above, Elfoid – as a potential herald of mobile telepresence robotics – actualizes several different notions of immediacy in its character as a hybrid medium. McLuhan’s well known dictum that the content of any new medium is an old medium can be applied quite literally in this case. A telepresence robot of curious looks on the outside, Elfoid essentially remains a mobile phone hidden inside a ‘humanoid’ shape. Both the discourse on telepresence robotics and that on mobile telephony are fueled by the topos of immediacy.

Luna Dolezal has pointed out in a phenomenological discussion on the “possibility of re-embodiment through technological interfaces”⁵⁵ that the crucial challenge in interface design lies in simulating to some extent the “prereflective and immediate manner”⁵⁶ in which the body is engaged with its environment. Following Merleau-Ponty’s understanding, in successful and healthy motor-intentionality the body becomes transparent to some extent so that the performing subject doesn’t have to constantly reflect its actions. The same applies to the interaction with objects like a blind man’s stick – which effectively becomes an extension of its owner’s body schema – and other media technologies insofar as they ‘vanish’ in favor of an interaction with content/the world.

⁵² Cf. Hartmut Winkler, *Basiswissen Medien* (Frankfurt/M.: Fischer, 2008), 39: “There is no ‘immediacy’ in the media” [translation T. K.].

⁵³ Cf. Wilke, *Medien der Unmittelbarkeit*, 229 [translation T. K.].

⁵⁴ *Ibid.*, 20.

⁵⁵ Luna Dolezal, “The remote body: The phenomenology of telepresence and re-embodiment,” *Human Technology* 5, no. 2 (2009): 208-26, 208, <http://www.humantechnology.jyu.fi/articles/volume5/2009/dolezal.pdf>.

⁵⁶ *Ibid.*, 214.

Telepresence robotics struggles precisely with the task to achieve this transparency of the interface that would allow for a) a convincing illusion of being present in a remote place or social setting from the perspective of the operator, and b) a complementary illusion on the part of the physically co-present interlocutor, i.e. the feeling of being in the presence of a social actor while in fact facing a technical device. The haptic dimension of telepresence robotics, further amplified by the employment of a skin-like surface material, is designed to evoke a feeling of directness otherwise denied by media of telecommunication. It has to be remarked that the engineers engage in the rather ‘touchy’ project of boldly reverse-engineering a face-to-face interaction as the closest model to an ‘immediate’ exchange imaginable from a common sense perspective. But, as the allusions to telepathy and the prospects of brain-to-brain communication have demonstrated, media are apparently believed to be able to outperform even traditional bodily encounters in this regard by providing an interface that allows the immediate exchange of minds.⁵⁷

Mobile telephony on the other hand carries its own set of implications that are summarized in the above-quoted notion of “unconstrained connectivity” in combination with the practical ubiquity – and close association with the human body – of personal communications devices. Katz and Aakhus introduced the socio-logic of perpetual contact as the central element of their *Apparatgeist* theory.

The compelling image of perpetual contact is the image of pure communication, which, as Peters [...] argues, is an idealization of communication committed to the prospect of sharing one's mind with another, like the talk of angels that occurs without the constraints of the body.⁵⁸

Several authors have pointed out that the mobile phone should rather be described in terms of its character as a *personal medium*, serving individual needs - not only of communication - and not only used while on the way. “The key feature in the

⁵⁷ Sigmund Freud believed telepathy to be a primordial mode of communication that has just been supplanted by a system of signs which are perceived with the sense organs. In this perspective, the history of mediation is one of degeneration. Media are then appreciated to the extent that they can evoke their mythical heritage. For this interesting alternative media history cf. Simone Bernet, “Telekommunikation und ihr mythischer Hintergrund: Notizen zu einer medienphilosophischen Vernunft der Telepathie,” in *Dis Connecting Media: Technik Praxis und Ästhetik des Telefons: vom Festnetz zum Handy*, ed. Ulla Autenrieth et al. (Basel: Christoph-Merian-Verl, 2011), 105–16.

