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Dire et Chanter Les Passions est une revue internationale à comité de lecture, créée en 2020 par Marc Jeannin et David Pouliquen (par ordre alphabétique), qui publie des articles scientifiques d'excellence rattachés à la thématique principale de l'expression vocale des passions.

La revue propose des sujets de réflexion interdisciplinaire de qualité en lien avec les différentes productions de la voix et les émotions qu'elles suscitent, dans de nombreux domaines.

Elle publie, en format numérique et sur demande en format papier, des articles de chercheurs français et internationaux venant de tout le spectre des Sciences humaines et sociales ainsi que des Sciences formelles.

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STAGING EMOTIONS: A TRANSDISCIPLINARY CONSIDERATION OF HUMAN-ROBOT INTERACTION

Salvatore Anzalone, Université de Paris VIII

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This paper presents the contributions of the scholars who took part in the panel *Dire e agire l'emozione: sulle scene dell'interazione uomo-robot* held at the international conference *Dire et chanter les passions: les voix de l'émotion* (Angers, 18th-19th October 2019). The panel aimed at investigating the forms and voices of the interaction – physical, emotional, affective – between man and robot by measuring the empathic components that result from it and verifying the possibility of understanding human behaviour starting from the reactions arising from contact with its artificial cohabitants.

In the opening, the contribution of Salvatore Anzalone, *Social robots as tools to understand humans' social mind*, following the most advanced studies in the field of human-machine interaction, allows us to have an overview of the various types of robots and the different areas in which robotics is used today.

The two following sections are instead a deepening in the multidisciplinary research project born within the University of Bologna *Performing Robots*. The paragraph *Motions of wonder and emotion for the artifice on stage: first notes from the Performing robots project, with a look at Japan* by Matteo Casari, starts from the first public working session of the research group staged in April 2019: *A dance for Lucy*. Starting from this topic will be presented a short excursus on traditional Japanese theatre and the influence of automata (*karakuri ningyō*) and puppet theatre on human actors.

About how the audience reacted to the dance performed by Lucy focuses on Cristiana Natali's intervention *Between relief and empathy: the emotions of the audience at the presentation of a performing robot*. The audience's perception of the performance was investigated through semi-structured interviews and questionnaires.

The final paragraph, *The voice of human emotions in the robot theatre of Hirata Oriza and Ishiguro Hiroshi* by Cinzia Toscano, focuses on the performance *Sayonara* in which the voice is an essential element in the performative construction of the identity of the robot android Geminoid F.

SOCIAL ROBOTS AS TOOLS TO UNDERSTAND HUMANS' SOCIAL MIND

Salvatore Anzalone
Université de Paris VIII

Hephaestus, the Greek god of fire, is represented in the Iliad in his forge, below the Mount Aetna, crafting the magnificent equipment of the gods, assisted by bronze wheeled tripods and golden handmaids, a kind of anthropomorphic mechanisms «to whom was voice, and sense, and science given» (“The Iliad of Homer”, Book XVIII, translated by A. Pope). From the epic of Daedalus and his *agalmata*¹, to the *Golem* of Jewish folklore², to the cyborg of *Metropolis* or *Blade Runner*³, the myth has always been nurtured by the idea of building “intelligent” machines. With time, this fascination translated in several attempts of making mechanisms able of showing a certain degree of autonomy: the automaton knight from Leonardo da Vinci⁴; the Japanese *karakuri ningyō*⁵; the Al-Jazari automatons⁶... But it is only in 1920 that the term “robot”, from the Czech word *robota*, forced laborer, employed for the first time in the sci-fi novel “R.U.R. - Rossum's Universal Robots” from Karel Čapek, started to be popularized while addressing such kind of machines: machines capable of a safe interaction with their surroundings, aimed at the extension of human's productivity and, more in general, of humans' abilities⁷.

From the success of the first industrial robot, the *Unimate*, in the second half of the '50s, the employ of these machines grew up: robots made up in different shapes and endowed by different degrees of autonomy, started to carry on repetitive or delicate tasks, relieving humans from dangerous, tiring or boring duties. Despite their success, however, the use of robots is still limited to a small number of activities in physically restricted areas. Industrial robots, in fact, are programmed to target very specified activities, operating in spaces in which every element is controlled and known: spaces similar to cages in which a strict separation between the world of humans, complex and unpredictable, and the world of the robot is enforced. In such robots, in fact, the capabilities of perceiving the surroundings, of reasoning and making decisions and of acting in a safe way within the environment, all the so-called “cognitive processes”⁸, very distinctive skills of human minds, are very limited.

Despite the defeat in 1996 of the grandmaster G. Kasparov in the chess game against *Deep Blue*⁹, a supercomputer from IBM endowed with a kind of very advanced “artificial intelligence”, and despite the subsequent progresses in the development of “intelligent” algorithms increasingly sophisticated, the goal of endowing robots with high-level cognitive skills that would make them

¹ Nigel Spivey, « Bionic Statues », in: *The Greek World*, ed. Anton Powell, London: Routledge, 1995, p. 442-459.

² Christos Iavazzo *et al.*, « Evolution of Robots Throughout History from Hephaestus to Da Vinci Robot », *Acta medico-historica Adriatica*, 12/2, 2014, p. 247-258.

³ Eduardo Benitez Sandoval, Omar Mubin, and Mohammad Obaid, « Human Robot Interaction and Fiction: A Contradiction », in: *International Conference on Social Robotics*, ed. Michael Beetz, Benjamin Johnston and Mary-Anne Williams, Cham: Springer, 2014, p. 54-63.

⁴ Mark Rosheim, *Leonardo's Lost Robots*, Berlin: Springer-Verlag, 2006.

⁵ Mateja Kovacic, « The Making of National Robot History in Japan: Monozukuri, Enculturation and Cultural Lineage of Robots », *Critical Asian Studies*, 50/4, 2018, p. 572-590.

⁶ Lotfi Romdhane and Saïd Zeghloul, « Al-Jazari (1136–1206) », in: *Distinguished Figures in Mechanism and Machine Science vol. 7*, ed. Marco Ceccarelli, Dordrecht: Springer 2009, p. 1-21.

⁷ Bruno Siciliano and Oussama Khatib, *Springer Handbook of Robotics*, Berlin: Springer, 2016.

⁸ William Kaye Estes, *Handbook of Learning and Cognitive Processes*, London: Psychology Press, 2014.

⁹ Murray Campbell, A. Joseph Hoane Jr, and Feng-hsiung Hsu. « Deep Blue », *Artificial intelligence*, 134/1-2, 2002, p. 57-83.

effective in real world scenarios, is still very far. But this is exactly the objective of “cognitive robotics”¹⁰: the development of machines capable of handling the complexity of the reality by endowing them with perceptive abilities, reasoning skills together with interactive capabilities, making them able of facing in real-time, highly dynamic, partially observable, complex environments. The challenge proposed by cognitive robotics has been tackled in particular by the *RoboCup initiative*¹¹, a competition that aims to the development, by the middle of the 21st century, of a team of fully autonomous humanoid robotic soccer players able of winning a soccer game, complying with the official rules of *FIFA*, against the winner of the most recent World Cup. Another among the most evolved challenges of cognitive robotics, as well as one of the most extraordinary applicative examples, is the development of autonomous driving systems¹², by endowing vehicles with the perceptive and the reasoning abilities needed to tackle in a safe way extremely complex and dynamic environments as cities and urbanized areas.

