LEOPOLDINA
FORTUNATI

2019

Fortunati, L., Cavallo, F., Sarrica & M. Mattiassi, A. (2019). Degrees of empathy: Humans' empathy toward Humans, animals, robots and objects. In F. Cavallo (Ed.), *Ambient Assisted Living Italian Forum 2017* (pp.101-113). Cham: Springer.

Abstract

The aim of this paper is to present an experiment in which we compare the degree of empathy that a convenience sample of students expressed with humans, animals, robots and objects. The present study broadens the spectrum of the elements eliciting empathy that previous research has so far explored separately. Our research questions are: does the continuum represented by this set of elements elicit empathy?
Is it possible to observe a linear decrease of empathy according to different features of the selected elements? More broadly, does empathy, as a construct, resist in front of the diversification of the element eliciting it? Results showthat participants expressed empathy differently when exposed to three clusters of social actors being mistreated: they felt more sad, sorry, aroused and out of control for animals than for humans, but showed little to no empathy for objects. Interestingly, robots that looked more human-like evoked emotions similar to those evoked by humans, while robots that looked more animal-like evoked emotions half-way between those evoked by humans and objects. Implications are discussed.

Keywords
Empathy · Robots · Social robotics · Social distance Human-object continuum · Living-nonliving continuum

1 Introduction

The aim of this study is to present an experiment in which we compare the degree of empathy that a convenience sample of students expressed with humans, animals, several typologies of robots and objects. We decided to include in our research various elements that previous research have so far explored separately or combined in a different way. The reason to build this complex setting of observation was to have the possibility to measure and compare the empathy with a set of selected elements belonging to the three natural realms: humanity, animals and inanimate objects. Now the third realm has become diversified because it contains objects that move autonomously (robots) and objects that continue to be inanimate.

Previous research that inspired the present study was conducted by Gray et al. [1] with the aim of describing the main dimensions that characterize different living and nonliving beings and the perception we have of theirminds. In their study, Gray et al. found two main dimensions able to differentiate elements: their perceived capacity of feeling and of agency. In our study, we looked at this issue from a different perspective—that is, the empathy elicited by a human, an animal, a robot or an object being mistreated—and we introduced more nuanced differentiations regarding robots. In particular, the stimuliwe used included a human, a cat, an anthropomorphic robot with the bipedal human structure ("Atlas", Boston Dynamics), a four-legged robot resembling the structure of a mammal ("Spot", Boston Dynamics), a robot half-way between the Roomba and theMars Rover, a smartphone and a Rubik cube.

We selected the following research questions. Does the continuum represented by this set of elements elicit empathy? Is it possible to observe a linear decrease of empathy according to different features of the selected elements? More broadly, does empathy as a construct resist in front of the diversification of the element eliciting it? In this research, we drew on the research carried out by Riek et al. [2] by adapting it to extend the study of empathy with robots outside the human-mechanical axis.

This allowed us to explore whether social distance (i.e., the difference between the empathizer and the one empathized with) plays a role in inferring mental states and sharing affective states. This study is organized as follows: in the next section, we address the main issues of the debate regarding empathy. In the following section, we articulate the debate on empathy according to the various elements with whom it develops.We then illustrate our methods. The next section is devoted to a description of our results, while the final section presents a discussion of the results as well as the limits of this research.

2 Empathy

Empathy is the ability to understand and feel what social partners feel, to perceive their feelings and emotions and to understand others' points of view, mental states, beliefs and thoughts. As such, empathy is an important emotional competence and a crucial social skill. Empathy is a skill that fosters socialization, solidarity and social cohesion in human society. It represents one of the prerequisites for a successful and rewarding interpersonal understanding and interaction. In interpersonal relationships, empathy is one of the main gateways to the moods and in general to the world of others. Thanks to empathy, the individual can grasp not only the meaning of what the other party is saying, but also can capture his/her emotional, innermost phenomenological messages, which are expressed generally by nonverbal language.

