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ARTÍCULOS

Antes del diseño de comportamiento social

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En el despliegue de lo social, se considera que el contacto cara a cara entre humanos ofrece la máxima expresión de la presencia, mientras que el cara a cara entre seres humanos y máquinas, la mínima. La verdadera atención o empatía con dispositivos tecnológicos como los robots requiere más que simplemente tener interfaces con la apariencia de una expresión tranquila o de un amistoso comportamiento. El diseño de interacción, en particular, debe basarse en parte en la existencia de cierta forma del efecto de presencia de los dispositivos. Basándose en experimentos que son tanto artísticos como tecnológicos, a saber, experimentos de encarnación con dispositivos para la comunicación y la telepresencia, hemos intentado ampliar el campo teórico del efecto presencia para estudiar y describir en detalle la información que es propensa a dar sentido a la presencia de tales máquinas ante fenómenos de comunicación. Así, el objetivo de sintetizar esta investigación es que dichos comportamientos específicos, los que hasta ahora han sido explotados, puedan ser utilizados a los sistemas de información interactiva como dispositivos de telecomunicación o robots sociales en Japón.

Introduction

"Let's be clear, this is really a robot. There shouldn't be any confusion—it's not a human being," comments professor Cynthia Breazeal as I present a video of Sayonara,[1] a play featuring a performance by the android conceived by Professor Ishiguro, Geminoid F. Researchers at the Media Lab of the Massachusetts Institute of Technology are not in the habit of confusing these categories. Breazeal founded the MIT Media Lab's Personal Robots Group. She is a pioneer in exploring the social interaction between humans and robots. Her conceptual approach differs from that of the Japanese. Their perspectives are as dissimilar as the technological issues involved. The futures they envisage are also different culturally. In Japanese robotics labs, visitors may feel as though they are already in the future, whereas in American labs they feel like they never leave the present even while looking to the future; furthermore, the point is to prepare for the future even if, perhaps, resting content with awaiting it. The conflicts between the different kinds of representation in robotic experiments are not simply due to technological challenges. Because there is a diversity of perspectives, lab research is also a war between competing imaginations into which each roboticist is drawn, to one degree or another, as an inventor of machines, experimental transformer and future first spectator of their own staged performances.

1. The Japanese context

Over the last two decades, the proliferation of robots in Japan has given the latter a futuristic look, and everyday life in the world's largest metropolis—Tokyo—can sometimes seem like a time travel journey. As recent developments have shown, its recent and radical technology boom may be a sign that a golden age of robotics is underway in this country. On the one hand, between thoughtful anticipation and detachment, it is not easy to maintain pragmatic relations with the present, innovations, or find a change of scenery. On the other hand, encounters with robots clearly demonstrate how difficult it is to try to trivialize our relations with certain technological innovations. As when meeting a stranger, when face-to-face with a robot, the main dilemma is how to get acquainted with one's interlocutor. Robotics is not the simplest way by which to try to grasp some of the societal choices made by this country.

To speak of a "golden age" in respect of robotics is equivalent to placing robots at the core of a myth—that of machines and artificial creatures. On the eve of a demographic autumn heralding an aging population that is forcing its society to reinvent itself, Japan is visualizing its future as one filled with robots. This golden age is therefore not a poetic revery like some harbinger of spring. It is not meant to succeed the creation of human beings in the tradition of manga and movies. The advent of the era of machines started long ago. Industrial robotics has already helped to increase productivity and the material comfort of industrialized countries, but it has obviously not yet freed mankind from all thankless tasks.

On the dawn of a virtually eternal life and pain-free death, Japanese reality has recently become much more complex: 80 percent of the population lives in an urban environment with the longest life expectancy on the planet. Although Japan is emerging from a period of industrial and economic prosperity, it must also create a new paradigm combining a plan to boost production with a need to expand certain areas of its internal market. First, it must regain the status of a dominant country and its position as an export leader. Production implies not just industry, but also the service sector, while access to greater comfort implies an increase in consumption. One of this project's priorities is to develop and manufacture robots, and the latter are already manufacturing robots. Although Japanese robotics may seem to be relentlessly attempting to make innovations familiar and acceptable, and to turn technology into a new civil religion serving an industrial ideology, the prospect of a roboticized society still seems hard to fathom.