⁵⁸ James E. Katz and Mark A. Aakhus, “Conclusion: making meaning of mobiles: a theory of *Apparatgeist*,” in *Perpetual contact: Mobile communication, private talk, public performance*, ed. James E. Katz and Mark A. Aakhus (Cambridge: Cambridge Univ. Press, 2002), 301–18, 307.

practice of mobile communication is connectivity, rather than mobility.”⁵⁹ Additionally, the mobile phone is usually in close contact to its wearer’s body, up to the point that it is increasingly integrated into the body image (like other personal objects or clothing).⁶⁰ “As constantly worn and automatically used devices they [mobile phones, T. K.] are losing their character as mere communication tools but are becoming more and more a part of the user’s body.”⁶¹ Regine Buschauer has questioned the rhetoric of perpetual contact in observing that the promise of presence-at-a-distance is in fact transferred to the device itself: “always ‘there’, ‘near’ and ‘in touch’ connected is not the other, but the cell phone”⁶².

When Ishiguro claims about the Elfoid: “If you hold it, it will be a part of your body”⁶³, the confusion of several discourses of immediacy becomes evident. It seems that it is not so much the communication partner at the other end of the line who is the true object of desire, but rather the artifact of the mobile phone. The prospect of immediacy is subtly shifted from access to the interlocutor’s mind to an intimate relationship with the device itself. It is no surprise then that designers try their best to avoid the “nightmare of the black box”⁶⁴ (see Ishiguro’s statement above) and to provide users with devices that are rather soft and user-friendly. As apparatuses hide their technical condition, they can come to be accepted either as a social counterpart or even as an incorporated body part.⁶⁵ In

⁵⁹ Jack Linchuan Qiu and Araba Sey, *Mobile communication and society: A global perspective* (Cambridge, Mass: MIT Press, 2007), 248.

⁶⁰ Cf. Leopoldina Fortunati, “The mobile phone as technological artefact,” in *Thumb culture: The meaning of mobile phones for society*, ed. Peter Glotz (Bielefeld: transcript, 2005), 149–60, and Virpi Oksman and Pirjo Rautiainen, ““Perhaps it is a body part”: How the mobile phone became an organic part of the everyday lives of Finnish children and teenagers,” in *Machines that become us: The social context of personal communication technology*, ed. James E. Katz (New Brunswick, N.J: Transaction publishers, 2003), 293–308.

⁶¹ Erika Linz, “Society on the move: The success story of the mobile phone,” in *Heinrich Hertz (1857 - 1894) and the development of communication: Proceedings of the Symposium for History of Science, Hamburg, October 8 - 12, 2007*, ed. Gudrun Wolfschmidt (Norderstedt: Books on Demand, 2008), 601–14, 612.

⁶² Regine Buschauer, *Mobile Räume: Medien- und diskursgeschichtliche Studien zur Tele-Kommunikation* (Bielefeld: transcript, 2010), 304 [translation T. K.].

⁶³ This slogan is used by Ishiguro in presentations of the Elfoid device. Cf. for example the image at http://news.cnet.com/8301-17938_105-20029351-1.html (accessed 06/11/2012).

⁶⁴ Fortunati, “The mobile phone as technological artefact”, 153.

⁶⁵ It is also possible to interpret the Elfoid technology as an ironic comment on the desire for immediacy, in the sense that the diorama, phenakistoscope and stereoscope constantly undermined their audiences’ wishes by confronting them with “eerie” images and “unwieldy” devices. Cf. Bolter and Grusin, *Remediation*, 37 in reference to Jonathan Crary’s account. If there is something like a secret wish to hold a distant conversation partner in your hands when engaging in telecommunication, it is a naïve approach to design an anthropomorphic device for this purpose. Cultural factors also play their part. What may seem to be a rather strange and

any case, the overarching goal in the creation of (tele)presence effects is to let users ‘forget’ that they are in fact dealing with media. While this is designers’ declared shibboleth, one must keep in mind that immediacy remains a play of thought due to its logical impossibility. Users actively engage in mediated environments and any subjective feeling of immediacy can only be the consequence of a willing suspension of disbelief. To be clear, Elfoid is no more immediate than any regular mobile phone – neither from the perspective of the remote operator nor the person currently holding it – but it nurtures an old dream by giving it a somewhat clumsy shape.