A detailed, historical reconstruction of the concept of empathy is given by Pinotti [3], who helps us to understand that empathy is at the basis of many important mechanisms that shape the social life. For example, Pinotti reports that Plato and Aristotle were perfectly aware that the identification of the public in the bards who recited their poems or in the theatrical actors was based on empathy. For his part, Freud [4] states that empathy is necessary to come to know the existence of a psychic life different from ours. Simmel [5] and Dilthey [6] suggest that empathy is necessary to the historical reconstruction of events and protagonists of the past. However, many scholars have stressed the limits of the empathy construct. Geertz [7], for example, highlights the intercultural limits of empathy; he states that empathy will never be able to make one understand what being a "person" or "individual " means for a Balinese, a Javanese, or a Moroccan. In contrast, Hoffman [8] points out that the strong interspecies empathy with animals seems to be characterized by fewer problems.

At the neurobiological level, a particular class of neurons called mirror neurons, discovered recently by Rizzolatti et al. [9], enables us to understand the mind and the lived experiences of other individuals. Participating as witnesses to actions, feelings and emotions of other individuals activates the same brain areas that are involved in performing the same actions in first person and in perceiving the same feelings and emotions in first person. Gallese [10], one of the italian scientist who discovered mirror neurons, argues that at the base of empathy is an 'embodied simulation process'. This process, which is ancient in terms of human evolution, is a motor mechanism characterized by neurons that would act immediately before any cognitive processing. According to Gallese et al. [11], perceiving and understanding the meaning of an action require its internal simulation. In other words, the observer understands the meaning of the other expression not necessarily or exclusively by analogy, but through a simulationmechanism. Thismechanism is amodeling process characterized by a non-conscious, automatic and pre-linguistic mechanism of motor simulation. It is precisely this simulation that produces the sharing of the same state body between observers and observed and allows this direct form of understanding.

While empathy has been studied on a number of different levels and fields, leading to many different and only partially overlapping definitions, a broad agreement is reached on the following main components of empathy:

(a) a cognitive facet, entailing the understanding and mentalization of another person's point of view and perspective

(b) an affective facet, entailing the affective experience of the other person's emotional State

(c) the ability to distinguishthe feelings of the self fromthose (inferred) of the other person [12].

As such, empathy encompasses both a non-affective perspective-taking ability and an affective sharing component.
This discourse reveals clearly that the genuine definition of empathy addresses human beings. However, in the last half century, although social sciences have continued to consider society and social relationships as the core of investigations, they have begun to encompass the attitudes and behaviors of humans toward objects.

For example, Barthes in 1957 [13] argued that to understand society it is necessary to focus on the myths and symbology attached to the objects of everyday life. Douglas and Isherwood [14] pointed out that objects serve to build social alliances or alienation. For Appadurai [15], objects have social lives, are socialized things, and have also a particular social potential. Latour [16] stated that it is impossible to build the social only with the social, as sociologistsmust recognize the role of objects asmediators of the social interaction. Finally, Cetina [17] observed, in modern societies, an "increased orientation toward objects as sources of the self, of relational intimacy, of shared subjectivity and social integration". In conclusion, objects, and particularly technologies, have been increasingly recognized as unintentional mediators of social relationships.

At the same time, non-human social actors are expanding their presence and impact as social companions, even in respect to popular sensitivity. In the past, nonhuman social actorsmeant animals only, but today they include more and more robots. While animals' and robots' mental and affective states remainmostly a philosophical issue, empathy with them in past decades has attracted the increasing attention of scholars. In particular, empathy with animals has been widely recognized and studied—one example is in [18]—whereas empathy with robots has only recently been touched upon [2]. Fundamentally, research in social robotics has focused, among other topics, on the emotions that the appearance of robots elicits in humans. An intriguing question, however, is how we humans infer robots' mental states, and how we affectively react to them, since both affective and cognitive empathy require our acceptance of the mental state of the entity we empathize with. Of the few studies on this subject, Riek et al. [2] explored whether the degree of anthropomorphism of the robots' appearance affected empathy with them. They showed that people are more empathetic with human-like robots than with robots that were more mechanical in appearance.

On a neurological level, Rosenthal-Von Der Pütten et al. [19] showed that neuronal patterns of activation in human observers of videoclips of social interaction between humans and other humans versus humans with robots did not differ when the interaction was affectionate, but did differ when it was violent and abusive. This result suggested that we may differentiate between humans and robots in some interactions but not in others.