While the presented examples are interesting and useful, they lack an explicit representation of a fundamental component of the environments in which we live: the human presence. Robots will walk out from their cages once endowed of an explicit representation of the “others”, becoming friendly, even empathic, machines¹³. Such robots will show a sort of social intelligence” through a set of “socio-cognitive” processes¹⁴ that will let them able of interact in a natural way with people in different collaborative contexts¹⁵: robotic butlers at home; robotic co-worker in the assembly lines; storytellers for children... These machines will be accepted by people if they will be able to be perceived as “believable”¹⁶, not only thanks to their physical shape, but also, and especially, thanks to their unique ability of communicating the intentionality of their acts. Social robots will exhibit such intentionality through a coherent exploitation of their social capabilities, by the consistency of their actions and of their behaviors and through a continuous adaptation to their human partners, exhibiting their unique ability of understanding and expressing emotions, showing a unique personality¹⁷. The goal of “social robotics” becomes, then, the disclosing, the modeling and the deployment into physical robots of the basic set of socio-cognitive skills that make believable interactions with humans possible.

This believable interaction will elicit in them a sort of “illusion of life”¹⁸, the feeling of being together¹⁹ with another intelligent, socially conscious, creature, or of *Sonzei-Kan*²⁰, the feeling of “co-presence” with another being. As consequence, the evaluation of the abilities of such robots would be no longer related to their speed or their precision while doing some particular activities, as done with other kind of robots, but it translates to a measure of their social competences. This measure could be related, in particular, to social contingencies of “engagement”²¹, of synchrony or

¹⁰ Andy Clark and Rick Grush. « Towards a Cognitive Robotics », *Adaptive Behavior*, 7/1, 1999, p. 5-16.

¹¹ Hiroaki Kitano *et al.*, « Robocup: The Robot World Cup Initiative », *Proceedings of the First International Conference on Autonomous Agents*, Marina del Rey, 1997, p. 340-347.

¹² Sebastian Thrun, « Toward Robotic Cars », *Communications of the ACM*, 53/4, 2010, p. 99-106.

¹³ Cynthia L. Breazeal, *Designing Sociable Robots*, Cambridge: MIT Press, 2004.

¹⁴ Albert Bandura, « Social Cognitive Theory: An Agentic Perspective », *Annual Review of Psychology*, 52/1, 2001, p. 1-26.

¹⁵ Cynthia L. Breazeal, « Toward Sociable Robots », *Robotics and Autonomous Systems*, 42/3-4, 2003, p. 167-175.

¹⁶ Kerstin Dautenhahn, « Design Spaces and Niche Spaces of Believable Social Robots », *Proceedings of the 11th IEEE International Workshop on Robot and Human Interactive Communication*, Berlin, 2002, p. 192-197.

¹⁷ Kerstin Dautenhahn, « Socially Intelligent Robots: Dimensions of Human-Robot Interaction », *Philosophical transactions of the Royal Society B: Biological sciences*, 362/1480, 2007, p. 679-704.

¹⁸ Ollie Johnston and Frank Thomas, *The Illusion of Life: Disney animation*, New York: Abbeville Press, Disney Editions, 1981.

¹⁹ Zaven Paré, « The Art of Being Together with Robots: A Conversation with Professor Hiroshi Ishiguro », *International Journal of Social Robotics*, 7/1, 2015, p. 129-136.

²⁰ Shuichi Nishio, Hiroshi Ishiguro and Norihiro Hagita, « Geminoid: Teleoperated Android of an Existing Person », *Humanoid robots: New developments*, 14, 2007, p. 343-352.

²¹ Salvatore M. Anzalone *et al.*, « Evaluating the Engagement with Social Robots », *International Journal of Social Robotics*, 7/4, 2015, p. 465-478.

of causality (action-reaction)²² in the context of human-robot interactions and compared to the case of interaction between people. Such evaluation could also be achieved by measuring the social intelligence perceived by human partners in interactive contexts. The scientific literature is rich of attempts of definitions and measures of the intelligence people perceives from machines. Particularly famous is the Turing Test²³, a game in which, without any specific hint, a person should distinguish a machine from a human through a series of textual interactions. Possible extensions to this test would include the one proposed by H. Ishiguro, the Total Turing Test²⁴: here, a person should be able to distinguish a human being from an android, a photorealistic human-like robot. Another interesting extension of the original Turing Test would be a Reverse Turing Test, in which a robot should be able to distinguish between an android and a human. Despite the many advantages, the drawback of using androids lies in their main asset: their photorealistic human-likeness²⁵. While the human form is usually perceived by humans in a positive way, when approaching to a photorealistic shape, this feeling violently turns into repulsion and disgust. This phenomenon known as the “Uncanny Valley”²⁶, connected to a still imperfect realism in both shape and behaviors of the robot, that, due to a sort of cognitive dissonance, is perceived as disturbing. Several theories link the emergence of this feeling to the perception of a disease or of death²⁷, or to the activation in the bystander of some cognitive processes entailing a deeper analysis and characterization of the human figure²⁸. In any case, further refinements in photorealism correspond to a rapid decrease of this feeling of uncanniness.

Among the several emerging applications of social robotics, particularly interesting are the ones focusing on socio-cognitive deficits²⁹, as in autism and in other neurodevelopmental disorders³⁰ or as in Alzheimer and in other forms of neurodegenerative disorders³¹, as part of the natural aging process of people³². In these contexts, social robots can be employed as useful tools to stimulate and train impaired, flawed, or not fully developed cognitive abilities³³, tailoring the proposed activities to the specificity of each user³⁴. In particular, as ideal tool for bringing the therapy outside the hospital and the rehabilitation centers, social robots have the potential of going

²² Emilie Delaherche *et al.*, « Interpersonal Synchrony: A Survey of Evaluation Methods across Disciplines », *IEEE Transactions on Affective Computing*, 3/3, 2012, p. 349-365.

²³ Alan M. Turing, « Computing Machinery and Intelligence », *Mind*, 59/236, 1950, p. 433.

²⁴ Hiroshi Ishiguro, « Android Science », in: *Robotics Research. Springer Tracts in Advanced Robotics vol. 28.*, ed. Sebastian Thrun, Rodney Brooks, Hugh Durrant-Whyte, Berlin: Springer 2007, p. 118-127.

²⁵ Karl F. MacDorman and Hiroshi Ishiguro, « The Uncanny Advantage of using Androids in Cognitive and Social Science Research », *Interaction Studies*, 7/3, 2006, p. 297-337.

