Meaningful Futures with Robots—Designing a New Coexistence

Edited by
Judith Dörrenbächer, Ronda Ringfort-Felner, Robin Neuhaus and Marc Hassenzahl

First published 2023

ISBN: 978-1-032-26267-3 (hbk)
ISBN: 978-1-032-24648-2 (pbk)
ISBN: 978-1-003-28744-5 (ebk)

Chapter 15

Empathizing with Robots—Animistic and Performative Methods to Anticipate a Robot's Impact

Judith Dörrenbächer and Marc Hassenzahl

DOI: 10.1201/9781003287445-15

CRC Press
Taylor & Francis Group
Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business
A CHAPMAN & HALL BOOK

Empathizing with Robots—Animistic and Performative Methods to Anticipate a Robot's Impact

Judith Dörrenbächer
Marc Hassenzahl

Winter 2008. Janet Vertesi, a sociologist, observes a team member from *NASA's Mars Exploration Rover Mission*. The woman next to Vertesi—a robot researcher and Rover camera operator—moves her body in strange ways. She twists her waist mechanically, head tilted down slightly, and suddenly raises her hands to either side of her head, forearms perpendicular to the floor (Vertesi, 2012). It is a choreography more reminiscent of pantomime or a shamanistic ritual than operating a robot (→ Fig. 1). When Vertesi asks her to explain her movements, she answers: "My body [ ] is always the Rover, so right here [touches chest] is the front of the Rover, my magnets are right here [touches base of her neck], and my shoulders [touches shoulders] are the front of the solar panels and that's [leans forward, splays arms out behind to either side at 45 degrees] the rest of it. So I have all kinds of things [i.e., antennae] sticking up over here [gestures to back], um [laughs]" (Vertesi, 2012, p. 394). What is going on with this robot researcher? Is she fooling around, making fun of the sociologist Vertesi, or even of her own work? She obviously does not sound or behave like a rational scientist.

Most robot developers or researchers rarely take the perspective of an object or become one with the technology they build and research. They consider their robots from a distance, as non-living tools, simply built to help humans to fulfill undesired or dangerous

tasks. Consequently, their main goal is usually to improve a robot's construction, to allow greater productivity and social acceptance. Particularly in the context of social robots, improvement often means mimicking the appearance, intelligence and behavior of humans or pets. Robots are supposed to speak human language, empathize with humans, understand human emotions, and anticipate human needs.

Let's turn the tables. What could humans learn through empathizing with technology? How would the design of robots change if developers took a robot's perspective, walked in its shoes to perceive and understand the world from its point of view, through its sensors and actuators? Is *technomorphizing* human bodies a mind-expanding complement to *anthropomorphizing* technology? To approach this question, we present a variety of innovative methods robot designers could make use of, all based on empathy.

NEW ANIMISM—USING SUBJECTIFICATION AND IMITATION TO GRASP RELATIONSHIPS

The idea of empathy towards technology is likely to trigger spontaneous rejection in most researchers and developers. This is hardly surprising. In the modern Western world, an approach to objects based on relatedness or even emotionality is quickly dismissed as childish, naïve, or irrational. Why should a well-educated person feel empathy towards an inanimate object? Isn't attributing a subjective perspective to the non-living an immature misinterpretation? Skepticism about empathic interaction with objects results from deeply ingrained theories about →Old Animism. In the 19th and early 20th century, these theories were used to draw distinctions between a modern view of the world and the supposedly immature belief systems of children, the mentally ill or indigenous communities (see, e.g., Freud, 1919; Tylor, 1871). These groups were considered to behave animistically, that is, to naïvely project human characteristics onto non-living elements of their environments. According to this view, it is a sign of primitiveness to consider objects, such as toys or stones, to have a *soul* (to have intentions or emotions). Nowadays, these theories have been replaced by a so-called →New Animism (e.g., Bird-David, 1999; Viveiros de Castro, 2004; Descola, 1994; Willerslev, 2007). Here, ethnologists observe and consider worldviews and practices of indigenous communities and find that *being subject* is not a characteristic that is unthinkingly and arbitrarily projected onto any type of object. According to those new theories, animism is not a naïve, primitive misbelief (Franke, 2010). Instead, it

Old Animism refers to anthropological and psychological research of the 19th and early 20th centuries on *primitive* religion, mental illness and child development. Here, animism is conceived as an archaic and infantile reflex based on an inability to differentiate between persons and things. Today, Old Animism is rejected for its colonialist world view.