To engage in robotics, robots need to be made, and vice-versa. On assembly lines, we were already familiar with machines that were manufacturing systems used by other machines, but when these are no longer machines, but robots that compel us to rethink society, or even human beings, it requires contemplating a radically different potential form of complexity. Robotics is the set of techniques that make it possible to design and build automatic machines or robots. Such robots can be described as mechanisms possessing a greater or lesser degree of autonomy, according to the number of axes involved in their movements, their environment, and the tasks to which they been assigned as a result of their programming. Thus, the term "robot" can cover a broad range of machines and automata. These are more or less automatic machines, depending on the level of their autonomy and programming. They can become more or less autonomous, based upon what automated functions they were programmed to perform, and the greater the need for them to be endowed with more autonomy, the more complex their programming must be. In the course of this evolutionary process, robots have transitioned from a status of machines with operational functions assigned to a fixed workstation in a factory, to that of interlocutors capable of interacting and circulating in a complex environment such as ours.

The golden age of robotics is thus this period during which robot autonomy has been designed to be technologically crucial, thanks in part to the development of artificial intelligence and to the miniaturization of controls. This is the moment when research and experimental findings emerged from robotics laboratories to gain entry into all disciplinary fields, from the neurosciences to the most diverse branches of engineering, before entering categories of other practices and uses, becoming media phenomena, dream settings for shop displays, and "genres," as in the theater.

In that sense, Japan seems to be choosing to opt for technological support, and betting on the silver economy. On one hand, Japanese research in robotics has a socio-cultural specificity, on the other hand, beyond the economic specificity of this country, such industrialized applications are extensible to many products and other types of customers, so to other cultures. Therefore, this type of study must, first, consider common behaviors, uses and practices; and secondly consider different kinds of relationships, specific to culturally distinct groups, according to age groups, for example, or specific needs. Most Japanese roboticists are quite excited and optimistic about this context, because their work is no longer be

viewed in terms of research cost, but rather as an investment opportunity, because they can point to the business prospects of some of their prototypes.

2. The robot as social interface paradigm

Assisting, accompanying, or reassuring have, until now, been factors of social bonding between human beings. Like pets, robots are said to be providential creatures destined to compensate for human deficiency from a cultural, economic or ethical perspective. But yet, robots are not just potentially replacement solutions. They can also be agents for multiplying the effects of companionship, communication and work: assistants.

Women, children, and animals have universally, and for a long time, been excluded from History. Paradoxically, we find that women, children, and animals have each played different roles in every culture, according to the history of societies. Yet in contemporary Japan, it appears that their physical and emotional characteristics have mainly served as models in the design of new machines endowed with social behaviors. These robots may, or may not, be anthropomorphic, and assume any shape or size. They abound in research labs, they are at work for new public experiment platforms, and they inhabit Japanese homes in the form of toys or household appliances.

More than meeting a mere ISO standard,[2] most new robots borrow various feminine traits, such as the gaze; or childlike features such as body proportions (the waist and neoteny), or a high-pitched voice; or even the docile and fidgety appearance of pets. Being a companion is not a mere posture, but a burgeoning relationship. That is why the objects and creatures that need to perform this function must allow room for the relationship to progress from empathy to habit, as with a premature baby, a young child, or a budding emotional relationship of any kind. The vulnerability of baby animals, children and young women, such as their muscle weakness or dependency on others, thus presumes that the simulation of empathy constitutes a necessary first stage in their socialization process.

Empathy, the etymology of which refers to what is felt internally, is a complex notion about the mechanisms and dispositions by which an individual or animal can "understand" others' feelings. In the study of interpersonal relations, empathy is different from sympathy, compassion, or emotional contagion. Empathy depends on affect—whether vague or defined, triggered, or part of a psychological state—and most of our emotional reactions are automatically activated in response to others' body language. However, concerning the specificity of our relations with certain robots or, more broadly, with certain animated objects, their abilities to move us are obvious. For some people, it may be an ability to identify with another's thoughts or actions, an ability to put themselves in another's place, or even to emotionally identify with another person or thing by intuitively sensing his/her, or its, "feelings."