²⁶ Masahiro Mori, Karl F. MacDorman and Norri Kageki, « The Uncanny Valley [from the Field] », *IEEE Robotics & Automation Magazine*, 19/2, 2012, p. 98-100.

²⁷ Karl F. MacDorman, « Androids as an Experimental Apparatus: Why is There an Uncanny Valley and can we Exploit it », *CogSci-2005 Workshop: Toward Social Mechanisms of Android Science*, 3, 2005.

²⁸ Wade J. Mitchell *et al.*, « A Mismatch in the Human Realism of Face and Voice Produces an Uncanny Valley », *i-Perception*, 2/1, 2011, p. 10-12.

²⁹ Cynthia L. Breazeal, « Social Robots for Health Application », *Annual international conference of the IEEE engineering in medicine and biology society*, 2011.

³⁰ Brian Scassellati, « How Social Robots Will Help us to Diagnose, Treat, and Understand Autism », in: *Robotics Research. Springer Tracts in Advanced Robotics vol. 28.*, ed. Sebastian Thrun, Rodney Brooks, Hugh Durrant-Whyte, Berlin: Springer 2007, p. 552-563.

³¹ Joost Broekens, Marcel Heerink and Henk Rosendal, « Assistive Social Robots in Elderly Care: A Review », *Gerontechnology*, 8/2, 2009, p. 94-103.

³² Maribel Pino *et al.*, « Are we Ready for Robots that Care for Us? Attitudes and Opinions of Older Adults Toward Socially Assistive Robots », *Frontiers in aging neuroscience*, 7, 2015, p. 141.

³³ Deanna Hood, Séverin Lemaignan, and Pierre Dillenbourg, « The Cowriter Project: Teaching a Robot how to Write », *Proceedings of the Tenth Annual ACM/IEEE International Conference on Human-Robot Interaction - Extended Abstracts*, Portland, 2015, p. 269.

³⁴ Salvatore M. Anzalone *et al.*, « Towards Partners Profiling in Human Robot Interaction Contexts », *International Conference on Simulation, Modeling, and Programming for Autonomous Robots*, Berlin: Springer, 2012.

beyond the limits of classical therapeutic approaches, overcoming, in particular, the lack of intensity, the artificiality of the context in which classic therapies are carried on, and the lack of generalization that such contexts could entail³⁵. At the same time, the interaction with such social machine would give the unique opportunity of observing pathological behaviors in more natural settings, such as a school or a house, becoming new diagnostic tools³⁶ that would allow practitioners to compose a finer, quantitative characterization of the socio-cognitive deficit³⁷.

The concepts exposed so far make clear how the development of social robots hides a multidisciplinary challenge in which the different branches of the engineering, together with the philosophy, the psychology, the psychiatry, and, more in general, the social and the human sciences can find a common language and a terrain for a dialogue on different terrains, mainly: on the analysis of the interplay between humans, aimed at the production of metrics, models, techniques and algorithms able of capturing and describing the dynamics of social interactions; on the development of socio-cognitive agents, capable of explicitly taking in account the human presence their perception-decision-action loop.

According to this framework and in a context of a mutual enrichment between disciplines, the study of social interaction can help the development of social robots. At the same time, such development can be beneficial for a better understanding of our social mind. Social robots, in fact, can go beyond their nature of complex tools, becoming instruments to investigate humans' social cognition, as well as platforms that can assist in the evaluation and in the verify of theories and of models issued from social and human sciences.

Interestingly, notions and concepts from social robotics overlap and merge with central concepts of theatre and, more in general, of performing arts³⁸, like the presence, the alterity, the illusion, the repetition, the improvisation, the identification, the distance, the dialog... The scene, consequently, becomes a privileged context for the study of the human behaviors³⁹, where the use of different technologies suitable for capturing and modeling sensorimotor contingencies become feasible. At the same time, the theatrical representation becomes an ideal semi-structured scenario to develop and test algorithms, models and techniques of interaction between humans and socially intelligent robots⁴⁰.

³⁵ Salvatore M. Anzalone *et al.*, « Quantifying Patterns of Joint Attention during Human-Robot Interactions: An Application for Autism Spectrum Disorder Assessment », *Pattern Recognition Letters*, 118, 2019, p. 42-50.

³⁶ Sofiane Boucenna *et al.*, « Learning of Social Signatures through Imitation Game between a Robot and a Human Partner », *IEEE Transactions on Autonomous Mental Development*, 6/3, 2014, p. 213-225.

³⁷ Salvatore M. Anzalone *et al.*, « How Children with Autism Spectrum Disorder Behave and Explore the 4-Dimensional (Spatial 3D+Time) Environment during a Joint Attention Induction Task with a Robot », *Research in Autism Spectrum Disorders*, 8/7, 2014, p. 814-826.

³⁸ Izabella Pluta, « Theater and Robotics: Hiroshi Ishiguro's Androids as Staged by Oriza Hirata », *Art Research Journal*, 3/1, 2016, p. 65-79.

³⁹ Shogo Nishiguchi *et al.*, « Theatrical Approach: Designing Human-like Behaviour in Humanoid Robots », *Robotics and Autonomous Systems*, 89, 2017, p. 158-166.

⁴⁰ Cynthia L. Breazeal *et al.*, « Interactive Robot Theatre », *Communications of the ACM*, 2003, 46/7, p. 76-85.

MOTIONS OF WONDER AND EMOTION FOR THE ARTIFICE ON STAGE: FIRST NOTES FROM THE PERFORMING ROBOTS PROJECT, WITH A LOOK AT JAPAN

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Robots and artificial intelligence are increasingly pervasive in human everyday life, to the point that some countries are already at an advanced stage of drafting legislation in order to recognize these artificial agents a place in the society in which they operate¹. It is no coincidence, therefore, if the performing arts are experimenting more and more in depth the aesthetic possibilities of the robots on stage or their interaction with human performers. Such experiments are often the object of study and work of an increasing number of researchers. In that ideal laboratory constituted by the theatrical scene, an intermediate space-time between the pre-established setting of the scientific laboratory and the unknowns of the public *agorà* – they can observe from multiple disciplinary angles the human-machine interaction by using the social and reflective components of the theatrical device².

In 2018, researchers at the University of Bologna created the interdisciplinary research group *Performing Robots*, intertwining robotics, artificial intelligence, theatre, anthropology, and cognitive sciences. Using the theatrical framework, understood as a place of artistic experience and practice, and as an ideal space for a community to reflect on itself, the group began to investigate the expressive and empathic communication skills of the artificial body. From a methodological point of view, they considered the artificial body of both performers in flesh and blood – who through specific training "build" their own artistic body – and of robots or automata, moved, depending on the case, by simple mechanisms or refined systems of artificial intelligence³.

