ISR Italian Sociological Review
University of Verona, Italy
ISSN 2239-8589 | Editor in Chief Paola Di Nicola
Managing Editor Debora Viviani

Robots in Social Research. Can Social Robots Conduct an Interview?

Eleonora Sparano

How to cite
Sparano, E. (2022). Robots in Social Research. Can Social Robots Conduct an Interview?. [Italian Sociological Review, 12 (3), 1209-1228]
Retrieved from [http://dx.doi.org/10.13136/isr.v12i3.610]

[DOI: 10.13136/isr.v12i3.610]

1. Author information
Eleonora Sparano
University of "Niccolò Cusano", Rome, Italy

2. Author e-mail address
Eleonora Sparano
E-mail: eleonora.sparano@unicusano.it

3. Article accepted for publication
Date: May 2022

Robots in Social Research. Can Social Robots Conduct an Interview?

Eleonora Sparano*

Corresponding author:
Eleonora Sparano
E-mail: eleonora.sparano@unicusano.it

Abstract

The pairing of Robots with the human species is increasingly common in everyday life and the outcomes of this relationship are the subject of numerous studies in this direction. Scientific literature shows that the relationship of empathy with Robots is much more possible, the more they resemble human beings, both in features and behavior. In the light of these considerations, the first Social Robots were designed, and are currently being tested to assist humans in carrying out a wide range of activities. The effects of this relationship between humans and non-humans are evident in the research conducted on educational robotics and support of fragile subjects, as in the case of people with autism.

We intend to investigate the possible uses of robotics in the field of social sciences, considering that, in a possible scenario of a post-pandemic future, Robots could be called upon to replace interviewers in the different phases of the research, and in particular in conducting interviews. The question is whether and how Robots are able to detect emotions in the answers of the interviewees, establishing a relationship of empathy with the interlocutors. If we can agree on the possibility of a future in which Robots accompany researchers in the context of the survey, the reasoning changes when we focus on the applications of robotics within the qualitative methodological strategy.

Keywords: social robot, human-robot interaction, robot as interviewer.

* University of "Niccolò Cusano", Rome, Italy.

1. Introduction

The *paper* sets out from what emerged during the mid-term conference of the Methodology section of the AIS, *La stessa non sei più*, during which the group of researchers belonging to the University of Turin presented the results obtained in the field of applied research on Social Robots[1]. In particular, the areas of intervention outlined by the team refer to educational robotics and interaction with minors, among which the case of children with autistic syndrome stands out. In this sector, very encouraging results have been achieved, tending to show how the educational relationship develops effectively given the sympathetic relationship established with Robots.

The work carried out by the laboratory highlights the effectiveness of the use of Robots (of which social Robots are a particular type, as will be discussed hereinafter) in conducting surveys, in which the use of a standardised questionnaire is envisaged, whereby, faced with the pattern of having to answer each question, the Robot effectively carries out the closed-question model. In fact, this result should not lead to thinking of an experiment devoid of adherence to reality, whose hypothetical framework is placed in a distant time frame. The idea of Robots replacing researchers, however, is not so far from reality: we need only recall the recent experience of the scientific world with the pandemic. In fact, if one thinks of the past crisis, it can be noticed precisely how it teaches - among many other things - the need to equip oneself with a machinery - as well as theoretical-conceptual - that puts the researcher, entangled in a situation similar to that experienced with COVID-19, in the condition of making up for a possible forced absence on the field, so as to be able to proceed with the surveys.

On the basis of these annotations, the present research work starts, with which we intend to lay the foundations for a theoretical-epistemological reasoning, with the relationship between the subject who studies and the studied reality, which revolves around the axis of the relationship between human beings and non-humans (henceforth humans/non-humans), in order to conduct a consideration on the opportunity to use Robots in social research. It is clear that a work in this direction cannot take place without considering the need to reconfigure the disciplinary fields, redesigning the profile of sociological knowledge, also through a review of the conceptual contents relevant for the

[1] The reference to the conference held online on 30 March 2021 concerns the speech held by Sandro Brignone, Antonio Falco, Silvia Palmieri of the Laboratory of behavioral simulation and educational robotics "Luciano Gallino", University of Turin, Department of Philosophy and Educational Sciences, entitled "La survey attraverso lo sguardo di un social robot".

discipline, since - as the current transition makes it clear - the scientific observation of behavior can no longer stop with the relationship between humans alone.

Therefore, the methodology envisaged for the structure of the *paper* is based on the analysis of a double thematic axis that goes from the study of man-machine interaction to that of the educational relationship, with respect to which a subset is identified in the research conducted on subjects affected by autism spectrum disorders (ASD). In particular, to answer this aim, the following research questions are followed:

a) what are Social Robots;
   - a[1]. what are the main social uses;
   - a[2]. what are the implications in the social sphere;

b) what interaction is possible;
   - b[1]) what are the results in educational robotics;
   - b[2]) what results in the treatment of autism.

Let us see, therefore, how the human-robot interaction relationship is shaped, before moving on to consider the theme of educational robotics and the caring relationship entrusted to Social Robots. Then, after having reconstructed the thematic background scenario, we will move on to a review of the salient features of the open questioning model, to assume a possible positioning of the Robots within this methodological framework.

