

Theater and Robotics:

Hiroshi Ishiguro's Androids as Staged by Oriza Hirata

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Introduction: Theatre and technology¹

The use of digital technology has become a frequent aesthetic choice in live performance and is particularly present in the scenic arts. The technology is integrated in different ways: almost all of light and sound tables today are digital; incorporated into the performance itself through objects and technological devices and even in the creation process, requiring IT research and specific collaborations. The "production with technological components" as Steve Dixon called it in *Digital Performance* (Dixon, 2007) or "intermedial performance" as defined in the field of intermedia (Cheng et al., 2010), is inscribed in the lineage of digital humanities where different areas are gathered together under the common denominator of advanced technologies. The production in question becomes, thus, at the same time creation and theatrical research, scientific and technological research.

The idea of the robot is increasingly at the forefront.² Today, one sees diversified productions interested in robots, made by artists long dedicated to this aesthetic, as well as by young proponents. For example, in 1991, Chico MacMurtrie created the Amorhic Robot Works (ARW), a collective of artists, engineers, and technicians who develop abstract and anthropomorphic robotic machines. This systematic work is seen in installations and environments, autonomous universes due to scenography, actors and the robotic plots. In 1996 Zaven Paré created an electronic puppet (initially with a video source, then digital and tele-remote), presented at

¹ This article takes up some issues presented in the Communication "The Geminoid F or laboratory limits" in the session "Live Show and digital technology: the scientific laboratory to the theater stage" held at the annual conference of the Digital Humanities in 2014, an event that had as its theme: Cultural Digital Empowerment.

² Artistic works that explore the field of robots and robotic elements are part of increasingly diverse creative fields, such as: metal performance, cyborg theater, electronic puppets.

the Cotsen Center for Puppetry of CalArts and also in Valère Novarina's production, *Théâtre des oreilles* (Theater of the ears). Paré also collaborated with Professor Hiroshi Ishiguro and is part of the Robot Actor Project, conceived by the Japanese scientist. An artist and sound engineer of the younger generation, Clément-Marie Mathieu, graduated from l'Ecole Nationale Supérieure des Arts et Techniques du Théâtre (ENSATT) in 2012, presenting a creation called *Thé-Ro*. This project, developed as the conclusion of his drama school course, aimed to use a robot as a theatrical object, a robot able to interact with the viewer, in addition to acting as a digital and live data generator. From a technological perspective, the platform allows the robot to be dramatized and its capabilities tested, even extended (Laboratoire, 2011).

Robotic solutions appear in multiple aesthetic forms, affecting many areas in the scenic arts: for examples, the recent choreography *Robot de Blanca Li* (2013); the opera *My Square Lady*, produced by the Gob Squad (2015); and, in theater, the Pipeline Theater's *Spillikin, a Love Story* (2015). Robotic objects are integrated into productions in different ways: they form part of the set design, serve as a device or carry out a performative function, getting increasingly closer to the actor and his performance. In recent years, the approximation between the performer and the robot has created real challenges for artists and engineers. Leonel Moura made a significant artistic contribution in this regard, creating a new version of Karel Capek's famous play *Rossum's Universal Robot* (1924), in which the Czech writer defines the robot and gives it a protagonic role in the play. In his show entitled *R.U.R, The Birth of the Robot* (2010), Moura updates Capek's story, putting robots to represent themselves alongside humans. He defines his creation as Robot Theatre.

This study is interested precisely in the integration of robots into stage productions, in their "performance" on stage with professional actors. As the object of this highly technological robots analysis, I propose the androids designed by Hiroshi Ishiguro at ATR Laboratories in Kyoto, which have participated in several stage works by the Japanese director and playwright Oriza Hirata. Looking at Hirata's work, I wish to highlight how certain paradigms of theater arts are overcome in relation to robotics, and what kinds of interferences are created, focusing mainly on how the creative process is organized, on the issue of scenic robot performance

and its interaction with the actor.³

Genesis of a collaboration between a director and a robotics engineer

The story of this collaboration is new and old at the same time, since it is difficult to examine the relationship between the director and the robotics engineer without taking into account the important role of the stage technician.⁴ It is up to him to generate the mechanics of the scene, ensuring that the techniques and effects function properly in performance. The integration of new technologies into staging, especially in the 1990s, brought successive changes in technical status. The technical team expands, bringing together engineers and researchers often from the exact sciences. Due to specified knowledge and other circumstances, directors may be unable to run a software program, to adapt a program to the needs of the production or invent a technological object. The situation poses new challenges to the director, requiring a posture and positioning distinct from what is required from non-technological staging.