The group initially focused on some fundamental activities, first of all "teaching" to Lucy, name given to their Nao humanoid robot, some first dance steps, in order to start, among others, the process of reinforcement learning that over time should lead the artificial intelligence that governs Lucy to hone autonomous skills in creating its own choreographies. To approach the before-mentioned preliminary questions, it was decided to look at the Japanese lesson of *nō* theatre: genre of theatre formalized between the 14th and 15th century thanks to Zeami Motokiyo (1364?-1444?), the *nō* soon codified a strict scenic language based on a dramaturgical repertoire and a stable executive vocabulary. The acting of the *nō* performer is still substantiated today in the *kata* (form, model), codified models of movement that in a finite and variously combined series allow to stage the entire repertoire. The stability and finitude of the choreographic vocabulary of *nō*, in addition to providing theatrically significant movements in itself, facilitates,

¹ Very well-known is the case of Shopia, the robot made by Hanson Robotics, who became a Saudi citizen in 2017. The ferment and focus around robotics and artificial intelligence also have broad economic motives, for example the European SPARC programme, a Public-Private Partnership between the European Commission, European industry and academia to facilitate the growth and empowerment of the robotics industry and value chain, from research through to production. It is the largest research and innovation program in civil robotics in the world. <https://www.eu-robotics.net/sparc/>.

² The theatre is mostly confronted with the so-called social robots, that is, those robots designed and built to interact with human beings from an emotional point of view. On social robotics see Paul Dumouchel e Luisa Damiano, *Vivere con i robot. Saggio sull'empatia artificiale*, Milano: Raffaello Cortina Editore, 2019.

³ For more information on the research group: <https://site.unibo.it/performingrobots/en>.

at least in part, the translation of the movement put in place by the human model that the research group intends to replicate through the mechanical body⁴. It should be pointed out that making Lucy dance the *nō* was never the goal. The objective is analogous to the concept of translation specified by Umberto Eco in his famous *Dire quasi la stessa cosa* (literally « Say almost the same thing »)⁵. Not an attempt – impossible given the physical and mechanical constraints of Lucy – to provide the external precision of the model but, rather, the creation of a double that can produce in the public effects – especially emotional – analogous to the original.

The first moment of public showing of the work was the lection-demonstration *Performing robots: una danza per Lucy*, held at the University of Bologna's Damslab theatre on April 4, 2019. A brief introduction to present the research and its methodological questions preceded the actual performance during which Lucy presented herself and spoke about herself. The dramaturgy written and imparted to Lucy for the occasion was deliberately bent to dissolve the boundaries between human and artificial, between organic and inorganic. This because the group wanted to test – as you will see in more detail in the next paragraph – the possibility and quality of an empathic relationship with the public⁶.

In expressing herself Lucy used a gesticulation appropriate to the content of the speech also producing some free body exercises like push-ups a *tai chi* routine arousing hilarity and admiration in the audience. She eventually showed a short choreography resulting from the assembly of six *kata*, freely extracted and combined from the *nō* drama *Hagoromo* (The Robe of Feathers).

Both in the presentation phase and in the *kata* demonstration, Lucy had some difficulties: she fell three times on her back and, during her version of *Hagoromo*, she lost the fan⁷. It was mainly the mistakes, together with the perceived quality of the dance, that moved more intensely and perceptibly the emotions of the audience who, inevitably, gave voice to their inner emotions through sighs, brief cries and cheers in the moments of greater aesthetic effectiveness and most (supposed) need of encouragement for Lucy. Everything culminated in a request from a spectator to give Lucy a second chance to make up for the error of the fallen fan. When, at the end of the repeat, Lucy concluded with the fan firmly in her hand the applause was liberating.

Una danza per Lucy took place without scenic design on a simple black dance mat under a white light, highlighting how the mere presence of the humanoid was sufficient to arouse interest and emotional participation. The contemporary technological scene, a veritable multimedia theatre that uses in various ways augmented reality, virtual reality, robots, artificial intelligence, video mapping and other instruments with a strong spectacular impact, sometimes indulges in the exhibition of the technical means for its own sake giving rise to the so-called « wow effect »⁸. Apart from the sterile content of some operations, however, it is undeniable that the sense of wonder is intimately connected to the theatre, it is a constituent component, and the technological prodigy is a powerful functional trigger to move the emotion of the audience.

⁴ On this front, some possible ways of operating have been explored. From direct programming (hard coded) to the manipulation of the robot exploiting its ability to memorize the movements. Some hours of *nō* dance have also been assimilated, but not yet implemented in the executive phase, through motion capture. Also, the first attempts at Labanotation were made, a method of graphic notation of movement, to arrive at useful forms of symbolic formalization to be used during programming.

⁵ Umberto Eco, *Dire quasi la stessa cosa. Esperienze di traduzione* (Eng. transl. *Experience in Translation*, Toronto, Buffalo, London: University of Toronto Press, 2001).

⁶ Lucy's incipit was « Hi everyone, my name is Lucy, and I am a humanoid robot. I was born in Japan, but I live in Bologna ».

⁷ The fan is an essential stage tool in *nō* theatre.

⁸ Anna Maria Monteverdi, *Leggere uno spettacolo multimediale. La nuova scena tra video mapping, interaction design e Intelligenza Artificiale*, Roma: Diano Audino, 2020, p. 13.

Precisely the wonder (*myō*) is for Zeami an exquisitely theatrical feature⁹. In his theoretical treatises he places the *myō* at the top of the stage purpose and the audience's experience, it is the goal that the great actor tries to reach with the audience, the interest that emerges from what is unusual, surprising. The surprise may also arise from an uneasiness caused by a situation that is not easily deciphered, that is simultaneously familiar (*heimliche*) and unfamiliar (*unheimliche*) or, coming to the case that interests us most, by uncertainty about the carnal or mechanical nature, organic or inorganic presence that is offered on stage: the reference is to the *uncanny valley*¹⁰, a theory by roboticist Mori Masahiro aimed at measuring the greater or lesser perturbation rate from the greater or lesser degree of similarity of the robot to human beings. Even without going into the details of Mori's theory nor the many existing robotic categories to which he applies it¹¹, it is interesting to note that he also includes theatrical objects among the models placed on the scale of the uncanny: the masks of the *nō* theatre and the *bunraku* puppets, the most famous Japanese style of puppet theatre dating back to the passage between the 16th and 17th centuries, highlighting what in Japan is a historically strong link between theatre, puppet and automata theatre, and robotics¹².

Robots, in fact, seem to have an intrinsic theatricality¹³, the same that in Japan is found in the automata, robots' precursors, the *ningyō karakuri*. By assimilating and developing the mechanical innovations of western watchmaking that arrived on the archipelago in the 16th century, the *ningyō karakuri* have become highly sophisticated automata – still made of wood today. They are grouped into three categories: the *zashiki karakuri ningyō*, small automata used to amaze and entertain guests in domestic environments; the *dashi karakuri ningyō*, mounted on parade carts used during religious ceremonies; the *butai karakuri ningyō*, proper theatrical automata. If the term *karakuri* indicates mechanism, *ningyō* has a more nuanced semantic that to the meaning of doll, automaton, puppet adds the sense of a mechanical device that cheats, that amazes the viewer. Producing wonder by making a spectacle of itself is a feature of the *ningyō karakuri*.