2. Research

2.1 Human-Robot Interaction

This discussion is based on the study of social interaction processes with specific reference to a particular category of automata, which goes by the emblematic name of Social Robot (SR), so defined because they are designed to support the human being in numerous moments and activities. Social Robots have an embodied artificial intelligence and are therefore able to collect, generate and analyse information from reality and the context of the interaction. Designed to respond to the purpose of a relationship with the human being, in the most fluid way possible, they show the possession of requirements that lead them to exhibit a social behavior through which they obtain results in multiple directions, including the areas of education and care (Grimaldi, Palmieri, 2020).

Robots have been part of social reality for quite some time now, and the remarkable progress achieved in this field is having a very fast pace, with a dizzying speed in the development of ideas and techniques. Therefore, it is really hard to keep up with the various and most recent acquisitions, which could even be outdated if compared with the times of theoretical consideration and writing

(Cipolla, 2015). However, the speed with which they are inserting themselves into the social plot provides that, in order to maximise their potential, extraordinary cognitive abilities are implemented, including "social intelligence", which Robots need to respond to the purposes for which they are created as well as to act naturally towards humans (Williams, 2007).

As mentioned, with respect to the very large category of Robots, here we take into consideration the particular type of social Robots, entities introduced in a complex and dynamic environment, capable of behaving successfully with respect to the objectives for which they are programmed and compared to those of the community in which they are inserted (Duffy et al., 2000). Given the significant impacts of SRs on social reality (Grimaldi, 2022), this means that it is essential to understand how and in which areas they can be used in practice.

In most cases, in addition to being an area in which their progressive insertion will inevitably take place, their use took place in laboratories and schools which represent suitable spaces for obtaining easily assessable results through research. On the other hand, already during the unexpected *lockdown*, the urgency of a targeted intervention emerged, able to guarantee, also through educational robotics, the continuation of the school year. In that phase, SRs proved to be not only a valid teaching tool, but at the same time to be able to strengthen the perceptual-emotional, as well as the cognitive, aspect of primary school children with whom these entities interacted (Grimaldi, 2015).

In the era of pushed digitisation (Cipolla, 2013), in which every vital element appears intrinsically connected (Cipolla, 2015), for the purposes of the integral development of the person, it becomes necessary to know how to elaborate new languages, thanks to which to co-create meanings making use of digital support.

As shown by the studies conducted on the theme of educational robotics, the presence of social Robots at the centre of the didactic activities increases the acquisition of knowledge, in the mathematical and linguistic fields; it also fosters the development of social skills within working groups (Denicolai, Grimaldi, Palmieri, 2017. Carrying out activities with the use of Probot[2] motivates the participants to apply mathematical logic, starting from the adherence of the algebraic rules to reality. Among other positive results, there

[2] Probot is the latest evolution of Beebot. Together they represent programmable robots, intended for primary and secondary schools, to initiate children in the use of logic, computational language and programming. The main difference between the two models is that while BeeBot moves in 15 cm steps backwards and forwards and rotates on itself 90 degrees, left or right, ProBot incorporates the Logo language and, like Papert's turtle, can leave a trace on a blank sheet of paper and then draw geometric figures or various paths (Denicolai, Grimaldi, Palmieri, 2017).

was a tendency from students to associating themselves in networks and thus forming working groups for project implementation.

2.1.1 Personal services and social care

Rapid technological developments over the last few decades have resulted in the creation of machines which, slowly but steadily, are implemented in numerous work contexts: one of these is the field of *leisure*, where SRs are proving to be particularly effective in customer service, for example when receiving guests in accommodation and leisure facilities.

Exemplary is the case of America and Asia, where restaurants without staff are spreading, in which the booking and service procedure takes place via a computer system (Livisha et al., 2018). For some time now, the most well-known and well-established fast-food chain in the world has been using booking and payment procedures entrusted to Bots, employed in substitution of the figures usually provided for at the cash register, with obvious consequences on profit and performance, given the ability of automation to work without breaks and uninterruptedly over 24 hours.

While in the past the main task of Robots was to store data and perform tasks that were beyond human capacities, at this historical phase the technological advances allow Robots to evolve towards processing information and providing automated services more efficiently than a human could.

The research conducted in Turkey on the evaluation of the customer experience in some restaurants examined the following aspects: the attraction to children, the robotic system, the quality of service, the memorable experience, the characteristics related to the environment, the characteristics related to food (meaning by this the economic value and the gastronomic aspects), to combine them with the evaluation of the lacks/gaps in the robotic system, in the quality of service, in the characteristics related to the environment and in the characteristics related to food (Seyitoğlu, Ivanov, 2020). The study has shown that the presence of Robots intrigues children and that communication campaigns must therefore be adapted to the result obtained, so as to more emphasise the interaction aspect.

Among other areas in which SRs find an appropriate place, certainly the care of fragile subjects is included. In a future in which longevity is expected to increase and, correspondingly, the number of elderly people is expected to rise, the possibility of applying SR in specialised facilities for the care of the elderly and sick people may prove to be really important, especially since the moment of care no longer falls solely on the shoulders of family members, but on institutions and professionals trained to do so.