Currently, we can see a real change in the collaborative chain in digital productions, formed by three collaborators, director - actor - stage technician, or by the combination, director - actor. The computer technician's function is no longer simply to carry out the director's ideas, but gains a new and elevated status. Yun Zhang speaks of the need, in the context of a digital art project, for a technologist to be present, one who can become co-creator of the work and who is an active engineer in the field of art (Zhang, 2011). This transformation, in turn, affects the director, who in the course of the production, acquires new skills in information technology and becomes increasingly initiated into the operation of the device or the digital creation of visual or sound effects. The director is often compared to a researcher or a scientist, a comparison that pertinently evokes a complex relationship with the technological device. On the one hand, there is the intra-scenic aspect, how

³ Regarding the relationship of the actor with intermediality, see my book *L'Acteur et l'intermédialité. Les nouveaux enjeux pour l'interprète et la scène à l'ère technologique*, Lausanne: L'Âge d'homme, 2011.

⁴ See my article "L'intermédialité et le processus créatif. L'artiste de la scène entre création et recherche", *Intermedia Review. An online peer-reviewed publication on art, culture and media*, avril, 2013, URL:

http://intermediareview.com/images/revistas/edicao2/Atas_III_art1.pdf and also Izabella Pluta, Mireille Losco-Lena (dir.), "Théâtres Laboratoires. Recherche-crédation et technologies dans le théâtre aujourd'hui", *Ligeia*. Dossiers sur l'art, Nos 137-140, Janvier-Juin, 2015.

to integrate a given interface into the universe of the production to make it work, first, and secondly for it to have scenic sense; on the other hand, the extra-scenic collaboration involves exchanges between director and engineer, for example, related to the course of the technological object, from its inception in the laboratory to its integration on the stage. The challenges of this interdisciplinary collaboration are complex and change the creative process considerably, posing multiple questions, including: how to organize the testing, how to communicate with engineers, how actors can react to robots? All these issues must be considered and managed by the project coordinator, who, in most cases is the director.

Hiroshi Ishiguro's Androids

Hiroshi Ishiguro, a professor of robotics, is currently working in two research units: Hiroshi Ishiguro Laboratories in environment of the Advanced Telecommunication Research Institute International (ATR) in Kyoto (four laboratories) and the Department of Systems Innovation in the Graduate School of Engineering at Osaka. When you visit the ATR lab site, you have the impression of seeing a cabinet of curiosities, where photos of people with beautiful faces (men, women) parade alongside beings with anthropomorphic forms.⁵ These are the diverse types of robots designed by the teams of these laboratories, including:

- Telenoid, a teleoperated android, with minimal human likeness, without gender or age, and whose body has the contours of a human silhouette;
- Elfoid, which follows the concept of the telenoid, but is smaller in size, the parameters of a celular phone;
- Hugvie (from the English "hug" and from the French *vie/life*), a pillow shaped to resemble a human silhouette, is a medium that awakens the sense of human presence: the user is asked to put his phone in a pocket located at the head of hugvie and hold a phone conversation by pressing the robot in his arms, which gives him the impression of having contact with his interlocutor;

⁵ See: <http://www.geminoid.jp/en/index.html>

- Erica is an android that performs conversations independently, with the realistic features of a young girl she is able to interact naturally with her interlocutor.⁶

Among these androids, the most fascinating are the geminoids (geminus in Latin, meaning “twin”) designed in the image of actually existing people. Ishiguro made his first geminoids in 2001 as a replica of his 4-year-old daughter (Repliee R1), then as a copy of a TV presenter (Repliee Q2). He developed, finally, his own double, the Geminoid HI-1, which had implants of his own hair, and later a more perfected version of it, Geminoid HI-2 (Pluta, 2012). This twin android seems a veritable aspiration of Pygmalion’s dream since it approximates the human appearance like no other android thus far designed has managed. In fact, the objectives of this robotics research are ambitious: since 2004, the work on human appearance, through research on artificial skin and the development of micro facial movements; and, since 2009, work on the unconscious movements that, in the human, are evidence of brain activity (Paré, 2015). Note that the geminoid is so complex that there is no one on the staff of the laboratories that knows all the functioning elements.