Conclusion

The mobile telepresence robot Elfoid occupies a position at the intersection of several - sometimes rivaling - promises of immediacy. The paper has outlined some of the diverse discursive threads that meet in the admittedly questionable prototype device. It remains to be seen whether the different notions of immediacy imaginatively attached to the device will eventually come to mutually enhance each other - which could be an ingenious way to introduce telepresence robotics to a wider audience by utilizing the well-established discourse of absent presence and bodily integration in mobile telephony. It is equally likely though that the highly-dosed infusion of different notions of immediacy will overstretch the device. Where, indeed, is the place of immediacy in the early 21st century? Is it the promise of being always-on, of having uninterrupted access, as Grusin proclaims? Or is it rather the continuation of the quest for an ever-higher realism in constructing immersive environments that create the illusion of ‘being there’ in an immediate sense? Does immediacy have to rely on physicality, e.g. on haptic impressions of some sort, or is it more appropriate to think of it purely in terms of neuronal stimulation, circumventing any representational intermediaries? A typology of the paradox of immediacy in the media is called for to disentangle the conceptual huddle.

At least one fundamental insight can be gained from the investigation of media hybrids like Elfoid. The concept of immediacy has so far been met with an almost univocal intellectualist disdain on the part of media theorists. The reason for this rejection is simple enough: If one takes ideas of immediacy seriously, the self-image of a whole field of study is called into question. Media studies are grouped around the assumption *that media matter* - including fervent proclamations of a primacy of the media from McLuhans’s “The medium is the

hypermediated device from a Western perspective, could be experienced as a transparent interface in Japan. Cf. *ibid.*, 73.

message” to Kittler’s “Media determine our situation”⁶⁶. Any conception of immediacy seems to be incompatible with the emphasis placed on the multifaceted processes of mediation that are generally accepted to be at work in society. It can be argued though that immediacy is a core term of media theory insofar as it simultaneously serves as a negative foil to mediation and as the utopian momentum of media development. In fact, McLuhan’s original contributions were very much influenced by the fascination with electric speed as a sort of “immediate mediation”⁶⁷. Paradoxically, media are discovered as an object of scholarly investigation at the historical moment of their apparent dissolution. Consequently, attention has to be paid to the ways in which media efface themselves in action - because these are the instances when their formative influence is very likely to hit its peak.

⁶⁶ Friedrich A. Kittler, introduction to *Gramophone, Film, Typewriter* (Stanford: Stanford Univ. Press, 1999 [German edition: 1986]), xxxix.

⁶⁷ Sprenger, “A theory of media as a history of electricity”, 76.