New Animism is the umbrella term for anthropological theories that are revisiting the notion of animism since the 1990s. Regarding the distinction between Old Animism and New Animism, see Franke, 2010.

comprises purposeful and insightful practices, such as so-called →subjectification and →imitation (Dörrenbächer, 2022). Communities practice animism by subjectivizing and imitating their environment, consciously and deliberately, to generate relational knowledge or to define power relations between humans and other entities. Animism turns out to be a practice of establishing complex interrelations between living and non-living entities rather than viewing entities in isolation.

Subjectification is a animistic practice derived from theories of Eduardo Viveiros de Castro (2004). He describes the transformation of objects into subjects as a mode of knowing that ontological boundaries are to be deliberately crossed.

When taking a closer look at methods for technology design, we can observe parallels with the practices of New Animism. Not only team members at *NASA*—as noticed by Janet Vertesi—but designers and developers in general have started to subjectify and imitate technology in the processes of conception, design, or planning use scenarios. Here, we will present four examples—"Thing Ethnography," "Object Personas," "Enacting Utopia" and "Techno-Mimesis"—and subsequently discuss their potential for the design of robots.

Imitation refers to the animistic practice "mimesis," observed by Rane Willerslev (2007), whereby people partly transform their own bodies into those of another species to negotiate ontological boundaries.

THING ETHNOGRAPHY—ATTACHING CAMERAS TO ACCESS AN OBJECT'S PERSPECTIVE

Thing Ethnography aims at understanding scenarios from a non-human perspective. The process involves attaching cameras to the objects being studied, such as kettles or cups (→Fig. 2). The term Thing Ethnography was coined by Giaccardi and colleagues (2016a). According to these researchers, not only people, but also objects, are capable of generating useful ethnographic data for designers. In one of their studies, they made use of so-called autographers, cameras which are able to take pictures automatically, and which can also capture data through five sensors (accelerometer to determine movement, color sensor, magnetometer, thermometer, and PIR proximity sensor). The researchers attached these autographers to household objects to better understand their everyday experiences.

The autographers collected more than 3000 photographs, which captured diverse and interconnected practices from the perspectives of the objects involved (→Fig. 3). The researchers aggregated the data into visual narratives. They analyzed timelines and movie clips to understand sequences of events, their temporal order and the trajectories of the objects.

According to Giaccardi and colleagues (2016a) this Thing Ethnography revealed insights into how objects exist in time and in relationships with each other. For example, they observed how mobile things, such as cups, occupy and connect multiple ecosystems. Moreover,

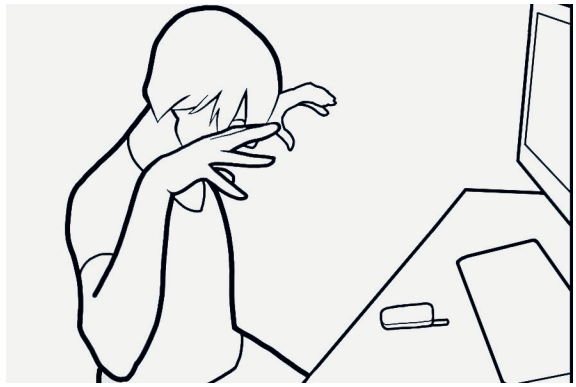

Fig. 1 Team Member from the Mars Exploration Rover Mission enacting a Rover. © Janet Vertesi/Craig Sylvester, Source: Vertesi, 2015

Fig. 2 Autographers attached to a kettle and to a cup. © ThingTank project, Source: Giaccardi et al., 2016b

Fig. 3 Photographs taken from a cup's perspective. © ThingTank project, Source: Giaccardi et al., 2016b

it became obvious that all objects are subject to their own temporal rhythms, uniting and separating them from one another and from their human partners. Some objects, such as the kettle, even created time which needed to be filled by human practices, such as making a telephone call. By capturing the perspectives of objects, a more holistic perspective was revealed, providing a deeper understanding of the interactions between humans and objects. Thing Ethnography was able to decenter human perspectives and surpass human limitations by, for example, capturing what might seem unremarkable to a researcher or a human participant in their home. The camera images taken from the perspectives of objects promote empathy, and can thus lead to a renegotiation of the relationships we have with objects.