"Being moved" encompasses an idea of "motion," of movement toward the other. To move someone means to activate, to stir up, to unsettle, to shake, to make more sensitive, to arouse sympathy, to make someone care, to affect, to distress, to panic, to upset, to captivate, as well as to trouble, interest, and touch. Empathy, whether vague or defined, is partially dependent upon the component of one of these states.

Every human life cycle includes stages during which we depend on others—when we are young, old, or sick—or others may depend on us for these same reasons. It is not just a matter of providing assistance during old age or illness—the important thing is to know on whom we might rely, or would like to rely, as we age. In that sense, Japan seems to be choosing to opt for technological support, and betting on the silver economy. The reality behind this debate on the degree to which modern society's age groups in general, and those of Japan in particular, are interdependent, typically relates to the areas of social relations, services, and personal assistance. Most Japanese roboticists are quite excited and optimistic about this debate, because their work is no longer be viewed in terms of research cost, but rather as an investment opportunity, because they can point to the business prospects of some of their prototypes. Yet this theme also touches on historically complex social relations, such as women's employment, domestic work, and involuntary servitude, even if we might think that robots will be planned solely to render service. Between a service rendered, its practicality, and the staging of its mechanical or docile execution, there is a noteworthy gap that has already been taken into account in the machines' design.

3. The robot as uncanny interface

At a Tokyo press conference on April 11, 2010, the Kokoro Company[3] brought out one of its new machines dressed up as a woman. This new android was called Geminoid F. It was the latest model in a line of actroids including HI-1, known for having been conceived in the image of his creator, Pr. Hiroshi Ishiguro. But what more could we expect than the impression of a pretty, smiling robotic face?

Pr. Ishiguro often likes to explain that the main problem is developing robots lies in their movements. Years ago, Robotics was more concerned with the study of how they move than how they look. But going against the main current, his lab decided to study how humans react to humanoids and androids. At the Department of Systems Innovation at Osaka University, the goal still to develop increasingly close relationships between robots and humans. Their experiments take place on various platforms simultaneously, on levels ranging from the humanoids Robovie's or Wakamaru's simple wave of the hand and gaze of the Actroid Replie Q2 to the recent android Erika's delightful conversational ability.

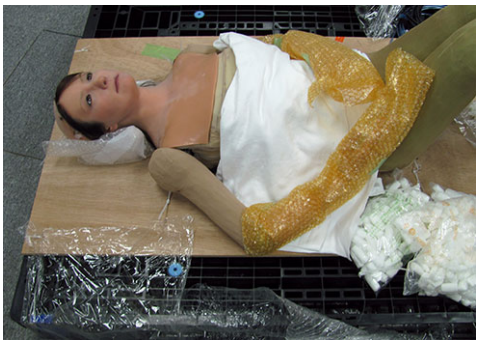
For example, Wakamaru was one of the first household appliance humanoid robot designed at Osaka University in close collaboration with the ATR laboratories,[4] and manufactured by Mitsubishi, which made 200 of this friendly robot model. While most of this production run was intended for home consumer use, one was donated for the showroom of its designer, Toshiyuki Kita, and others were given to the labs run by Pr. Ishiguro, who helped develop it. Two of this batch were employed as actors in a pair of plays written by the director and playwright Oriza Hirata. In addition to their acting gig, they also take part in experiments concerning human/robot relationships and human/human relations using robots.

The actroids are humanoid robots or very human-looking androids also designed at Osaka University and ATR. These humanoids usually act and communicate in a preprogrammed manner, whereas androids interact and dialog by remote control. Research is being carried out on these machines' ability to engage with humans spontaneously, from a simple exchange of glances to a real conversation. For example, study is being carried out on the effects on humans of the extremely realistic actions of actroids and Geminoids and the impression of presence *(Sonzai-Kan)* they give with the aim of making the realism more intense even when these robots are not moving. By perfecting both the immobility of the Geminoids and the precision of their movements, observing their wrappers that make them seem like perfect automatons made in our image, the idea was to deepen the study of certain ways of expressing detachment so that they can seem either as if they were paying close attention, or self-absorbed. When robots are able to express boredom when observed immobile in a hallway, the study of the least hint of a gesture after a long wait becomes truly fascinating.