Research results are striking at this moment: the silicone skin perfectly imitates human skin (texture, color, imperfections like pimples); the face is given lip movements and blinking eyelids. The geminoid can move its hands, fingers - especially the latter - resembling gestures linked to stress, impatience, and nervousness in a human being. The geminoid cannot walk and is operated remotely by an engineer who lends his voice. Some types already have a second mode of operation without teleoperator, much more autonomous in its interaction with an interlocutor and equipped with a synthesized voice. Several robotics concepts, psychology, and philosophy are at the heart of this research, such as the autonomy of the robot, and especially the effect of its presence. Since the beginning of his research, Ishiguro probes into the concept of *sonzai-kan*, which means “feeling of being in the presence of another person” (*Understanding*, 2011). In this respect, he touches on the fundamental idea of being a human being, studying this not only from the point of view of his robotic models, but also in terms of who sees the robot:

⁶ There are other androids created here: *Kodomoiroïde* (an android with the features of an adolescent girl), *Otonaroïde* (a geminoid with the face of a young woman) and the most famous Geminoid HI-4 (Ishiguro’s double), as well as the Geminoid F, integrated into Hirata’s scenic work. See: <http://www.geminoid.jp/en/robots.html>, accessed November 25 2015.

the spectator who is the recipient of this amazing “being present.” In fact, for its striking resemblance to a human being the geminoid provokes contrasting feelings such as fascination, fear, disgust and thus brings to mind Sigmund Freud’s idea of the uncanny referring to inanimate anthropomorphic objects. This feeling of the uncanny, as generated by androids, was analyzed in detail in 1970 by robotics engineer Masahiro Mori. He noted the unease and discomfort of people in front of a humanoid robot and named these feelings “Uncanny Valley,” an idea similar to Freud’s concept of the uncanny (Mori, 1970).

Currently, the research conducted by Ishiguro’s teams aims to extend the time during which the user has the impression of being in front of a living being and also get him to establish a relatively spontaneous interaction with the android (Pluta, 2012). Ishiguro speaks in these terms:

Interaction with machines is generally more complex and means you need to have read the instructions beforehand ... We need to create situations and interactions in which we can act and react intuitively (Paré, 2015, p. 6).

So, Ishiguro orients the work in the direction of increasing the edge of the unforeseen and the unexpected in the android, which is a currently an important issue for robotics in global research. Ishiguro is absolutely aware that the psychological aspect of a robot is one of the most difficult aspects to study, and to go more deeply into the double question “what is human?” and “what it is not?” he works with psychologists, neurologists, and specialists in cognition. Placing a geminoid acting on stage lets us examine some of these issues in a unique way, through techniques of representation. Although it is highly inappropriate to assign a machine functions that are not part of its protocolar use in the Japanese scientific tradition, Ishiguro is interested in the actions of his robots in other contexts. Thus the Robot Actors Project was born, in which the stage becomes a new laboratory for robot study, a place of experimentation. It is also an opportunity to investigate the viewer’s perception and identification. Indeed, the public identifies, to a greater or lesser degree, with the characters seen on stage and this identification allows you to better understand the performance. What happens, then, if the character is represented by a robot? Does identification operate the same way? The concept of empathy becomes particularly important in this context and much work in robotics address

the increasing viewer's empathy levels relative to the robot.⁷

For this staging experiment, Ishiguro chose the female version, Geminoid F, a young and beautiful 25-year-old Asian woman, a "lighter" model that requires only 12 contols. Designed in 2007, this robot went directly into Oriza Hirata's staging project, becoming part of the Android-Human Theatre (Hirata, 2012). Ishiguro proposed to integrate Geminôide F into a live performance and put it in a game situation alongside professional actors (Fig.1).



Fig. 1: Hiroshi Ishiguro (à gauche) et Oriza Hirata. Phot. Seinendan©

As he expressed it:

Our first objective was to transform the conventional display of robots at scientific expositions into the robot theater of artwork. [...] We thought we should display robots that inspire people. This stance provides a basis for research into developing future robots that will not make elderly people and children feel uncomfortable or intimidated (Hirata, 2012, p. 1).

The projects, Android-Human Theatre and Robot Actors Project, belonging to two completely different fields, finally have common goals.

⁷ Regarding this study, see Edmond Couchot's conference "L'externalisation des compétences créatrices : Une inflexion inattendue de l'évolution," in the colloquium papers *Corps en scène : l'acteur face aux écrans*, June 3, 4, 5 2015, la Sorbonne Nouvelle.