OBJECT PERSONAS—IMAGINING THE PERSONALITY OF AN OBJECT

Object Personas build on Thing Ethnography, and were developed by Cila and colleagues (2017). Here, the human-centered design method of creating personas—i.e., typical users—is transferred to objects. Participants in a workshop were first presented with the visual narratives generated by Thing Ethnography and then invited to fill in a questionnaire for the cup, kettle, and refrigerator (→ Fig. 4). They were asked to write down a typical day in the *life* of the object and to describe its possible inner life (such as its personality, its attitude towards life, its temperament, mood, needs, fears, issues, habits, or special abilities). In addition, the social relationships between objects and their users were described. Through this process, participants explored questions such as what objects might talk about with each other and what they might teach one another. Which objects could be allies, which hated each other? Finally, participants imagined the biographies of the objects, their past and future.

According to Cila and colleagues (2017), these thought experiments inspired new design solutions. For example, it became obvious that in many households the cups gain a very intimate insight into the lives of their users—they accompany them onto the balcony, to the desk, to the bed. This information can be used for coming up with new ideas for smart home environments. Attributing emotions and needs to objects led to unusual assessments, for example, that the proximity of the cup to the user could cause jealousy in other objects—which in turn inspired new product ideas, for example, could a cup learn the ability to heat water from a kettle in order to differentiate itself even more in its fight for attention? For the kettle, on the other hand, it was noted that it might feel devalued in some households because it often has to stand near the trash can. Participants further stated that the kettle has significantly more free time

than the refrigerator, and in summer it might even feel bored. These unconventional insights into the relationships between objects, as well as between objects and people, only came up because a shift in perspective took place. Thus, subjectification can lead to a better understanding of use scenarios and a fresh perspective on the technologies involved.

ENACTING UTOPIA—PERFORMING AN OBJECT IN A POSITIVE FUTURE

Enacting Utopia is a performative ideation method that puts social innovation before technological innovation. Technological concepts based on this method aim towards positive futures and human wellbeing. The method was developed by Dörrenbächer and colleagues (2020b; 2021) and explored in several workshops. It involves three steps:

STEP 1—IMAGINING UTOPIA AND CORRESPONDING TECHNOLOGY

Participants are first asked to imagine themselves in a desirable, enjoyable and meaningful future setting; for example, in a positive future work situation. They are asked to complete the following sentence: "While working in the future I feel positive because …." Participants then express several reasons why they might feel positive, such as "I can make use of my capabilities in a diverse team" or "I know how to convince others of innovative ideas." After this ideation session, participants are asked to imagine technologies that create or support the positive outcome. In one workshop, for example, they invented a consulting artificial intelligence called *Two Bugs for One's Ears*. This product is supposed to secretly give advice in business negotiations. One bug focuses on finances, and the other on social aspects.

STEP 2—BRINGING UTOPIA TO LIFE WITH HUMAN AND NON-HUMAN STAKEHOLDERS INVOLVED

Subsequently, the participants consider a specific situation, such as being in the home office or on a lunch break, and set some roles, such as secretary, business partner, tax adviser, or client. Next, the participants take on the roles of the different stakeholders, and the role of the technology. Thus, in the case of *Two Bugs for One's Ears*, it was not only the roles of two businesspeople which had to be played, but the two technological bugs as well (→ Fig. 5). During the enactment, the two bugs turned out to be positive and helpful, but also contradictory and disorienting. For example, while one bug advised the user to be straightforward and demanding—"Don't be cheaper than the competition!"—the other intervened with:

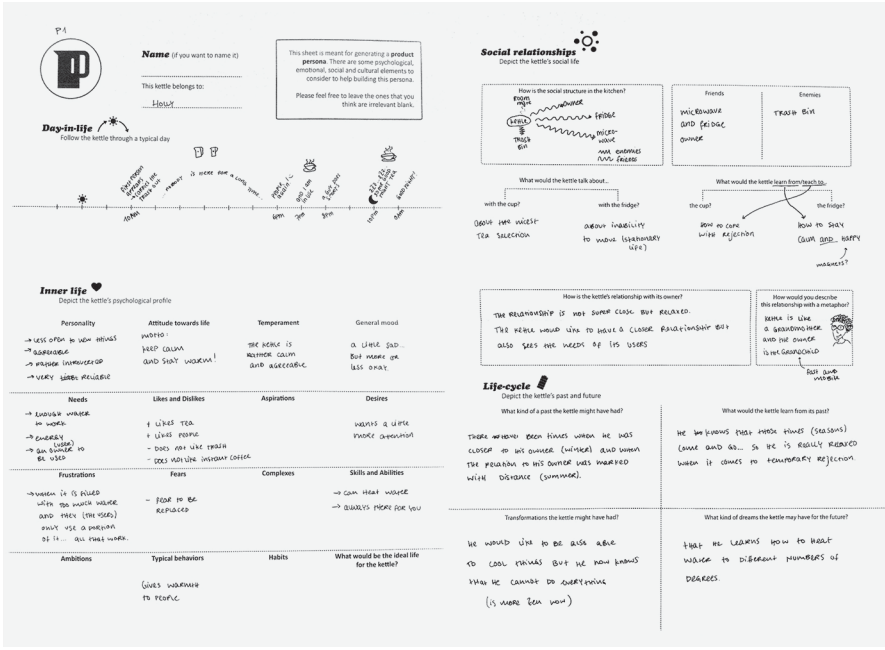

Fig. 4 An Object Persona template filled in for a kettle. © ThingTank project. Source: Cila et al., 2015

Fig. 5 A business negotiation supported by the artificial intelligence *Two Bugs for One's Ears*, embodied by two participants (right) connected to the user (connections symbolized by two ropes). © University of Siegen, Ubiquitous Design

Fig. 6 Two businessmen (top) and the artificial intelligence *Two Bugs for One's Ears* (bottom) express positive and negative experiences from their point of view. © University of Siegen, Ubiquitous Design

"You are not grateful enough. He just opened the door for you, and you didn't go in!"

STEP 3—EVALUATING UTOPIA FROM WITHIN THE FICTION

After the enactments take place, the participants are asked to step in front of a camera and talk about their positive and negative experiences with the fictional technology while staying in their fictional character and perspective (→ Fig. 6). However, not only the human, but also the non-human stakeholders got a voice. One of the *bugs* stated: "I got the impression that our user did not respond as fast to our advice as you [the other bug] did. Thus, we started to argue. I think we would need to come to an agreement before talking to the user; we need to be programmed a bit better." The other *bug* added: "Yes, one of us should be the boss."

Enacting Utopia as a method enables researchers to anticipate a technology's impact on everyday life for important stakeholders, and not necessarily just the potential users. Since the technology is enacted as well, it is possible to do "live-prototyping" during the enactment—that is, to modify and adapt the interaction design to the specific dynamics and demands of particular situations. Furthermore, embodying future technology allows interaction concepts to be experienced even if they are not yet feasible technology-wise. In sum, Enacting Utopia allows for a decentered design process. It points to new challenges and opportunities in the interactions between human and non-human stakeholders, aiming not only to create functional technologies, but to better understand how technology may support meaningful and enjoyable futures for all humans involved. Again, empathy—here gained through enacting and performing the roles of both people and technology in particular situations—is key.

TECHNO-MIMESIS: PERCEIVING A USE SCENARIO LIKE AN OBJECT

Mimesis was observed by the ethnologist Rane Willerslev. Here, indigenous people transform themselves physically and try to move, sound or smell like an animal to gain intermediate positions between identities, create self-distancing, and negotiate differences between themselves and other species (Willerslev, 2007).