In 1970 the roboticist Masahiro Mori formulated the Uncanny Valley theory[5] regarding the making of this kind of anthropomorphic robots and the carrying out of such experiments. The well-known graphic illustration for this theory synthesizes a major argument in the conception of artificial creatures: the more a puppet or robot resembles us, the more our emotional response to it is positive. But at a certain point, when the degree of resemblance becomes excessive, then suddenly we feel repulsion.[6] Consequently, an Uncanny Valley android is no longer perceived according to the criteria by which we judge the success of a robot at passing for human. Instead, it stirs up feelings of confusion in the same way we might react to a person behaving abnormally.

But since then, and because of the Geminoids, in his new version of the curve used to represent his Uncanny Valley theory, in 2005, Pr. Mori put a picture of Buddha at the top. His aim was not just to find the perfect representation of an ideal human in sculptural form, but also to foreground the importance of the suggestion of an interiority conveyed by Buddha's half-closed eyes (zazen) and archaic smile.

Geminoid F is one of this new generation of androids, and its performance in the play Sayonara interrogates the ordinary physical presence of these anthropomorphic objects and their possible consciousness, and, at the same time, the rise of robots in a society that is growing increasingly complex and dependent on ever-more powerful technology. So today, the question is: what do we see when we see the surface of an android's artificial skin?



Geminoid F, transportation from the Advanced Research Telecommunication International Institute (ATR) to the Owl Spot Theater for the Tokyo Theater Festival (2010).

First in a lab and then in a theater, the slightest quiverings of the emotional markers installed under an android's skin are intensely observed in hopes of witnessing a veritable metamorphosis. Androids, like images and words, pose several problems, not only that of how they appear but also, more concretely, how they are made, so that we can better learn how to design them and what attributes to give them after their chrysalis. It is as if androids, like insects or butterflies, needed to undergo a rebirth in order to finally emerge and metamorphose. If we hold that words and images are shells or shadows that are neither completely things nor completely thought, then what about the wrapper of an android, which is certainly a thing but which tries to pass for something else?

Androids are containers for the projection of an ideal human, a hoax based on our desire for self-representation. They are caricatures of themselves, us and the other. Instead of creatures, aren't they really just hi-tech chrysalises, something halfway between a nice technological object and a fallen human being?

Essentially, an android is like an apparition in that, while it is truly present, nevertheless is presence is basically determined by the initial effect it produces.

4. The research context

Since 1999, thanks to several experiments in the dramatic arts with the first robots that I designed and built for theater (California Institute for the Arts, Valencia USA, 1999-2001[7]), and following the first encounter with Japanese professor Hiroshi Ishiguro at a seminar on anthropomorphism in Oxford (2007), him as a roboticist and me as an artist, we came to the conclusion the conditions for a certain form of expression of empathy by robots would certainly fail for some time to come and for various technical reasons relative to the issues of artificial intelligence.[8]

Geminoid HI-2, Ishiguro Lab., Intelligent Robotics Laboratory, Osaka University (2013).

The general question of the recognition of the presence of an intentional being is one of the main issues in the field of social cognition in the cognitive sciences: under what conditions one can judge that the behaviour of an object obeys (Premack, 1990[9]), either solely to mechanical causality, or to the pursuit of a goal according to an internal agenda?

It is also one of the possible variants of the famous "Turing test": which behaviour of a machine can lead us to attribute to it an intentionality (Avraham et al., 2012[10]) similar to that of a human being?

On a continuum of social presence, the face-to-face medium between humans is considered to yield the greatest sense of presence, whereas face-to-face between humans and machines, the least. Social Presence Theory classifies different communication media along a one-dimensional continuum of social presence that is equated to the degree of awareness of the interlocutor during an interaction (Leite - Martinho - Paiva, 2013[11]). True attention or empathy with technological devices requires more than simply having interfaces with the semblance of a calm expression or a friendly behavior; empathy is more complex phenomenon than that (Berthoz- Jorland, 2004[12]). In my opinion, with a professional experience in puppetry, interaction design, in particular, should lie in part on the existence of a certain form of the devices' Presence Effect: the minimum perceptual activity in the situated interaction, integrity of the reference posture, embodiment as a paradigm of identity, signs of connection, realignment operations, gestures resulting from stress, pacifying gestures and triggers and layering of these gestures. This would assume the possible expression of a form of intelligence, alertness, or attention, be it real or simulated (Breazeal 2002[13]). Above all, however, it would make it possible to induce an intuitive relationship without having to read any operating instructions or customize the equipment settings. Being in intelligence with a device seems to be an essential condition for making it familiar. Moreover, beyond any unsettling feeling it could arouse in the user, through excess or failure of resemblance with the known or identifiable agents, the design of the interfaces and the interactions of complex systems or devices should give as much of an impression of being simplified, or humanized as possible.