In a similar scenario, social Robots can alleviate loneliness, reducing the sense of isolation and abandonment that characterise this delicate phase of life

(Galletti, 2018). Now, although the empirical research in the sector is not yet very advanced, it is nonetheless necessary to reflect on what already appears to be a de facto reality and to ask what would be the ethical implications of such a reversal, whereby the human being would be completely replaced by the machine in the care relationship. This is why, even in a gradual integration's anticipation of Robots in these specific areas, we should continue to work on promoting a positive and constructive relationship between human and non-human.

2.1.2 Social Robot and Autism Care

Another area that is taken into consideration here for the analysis of the different applications of SR concerns the educational context, with particular regard to the "cross-collaborative approach" used in the care of minors affected by the autism spectrum syndrome (Silvera-Tawil, Brown, 2019). Far from wanting to enter into the merits of an evaluation of the results achieved in the medical-clinical field, which in fact does not pertain to this analysis, we wish to put the results achieved by researchers in this dimension as the object of sociological attention, in order to consider which implications may arise from the interaction with Robots. As will be remembered, in fact, the purpose of this work is to start a consideration on the possible uses of social Robots in sociological research, given the epistemic need to think about the post-pandemic future of social research and the possible applications of SRs in qualitative methodological strategy, in which a framework of interaction based on *trust* and *reciprocity* is envisaged. This means that the study of the area linked to autism spectrum disorders (ASD) is merely functional with respect to the need to answer some specific questions of sociological significance on the possibility of using SRs for the research methodology during the phases of data collection through an interview.

Logically, it should be noted that in this context the total autonomy of the Robot is not currently conceivable, since it acts on the basis of the programmer's inputs, in accordance with the person in charge of the therapy, in order to avoid any risks and traumas for the patient. Having said that, a further clarification needs to be made. The results achieved in the field certainly do not lead to arguing that, thanks to the use of Robots, the problem of autism can be eliminated (Pennisi et al., 2016); if anything, with their implementation, family members, doctors, and therapists, as well as all the other figures that normally gravitate around an autistic subject (from speech therapists to social workers and support teachers) have on their side an effective tool to work in synergy on the quality of the relationship, with the aim of drastically reducing the inequalities due to the disease, thanks to the *connective* capacity (Cipolla, 2021) that is established between the automaton and the autistic subject.

Having made this necessary premise, it is now necessary to consider the empirical results that have emerged.

The research carried out in this sector shows how the use of SRs in the treatment of subjects suffering from ASD can lead to appreciable results, especially in the removal of one of the main obstacles caused by the syndrome, concerning the difficulties related to the *external environment*. During the therapies in which the presence of the SRs was foreseen, a greater tendency to open up to others and to pass through the channels of sociality was noted; a tendency to a better use of language was observed, which is associated in most cases with the search for a closer eye contact with the therapist, as well as learning and observing precise rules (Marino et al., 2020).

Another important element concerns the motor rehabilitation of small patients with ASD: an aspect generally neglected because usually, when dealing with autism, more attention is paid to the theme of language and communication, although the difficulties in the system remain to be studied in depth motor system, a further aspect of connection with the *external environment*.

Researches conducted in this direction testify that, although there are countless possibilities of using SRs for motor rehabilitation (through physical, rhythmic, occupational, and technological therapy, in which augmented reality is used), known applications in this field still remain circumscribed (Jouaiti, Hénaff, 2019). In any case, the experiments carried out demonstrate the functionality of using Robots, when trying to develop the para-verbal side of communication through movement, due to the tendency observed in children to emulate the gestures of Robots, with room for improvement in bodily expression and awareness of self-positioning in the inter-active space. The experimentation carried out at this level shows positive results not only in the reproduction of the therapists' gestures, but also in the conversational participation between children and Robots. Other encouraging findings are highlighted in the register of eye-manual coordination, as well as in the ability to learn concepts by linking them to the typical gestures of para-verbal communication. In a nutshell, the use of Robots in the care of autistic subjects shows how the interaction with them improves the construction of a healthy relationship with the external environment.

2.2 First study. The interview in the interpretative paradigm

Once the thematic background scenario has been reconstructed, it is necessary to go back to the initial question, that is: can a SR conduct an interview?

In fact, at present Robots are already capable of interpreting human emotions, intercepting them through precise parameters that can be identified

on the face. Furthermore, always thanks to the implementation of precise software, they are able to respond to emotions by revealing an empathic subjectivity[3] through bodily attitude and facial expressions.

This would establish a pattern of interaction between human and non-human which, from a methodological point of view, could be fine as long as it is embedded in the quantitative model, based on the use of standardised tools. On the other hand, if one wishes to consider the qualitative strategy, based as it is on the search for *understanding*, it would be necessary at least to consider some fundamental epistemological premises, which necessarily lead to the roots of inclusive sociology and to what is understood in the historicist context, with particular reference to the contributions of Dilthey and Weber on the concept of understanding considered as lived experience, *Erlebnis*, in the first case, and of intentional understanding, *Verstehen*, in the second.

On the other hand, however, a thrust of this magnitude would require a passage of no small importance, with references to the theme of objectivity, generality, and self-worth, which at the moment are beyond, for obvious reasons of space, the purposes of this paper. Nonetheless, in the future, it could certainly prove useful to address, in the appropriate scenarios, some inevitable considerations on the theoretical-methodological assumptions that form the background to the different modeling of the interrogation, in order to evaluate their direct consequences. At the moment, however, what we believe to be more profitable, for the general economy of the present work, is to focus attention on the technical characteristics that mark the model of open questioning, in order to understand, at least hypothetically, how the conducting of interviews by Robots can be conceived.