Techno-Mimesis (Dörrenbächer, 2016; Dörrenbächer et al., 2020a) also takes a performative approach. In contrast to Enacting Utopia, it is not a broad ideation method for entirely new concepts but aims to rethink existing concepts of robots. Techno-Mimesis is based on the animistic practice of → mimesis. The technique allows robot designers and developers to embody their robots and to negotiate the differences and unique strengths of both humans and robots. Techno-Mimesis aims at discovering and utilizing so-called robotic superpowers (→ p. 44), that is, the particular strengths robots have *because* of their mechanistic nature. Practicing Techno-Mimesis requires a transformation of the human

body. Dörrenbächer and colleagues (2020a) used "prostheses" to enable humans to move and sense in the same technologically determined way as their robot. Typical input and output modalities (e.g., voice recognition) and familiar hardware decisions (e.g., a platform with wheels) serve as rationales for the prostheses.

Dörrenbächer and colleagues (2020a) explored Techno-Mimesis with three of the eight robotic projects presented and interviewed in this book. In these particular cases, all prostheses were simple mockups, that is, low-tech or simply made from cardboard, such as eyeglasses to change the visual sense to a constrained or enhanced vision, or headphones to turn off one's sense of hearing (→ Fig. 7). None of the prostheses copied robotic sensing and movement perfectly, and this was not the aim. Techno-Mimesis aims to produce an imperfect imitation to allow designers to experience being human and being robot at the same time, thereby centering on the relation between the two rather than favoring a human- or technology-centric perspective.

The Techno-Mimesis process involved a member of the robot design team for each project transforming his or her body and becoming, for example, the envisioned shopping robot (→ Fig. 8) or cleaning robot for train stations (→ Fig. 9). One of the developers from the *I-RobEka* project (→ p. 154), for example, tied one of his arms behind his back to simulate being equipped with one gripper only. He wore glasses on the back of his head to simulate a 360°-degree view. Additionally, he wore a tablet tied to his back to replicate communication with supermarket customers while sitting on a dolly board. Subsequently, the team chose one of their suggested shopping use scenarios to enact. They defined the time and place, the robot's specific task, and all the human roles involved.

After several enactments—with changing roles and scenarios—the human enacting the robot was interviewed. The semi-structured interview revolved around situations where they felt positive and at an advantage in comparison to being human, and situations where they would have preferred to be human. In contrast, the humans enacting humans were asked about situations where it seemed advantageous to interact with a robot instead of a human, and when they would have preferred a human partner.

Through Techno-Mimesis, Dörrenbächer et al. (2020a) found three general categories of robotic superpowers: "physical superpowers," such as being insensitive to pain, "cognitive superpowers," such as being persistent and patient, and "communicational (social) superpowers," such as being non-discriminatory and unselfish. Techno-Mimesis revealed those possibilities by allowing participants to experience their robots emotionally, physically, in time and space, holistically, and in-between two perspectives. For example, a participant playing the role of a cleaning robot in public mentioned that the method helped her understand what distance a robot needs to keep