Having noted that the pertinence of a certain quality of interaction and interlocution was essential for creating a feeling of familiarity with humanoids and thereby encouraging emotional relationships, it was decided not to limit the emotional range of robots to an expressive appearance or friendly behavior, which often leads to infantilizing them or relegating them to being passively servile. A part of the research on empathy which until now has been circumscribed to imitation would have to be spread to other criteria of resemblance, especially by transferring the synchronization of (programmed) simulated movements or (remote-controlled) direction to the coordination of behaviors.[14]

At Osaka University, since the initial intention was to take robots out of the labs, making up for the gap between imaginary and the state of the science of actual robots was no longer an issue of simply performing demonstrations or sequences of pre-recorded social behaviors, such as those we still see today in the West for commercial reasons or for short-term needs related to product launches like chatbots or friendly robots (Paré, 2016[15]).

Drawing on two decades of experiments that are both artistic and technological, namely embodiment experiments with devices for communication, telecommunications and telepresence, I have tried to extend the theoretical field of the Presence Effect to study and describe in detail the information that is prone to giving meaning to the presence of such machines or devices upstream of communication phenomena. Thus, the objective of synthesizing this research is to make

it possible to apply these specific behavioral states, which so far have been exploited, to interactive devices, such as telecommunication devices or social robots (ranging from household appliances to friendly robots).

In fact, while at ATR labs I noted that the Presence Effect was part of the studies in telecommunications, since the anthropomorphic robotics lab I was working in was established at the heart of this research center. That the reason why we particularly used and quoted the Japanese term *Sonzai-Kan*. The robots were used in the context of studies on communication, telecommunications, teleoperation, telerobotics, and telepresence of conversational and embodied agents Thus, there was no need to distinguish the Presence Effect in this field of research since it is directly connected to studies on telepresence. Nevertheless, it seemed necessary to perhaps gradually try to distinguish types of communication. This would mean even detecting non-verbal communication and body language. All gestures are not necessarily a communication event or element, but certainly at times they are a prerequisite thereof. Sonzai-Kan translates to the "presence" or "spirit" of a person. It's work that blurs the line between technology, philosophy, psychology, and art, using real-world studies to examine existential issues once reserved for speculation. "Where does the *Sonzai-Kan*, the feeling of one's presence, such as the atmosphere, the authority, come from? How can it be captured, revived, and transmitted?"[16]

For example: posture can be analyzed as a measure taken before engaging in a communication process, or for guaranteeing the optimal conditions for it to function when it is carried out (Grimaud - Paré, 2012[17]). It is thus that master bunraku puppeteer Kanjuro Kiritake III, with whom I studied bunraku theater in Osaka (2009) came to visit the robotics labs to bring a contribution to the knowledge of postures and predispositions upon triggering gestures and speech turn-taking in robots (Paré, 2012[18]).

From these studies there are, among other matters, applications on the posture of robot torsos in the attention-alertness simulation and interaction engagement. Looped sequences of movements to simulate continuous corporal activities are being replaced by giving these machines individualizing small movements. This first range of movements that can be compared to tics replace the programming loops that until now sought to imitate a body at standstill: which involved imitating respiration, blinking eyes, or certain movements of the shoulders, bust and arms in a seated position (Geminoid HI-1, 2009). This heavy randomization of actions led especially to the opposite effect of what was expected and it is therefore the improvement of these tasks that my colleagues and I were set to carry out. From the first to the second Geminoid, we went from 50 degrees of freedom (DOF's), i.e., from fifty actuators to a dozen.

Geminoid HI-2's hands, Ishiguro Lab., Intelligent Robotics Laboratory, Osaka University (2013).