The *butai karakuri ningyō* enjoyed a large success during the 18th century by filling theatrical halls and influencing stylistically and technologically the *bunraku*. This eventually abandoned the simple puppets in use until then to adopt new ones, so sophisticated that three puppeteers were needed to act on the stage. The *bunraku*, in which puppeteers are visible to the public, achieves a perfect symbiosis of the human and the mechanical, « a set of internal mechanisms and external

⁹ Zeami Motokiyo, *On the Art of the Nō Drama. The Major Treatises of Zeami* translated by J. Thomas Rimer and Yamazaki Masakazu, Princeton: Princeton University Press, 1984; Zeami, *Performance Notes*, Translation by Tom Hare, New York: Columbia University Press, 2008.

¹⁰ Mori Masahiro, « Bukimi no tani », *Energy*, Esso Standard Japan, 7/4, 1970, p. 33-35. (Eng. transl. « The Uncanny Valley », *IEEE Robotics & Automation Magazine*, 19/2, 2012, p. 98-100. Mori does not cite him directly, but his theory resonates with Freud's essay on the *unheimliche* (uncanny), Sigmund Freud, « Das Unheimliche », *Imago*, 5/5-6, 1919, p. 297-324. On the uncanny in *nō* and on the Japanese contemporary scene see respectively Matteo Casari, « Waki. Il *nō* visto di lato », *Teatro e Storia*, 38, 2017, p. 399-422; Cinzia Toscano, *Oltre il perturbante: Sayonara di Hirata Oriza e Ishiguro Hiroshi*, in: *La scena del perturbante*, dir. Monica Cristini, Nicola Pasqualicchio, Verona: Scripta Edizioni, 2018, p. 45-67.

¹¹ In relation to the robotic soma, besides the humanoids, we must remember at least the androids and the ginoids which aim to be faithful copies of the male and female human race. The search for a total resemblance to man can go even further, as in the case of Ishiguro Hiroshi who has been working for years on the creation of geminoids, that is, androids that replicate a specific person, not a man or a woman in general:

<http://www.geminoid.jp/en/index.html>. For Mori an excessive resemblance produces the uncanny.

¹² On this link and on the theatrical union of organic and inorganic in Japan see Cody Poulton, *From Puppet to Robot: Technology and the Human in Japanese Theatre*, in: *The Routledge Companion to Puppetry and Material Performance*, dir. Dassia N. Posner et al., London and New York: Routledge, 2014, p. 280-293.

¹³ Matteo Casari, *Meccanismi di umana perfezione: la meraviglia nel teatro dei robot*, in: *Il teatro dei robot. La meccanica delle emozioni nel Robot-Human Theatre di Hirata Oriza*, Cinzia Toscano, Bologna: CLUEB, 2019, p. 217-221.

presences »¹⁴. The thread that connects the theatre of the *ningyō karakuri* to the *bunraku* leads up to the *kabuki*, a Japanese classic genre with actors in flesh and blood dating back to the 17th century.

Kabuki actors were the first victims of the *bunraku*'s success during the 18th century. The public began to prefer puppet shows and the best playwrights abandoned the histrionic and fickle actors in flesh and blood and began to write plays for their mechanical competitors. To recover ground the *kabuki* actors began to steal the art of puppets readapting operas and imitating their acting to regain the favour of the public. Among the most amazing and fascinating acting styles encoded by *kabuki* is the *ningyōburi*: the main actor, flanked by supporting actors in the role of puppeteers, moves on stage imitating the mechanical grace of *bunraku* puppets in a real example of incorporating the artifice that has excited and still enthuses the audience.

Edward Gordon Craig (1872-1966), director, theorist and set designer whose work became a turning point for the thought and practice of theatre in the 20th century, looked with interest at this outcome, the result of human learning from mechanical masters. The *kabuki* actors, “killed” on stage by the make-up and the costumes that remove their personal identity and naturalness, disciplined by a very strict artistic codification – *kabuki* is also based on *kata* – indicate a possible way to the ideal actor that Craig, without ever coming to define it with precision, called *Übermarionette*¹⁵. Craig seems to think of a technological actor, a mixture of organic and inorganic elements put together artificially (artfully), an actor that thanks to an embedded technique is no longer on stage himself but a symbolic presence, a manifestation that transfigures and transcends him. The artificiality, therefore, if artistically motivated and supported by a method (training) that does not make it merely exorbitant, would allow the actor to enhance his stage presence and reach aesthetic peaks comparable to Zeami's *myō*.

In the context of *kabuki* the actors-*übermarionette* arouse in the audience such a sense of wonder that it is uttered in screams of appreciation and jubilation in moments of great dramatic intensity or emphasis, like the *mie*, the emphatic stops of the movement. These screams are called *kakegoe* – the name given to the vocal calls of the *nō* and *kabuki* orchestras – while *ōmukō* indicates the people who scream. *Ōmukō* means literally « grounded there », hinting to the gallery from which the most passionate audience followed the shows and expressed their emotions. The *ōmukō* has become over time a coded role – a *claque* – and the acoustic presence of these voices is considered an essential element of a *kabuki* show.

Like what we saw with Lucy, the artificial beauty of *kabuki* produces such reactions in the audience that, if vocally manifested, become an integral part of the show by making the separation between the audience and the scene disappear, transforming an ideal boundary into an edge. It is a cancellation of the difference and distance that is reflected on the relationship between actor and spectator making possible, through an aesthetic emotion, a sense of empathy with a robot.

¹⁴ Giovanni Azzaroni, *Teatro in Asia (Malaysia – Indonesia – Filippine – Giappone)*, vol. I, Bologna: CLUEB, 1998, p. 323 (my translation).

¹⁵ On the role of traditional Japanese theatre in the idea of *Übermarionette* see Matteo Casari, *Per risvegliare l'attore: il Giappone tra le righe di « The Mask »*, in: *Dentro e fuori «The Mask»*. Craig e il teatro del suo tempo, dossier, dir. Matteo Casari et al., *Teatro e Storia*, 41, 2020, in print.

BETWEEN RELIEF AND EMPATHY: THE EMOTIONS OF THE AUDIENCE AT THE EXHIBITION OF A PERFORMING ROBOT

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In investigating the relationship between spectators and performing robots, it can be beneficial to draw on a branch of cultural anthropology dedicated to the analysis of emotions. This is a recent disciplinary field, dating back to the 1970s, which takes into account the difficulty of dealing with an extremely complex subject. First of all, the presumed universal validity of emotions has been questioned, and the need to historicize them, to consider their learned character and to evaluate their relationship with the body dimension has been stressed¹. The study of emotions has also triggered a reflection on the anthropological methodology itself, proposing a move from participant observation to what has been called participant immersion². Although aware of the problematic nature of accessing the sphere of interiority, anthropologists in this field do not shy away from investigating emotions, and so one important strategy is collecting testimonies, in oral and/or written form.