Bibliography

- Bartneck, Christoph, Takayuki Kanda, Hiroshi ISHIGURO, and Norihiro HAGITA. "My robotic doppelgänger - a critical look at the Uncanny Valley." In *Proceedings of the 18th IEEE International Symposium on Robot and Human Interactive Communication RO-MAN 2009*, 269–76. Piscataway, NJ: IEEE, 2009, doi: 10.1109/ROMAN.2009.5326351.
- Bernet, Simone. "Telekommunikation und ihr mythischer Hintergrund: Notizen zu einer medienphilosophischen Vernunft der Telepathie." In *Dis Connecting Media: Technik Praxis und Ästhetik des Telefons: vom Festnetz zum Handy*, edited by Ulla Autenrieth, Andreas Blättler, Regine Buschauer, and Doris Gassert, 105–16. Basel: Christoph-Merian-Verl, 2011.
- Bolter, Jay D. "Remediation and the desire for immediacy." *Convergence: The International Journal of Research into New Media Technologies* 6, no. 62 (2000): 62–71, doi: 10.1177/135485650000600107.
- Bolter, Jay D., and Richard Grusin. *Remediation: Understanding new media*. Cambridge, Mass: MIT Press, 2000.
- Bracken, Cheryl C. and Paul D. Skalski, eds. *Immersed in media: Telepresence in everyday life*. New York: Routledge, 2010.
- Buschauer, Regine. *Mobile Räume: Medien- und diskursgeschichtliche Studien zur Tele-Kommunikation*. Bielefeld: transcript, 2010.
- Dolezal, Luna. "The remote body: The phenomenology of telepresence and re-embodiment." *Human Technology* 5, no. 2 (2009): 208–26, <http://www.humantechnology.jyu.fi/articles/volume5/2009/dolezal.pdf>.
- Dreyfus, Hubert L. "Telepistemology: Descartes's last stand." In *The robot in the garden: Telerobotics and telepistemology in the age of the Internet*, edited by Ken Goldberg, 48–63. Cambridge, Mass.: MIT Press, 2001.
- Fortunati, Leopoldina. "The mobile phone as technological artefact." In *Thumb culture: The meaning of mobile phones for society*, edited by Peter Glotz, 149–60. Bielefeld: transcript, 2005.
- Grusin, Richard A. *Premediation: Affect and mediality after 9/11*. Basingstoke, New York: Palgrave Macmillan, 2010.
- Ishiguro, Hiroshi. "Interactive humanoids and androids as ideal interfaces for humans." In *Proceedings of the 11th international conference on Intelligent user interfaces - IUI '06*, edited by Cécile L. Paris and Candace L. Sidner, New York: ACM Press, 2006, doi: 10.1145/1111449.1111451.

- Kahn, Peter H., Hiroshi ISHIGURO, Batya Friedman, Takayuki Kanda, Nathan G. Freier, Rachel L. Severson, and Jessica Miller. "What is a human? Toward psychological benchmarks in the field of human-robot interaction." *Interaction Studies* 8, no. 3 (2007): 363–390, http://www.vsdesign.org/publications/pdf/407_kahn.pdf.
- Kaplan, Frédéric. "Who is afraid of the humanoid? Investigating cultural differences in the acceptance of robots." *International Journal of Humanoid Robotics* 1, no. 3 (2004): 1–16, <http://www.csl.sony.fr/downloads/papers/2004/kaplan-04e.pdf>.
- Katz, James E., and Mark A. Aakhus. "Conclusion: making meaning of mobiles: a theory of *Apparatgeist*." In *Perpetual contact: Mobile communication, private talk, public performance*, edited by James E. Katz and Mark A. Aakhus, 301–18. Cambridge: Cambridge Univ. Press, 2002.
- Kittler, Friedrich A., *Gramophone, Film, Typewriter* (Stanford: Stanford Univ. Press, 1999 [German edition: 1986]).
- Krämer, Sybille. *Medium, Bote, Übertragung: Kleine Metaphysik der Medialität*. Frankfurt/M.: Suhrkamp, 2008.
- Lee, Kwan M. "Presence, explicated." *Communication Theory* 14, no. 1 (2004): 27–50.
- Linchuan Qiu, Jack, and Araba Sey. *Mobile communication and society: A global perspective*. Cambridge, Mass: MIT Press, 2007.
- Linz, Erika. "Society on the move: The success story of the mobile phone." In *Heinrich Hertz (1857 - 1894) and the development of communication: Proceedings of the Symposium for History of Science, Hamburg, October 8 - 12, 2007*, edited by Gudrun Wolfschmidt, 601–14. Norderstedt: Books on Demand, 2008.
- Lombard, Matthew and Theresa Ditton, "At the heart of it all: The concept of presence," *Journal of Computer-Mediated Communication* 3, no. 2 (1997), <http://jcmc.indiana.edu/vol3/issue2/lombard.html>.
- Mersch, Dieter. "Medialität und Undarstellbarkeit: Einleitung in eine 'negative' Medientheorie." In *Performativität und Medialität*, edited by Sybille Krämer, 75–96. München: Fink, 2004.
- Minsky, Marvin. "Telepresence: A manifesto." *Omni*, 1980: 44–52.
- Mori, Masahiro. "The uncanny valley." *Energy* 7, no. 4 (1970): 33–5, <http://www.movingimages.info/mit/readings/MorUnc.pdf>.