5. The robot out of context

For the bachelor, the housewife, or the elderly person confined to an apartment, the services and presence of these humanoids can greatly reduce the feeling of solitude. Sometimes robots can be exceptionally charming, or help patients regain confidence by helping to bolster weakened social relationships. Even clothed in a hard shell, social robots must move people. They must display a certain dependency, like a little dog or "a devoted and faithful wife" and, if possible, an ability to learn, like a child. Without being as helpless as a newborn, they must nonetheless demonstrate that they have developed an intelligence or a stage of maturity during which specific cognitive development manifests, whether in relation to space, or to gesture memorization, such as a child of eight months to two and one-half years old would have; or exhibit the learning stage of a child eight years old, or older. A domestic robot must suggest and inspire a certain number of feelings, such as the capacity to soften hearts (we think of what a baby induces us to recall and reexperience about our own infantile amnesia), or even inspire sympathy by making us feel responsible in a way akin to parental behavior, not out of a sense of duty, but voluntarily. This desire can extend beyond mere regression and express itself in a wish to help or protect the robot or device concerned.

Note that, depending upon how sophisticated they are, most of these machines are still somewhat fragile. As in relationships with a child, the desired aim is to try to make our gestures change: they need to be slower and more attentive as we focus our visual attention on fine-tuning the interaction. The robot must change the user's state of mind by inspiring new feelings about a machine, such as the user wanting to keep it company and not the other way around, to take care of it—even though the robot concerned is not in danger—and help it. In a way, it means being able to show that the desire to assist is reciprocal. Companionship calls for sharing intentions and emotions via eye contact and tapping into mental perceptions of abilities to assist, which give rise to the idea of cooperation. This involves a potential emotional resonance transmitted through what the robots' bodies express, or what we can presume about their affordance, determined by their "affective" states, according to their status, expressions, colors, or shapes.

The empathy produced by this sharing, easing of tension, or feeling of emotional security is produced through contagion, as is the complementary component of any affective state. Nothing becomes real unless it is felt, which is the prerequisite for the other to share in the reality projected into us. Thus, we attribute to robots what we mimic in ourselves, thanks in part to the coordination and synchronization of our movements, as well as to the mirror neurons constituting the biological basis for getting to know an alien "me"—this uncertain part of what we perceive of others. Facial expressions and voice intonations are essential, just as they are in the parental connection that emerges early in the life of each individual of our species. In most situations observed with social robots, even when the latter are placed in a position of assistants, we tend to want to help them because of their inability to help themselves. Like children, they are incapable of controlling their "desire." They are only apprentices in social bonding, and this inability sometimes seems to hinder their "reasoning" skills. Curiously, we occasionally attribute to them an inner life and language, a sort of budding conscience: "If you did not exist, I would not exist, since I'm almost like you, with this need that you may have of me." As in a relationship with a child, a love relationship, or one with anyone in general, and to more or less intense degrees, the bond stems from two beings in interaction, from the space between them, or between two relationships. As in the Actor-Network Theory (ANT), the relationship then becomes as important as the person himself or herself. The robot "exists" for the first time when it appears to the other who is leaning toward it, smiling at it, touching it, and—like humans—robots are never "born" just once, but at each new meeting. Robots emerge in others, in the course of their encounters, and become a part of their interlocutors' and their users' inner world. Before language, just as before Robby's words: "Danger, Will Robinson!" we need to internalize the emotions of this other clumsy being. To some extent, we need to experience the robot's ineptitudes and the limits of its intentions, because even if it warns of an imminent danger, our grasp of this information is measured by what we know of the robot.

On this first decade of the 21st century in Japan, a period in which a surprising rise in curiosity and skills propelled the development and manufacture of widely diverse robots. For a foreigner, some of them are surprising, others unsettling at times, but for the most part, they seem made mainly to charm and delight. But all the effort made until then still was not enough to overcome the Uncanny Valley (Paré, 2012[19]).

So, the idea was to reinforce the machines' Presence Effect by simulating and suggesting a state of awareness thanks to the programming of unconscious postures and movements. The premise was that: if a creature has unconscious behavior, especially if it adopts certain postures, gestures or behaviors related to stress or calming, then there could be no doubt that simulating them would suggest to the interlocutor that the creature would potentially have a conscience, or some kind of ability to express intentionality, which could, in that case, express itself as a counterpoint to this 'standby status.'