2.2.1 Interview conducting techniques

In the scientific literature, the qualitative interview is presented as an art based on listening, as well as on the empathic attitude towards the other, in order to develop an *understanding* of its point of view through an internal vision.

The purpose of this method is not only to acquire data by recording and measuring reality, but rather to make the person speak, causing a fluid narration of the experience, with respect to which the researcher, if placed in an ideal situation, can limit themselves to ask for some clarification by resorting to cautious and well-targeted interventions.

The interview is, therefore, a *micro-process of interaction* inscribed in a broader macro-context, for the success of which it is necessary to gain trust and

[3] The choice of the term "subject" in the case of a Robot is completely random and corresponds to the observation of a reality that sees the Robots as carriers of a possible personality.

collaboration, not so much as professionals, but as people. In this sense, it is presented as the outcome of the communicational flow established between the two inter-acting personalities and is, therefore, to be considered the result of a unique experience, although the research design may provide for the administration of the same interrogation scheme to all respondents. Therefore, far from being a mere observation act, the interview represents, for the interpretative researcher, a way to access the vital world (Ardigò, 1980) of the interviewee.

What has just been said implies that, in this dynamic model, the outcomes of the conversation will be the result of the relationship of co-construction of meanings in which the *role of the interviewer* is not only central, but decisive. The task of the qualitative interviewer is therefore complex and not without contradictions: if on the one hand, they must direct the interview, on the other they must avoid excessively interfering with the interviewee, encouraging and limiting them with their interventions, to the point of producing a departure from the genuine rendering of their reports.

According to Livolsi (1964), in the tension between these needs, the functions of *comfort* and *understanding* remain firm. *Comfort* because it is necessary to give the interviewee a certain warmth, making the topic appear interesting and useful to carry it out for a long time. *Understanding* because it must be shown that everything the interviewee says, as it is said, is of the greatest interest for the purposes of the research.

From what has been stated, it emerges that the interviewer's task is complex and demanding, since what is required of them goes far beyond the ability to meticulously follow the instructions for filling in a form. The qualitative interviewer is asked for sensitivity, intuition, the ability to identify with the interlocutor's personality; experience in human relationships, and in-depth knowledge of the object of the study, with a degree of complexity that intensifies as the openness and de-standardisation of the tool increases.

3. Results

As we know, the interview follows different levels of directivity and structuring (Bichi, 2004; Gianturco, 2004). Despite this, it is still a method located within the interpretative paradigm, for which the interrogation model cannot respond to a scheme based on the stimulus-response mechanism, as in the case of standard research. It is preferred to leave a wider margin to the subject listened to allow them to fully and deeply express their thoughts. In this typical connotation of the semi-structured interview (Corbetta, 1999), where the interventions of the surveyor, while always focused on the interrogation

scheme, are reduced to a minimum, it becomes even more evident when one moves towards a non-structured interview, up to the extreme limit of the biographical interview (Bichi, 2004), of the biography and of the *life story* (Bertaux, 2003; Ferrarotti, 1981; Macioti, 1985, 1986), in to which the interviewer's voice moves back completely to leave the field open to the interviewee.

A first element to be considered for the purposes of an analysis that aims at identifying a possible model on which to graft the experimentation of the SRs as interviewers concerns *language*. If in the case of the questionnaire the problem arises in terms of clarity and linguistic comprehensibility, given that the standardisation of the tool requires the use of formulations understandable by all, in the case of the qualitative interview the theme of language is put in another light because, the linguistic style used, for example, can vary significantly in passing from one interview to another. Furthermore, in this second case, language constitutes a vector for the purposes of *empathy*. In this regard, Kahn and Cannel (1968 [1967]: 150-151) write:

> Language provides both the interviewer and the interviewee with clues to understand what kind of person their interlocutor is. The first indications that the interviewee is able to have, to know if the interviewer is a person very similar to himself or very different, will come precisely from the language that the interviewer uses to introduce himself and to present the topic of the interview. […] If the interviewer and the interviewee "speak the same language" it is very likely that they have similar experiences, and it is therefore much more likely that they can understand each other.

While it is true that the interview is presented as a difficult art to learn, it is also true that there are some technical measures to be taken into account from the linguistic point of view for the success of the interview. The first concerns the *preliminary explanations*, essential for establishing the first contact with the interviewee and obtaining consent to the interview and the recording of the interview. In this initial phase it is necessary to know how to overcome the possible distrust of the individual identified, explaining the cognitive reasons that push the researcher to turn to him.

Then, there is the distinction between the *primary and secondary questions* with which Kahn and Cannel (1968 [1967]) distinguish the questions that introduce a new theme, or open a new question, and the questions aimed at articulating and deepening the topic of the primary question.

The interview is not just about asking a question to record the answer. The interviewer's technical background consists, in fact, of a series of tools to rely on to encourage the focus of the interviewee's real positions on the topics

covered. In this sense, *probe-questions* play an essential role, that is, apparently neutral stimuli with the function of encouraging the interviewee to continue the story by deepening it with more explanations. Therefore, these are non-directive interventions, with which we try to make the subject talk by limiting to stimulating his initiatives, without influencing him, but making sure that he chooses the themes to be explored and the different ways of exposure.