In the case of Lucy's performance³, these testimonies highlighted how Lucy's childlike appearance and "behaviour" produced two fundamental effects on the audience: on the one hand, a widespread feeling of relief in finding that Lucy contradicted the stereotype of the potentially dangerous robot; on the other hand, the establishment, for many, of a relationship of empathy with the performer. The difficulty shown by Lucy in the performance was often compared to what a child might encounter when faced with a complex task, and this imperfection made Lucy, in the eyes of the audience, more human than they had expected. The dystopian vision of the robot – which Lucy's performance completely deconstructed – is mainly linked to images from science fiction literature and cinematography in which robots endanger the lives of human beings or the entire human species. The interviewees evoke scenarios of this kind in various ways. For example, a retired theatre teacher explained: «I am reminded of science fiction movies, fantasy stories where robots take over the world and humans become slaves. [...] It's like saying... it's a sort of *Planet of the Apes* if you think about it». And an engineering technician observed:

I think of scenes like *Terminator* [...]. Or banally I think of [the] Omega, of Bonelli's comics, that is to say these very "extreme" elaborations of sentient life forms, which however at a certain point escape the... The three laws of robotics do not even know what they are, because they are born without - rightly so, because otherwise they could

¹ Chiara Pussetti, «Emozioni», in: *La ricerca sul campo in antropologia. Oggetti e metodi*, ed. Cecilia Pennacini, Roma: Carocci, 2010, p. 257-286.

² Jon Mitchell, «A Moment with Christ: The Importance of Feelings in the Analysis of Belief», *Journal of the Royal Anthropological Institute*, 3/1, 1997, p. 79-94.

³ The idea of collecting the spectators' opinions of the lecture-demonstration developed within the course of Methodologies of Ethnographic Research of the Second Cycle Degree Programme in Cultural Anthropology and Ethnology of the University of Bologna. A group of students was proposed, as an exercise for the course, to conduct semi-structured interviews and develop questionnaires to investigate the audience's perception of the performance, knowing that the participants would be degree students, PhD students, researchers, technicians and teachers of theatre, engineering, anthropology and other humanities. The interviews (twelve in all) were carried out at the end of the performance to people who had previously been asked for availability, while the questionnaires were sent in the following days to those who had left an email address (twenty-six answers) through the Google Modules platform. The questions were developed also accepting the proposals of the teachers who had participated in the project, and therefore had specific interests beyond those of the teacher (i.e. the present writer) and the students of anthropology: some questions from the engineers Paola Mello and Andrea Roli, the theatre scholar Matteo Casari and the psychologist Alessia Tessari were in fact included in the final list proposed for interviews and questionnaires.

not evolve - but how they evolve is not known, I think, I presume. And therefore a little bit of curiosity, a little bit of mystery... and why not, a little bit of fear.

The unease that comes from the fear « that androids become autonomous machines, and that they can therefore escape their creators' control »⁴ is however diluted by the sight of Lucy, which, with its appearance and modes of expression, produces genuine relief in the spectators. As a student of anthropology explained:

The apocalyptic visions we see in movies where robots take control have always frightened me. Lucy is not the case ; her sweetness has deconstructed the idea that I had. A detail that made Lucy less scary was the fact that she could talk and her saying a few words made you feel comfortable. For example, saying «Please» or «I haven't perfected my movements yet».

A fundamental component contributing to giving Lucy a comforting image is her childlike appearance, mentioned by almost all the spectators (« The fact that she is so small means you can already view her in a childlike way, already in a light, carefree way »⁵; « I could compare my experience with other viewers and see that many of them saw Lucy as a child. When she fell, many of them exclaimed "How cute!" or laughed, as if she were a child in her own right »⁶; « Her appearance was partly something that I was already expecting, so not completely new, but that reflected my childish image »⁷). Although many spectators were surprised by the fluidity of the dance movements⁸ (while others felt they were excessively mechanical⁹), sometimes it was the effort in the execution that accentuated the feeling of observing a being who was learning the movements, and therefore a child or a small animal:

Knowing some of the progress made by robotic engineering, I expected the robot to be able to perform movements smoothly. Instead, watching Lucy, who was trying with extreme fatigue to follow the programmed inputs, gave me a feeling of tenderness, as if looking at a puppy of some species (questionnaire of an anthropology student).

Lucy's childlike appearance and "behaviour" are elements that contribute to inducing deep empathy in the spectators towards the robot. The establishment of an element of emotionality in the relationship with robots has been repeatedly emphasized by scholars dealing with interactional dynamics in this area: Yueh-Hsuan Weng, Chien-Hsun Chen and Chuen-Tsai Sun, for example, observe how the processes of affection develop more easily towards an android than towards an object¹⁰. On the other hand, as other scholars observe, since the contexts in which we act and elaborate our thinking are dialogic, there is a tendency to treat animals and artefacts as if they were our interlocutors: anthropomorphism, therefore, comes from fundamental cognitive structures¹¹. It should not surprise us then that in interviews and questionnaires, terms drawn from the lexicon

⁴ Antonio Marazzi, *Uomini, cyborg e robot umanoidi*. Antropologia dell'uomo artificiale, Roma: Carocci, p. 32.

⁵ Interview with an anthropology student.

⁶ Questionnaire of an anthropology student.

⁷ Interview with an anthropology student.

⁸ « Actually, I'd imagined [the movements] to be much more mechanical, much more rigid, but I saw that, with the great work of the computer engineers, the movements were very fluid, so the robot was performing them quite fast » (interview with an engineering student); « I had previously thought that this performance would have been more mechanical and angular, but I found it more fluid, lighter than I had imagined » (questionnaire of a psychology researcher); « At first, knowing that it was a Japanese dance, I thought it would remain much more... [mimes mechanical gestures typical of a robot] robotic, a bit jerky. Instead, I had to change my mind, especially for the final choreography because the movements were very fluid, they were... yes, very soft. And so at first I thought it would have been much more 'robotic', in the most stereotypical sense of the term » (interview with an anthropology student).

⁹ « The movements are not fluid enough, too mechanical, and there are still too many "errors" » (questionnaire of a psychology student); « I had expectations that, once I saw Lucy, I realised were excessive. I expected fluidity and much more variety of movement » (questionnaire from a psychology research fellow).

¹⁰ Yueh-Hsuan Weng, Chien-Hsun Chen, Chuen-Tsai Sun, « Toward the Human-Robot Co-Existence Society: On Safety Intelligence for Next Generation Robots », *International Journal of Social Robotics*, 1, 2009, p. 267-282.

¹¹ Paul Dumouchel, Luisa Damiano, *Vivere con i robot*.

of kinship are sometimes used to designate Lucy. In answer to the question « What feelings did Lucy's demonstration arouse in you? », a student of anthropology replied: An unexpected and two-way empathy [has developed] regarding both Lucy herself and her creators. To simplify the concept, I could describe my feelings as that feeling of apprehension typical of parents at their children's performances in plays. I believe that every gesture of (and towards) Lucy, from addressing her as a being endowed with a sexual gender, to feeling compassion for her little mistakes, has nourished the public's perception of her form of humanity. In essence, no matter how much she was made of metal, cables, plastic, and above all how much I was fully aware of it, Lucy was human for a moment.