Androids in the staging of Oriza Hirata: redefining the creative process and the figure of the actor

Oriza Hirata really started to work with Hiroshi Ishiguro in 2008 when he produced a twenty-minute performance that he wrote, *I Am a Worker*, with two actors and two household robots of the Wakamaru type.⁸ The play takes place in a small apartment and brings a young couple, Yuji and Ikue, together with the robots Takeo and Momoko (Osaka Kaleidoscope). The author of the piece creates a parallel between human and robotic characters: Yuji and Takeo suffer from a lack of motivation to work. The sequence of dialogues - dear to the director - interrogates the similarities between the human and the technological and made the public believe that robots can be struck by some illness.

Since the assimilation of robots into this show was a success, Ishiguro rapidly proposed an even more difficult test to Hirata: to work with Geminoid F. The director agreed, and visited the lab to become familiar with operating the android. The integration of the robot into staging clearly brought him a new challenge. Hirata is not only a director and one of the best-known Japanese authors, widely recognized for his "Theory of the spoken style" in the theater. He is also artistic director of the group Seinendan, director of the Theatre Komaba Agora and a professor at Osaka University. His extensive knowledge about the theater clearly brings to the Android-Human Theatre project the artistic dimension of the role of robots in Japanese society, without losing sight of the sociological aspects.

By opting to perform with highly humanized robots, the director entered a creative process that became, in essence, a process of experimentation, where different issues emerge from the beginning, working with the Geminoid F. These are simple and complex technical, logistical, artistic, issues, such as:

- What play to choose, taking into account the lack of the robot's motor mobility;
- Integration of the android into the scenography: whether to hide or show the wiring, the speakers, the chair on which it sits;
- Dubbing work to be performed by an actress (she lends her voice

⁸ This is a robot of a meter high that moves on wheels. It has the shape of an orange cone, has two hands and is able to speak and to recognize the human voice.

to the geminoid)

- Directing the performance of another actor with the robot on the stage;
- Teaching the actors how to deal with the unexpected arising from some operational defect in the android, such as a breakdown;
- Organization of the creative process between the artistic team and the laboratory: communication, sharing the steps of staging and robot control integration in the production.

Hirata finally decided to write the story himself, which is basically not a very surprising plotline (Fig. 2).



Fig. 2: SAYONARA VER. 2, Oriza Hirata, comédienne
Bryerly Long et Géminoïde F, 2012, Phot. Tatsuo Nabu©

Sayonara is the story of a young woman suffering from an incurable disease in the terminal phase. Shut up in her small apartment, her parents give her an android to keep her company. Hirata put on the piece in 2010, with Bryerly Long in the lead role, the Geminoid F as the companion robot and Minako Inoue, who operated the robot backstage by remote control (Pluta, 2013).

The half-hour long performance took place in a minimalist space with only two chairs, developing at a quiet pace in an intimate atmosphere. The robot is there

to recite poems, but at the same time to help the young woman in her departure. Hirata puts the android not only in a game situation, as it did with the Wakamaru, but gives it a scenic importance equal to that of the actress, the two then become partners in the scenic interpretation. The text of the piece explains, perfectly, all staging exigencies: the slow pace is explained by the intimate aspect of the piece, the limits of robot motion in the reserved activities and stoicism in the face of the young woman's death. In 2012, Hirata presented *Sayonara Ver. 2* with a new epilogue in honor of the tragedy at Fukushima: After the death of the young woman, the android is transferred to the location of the radiation, which is forbidden to living beings and where only a robot can survive and recite poems for the victims of the disaster.

The debut of *Sayonara* in 2010 thus marks a decisive step for both Android-Human Theatre as well as for theater arts in terms of its approach to robotics and examination of theater paradigms, especially in relation to the actor's performance. This particular staging clearly questions the scenic performance of Geminoid F. Can we now speak about a new interpreter, the actor-robot, or is this more exclusively integral to the performativity of robots? The answer is still out. Furthermore, the effect produced by the presence of the android onstage is equally problematized by its effect on the spectator. Importantly, spectators at the Théâtre de Gennevilliers, where *Sayonara* was presented were given a questionnaire in order to "improve in the future, other productions with robots and also to encourage research in robotics through this kind of performance."⁹

Hirata soon decided to continue the experiment, proposing to expand the creative team and introduce a second robot. For his text, he turned to an icon of European drama, Chekhov's *Three Sisters* (Fig. 3).