Sometimes, to draw attention to the issues to be explored, simply *repeating the question*, formulated differently, or placing the accent on different words may be sufficient. With the same purpose, one can echo the person being listened to, by *repeating the answers or a synthesis of them* to invite them to take up the issue and deepen it.

Another way to get a detailed report is to encourage your interlocutor through verbal and para-verbal *hints of interest*, unveiling them with words, with nods of the head and facial expressions.

In conducting a non-structured interview, it is particularly difficult to *respect the pauses and silences*, since there is a tendency to fill the void with inappropriate phrases at that moment, given the fear of a possible feeling of discomfort on the part of the interviewee. Contrary to popular belief, instead, knowing how to respect pauses for reflection can encourage people to continue with the report by giving more details.

Finally, together with the expedients considered, there is also the possibility of explicitly requesting an in-depth study, in order to have a clearer explanation of the interviewee's point of view on the topic.

4. Debate

The absence of standardisation represents at the same time the greatest strength and weakness of the qualitative interview, since it places numerous constraints on the interviewer. This one can run into unexpected and unexplored paths, which require the elaboration of new hypotheses on the phenomenon under investigation, going beyond the original formulation of the problem. In this sense, the interviewee is likewise granted the widest margin of discretion in deciding how to present the various topics, offering the interviewer a vision based on their mental categories and language. The interview is therefore a tool particularly appropriate to the *context of discovery* and *understanding*.

Although it remains a difficult art to learn, since it is based on psychosocial elements that make the outcomes particularly unpredictable (think of the similarity of experiences, style and linguistic register, sympathy and antipathy, listening skills, rigidity and to the positioning with respect to the topic in

question), some technical measures mentioned above remain and can be relied upon to ensure that the interview meets the objectives of the analysis.

With respect to each of the aforementioned points, which concern - as will be recalled - the *preliminary explanations*, the *primary and secondary questions*, *the probe-questions*, the *repetition of the question*, the *repetition of the answers or a summary of them*, *the hints of interest*, the *respect of pauses and* silences and the *explicit request for further information*, it can be assumed that experimental studies will be carried out in order to refine the skills that the SRs have to interview people. For now, what can be done is to assume, in theory, that the SR, suitably programmed, is able to effectively conduct the meeting, making use of the technical aspects mentioned (TAB. 1).

TABLE 1. Possible implementation of the technical aspects of managing interviews in Robots.

Preliminary explanations	√
Primary and secondary questions	√
Probe-questions	√
Repetition of the question	√
Repetition or summary of answers	√
Hints of interest	√
Respect of pauses and silences	√
Explicit request for further information	√

Source: Developed by the Centre for Transdisciplinary Studies and Research 2022.

Despite this first consideration, some controversial points remain to be pointed out, relating, for example, to the need to educate the SR on the appropriate moment to insert spontaneous and unforeseen questions in the questionnaire, given the relevance to the topics covered by the research. Or, how to make the Robot recognise the salient topics on which to ask for more information? In semi-structured and non-structured interviews, indeed, the themes may not correspond to a precise order, in order to follow the flow of communication. This means that the Robot should discern the moment in which it is necessary to intervene to draw attention to a topic discussed, since it falls within the objectives of the research.

If these aspects represent a first set of elements to work on for the purpose of implementing the SRs in qualitative investigations, due to the system's feedback capacity with respect to the *internal sphere*, the character of the unpredictability due to the presence of an *external environment* remains to be considered. In respect of this last one, the machine shows a lack of autonomy, in any case residual and dependent on the intervention margin provided by the

programmer. Think of the ability to interact with independent judgment in unexpected situations that could be caused by a trivial technical failure. Not to mention the situations in which the interviewee gives in to unexpected emotional reactions. How can the Robot handle the unexpected?

In this process of transition from the quantitative to the qualitative model, and particularly with reference to the topic of language, it could be useful to implement a tool such as GPT-3[4], a third-generation autoregressive language model that uses deep learning to produce human-like text. It is an advanced software that currently represents the extreme frontier of AI that could one day allow a robot to answer questions in a natural way, thus approaching the semi-structured and non-structured interview typology.

Beyond the fact that it remains to understand how to go into the details of a control regarding highly complex dimensions that cannot be reduced to the space of this discussion, such as *understanding* and *empathy*, with respect to which a well-thought-out SR could at least show itself ready, it is to be considered the need to read reality by drawing on a fund of common experiences - as Dilthey (1883) argues - without the personal component being part of this process, providing a result deriving from stereotyped visions and prejudice.

If it is true that the SR can proceed towards an objective and non-evaluative knowledge (Weber, 1904, 1917), precisely because it lacks in human connotations, as it is not conditioned by the emotional component, it is more

[4] GPT-3 is a machine learning model for neural networks built to generate any kind of human language text. In 2021, GPT-3 formed the largest neural network ever created, with over 175 billion machine learning parameters. Typically, AI has difficulty generating natural language, given the complexity and nuances of language. GPT-3 is designed to bring texts of all kinds to life: from poems to articles, from reports to dialogues; it is used to transcribe automatically generated tasks, such as customer service chatbots.
The templates are based on a large corpus of texts found on the Internet such that speech and language patterns can be identified. When a user searches for a text consisting of even a few sentences, the system analyses the language and creates a language predictor that comes closest to the best possible solution. Even in the absence of special rules and training, the generated text is of high quality and resembles what humans would say or write. In this sense, a GPT-3 model not only provides realistic answers, but also responds on the basis of common sense. This means that GPT-3 is able to answer closed and open questions.
Among the limitations observed: limited learning, because models are pre-set and learning is not continuous; impossibility of explaining and interpreting results, with limitation of certain applications; a wide range of machine learning biases, present on the other hand in the human biases on which the texts on the web are set.

complicated to imagine a human programming, in which the value component and the cultural interpretations of the developer are not included.