- NISHIO, Shuichi, Hiroshi ISHIGURO, and Norihiro HAGITA. "Can a teleoperated android represent personal presence? — A case study with children." *Psychologia* 50, no. 4 (2007): 330–342.
doi:10.2117/psysoc.2007.330.
- Oksman, Virpi, and Pirjo Rautiainen. "“Perhaps it is a body part”: How the mobile phone became an organic part of the everyday lives of Finnish children and teenagers." In *Machines that become us: The social context of personal communication technology*, edited by James E. Katz, 293–308. New Brunswick, N.J: Transaction publishers, 2003.
- Reeves, Byron, and Clifford I. Nass. *The media equation: How people treat computers, television, and new media like real people and places*. Stanford: CSLI Publ., 1998.
- Riva, Guiseppe, Fabrizio Davide, and W. A. Ijsselsteijn, eds. *Being there: Concepts, effects and measurements of user presence in synthetic environments*. Amsterdam, Washington D.C, Tokyo: IOS Press; Ohmsha, 2003.
- Sekiguchi, Dairoku, Masahiko Inami, and Susumu Tachi: "RobotPHONE: RUI for Interpersonal Communication," CHI2001 Extended Abstracts, 2001, 277-278, <http://www.star.t.u-tokyo.ac.jp/projects/RobotPHONE/robotphone.html>.
- Sprenger, Florian. "A theory of media as a history of electricity: How McLuhans thoughts about mediation are thwarted by their negation." In *Understanding media, today: Conference proceedings*, edited by Matteo Ciastellardi, Cristina de Miranda Almeida Barros and Carlos A. Scolari, 74–9. Barcelona: Editorial Universidad Oberta de Catalunya, 2011.
- "Was wissen Medien darüber, dass es sie gar nicht gibt?," lecture at the annual conference of the *Gesellschaft für Medienwissenschaft* "Was wissen Medien?" October 2008 2-4, Institut für Medienwissenschaft, Ruhr-Universität Bochum, http://redax.gfmedienwissenschaft.de/webcontent/files/2008-abstracts/Sprenger_WasWissenMedienDarüber_GfM2008.pdf.
- Syrdal, Dag S., Tatsuya Nomura, Hiroto Hirai and Kerstin Dautenhahn. "Examining the Frankenstein syndrome: An open-ended cross-cultural survey." In *Social Robotics: Third International Conference, ICSR 2011, Amsterdam, The Netherlands, November 24-25, 2011. Proceedings*, edited by Bilge Mutlu, Christoph Bartneck, Jaap Ham, Vanessa Evers and Takayuki Kanda, 125–34. Berlin, Heidelberg: Springer, 2011.
- Vogl, Joseph. "Medien-Werden: Galileis Fernrohr." *Archiv für Mediengeschichte* 1, no. 1 (2001): 115–23.

Weaver, Warren. "The mathematics of communication." In *Communication theory*, edited by C. D. Mortensen. 2nd ed., 27–38. New Brunswick, NJ: Transaction Publ, 2008.

Wilke, Tobias. *Medien der Unmittelbarkeit: Dingkonzepte und Wahrnehmungstechniken 1918 - 1939*. München: Fink, 2010.

Winkler, Hartmut. *Basiswissen Medien*. Frankfurt/M.: Fischer, 2008.