3 Empathy Toward Robots, Technologies and Objects

The construct of empathy in reality is challenged significantly if we change the object of the empathy. Let us try to see what happens to this construct in the various cases we considered. Rather than the simple simulation mechanisms we found between humans, the empathy of humans toward robots, animals and objects is based on a double mechanism of simulation, in the sense that we have to simulate also that the other entity has something in common with humans, a sort of humanization process.
Empathy toward robots.
The key point from which to start is the simulation.

The Simulation Theory is a well-established theory in psychology that states that we understand others' minds through simulating [20]. What happens, however, when we are led to simulate a simulator such as with the case of the robot? Traditionally, the automata embodied the attempt to pose a robot as a human being. This was the main reason for the hostility expressed toward robots by the Catholic Church, which was attributed to "the magic halo that surrounded them and that derived from the delay with which the public understood the truth of the artifact" [21].

This simulation increases considerably in the case of androids or gynoids and in general with anthropomorphic robots. However, it reaches its apex with the Turing test used to evaluate if an artificial intelligence is effectively able to posit itself as a human being [22]. What is the acceptable measure of the simulation of a simulator? The theory of the uncanny valley [23–25]. Suggests that the more a robot is human-like, the more we become familiar with it, until its similarity reaches too high a degree, at which we feel a sense of unease. From this, we expect to derive the conclusion that for humans it is easier to simulate the simulator's actions or feelings when the quality of the simulation generated by the simulator is sufficiently poor that it enables us to understand immediately that the simulator simulates its actions or feelings. This topic is precisely what the present study is about.

Empathy toward animals. O'Connell [26] puts it simply that empathy is "the capacity to experience the feelings of another person or an animal, cognitively or emotionally". However, if we posit that the construct of empathy requires the understanding and simulation of the feelings of the others, even only imagining the feelings of animals appears very difficult. Perhaps this is the reason for which, as Angantyr et al. [27] point out, a substantial body of research exists on inter-human empathy and inter-animal empathy, but a shortage of research exists on the comparison between the empathic reactions of humans to humans and that of humans to animals. For example, Paul's [28] survey (N 514 adults) on measuring empathy with humans and with animals revealed that these two forms of empathy were modestly correlated, indicating that they are unlikely to tap a single, unitary construct. Animal-oriented empathy was associated to the current ownership of pets and to their ownership during childhood, while human-oriented empathy was related to having a child or children at home.

Angantyr et al. [27] conducted their own experiments on this issue, and obtained the following results: in experiment (1) women showed significantly more empathy with animals than with humans, whereas men expressed the opposite. In experiment (2) adult women expressed the same degree of empathy with a child as with a puppy, and in experiment (3) adult men and women expressed the same degree of empathy with a baby as with a puppy. These experiments are interesting because they not only reveal gender differences regarding empathy toward humans and animals (although the literature shows contradictory results in this concern) but they also introduce in the setting a puppy which elicits the same degree of empathy as a baby.

Empathy toward technologies and objects. In addition to the above mentioned research, Misselhorn [29] addressed directly the topic of empathy with inanimate objects and concluded that with objectswe feel a form of empathy involving a kind of imaginative perception. Crozier and Greenhalgh [30] proposed amodel which draws upon the principle of empathy to explain properly the complexity of the aesthetic experience.

It might be surprising to discover that the word "empathy" was first used by Titchner [31] to indicate the process of "humanizing objects, reading or feeling ourselves into them". This process is related to the irrepressible human need to reduce the distance between individuals and the world that surrounds them, to reduce uncertainty. We can say, Phillipps [32] argues, that the empathic theory was developed "with nineteenth century German aesthetes, who believed that humans can derive feelings from objects, particularly architectural or natural for which they used the word Einfühlung, or 'feeling into'".

4 Methods

4.1 Paticipants

We recruited participants by presenting the experiment during lectures at the University of Udine (Italy). A total of 163 students participated in this study: 95 of them were male, 67 were female, and 1 did not specify the gender. Their mean ± standard deviation age was 20.09 ± 2.28 years old, and they came from three different study courses: Laboratory of Social Robotics in the graduate program in Multimedia Communication and Technologies of Information, Economic Sociology in the undergraduate program of Social work, and Psychology of Communication in the undergraduate program on Web and Multimedia Technologies.