In fact, the studies conducted by the Prism Laboratory (Duffy et al., 2000) show that there is already the possibility that robotic agents can interact with each other by cooperating for common objectives. The SR architecture is designed to process the information existing in the *physical* environment and communicate it from the *reactive to the deliberative level of the system*, so as to offer ever new *social* behavioral responses due to continuous updates in one's data set of beliefs. In this sense, the Robots show that they can work in teams with a certain behavioral and system autonomy, which allows them to be considered as agents inserted in a highly integrated interactive model.

Briefly, the technical expedients can undoubtedly put the Robot in a position to reveal trust, reciprocity, objectivity, non-valuation, generality, comfort and understanding, that is all the key elements around which the empathic interaction revolves (TAB. 2), and in this it is also likely that the Robot succeeds better than a human actor: think of the search for an objectivity and a non-valuation that are always very difficult to grasp.

TABLE 2. Requirements for conducting qualitative interviews.

Non-evaluation	√
Comprehension	√
Comfort	√
Empathy	√
Trust	√
Generality	√
Objectivity	√
Reciprocity	√

Source: Developed by the Centre for Transdisciplinary Studies and Research 2022.

Such potentialities, deriving precisely from the very fact of being non-human, while emphasising the incomparable human virtues, however, do not exclude any possible application of social intelligence to other beings. In fact, the very possibility of Robots to interact with each other and with humans in a social context opens the door to critical reflection on the bioethical development of this relationship, in which it is not so much the function of social Robots that is questioned, but rather the role of humans in the framework of future interactions.

5. General debate

In recent decades, technology has made a lot of progress in robotics and artificial intelligence (AI). In fact, there are countless products on the market that, based on AI, come in the form of voice assistants, through an integrated software, with a speaker and other smart devices capable of interpreting language and interacting with humans. Some examples include Alexa and Google Home, tools capable, through voice interaction, of providing information, reproducing audio and video, controlling other devices and purchasing goods or services. The functionalities are innumerable and range from web searches to real-time updates on weather and traffic, from entertainment to calendar and shopping management, up to home automation, that is the intelligent control of the home through the *Internet of Things* (light bulbs Wi-fi, smart sockets, thermostats, wireless video surveillance systems and locks).

Naturally, there is a remarkable difference between these devices and the SRs, designed not to perform practical work tasks, but to be in the company of humans, exploiting the embodied intelligence, the empathic character and the affection of which human beings are capable, in order to accompany them during the stages of existence[5].While Siri and Alexa have no bodies, SRs have a human-like physical structure, such as to endow them with the ability to move and express themselves through non-verbal communication.

A point to linger concerns, therefore, the external dimension and the aesthetic aspect of the Robot, which seems to have a considerable impact on the possibility of establishing a relationship of interaction between human and non-human, as indeed also happens between human beings, who show that, in their choices, they favor relationships with individuals they consider to be nice and similar to themselves, on the basis of an external perception.

Some scholars who study the link between anthropomorphism and man-machine interaction believe that the more the Robot reproduces the human appearance, the simpler the initiation phase of knowledge with the human being is (Dragone et al., 2006). Research conducted in this direction underlines the importance of physical similarity between the Robot and humans, as well as other fundamental characteristics, such as emotional and social intelligence. Through augmented reality[6], the authors were able to apply a virtual avatar to

[5] In this regard, check out the interview by the Professor Renato Grimaldi, made on 18 June 2020 and available on YouTube.

[6] Augmented reality makes use of equipment that makes it possible to fully immerse yourself in a space where the subject can live first-person experiences without physical barriers in any environment.

the physical structure of the Robot which, combining with the *external environment*, provides a behavioral flexibility able to allow rapid prototyping of the aesthetic and behavioral characteristics to be attributed to the Robot, with the consequence of developing the final product in a more coherent and balanced way.

Another important aspect concerns the ability to show *empathy* in order to capture the state of mind of the interlocutor. Recently, the University of Pisa has developed Sophia, a Cyborg capable of objectively probing the emotional state of the interlocutor, with whom it manages to establish a good empathic relationship. The Robot can act autonomously, even if the researchers want to point out that the decision-making spectrum will not extend - at least for the moment - much beyond the range expected by the developers.

The idea of autonomous action by Robots is not so far from reality, so much so that among them there is already a possibility of mutually infecting each other with the spread of viruses that affect the functioning of the system (Grimaldi, Palmieri, 2020). This is not an irrelevant aspect because, if it is true that Robots can infect each other, it means that there is already an interactive frame to think for these agents.

Such an aspect leads to think of the need to review the fundamental concepts of sociology, intended as the study of social relations between human agents. We might ask ourselves in what frameworks should we place the concept of social interaction, considering a future in which the relationships between humans and non-humans are destined for a co-evolution[7]?