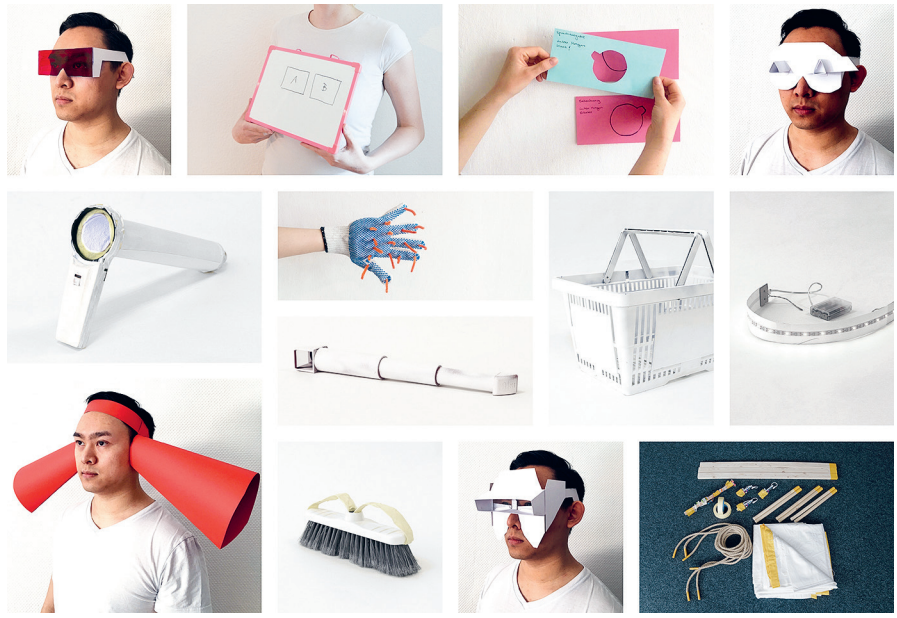

Fig. 7 A selection of prostheses used for Techno-Mimesis—from infra-red glasses and voice recognition stencils to a focused hearing headband. © University of Siegen, Ubiquitous Design. Source: Dörrenbächer et al., 2020

Fig. 8 Human participant transforms into a shopping robot for supermarkets (I-RobEka). © University of Siegen, Ubiquitous Design. Source: Dörrenbächer et al., 2020

Fig. 9 Human participant imitates a cleaning robot for train stations. He uses a "laser sensor" to identify obstacles (RobotKoop). © University of Siegen, Ubiquitous Design. Source: Dörrenbächer et al., 2020

from a person. She gained this knowledge immediately and in a physical way, rather than rationally and without context. Another participant realized how long it took for humans to move out of a robot's way when it *talked* to them in a human fashion. He stated: "By just heading towards them, the conflict would have been solved faster. If we had discussed this topic [instead of doing Techno-Mimesis] I would not have realized this. It was experiencing the time you sit there and wait until humans finally do something." Further, he found Techno-Mimesis helpful as a way of avoiding entanglement with the host of technological problems he normally deals with: "I need a sensor for problem A and another sensor for problem B. Usually, we work in a very problem-oriented way. But this way [through Techno-Mimesis] the general system comes to the fore. What do I really need when sitting in such a box [the robot]?" The robotic superpowers, however, were mostly revealed because of the double perspective of being a human and a robot at the same time. Occupying the space and role of a service robot with the help of perception-changing prostheses triggered a comparison: during the enactment, the participants, although acting as robots, spontaneously responded in a human way. They felt pushed around, ashamed or exposed. Upon realizing that true robots do not have these feelings, the contrast creates a new consciousness of one's own humanity vis-à-vis the specific nature and benefits of robots. Follow-up design questions arose, such as: should we design robots with human-like politeness, or could we make use of the fact that robots can't feel offended? Should we make humans say thank you to robots, or could there be benefits to not having to show gratitude? In sum, Techno-Mimesis enables designers to reflect on design concepts and gain new insights into robotic superpowers instead of just copying human behavior and abilities—again, mainly through empathizing with objects.

WHY EMPATHIZE WITH TECHNOLOGY?

All four approaches presented above make use of the human capacity to empathize with the inanimate. Designers and developers are able to adopt the perspectives of objects and technology through a shift in their vantage point. Yet the four approaches also constitute different routes to empathy, which is achieved either by attributing a subject perspective to objects (subjectification), or by enacting a technology in time and space in a way that involves the human body (imitation). While Thing Ethnography and Object Personas are subjectification-based, Enacting Utopia and Techno-Mimesis involve imitation. In addition, these methods target different stages of the design process. While Object Personas and Enacting Utopia constitute methods for ideation, Thing Ethnography and Techno-Mimesis are

particularly suitable as evaluation methods—they reflect pre-existing technology or technology concepts. While all approaches reveal interrelationships among living and inanimate entities, Object Personas and Enacting Utopia permit us to anticipate future interdependencies and become aware of the technology's ethical agency. Techno-Mimesis, on the other hand, places a particular focus on understanding the ontological differences between humans and technology.

The methods presented in this article form a subjective selection. Robot designers interested in making use of the strategy of empathizing with technology are urged to take a look at several related approaches already in practical application in many fields. For example, the use of cameras to personify non-human perspectives has been applied in autonomous technology, such as drones (Davoli and Redström, 2014) and social robots (Disalvo and Lukens, 2011). The latter example attached a camera to a robot to allow participants to experience urban infrastructure from the robot's perspective, allowing the participants to grasp (among other insights) the capabilities and limitations of the robot, how robots are different from their human counterparts, and how future urban infrastructure needs to be adapted to accommodate the presence of robots. Moreover, performative design methods increasingly make use of non-human perspectives. For example, in their engagement with "Stakeholder Drama," Buur and Friis (2015) asked participants to embody technologies in similar ways to our Enacting Utopia project. Likewise, in "Interview with Things," the theater method involved an actor *becoming* the technology, for example a scooter, and answering questions from the technology's point of view (Chang et al., 2017).