4.2 Stimuli

We prepared seven short (2 s long) videoclips in which a human pushed, thrust or threw a "passive" social actor (PSA). While all the interactions were only slightly violent, all of them were obviously negative.Our rationalewas to showdifferent PSAs being victims of a negative interaction in order to make participants feel empathic with them. By varying the nature of the PSA, we manipulated our main independent variable (i.e., the social distance between the human observers and the social actors with which they had to empathize). The PSAs and the interactions of which they were victimswere a human being pushed; an anthropomorphic robot with the bipedal human structure ("Atlas", Boston Dynamics) being pushed with a pole; a cat being pushed with a foot; a four-legged robot resembling the structure of a mammal ("Spot", Boston Dynamics) being pushed with a foot; a robot half-way between the Roomba and the Mars Rover being pushed with a foot; a Rubik cube being thrust with a foot; and a smart phone being thrown by a hand on a bed. The humans performing the actions were fully visible only in the human and anthropomorphic robot video clips, while in the other videoclips only the interesting body part was shown.
We hypothesized two axes of social distance: the first is the living-nonliving: humans and cat on one pole, the Rubik cube on the other, and robots somewhere in the middle. The second axis is the human-animal (humans on one pole, cat on the other, and the remaining objects positioned in-between).

4.3 Procedure

To assess the participants' basic levels of empathy, each participant was first required to complete the Empathy Quotient scale (EQ [33]). Participants were then exposed to the seven videoclips. The videoclips were present ed sequentially in three university classrooms, projected on a screen. The presentation order of the videoclips was randomized and resulted in three different orders.[1]

[1] The first sequence of videoclips had the following order: mammal robot,Rubik cube, anthropomorphic robot, mechanical robot, cat, smartphone, and human. The second sequence of videoclips had

After each videoclip, the participants were requested to complete two self-evaluation tasks. The first task aimed to evaluate how much participants felt sorry for the PSA ("How sorry do you feel for the object or person that was a victim of the action?") on a six-point Likert scale. The second task aimed at self-assessment of emotions felt by the participants ("While watching this videoclip I feel:") and attributed to the PSA ("While watching this videoclip I imagine that the object or person feels:").

We used the Self-Assessment Manikin (SEM [34]), which is a nine-point visual scale for measuring emotional valence (from unhappy to happy), arousal (from relaxed to activated) and dominance (from lack of control to fully in control).

In addition to basic socio-demographic variables (sex and age) and the type of program in which students were enrolled, the questionnaire contained items investigating the ownership of a smartphone or a cat; being familiar with several types of "robots" such as Siri, Cortana, etc.; and having tried to solve a Rubik cube. The questionnaire also investigated the use of the smartphone and several robots such as Roomba, Bimby, a robotic arm and a robotic mower. Finally, a free association exercise was given on the smartphone, and a question investigated on a five-point scale the emotional attachment to the smartphone and the Rubik cube. For space reasons, data pertaining to this last section of the questionnaire and to the feelings attributed to the PSA are not reported in this paper.

4.4 Data Handling

Among the EQ scores, only the "cognitive empathy" subscale (items 1, 19, 22, 25, 26, 36, 41, 43, 44,52, 54, 55, 58 and 60) turned out to be reliable (alpha > 0.70). The subjects with a score inferior to the median (< 16) were classified as having a low empathy level, while those with a score equal or superior to it (≥ 16) were classified as having a high empathy level.

The values of valence, arousal and dominance of emotions (i.e., the SEM scales) were entered as dependent variables into a 7 × 3 × 2 repeated-measures ANOVA. PSA (human vs. anthropomorphic robot vs. animal vs. mammal robot vs.mechanical robot vs. Rubik cube vs. smartphone) were variables within subjects; videoclip order (order 1 vs. order 2 vs. order 3) and empathy level (high vs. low) were variables between subjects.

Data were analyzed using the StatSoft Statistica10 package (Statistica, 2300 East 14th Street, Tulsa, Oklahoma, 74,104). Post hoc multiple, pair-wise comparisons were performed using the Bonferroni test. A significance threshold of $p < 0.05$ was set for all statistical analyses.