Moreover, this process has always touched humanity, if only for the need to respond to environmental changes in order to survive and guarantee the continuity of the species. The same search for autonomy also seems to go through the Robots, which show to select, if necessary, adaptive mechanisms and behavioral patterns that allow them a social action, thanks to linguistic skills and socio-emotional intelligence, capable of giving the Robots a depth of thought (Breazeal, 2004).

---

[7] Luciano Gallino (2000: 378) defines "social interaction" a relationship between two or more individual or collective subjects, of short or long duration, during which each subject repeatedly modifies their behavior or social action in view of the behavior or action of the other, either after this has taken place, or by anticipating or imagining - it doesn't matter here if correctly - what might be the action that the other will perform in response to their own or for other reasons. The quotation taken as a reference (but many others could be taken) indicates the object of scientific attention, aimed at social interaction, in subjects, individuals and collectives, referring to a classical conception of sociological knowledge. This is clearly an outdated definition and limited to a traditional vision of society, which requires - given the profound transformations taking place - to be revisited and expanded, including within it also non-human subjects.

This means that developments in the field are following the line of humanisation aimed at increasing the potential of social Robots. A work conducted in this regard shows the usefulness of the robotic humanisation process (Giger et al., 2019).

According to the researchers, the humanisation process of Robots would pass not only through aesthetic requirements, but also through the acquisition of social skills (language, non-verbal behavior, personality, emotions and empathy), ethical skills (values and morals) and spiritual skills (religion, culture and tradition). If this occurs it is because human beings tend to attribute human thoughts, intentions and emotions to animals and objects as well. It is therefore plausible that, in the frame of anthropomorphist action, the attribution of characteristics relating to race and gender, or as well as the insertion of parametric elements that may concern the external appearance of the face (therefore eyebrows, lips, chin, hands and limbs), in addition to non-physical parameters, such as gaze and its intensity, tone of voice, gestures and para-verbal expressions, can assist the human/non-human relationship, accompanying the former in the process of anthropomorphisation of Robots.

For now it is difficult to estimate the outcomes of a possible relationship between humans and Robots, also because in most cases the interactions take place in experimental contexts, placed under the control of the research teams, since the Robots have not yet entered fully in the social reality, although they have already been demonstrating for some time that they possess the criteria of eligibility for obtaining legal personality, with strong implications on all that this recognition could entail in terms of rights. Are Robots subjects of law, aspiring members of the same *planetary citizenship*, a (human) citizenship that still struggles to consolidate itself as an equitable, peaceful and supportive entity? Are human beings ready to make the transition towards a condition of integration that no longer sees them as the only protagonists of the social scene?

In this regard, it would be interesting to carry out studies based on the scientific observation of the behaviors between the different agents, in a framework that goes beyond the educational and laboratory environment to which experimentation has been associated up to now.

Undoubtedly, the path that led Robots to assume typical characteristics of the human being could have contributed, over the years, to a reversal of the negative prejudice that moves humans towards machines, also due to a literary imagination and film that has always proposed automata as threatening entities, devoid of feelings and emotions, which act against humanity to annihilate it, or subjugate it. It is therefore likely that the humanisation process of Robots involves these aspects, positively affecting the idea that humans have of Robots, thanks to a leveling of the sense of discomfort and concern felt towards machines.

Even if, it must be specified, the effects deriving from the disorientation due to an all too alienating likelihood, must not be overlooked. It is good - this is my hypothesis, all to be discussed - that the human being knows, or rather, can recognise the difference with the Cyborg, identifying the distance that separates it from the non-human subject, in order to avoid falling into the *Uncanny Valley*. It is a consideration that leads again to a methodological attention on the possibility of having the interviews conducted in depth by different agents, with possible differences in terms of results.

Considering the point of view of the writer, the outcome of two interrogation processes is not to be taken for granted, for example one carried out by Sophia, a Cyborg embodied in human characteristics, the other conducted by Nao, a funny-looking social Robot who precisely for this characteristic could favor the interviewee's openness to the topics of the interview.

In conclusion, it is difficult to say whether the humanisation process of Robots represents a good strategy: not only because the topic is complex and multi-faceted, but also because the transition path towards a post human society that has just begun, already presents numerous possible scenarios (Giger et al., 2019).

References

Ardigò, A. (1980), *Crisi di governabilità e mondi vitali*, Bologna, Cappelli.

Bertaux, D. (2003), *Racconti di vita. La prospettiva etnosociologica*, Milano, FrancoAngeli.

Bichi, R. (2004), *L'intervista biografica. Una proposta metodologica*, Milano, Vita e Pensiero.

Breazeal, C. (2004), Social Interactions in HRI: The Robot View, *IEEE (Institute of Electrical and Electronics Engineers). Transactions on systems, man, and cybernetics-Part C: Applications and Reviews*, 34(2), 181-186.

Cipolla, C. (2013), *Perché non possiamo non essere eclettici. Il sapere sociale nella web society*, Milano, FrancoAngeli.

Cipolla, C. (2015), *Dalla relazione alla connessione nella web society*, Milano, FrancoAngeli.

Cipolla, C. (2021), *Una sociologia connettiva e autocorrettiva*, Milano, FrancoAngeli.

Corbetta, P. (1999), *Metodologia e tecniche della ricerca sociale*, Bologna, Il Mulino.