One of the experiments in these preliminary studies I have done as a drama researcher in Robotics lab was the production of certain calming or stress-induced movements that lie upon the constitution in the act of sensory-motor, bodily or gestural invariables, such as tics. This is an interesting study in that it intended to program tics in robots. As a drama researcher these days in the Japanese labs where I work concerns planning the micromovements of androids so as to reduce the tension create by the void (i.e., the very odd absence of the "other") and, in the end, of presence to the bodies of machines in waiting. These micromovements are not a language of signs. Of course they can be interpreted and are forms of nonverbal expression, discreet messages, metamessages, forms of infracommunication and metacommunication in body language, metalanguage, micro-body language or a form of protomovements, but essentially they contribute to giving the impression of presence. However, these preliminary movements ranging 3 to 7 cm for 3 to 7 seconds are nevertheless at the heart of this research that is still under development. This unique background of the understanding of the mechanism of Sonzai-Kan through the collaboration with Pr. Ishiguro and part of his research team helpful to build upon and go beyond the insights gained from analysing the existing data. From this point, the plan to design social robots is now to be able to give to these previous consistent experiments a new theoretical framework, and to establish the study of the Presence Effect as a segment of cognitive studies within telecommunication science, and maybe one day start to think how to design real social robot's behaviors or cultural behaviors for such companions.

Afterwords

"Lack of individuality," "imitation-prone," and "coldness," however, had ceased being clichés clinging to the general perception of the Japanese culture ever since its imaginative vitality had conquered the West through the power of its industry and thriving economy. In the popular imagination of Westerners—probably haunted by the promethean myth—robots have still not won over the public, despite their reassuring gestures and charming faces. In Japan, however, the mission of robotics seems to be to reinforce the praise of Japanese genius, perfectionist individual tasks, and of learning by imitation, to reach some infinitely repetitive and perfectible reproduction capacity. Yet with robots, and more recently, the Fukushima nuclear accident, Japan is once again, despite itself, questioning its society, the relentless advance of technology in daily life, its potential and real dangers, the coldness of machine calculations, and a trend toward extreme uniformization driven by new decision models.
For example, whether a consequence or paradox of a culture in which social control is pervasive, robots would seem to have the potential capacity of becoming social agents through mimicry, to the point of rendering themselves familiar and arousing empathy. The dramatic growth of Japanese robotics is not a mystification, and even with a little hindsight it is possible to assess how these advances in robotics are being received in this country, the manner and cultural context in which certain robots already exist, and those that will be produced in ever-growing numbers to meet domestic needs, social life expectations, or therapeutic hopes.

1.
Premiered on September 30, 2010 at the Aichi Triennial (Aichi Arts Center Mini Theater), Japan.

2.
ISO 13482, currently being debated in connection with non-medical assistance robots.

3.
Animatronic branch of Sanrio.

4.
Advanced Telecommunication Research International Institute, Kyoto.

5.
Mori M (1970), "The Uncanny Valley" (*Bukimi no tani*), Translated by Karl F. MacDorman and Norri Kageki, *Trans. Energy* 7, n°4: 33-35.

6.
Pr. Mori, a trailblazer in prosthetic design, points out, "If you shake hands with someone wearing prosthesis, you might be startled when you realize that their hand doesn't feel like a real hand at all, even though it looks like one."

7.
Presented at the Jim Henson International Festival of Puppet Theater, New York, 2000; Avignon Festival and *Institut International de la Marionnette* de Charleville Mézières, France, 2001-2003.

8.
Practices of Anthropomorphism, Artmap Research, Maison de France, Oxford, 2007.

9.
Premack D. (1990) "The infant's theory of self-propelled objects," *Cognition*, 36, n°1:1-16.

10.
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11.
Leite I., Martinho C., Paiva A. (2013) "Social Robots for Long-Term Interaction: A Survey," *International Journal of Social Robotics*: 1-18.

12.
Alain Berthoz, Jorland G. (Dir.) (2015) *L'empathie* (The Empathy), Paris: Odile Jacob.

13.
Breazeal C. (2002), *Designing Sociable Robots (Intelligent Robotics and Autonomous Agents series)*, Cambridge: MIT Press, 2002.

14.
Coordination here expresses the idea of actions that are carried out at the same time in a certain order. This same time would not be instantaneous, but it would be part of a duration.

15.
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Link a la nota: http://untref.edu.ar/rec/num8_art_2.php

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