5 Results

Feeling sorry

Analysis of the answers to the "Howsorry do you feel for the object or person thatwas a victim of the action?" question revealed both a main effect of the PSA ($F(6936)$ 79.88, $p <$ 0.001) and its interaction with the videoclip order ($F(12,936)$ 2.65, p 0.002). Post hoc comparisons identified (all ps < 0.01) a first cluster composed of non-living elements—mechanical robot (1.37 ± 0.08), the Rubik cube (1.42 ± 0.12) and the smartphone (1.38 ± 0.09)—which elicited lower levels of empathy than a second cluster including humans, anthropomorphic and zoomorphic elements—the human (2.67 ± 0.13), anthropomorphic robot (2.26 ± 0.14) and the mammal robot (2.42 ± 0.14).

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this order: anthropomorphic robot, mammal robot, mechanical robot, Rubik cube, human, smartphone, and cat. The third sequence had the following order: mechanical robot, anthropomorphic robot, human, smartphone, cat, Rubik cube, and mammal robot.

Within each cluster, the levels of empathy elicited by the PSAs did not differentiate. The videoclip with the cat yielded the highest result (4.12 ± 0.17; all comparisons' $p < 0.001$). Figure 1a shows the responses to the "How sorry do you feel for the object or person that was a victim of the action?" question for each PSA.

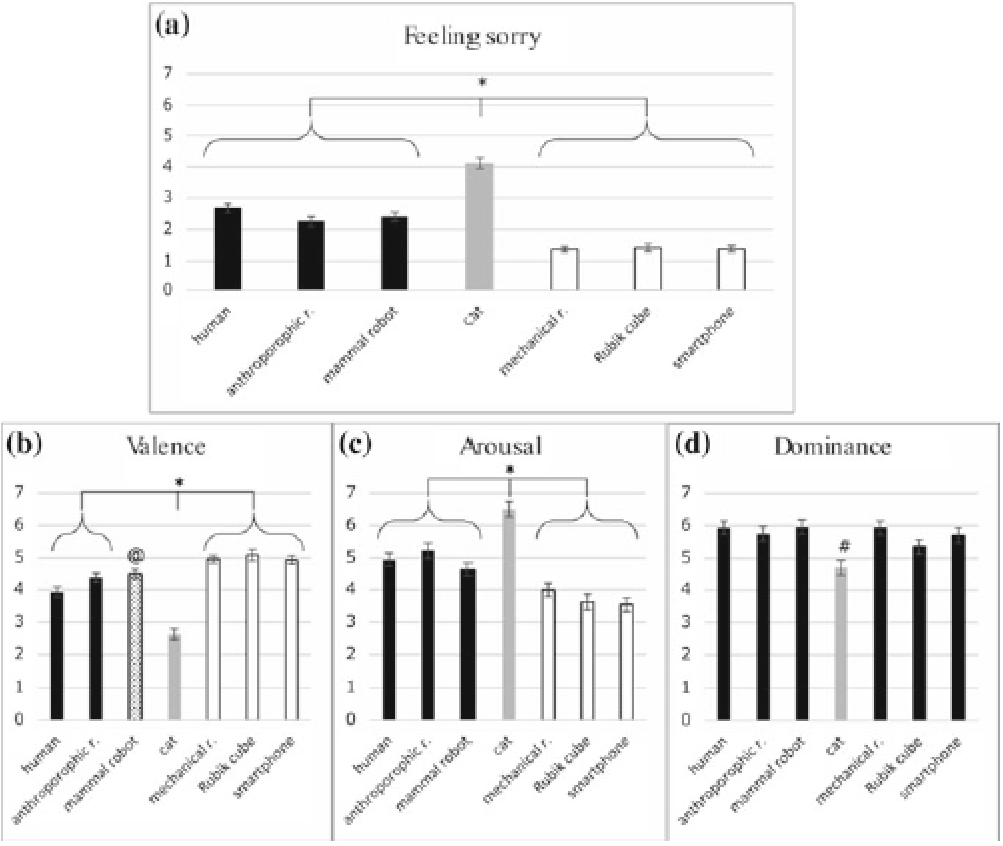

Fig. 1 All comparisons marked with * are significant with $p < 0.05$. **a** "Feeling sorry" responses for all PSAs. Bars of the same color denote nonsignificant differences. **b**, **c**, **d** SEM scale responses for all PSAs. Bars of the same color denote nonsignificant differences within each graph. @: The mammal robot videoclip only differs from the cat ($p < 0.001$) and the Rubik cube videoclip ($p < 0.01$) in valence. #: The cat videoclip differs from all other videoclips ($p < 0.001$). In dominance