To return to the robot researcher from the *Mars Exploration Rover Mission*: why exactly did she imitate one of her Rovers? The sociologist Janet Vertesi found that almost everyone on the *NASA* team, not just this one researcher, engaged in bodily performance as a way to empathize. The team went as far as to construct simple paper props to compare their human perception to the robot's perception: a form of Techno-Mimesis. However, in this case, unlike in Techno-Mimesis, the team's aim is not to identify robotic superpowers. Instead, they imitate to imagine what the Rovers might see, think, or feel on Mars, in order to plan activities. It takes around seven to twenty minutes for a signal to travel between Earth and Mars, which means that real time telecontrol is not possible, so planning in advance is essential. Thus, the researchers' enactment is primarily about anticipating the Rover's movements on Mars. In this respect, their aim is comparable to Enacting Utopia, that is, it is about anticipating complex interdependencies. Beyond fulfilling this aim, according to Vertesi, the embodiment of the Rovers helps coordinate the diverse perspectives of the interdisciplinary team members. Thus, empathy arises between humans, not just between humans and the robot. She concludes that the change in perspective is about

"cementing collective social ties between team members on Earth. Imaging that places the observer behind the Rover's eyes builds empathy and intimacy between team members and their distant robots, just as gesture evokes the robot's body-in-interaction and makes Mars available to visual interpretation" (Vertesi, 2012, p. 408).

Ultimately, then, design methods based on subjectification and imitation should not be rejected on the grounds that they engage with supposedly *naïve* animism. In line with theories of New Animism, we claim that empathizing helps us to understand the interrelations and especially the differences between human and non-human actors. In other words: Empathy triggers an understanding of distance and otherness through approximation. Were a new silicon-based species like assistive robots eventually to live alongside us, it would be essential to understand and design these interrelations and differences beforehand. We need to better understand how robots will (and should) impact our social world. It is evident that the reverberations will reach not only the immediate users of robots, but the larger circles and communities in which they are embedded. The material world—for instance, the interior design of living spaces or the infrastructure of cities—will inevitably change in much the same way that the car reshaped our manufacturing industries and social practices. We believe that designing robots should not only be about creating and optimizing useful products that resemble species we already know, but about imagining and shaping a yet unknown everyday life with a new species. Thus, we need to understand the ecological niche that a robot might fill, and anticipate how robots could, and should, positively influence our shared environment—both for us and them. Empathizing with robots constitutes an important first step towards reaching this goal.

Bird-David, N. (1999). Animism revisited: Personhood, environment, and relational epistemology. *Current Anthropology*, 40(S1), 67–91.

Buur, J., & Friis, P. (2015). Object theatre in design education. *Nordic Design Research Society Conference (NORDES '15)*, 6(6), 1–8.

Chang, W., Giaccardi, E., Chen, L., & Liang, R. (2017). "Interview with things": A first-thing perspective to understand the scooter's everyday socio-material network in Taiwan. *Proceedings of the Conference on Designing Interactive Systems (DIS '17)*, 1001–1012.

Cila, N., Giaccardi, E., Tynan-O'Mahony, F., Speed, C., & Caldwell, M. (2015). Thing-Centered Narratives: A study of object personas. In *Proceedings of the 3rd Seminar International Research Network for Design Anthropology.*

Cila, N., Smit, I., & Giaccardi, E. (2017). Products as agents: Metaphors for designing the products of the IoT Age. *CHI'17: Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 448–459. https://doi.org/10.1145/3025453.3025797

Davoli, L., & Redström, J. (2014). Materializing infrastructures for participatory hacking. *Proceedings of the Conference on Designing Interactive Systems (DIS '14)*, 121–130.

Descola, P. (1994). *In the society of nature: A native ecology in Amazonia*. Cambridge University Press.