Denicolai, L., Grimaldi, R., Palmieri, S. (2017), Dal Logo alla robotica educativa: esperienze di pensiero computazionale e transmedialità, In R. Trinchero, A. Parola (eds.), *Educare ai processi e ai linguaggi dell'apprendimento*, pp. 128-145, Milano, FrancoAngeli.

Dilthey, W. (1883), *Einleitung in die Geisteswissenschaften*, trad. it. *Introduzione alle scienze dello spirito*, in Izzo, A., *Storia del pensiero sociologico*, Bologna, Il Mulino, 1974.

Dragone, M., Duffy, B.R., Holz, T., O'Hare, G.M.P. (2006), Fusing realities in human-robot social interaction, *37th International Symposium on Robotics ISR/Robotik, Munich, Germany*.

Duffy, B.R., Rooney, C.F.B., O'Hare, G.M.P., O'Donoghue, R.P.S. (2000), What is a Social Robot?, *10th Irish Conference on Artificial Intelligence & Cognitive Science*, *September 1-3*, *1999*, *University College Cork*, *Ireland*.

Ferrarotti, F. (1981), *Storia e storie di vita*, Bari, Laterza.

Galletti, M. (2018), Trasformazioni della cura. Relazioni morali tra umani e robot nell'assistenza agli anziani, *NEU. Aggiornamenti*, 3, 47-54.

Gallino, L. (2000), *Dizionario di sociologia*, Torino, Utet.

Gianturco, G. (2004), *L'intervista qualitativa. Dal discorso al testo scritto*, Milano, Guerini.

Giger, J.C., Piçarra, N., Alves-Oliveira, P., Oliveira, R., Arriaga, P. (2019), Humanization of robots: Is it really such a good idea?, *Human Behavior and Emerging Technologies*, special issue: Emerging Technologies: Perspectives from behavioral scientists, Wiley Periodicals, Portugal, 1(2), 111-123.

Grimaldi, R. (ed.) (2015), *A scuola con i robot. Innovazione didattica, sviluppo delle competenze e inclusione sociale*, Bologna, Il Mulino.

Grimaldi, R. (ed.) (2022), *La società dei robot*, Milano, Mondadori.

Grimaldi, R., Palmieri, S. (2020), I social robot, cosa sono, come utilizzarli nel settore dell'educazione, *Agendadigitale.eu*, Milano, 1-6.

Jouaiti, M., Hénaff, P. (2019), Robot-Based Motor Rehabilitation in Autism: A Systematic Review, *International Journal of Social Robotics*, 11, 753-764.

Kahn, R.L., Cannel, C.F. (1967), *The Dynamics of Interviewing*, New York, Wiley, trad. it. *La dinamica dell'intervista*, Padova, Marsilio, 1968.

Livisha, K., Vinothini, S., Dhaheera Banu, M., Poonguzhali, R. (2018), Wheeled Robotic System for Restaurants, *International Journal for Trends in Engineering & Technology*, 32(1).

Livolsi, M. (1964), L'intervista non direttiva, *Ricerche motivazionali*, 1, 34-49.

Macioti, M.I. (ed.) (1985), *Biografia storia e società*, Napoli, Liguori.

Macioti, M.I. (ed.) (1986), *Oralità e vissuto*, Napoli, Liguori.

Marino, F., Chilà, P., Trusso Sfrazzetto, S., Carrozza, C., Crimi, I., Failla, C., Busà, M., Bernava, G., Tartarisco, G., Vagni, D., Ruta, L., Pioggia, G. (2020), Outcomes of a Robot-Assisted Social-Emotional Understanding Intervention for Young Children with Autism Spectrum Disorders, *Journal of Autism and Developmental Disorders*, 50, 1973-1987.

Pennisi, P., Tonacci, A., Tartarisco, G., Billeci, L., Ruta, L., Gangemi, S., Pioggia, G. (2016), Autism and Social Robotics: A Systematic Review, *Autism Research*, 9, 165-183.

Seyitoğlu, F., Ivanov, S.H. (2020), Understanding the robotic restaurant experience: a multiple case study, *Journal of Tourism Futures*.

Silvera-Tawil, D., Brown, S.A. (2019), Cross-Collaborative Approach to Socially-Assistive Robotics: A Case Study of Humanoid Robots in a Therapeutic Intervention for Autistic Children, In O. Korn (ed.), *Social Robots: Technological, Societal and Ethical Aspects of Human-Robot Interaction*, pp. 165-186, Human-Computer Interaction Series, Springer Nature Switzerland.

Weber, M. (1904), *Die Objektivität sozialwissenschaftlicher und sozialpolitischer Erkenntnis*, Archiv für Sozialwissenschaft und Sozialpolitik, trad. it. *L'oggettività conoscitiva della scienza sociale e della politica sociale*, in Rossi, P. (ed.), *Lo storicismo contemporaneo*, Torino, Loescher, 1974.

Weber, M. (1917), *Der Sinn der «Wertfreiheit» der soziologischen und ökonomischen Wissenschaften*, trad. it. *Il significato della avalutatività delle scienze sociologiche ed economiche*, in Rossi, P. (ed.), *Lo storicismo contemporaneo*, Torino, Loescher, 1974.

Williams, M.A. (2007), *Robot Social Intelligence*, Sydney, Springer-Verlag.