The videoclip order did not affect the general pattern. A slightly higher variance in reactions was observed only for the group that used the third order, which started from the mechanical robot, and which shows a significant difference only for the evaluation of the cat videoclip.

Self assessment of emotions—subjective feelings

Analysis of the SEM evaluations to the "While watching this videoclip I feel:" question was performed over 160 subjects after case-deleting for missing data. The ANOVA revealed a simple effect of both between-subjects variables: i.e., empathy level ($F(1154)$ 5.51, p 0.02) and videoclip order ($F(1154)$ 11.83, $p < 0.001$). The main effect of empathy level showed an answering pattern with generally higher values (5.03 ± 0.09) for participants with low empathy levels than for participants with high empathy levels (4.71 ± 0.1; p 0.008). The interaction between empathy level and other variables did not reach significance (all ps > 0.472).

In other terms, the more participants are empathic, the more they feel sad and out of control when looking at the videoclips.

Despite the between-group differences due to videoclip order (see the section regarding the limits of this study), the ANOVA showed a full within-subjects significant interaction between PSAs and SEM scale ($F(12,1848)$ 38.208, $p < 0.001$).

Looking at the valence (from sad to happy), post hoc comparisons showed again that the feelings activated by PSA can be grouped in three clusters. The cat videoclip yielded the lowest scores (2.63 ± 0.16; all ps < 0.001), meaning that our participants felt extremely sad when looking at the cat being mistreated. A second cluster groups the valence scores of the human (3.93 ± 0.15) and anthropomorphic robot videoclips (4.37 ± 0.15), which are just below the neutral point of the scale and activated a moderate level of sadness. The third cluster groups the valence scores of the smartphone (4.94 ± 0.14), mechanical robot (4.97 ± 0.12), and Rubik cube videoclips (5.09 ± 0.17), which suggests a lack of negative feelings activated by these videoclips. Finally, the mammal robot (4.49 ± 0.16) is positioned between the second and the third cluster; the valence of emotions activated by this videoclip was significantly different only from the cat videoclip ($p < 0.001$) and the Rubik cube videoclip ($p < 0.01$).

A similar pattern emerged from the analysis of the arousal (from relaxed to activated) scale. The cat videoclip (6.5 ± 0.23) significantly differed from the other PSAs (all ps < 0.001), having yielded higher arousal than other videoclips. The human videoclip (4.94 ± 0.21), anthropomorphic robot videoclip (5.22 ± 0.23) and mammal robot videoclip (4.64 ± 0.22) constitute a second cluster. They activated relatively high levels of arousal. Again, the smartphone (3.54 ± 0.21), Rubik cube (3.62 ± 0.24) and mechanical robot (3.99 ± 0.2) are grouped into a third cluster, which is an object-like group. These videoclips activated lower levels of arousal.

The Post hoc comparisons for the dominance scale (from lack of control to fully in control) only showed lower scores for the cat videoclip (4.7 ± 0.24) compared to all the other videoclips (all ps < 0.001).

Figure 1b, c and d show the responses to each SEM scale for all PSAs. Table 1 shows means and standard deviations for each SEM scale for all PSAs.