In the interview, an engineering technician highlighted how empathy developed even in an audience anything but unprepared for the content of the performance:

Although it was an audience of insiders, although anyway... it was quite evident the empathy of human perception of the result Lucy managed, although it is a robot that has been programmed with very complex systems, with complex algorithms. So I think that, if an audience of this kind had such a reaction... If I think of an audience of "elderly ladies", they could easily see their grandchild in Lucy.

And in fact, sometimes viewers expressed real surprise to discover that they felt empathy towards a robot, because their expectations of the performance did not lead them to imagine such an outcome¹². It is important to emphasize how the difficulties encountered by the performer were decisive in producing this state of mind. For example, a student of anthropology wrote in the questionnaire: « [I felt] a strange empathy towards Lucy that I did not expect, especially in moments of "embarrassment", when she fell or lost her fan ».

The degree of difficulty of the dance performance was also mentioned as a trait that helped induce a feeling of affinity with Lucy. As one of the interviewees, an engineering technician, for example, observed:

About the performance, well, uh... hats off to the robot, because anyway it is – in as much as it is – a learning being, you are giving it information, but it tries to digest it, and tries to transpose it. [...] So much empathy when it fell, because I found so much similarity in my paths... For example, in my martial arts development, where I was able to physically experience everything that had been said by the teacher, especially regarding the development of forms and kata¹³, which require precision... really Japanese. [...] It's an attitude, and very methodical work, based on details, and therefore... a lot of empathy, just related to fatigue, because I perceived very well the fatigue that the robot was enduring, because it's the same fatigue that I had to go through, and so I had to develop and perceive as well.

It is interesting to note, in conclusion, how the aspects that were most problematic for the organizers of the lecture-demonstration – defects in the execution of the performance (the falls, the difficulty in movements, the loss of the fan) – actually became a privileged channel for the audience to experience identification with Lucy and feel empathy with her. The image of a perfect robot, complete and impeccable in the execution of the planned tasks, has been replaced by that of a fragile robot, in the learning phase, that makes mistakes and faces difficulties which it tries to overcome: imperfection and incompleteness have opened the way for the emergence of emotions.

¹² A spectator, an anthropology student, wondered if the production of empathy was not reinforced by the organizers of the lecture-demonstration, who emphasized Lucy's childish aspect: « They prepared us to see her in a positive way, to empathize with her, to see her positively, right? They said "She looks like a child". [Instead] ignore this, don't say it, because you risk making me see her as a child once you say [this] thing. In my opinion this influenced the audience a little bit [...]. Maybe not all of us would have had such a strong positive attitude towards Lucy, or maybe we would have. But I have the impression that they made us a little more emotionally involved than we already were ».

¹³ Codified movements typical of Japanese martial arts.

THE VOICE OF HUMAN EMOTIONS IN THE ROBOT THEATRE OF HIRATA ORIZA AND ISHIGURO HIROSHI

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Tanaka Hisashige (1799-1881) was one of the most important scholars and builder of *zashiki karakuri ningyō*, one of his most extraordinary works was the Yumihiri Doji, a small archer capable of shooting five arrows. This *karakuri ningyō*, every time he takes an arrow from his quiver, moves his head fluidly imitating the typical human gestures useful to take aim so that the arrow hits the target not far from him. After a few seconds necessary to settle the position of the head, he throws the shot perfectly hitting the centre. In spite of its mechanical nature, programmed not to fail, its brilliant builder has endowed it with a gesture of pure and simple humanity: the third shot, which should reach, like the others, the centre of the target, will instead conclude its sprint very far from the main objective. In this case, the *karakuri ningyō* will make a movement of the head that expresses its disappointment for the mistake made, but it will have certainly captured the emotional attention of the public as happened to little Lucy. The mistake, the possibility of making a wrong, sharing a moment of difficulty is certainly one of the occasions that allow the human being and the mechanical being to share a common emotional space, united and in solidarity with each other¹.

The imaginary associated with the automaton, the cybernetic being, the android, is one of the most long-lived themes of culture and, above all, of modern and contemporary art; starting from Isaac Asimov and Philip K. Dick the interest in the technologically advanced future has always increased, as in cinema as in literature and figurative art. In the performative field, on the contrary, although it has influenced and interested several authors, it is a line of research developed more recently, able to highlight also the role of the performative voice.

The first hints of study on artificial vocality were already revealed in 1700 when Jacques de Vaucanson² measured himself in three automatic projects on artificial vocality: the Flutist (1738), the Drummer (1739) and the Talking Automa (1762). In 1779 Professor Kratzenstein of Copenhagen presented a machine made up of five acoustic resonators at the Imperial Academy in St. Petersburg, with a shape very similar to that of the human vocal conduit. Between 1789 and 1791, the Hungarian Baron Wolfgang Von Kempelen created a machine that emits continuous phonemes: he was able to pronounce phonemes in Latin, French and Hungarian³. This was followed by the experiments of Eugène Faber in the early 19th century, who made improvements to Kempelen's machine by adding a tongue, jaws and a mechanical glottis. From these few examples, it is possible to deduce that the voice, for these inventors, becomes a fundamental element to be grafted into their inventions as it gives inanimate objects a greater truthfulness, an effect of authenticity, it almost becomes a symbol of their identity: their whole body, through the voice, is projected outside and makes their “ego” perceptible.

The voice, together with the gender and the conformation of the face, is the strongest matrix of identity. The French scholar David Le Breton underlines how the voice and the face behave in the

¹ Cinzia Toscano, « Saggio di robotica teatrale: tra orientamenti scientifici e pratiche sceniche », *Culture Teatrali*, 29, 2020, p. 266-278.

² Jacques de Vaucanson (1709-1782) was a French inventor that during the XVIII century has created innovative automata.

³ Pierre Liénard, *Petite histoire de l'acoustique*, Paris: Lavoisier, 2001.

same way: they bear the signs of age, vary with the modulation of emotions and often betray a feeling⁴, in this perspective the voice shapes an individual and his uniqueness.

The cyber-punk imaginary, the attraction for the artificial body and the creation of a mechanic double are fascinations that have contributed to the creation of a real poetics of the artistic automaton; in this scenario, the voice inserted in a mechanical body becomes the “bearer” of another identity. In the performative field the physical characteristics of the voice, due to their malleability, are perhaps one of the most iridescent instruments available to performers: varying the intensity makes it possible to make the speech mild or severe, choosing one kind of vocal attack over another makes it possible to recognise the tenor of the speech.

According to Maria-Christine Lesage, « technologies have defined new perceptive experiences for the spectator, working to induce different sensations of reality and making presences of an unprecedented nature proliferate »⁵; the starting model certainly remains the natural voice, extreme, minimized, filtered and synthesized until it no longer seems a natural voice but able to generate an effect of presence. The English scholar Steve Connor writes:

Nothing else about me defines me so intimately as my voice precisely because there is no other feature of myself whose nature it is thus to move from me to the world, and to move me into the world. If my voice is my because it comes from me, it can only be known as mine because it goes from me [...] The voice does not merely possess phonetic measures and pattern; it works to confer a dynamic shape of my whole body⁶.