⁹ Audience questionnaire regarding their impression after having seen the android production *Sayonara*, Paris, Théâtre de Gennevilliers, December 2012.



Fig. 3: Hirata rewrote Chekhov's play, adapting it to a Japanese context (Pluta, 2013).

We are in the Fukuzawa family with the three sisters, Rizako, Marie and Ikumi, and Akira, the prodigal brother. The action takes place at their father's funeral, a known robotics engineer. The family lives somewhere in the interior of Japan and meets to reflect on their future and that of the company run by their father. Hirata introduces a conflict regarding a secret related to the younger sister, Ikumi, who everyone believes to be dead and be embodied by her technological clone, an android (Geminoid F), built by her father. At one point, Ikumi runs out of her room and decides to break with the mystery of her disappearance.

The challenge of staging is, this time, more difficult, because the room is much longer, and the play is represented by nine actors and two robots, Geminoid F and Wakamaru Robovie-R3. The process of creating the *Three Sisters android version* went on stage with and without robots and laboratory preparation played an important role. Hirata described the steps of the creation process:

In the case of the *Three Sisters*, we worked first with human actors. Instead of Robovie, the little robot Wakamaru, the assistant director played the robot's role for two weeks. Then we filmed everything and sent the video to researchers at the ATR laboratory who developed a program from that register. This step took two weeks, during which the actors had a break. After the programming, the robot began working with the actors

for two weeks. It was important, during this period, to simultaneously observe the acting and the programmed robot, to make them compatible and effect possible alterations. After that we could set the program. It is very risky to alter the programming just before the show so we try to fix it at least two weeks before the premiere. If there are questions or problems that arise at that time, the actors try to solve it, to modify something in their acting, to adapt. We do not interfere any more with the robot. The process of creation lasts a total of eight weeks (Pluta, 2013).

Once again, the production counted with a heterogenous team with the permanent assistance of Takenobu Chikaraishi, an ATR laboratory engineer who accompanied the production throughout its presentation. The collaborative chain visibly acquired a new configuration and distribution of its tasks. Hirata also affirmed that the new pace of the creative process, developed between the stage and the ATR laboratory, was easily assimilated by his creative team, because they had worked collaboratively for several years. Artistic continuity has been a very important factor in opening the creative process in the direction of the technological laboratory.

In 2014, Hirata presented *Metamorphosis. Android version*, a production inspired by Franz Kafka's text. It's worth noting that his first textual choice was Jean-Paul Sartre's *Huis clos*, but his petition for copyright was rejected by virtue of the project's intention to have actors and robots acting together on stage. For the Kafka text, he followed the same line of scenic research devoted to robots. He rewrote the text, giving it a contemporary context, and introducing a significant change: the main character, Gregor Samsa, transforms into a robot rather than into a cockroach (Helliot, 2014). Hirata invited four European actors for this staging: Laetitia Spigarelli, Irène Jacob, Jérôme Kircher and Thierry Wu Huu. Gregor is represented by a Repliee S1 type robot, his face is composed of a flexible, mobile white mask but his anthropomorphic body is, however, all metal. This time, Hirata confronted the actors and the audience with a robot that was instantly recognizable as such. Here, the contingent strangeness of the robot is intrinsically linked to the character's unexpected metamorphosis.

Conclusion: The meeting of theater and robotics engineering. New challenges for staging

We can see in the examples analyzed that the creative process takes the form of

a “collective coordination company” [*entreprise de coordination collective*] as media sociologist of Jean-Paul Fourmentraux termed it in relation to digital creation, naming, as active creative agents, artists, stage technicians, pure scientists, computer engineers (Fourmentraux, 2011). The latter do not participate as performers of the director’s ideas, but effectively become his creative partners.

The Geminoid F constitutes a link between the teams and the different functions, allowing the meeting of scientific and artistic worlds. Moreover, the staging initiatives enable the discovery of potentialities for uses not yet considered by the production industry.

Through Hirata’s staging, the robot becomes part of a very important experience, in which a uniquely acting function is given to a humanoid robot. It’s an innovation whose technological level is unprecedented and puts into question one of the constituent theater paradigms: presence. While Android-Human Theatre is still a highly experimental work, Hirata raises several key issues for the theater and thus leads an aesthetic path, no doubt, to be continued.

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