Table 1 SEM values for each videoclip

	Valence		Arousal		Dominance	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
Human	3.93	0.15	4.94	0.21	5.93	0.21
Anthropomorphic robot	4.37	0.15	5.22	0.23	5.75	0.23
Mammal robot	4.49	0.16	4.64	0.22	5.96	0.22
Cat	2.63	0.16	6.50	0.23	4.70	0.24
Mechanical robot	4.97	0.12	3.99	0.20	5.93	0.21
Rubik cube	5.09	0.17	3.62	0.24	5.35	0.22
Smartphone	4.94	0.14	3.54	0.21	5.70	0.24

6 Discussion and Final Remarks

In our study we showed different social actors, including human, cat, an anthropomorphic robot with bipedal human structure ("Atlas", Boston Dynamics), a four legged robot resembling the structure of a mammal, a robot half-way between the Roomba and theMars Rover, a smartphone and a Rubik cube, being mistreated and measured the evoked emotions in human observers by means of a self-report questionnaire. It must be considered that our study was set beyond the uncanny valley [22–24]—that is, the area in which robots resemble humans so much that they might be confused with them. Studies have shown that likeability of android robots in this area does not follow a linear trend, but drops. Indeed, we only used stimuli that are obviously non-human. As such, this choice is particularly interesting when seen in light of the "threat to distinctiveness hypothesis" [35], which states that robots are more likely to be accepted if the distinctiveness between them and humans is preserved.

The results showed that participants clustered the selected social actors on the basis of their similarity with living things (i.e., their perceived social distance). This study confirms thework ofRiek et al. [2]which showed that empathy is modulated by perceived social distance in androids, and extends the results further to non-android robots and objects. Our results also preliminarily question the findings by Gray et al. [1], who found a neat distance between robots, on the one hand, and humans and pets, on the other, on the dimension of experience (that is, the capacity of feeling pain, rage, hunger, etc.). Indeed, we found that participants empathized more (i.e. more negative valence, more arousal, less dominance, more feeling sorry for) with mistreated humanoids than with mistreated object-like actors. Moreover, we found that participants felt more empathy with the cat than with all the other actors, even more than humans.

By looking at appearance alone, the mammal robot was included among the stimuli to explore perceived social distance for both axes, human-animal and living nonliving. If the axes were completely orthogonal, our results would have suggested that the mammal robot would be positioned in the middle of living-nonliving axis, and on the animal side of the human-animal axis, but in terms of empathy it scored lower than both poles of this second axis. As such, we might infer that empathy is modulated only by social distance on the living-nonliving axis. However, this interpretation presents some problems: if we used another animal, let's say a rat, hippo, hyena or triceratops, would the results be the same?

Maybe the perceived social distance was not modulated by cats, because they are perceived more like pets than animals in general, but this speculation needs to be tested. This result, however, is in line with other studies showing at least as much empathy with animals than with humans; an example is [26]. An interpretation of this particularly intense empathy with animals needs to be proposed here. We suggest consideration of at least two elements: the first is that people are aware that animals are more vulnerable than humans; the second is that animals are able of an unconditional love for humans or, as Philipps [32] posits, "the possibility of reciprocal altruism cannot be dismissed". If this was correct, another layer of analysis would be needed: indeed, in no videoclip did we show a reason for being responsible for mistreatment for any "passive" social actor (PSA), but the cat videoclip elicited completely different responses than other videoclips, nonetheless. Such interpretation requires us accepting a mental state of the animals (shown also in our study) that may add to the "responsibility" layer, both of which may interact with social distance. As such, further studies on this topic are required.

This study has other limits. First, the experimentwas run during university classes, whereby the videoclip order was the same for large groups of participants. In fact, we notice answering patterns depending upon the videoclip order (interacting separately with the PSA and SEM scale variables), impacting both the general way in which participants responded to each videoclip and how they "set the standard" for each SEM scale. These results have no clear meaning to us and require further analysis. However, even if we used the strictest post hoc correction (Bonferroni), a number of within-subject results still survive the correction. Thus, a null hypothesis is difficult to accept. A follow-up study would need to use single-participant presentation and a fully randomized videoclip order to overcome this problem that renders the interpretation of the results slightly more difficult. Second, further studies could use longer videoclips in order to elicit a proper empathic answer from the participants.

Moreover, the videoclips were balanced on a number of dimensions (number of actors per videoclip, duration, etc.), but the depicted action was not totally balanced; perhaps this was the source of some of the variance we found. Finally, an additional control condition for animals instead of, or in addition to, the cat videoclip would have prevented the interpretation problems experienced with the animal/pet dilemma.

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