Starting from this statement that the voice possesses a uniqueness related to the singularity of the individual, we will consider one of the performances of the well-known Robot-Human Theatre project launched in 2008 thanks to the collaboration between theatre director Hirata Oriza and engineer Ishiguro Hiroshi. Their meeting constituted the beginning of a project that gave life to five shows with different robot models and dramaturgical structures that follow the theoretical foundations of Hirata. The five shows are very different from each other in terms of the themes covered and the way they are staged, but the element that unites them all is the close relationship that links them to contemporary Japanese society and the vision of a future in which robots will live in close contact with humans⁷. Among the five productions of the project, where humanoid robots and androids go on stage together with real-life actors from the Seinendan Theatre Company, founded in 1983 and still directed by Hirata, the one that is able to highlight the performative role of the voice is certainly *Sayonara* (2010/2012).

Ishiguro has been working for a long time to develop the potential of the man-machine relationship, imagining a future society in which robots will be able to relieve humans from their work duties in the everyday life. One of the robotic engineer's most ambitious goals is to transfer to his androids the *sonzai-kan* that we can translate with 'feeling of presence', what we usually call 'presence'.

Hirata's theatre is characterised by a realistic aesthetic that brings on stage images, characters and dialogues drawn from contingent reality. Its dramaturgies contain within them most of the elements of the scenic apparatus and the dialogues, recited in a composed style, make use of a subtext that refers to the nuances of meanings, the social codes implicit in the language and the gestures of communication. In particular, it is the rhythm and the way in which the lines are

⁴ David Le Breton, *Éclats de Voix*, Paris, Éditions Métailié, 2011.

⁵ Marie-Christine Lesage, « Presenze Acustiche », *Culture Teatrale*, n. 21, 2012, p. 164 (English translation by the writer).

⁶ Steven Connor in Paul Barker, « With one voice: Disambiguating sung and spoken voices through a composer's experience », in K. Thomaidis, B. Macperson (edited by) *Voices Studies. Critical approaches to process, performance and experience*, New York: Routledge, 2015, p. 2.

⁷ Cinzia Toscano, *Il teatro dei robot. La meccanica delle emozioni nel Robot-Human Theatre di Hirata Oriza*, Bologna: CLUEB, 2019.

pronounced that unfolds the deepest sense of his texts; the Japanese director's method, structured in the « theory of contemporary colloquial theatre », makes time and its multiple rhythmic fragmentations the main pivot for breaking down and recomposing the elements of communication according to the meanings to be conveyed. The themes that recur most frequently in his dramaturgies are linked to the existential sphere and include topics such as the breakdown of human relationships or the difficulty of living a life locked in social conventions.

Sayonara is the most incisive performance in analysing the importance of voice in recreating the identity of a mechanical object. It is the use of a performative voice similar to the gesture of a flesh and blood actor, able to present and therefore make present, the interiority of the subject that expresses itself, beyond the sense of the speech.

To start the show is the voice of Geminoid F⁸ who, still hidden in the darkness of the room, starts reciting a poem by the Japanese Tanikawa Shuntarō: « Now I have to go », his naturally warm voice recites. The scenography that appears to the spectator is really essential, composed of black panels that create the closed environment of a room and a white carpet on which the two protagonists sit. In this beginning are condensed the directing wisdom of Hirata, the power of the declamatory voice and the more ambitious intentions of the whole project.

The spectator, whether he is unaware or aware of the presence of an android on stage, is deceived in his perceptions because what he hears at the beginning is a human voice full of pathos; what then materialises on stage is a body whose nature remains ambiguous at first.

In this case, the words spoken have a secondary relevance and their meaning is subordinate to the signifier, understood as the manner or practice of using the vocal tonality. The voice thus becomes the element through which the palpable and volumetric presence of a body and its individuality and uniqueness is announced, even though it is an easily reproducible mechanical body. It is no coincidence that the android protagonist of Sayonara recites several poems in the continuation of the performance, also fruiting the refined and methodical technique of poetic declamation, interwoven with pauses, accents and lengths that give a strong emotional characterization to the speech. Hirata for the android Geminoid F chooses to use a human voice that echoes a certain mechanicity, he wants the spectator to be fascinated and struck by the emotionality that the machine is able to express rather than by the extraordinariness of having a latest-generation android on stage.

Interesting from this point of view is the statement of the actress Bryerly Long, co-star of the show together with Geminoid, during one of the question-and-answer sessions after the Sayonara's 2013 replication in the United States and Canada:

Question: So I have a question for Briely, what was it like to perform with a robot?

Long: Well I first worked with a robot there was an actress back stage who was operating the robot, so it felt like I was working with her through an object. And then when we did the French, English and German versions play then I was inputting the voice of the robot as well, so that was a bit strange... hum.⁹

What is probably particular for the actress is precisely the insertion of a purely human element inside an object that until that moment had been perceived as such because it had been manipulated by a human being; the vocal emission made the robot like the container of a "presence" that previously could not be perceived. The voice thus becomes the means through which to present the mechanical character emotionally involved. Finally, the slight mechanical inflection of the voice, as seen, betrays Geminoid's nature by giving it identity characters that define

⁸ Android robot and main character of the performance.

⁹ Bryerly Long, in Cinzia Toscano, *Il teatro dei robot*, p. 206-207.

it as "non-human". The use of a voice that is recognisable as human but carries within itself elements of mechanicity affects the viewer's vision, triggering a perhaps unexpected emotional response to the mechanical object.

Technically, in the show the construction of sound geography exploits two elements that seem to be in contradiction but which, when combined, bring a greater emotional thrust to the discourse of the mechanical character: the localization and spatialization of sound. The voice is situated in the body of the two actresses as it finds its origin there; at the same time the expansion of sound in space occurs thanks to the amplification of the vocal act, so, even if the mechanical actress moves her mouth to simulate the sound emission, for the spectator the starting point of the sound remains indefinite giving the sensation that the voice propagates in all the spaces of the hall. A similar construction, focusing on vocality, can also be found in another performance of the project *La Métamorphose version androïde*, inspired by the Kafkaesque tale, where the spectator witnesses Gregor Samsa's transformation into a robot instead of an insect. In this case the character remains strongly anchored to his human identity through his voice, the only element not involved in the robotic mutation as it remains constantly human.

Going back where we started – the uniqueness of the voice linked to the individual who shapes the image/perception of an entire body – we can say that the same is true, at least in the performative field, for mechanical actors where, in a more extreme way¹⁰, the voice contributes more than other elements to compose an identity able to stimulate the most emotional part of the spectator, succeeding in making him or her identify with an 'other' profoundly different from himself or herself.

¹⁰ Think for instance about giving a male, female or hybrid gender to robots by voice.