Disalvo, C., & Lukens, J. (2011). Nonanthropocentrism and the nonhuman in design: Possibilities for designing new forms of engagement with and through technology. In Foth, M., Forlano, L., Satchell, C., & Gibbs, M. (Eds.), *From social butterfly to engaged citizen: Urban informatics, social media, ubiquitous computing, and mobile technology to support citizen engagement* (pp. 421–435). The MIT Press.

Dörrenbächer, J. (2016). Design zwischen Anthropomorphismus und Animismus. In Dörrenbächer, J., & Plüm, K. (Eds.), *Beseelte Dinge. Design aus Perspektive des Animismus* (pp. 71–95). transcript.

Dörrenbächer, J., Löffler, D., & Hassenzahl, M. (2020a). Becoming a robot - overcoming anthropomorphism with techno-mimesis. *CHI'20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–12. https://doi.org/10.1145/3313831.3376507

Dörrenbächer, J., Laschke, M., Löffler, D., Ringfort, R., Großkopp, S., & Hassenzahl, M. (2020b). Experiencing utopia. A positive approach to design fiction. *Workshoppaper Submitted for CHI'20*.

Dörrenbächer, J., Laschke, M., & Hassenzahl, M. (2021). Utopien erleben. Eine Methode für soziale Innovationen aus dem Jahr 2020. In Röhl, A., Schütte, A., Knobloch, P., Hornäk, S., Henning, S.,& Katharina, G. (Eds.), *Bauhaus-Paradigmen. Künste, Design und Pädagogik*. (pp. 369–377). De Gruyter.

Dörrenbächer, J. (2022). Distanz durch Nähe: *Animistische Praktiken für kritisches Design.* Birkhäuser.

Franke, A. (2010). Much trouble in the transportation of souls, or: The sudden disorganization of boundaries. In Franke, A. (Ed.), *Animism (Volume I)* (pp. 11–53). Sternberg Press.

Freud, S. (1919). *Totem and taboo: Some points of agreement beween the mental lives of savages and neurotics.* G. Routledge & Sons.

Giaccardi, E., Cila, N., Speed, C., & Caldwell, M. (2016a). Thing ethnography: Doing design research with non-humans. *Proceedings of the Conference on Designing Interactive Systems (DIS '16)*, 377–387. https://doi.org/10.1145/2901790.2901905

Giaccardi, E., Speed, C., Cila, N., & Caldwell, M. L. (2016b). Things as co-ethnographers: Implications of a thing perspective for design and anthropology. In Design anthropological futures (pp. 235-248). Bloomsbury Academic, an imprint of Bloomsbury Publishing Plc.

Tylor, E. B. (1871). *Primitive culture: Researches into the development of mythology, philosophy, religion, art and custom (Volume 2)*. John Murray.

Vertesi, J. (2012). Seeing like a Rover: Visualization, embodiment, and interaction on the Mars Exploration Rover Mission. *Social Studies of Science*, 42(3). https://doi.org/10.1177/0306312712444645

Vertesi, J. (2015). *Seeing like a rover: How robots, teams, and images craft knowledge of mars.* University of Chicago Press.

Viveiros de Castro, E. V. (2004). Exchanging perspectives. The transformation of objects into subjects. *Common Knowledge*, 10(3), 463–484.

Willerslev, R. (2007). *Soul hunters*. University of California Press.

I-RobEka

AIM OF OUR RESEARCH PROJECT

The aim of our research is to show how different existing technologies can be successfully combined to create a robotic shopping assistant. Here different modes of human-robot interaction based on varying expectations of users will be designed and implemented.

CONTEXT, ROLE AND TASK OF OUR ROBOT

The robot of *I-RobEka* is an assistant to support in a supermarket. It helps shoppers find their favorite items and can navigate them throughout the market. Furthermore, it can pick up items or even shop for them autonomously.

WHAT MEANINGFUL HUMAN-ROBOT INTERACTION MEANS TO US

We believe that robots must solve actual problems faster than humans. They have to meet the user's expectation in the interaction and must anticipate the user's intention. Also, it is vital that humans can give instructions to robots easily.

WHO WE ARE

EDEKA Group, EDEKA Digital; Chemnitz University of Technology; Innok Robotics GmbH; Toposens GmbH.