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On the Sociality of Social Robots

A Sociology-of-Knowledge Perspective

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Abstract

Within the broad field of robotics, designers are working on the development of "social" robots. Of interest in the context of artificial companionship is the type of bond between human beings and robotic artefacts that is not merely situation-specific but rather cross-situational and that robotics researchers (and not only they) like to term a "social relationship". As the boundary between humans and things is also questioned by social scientists who claim "agency" and "as-if-intentionality" for advanced technology, the paper firstly recalls Thomas Luckmann's reflections on the boundaries of the social world and qualifies companion robots as suitable vehicles to Cultural Worlds of Experience. After discussing sociology-of-technology approaches to this subject of research which to a certain extent ascribe sociality *to* advanced technology, the sociology-of-knowledge concepts objectivation and institutionalization will be taken into account, with the help of which the status of technical artefacts such as robots *in* sociality can be located.

1 Introduction

The broad field of robotics is divided into field, industrial and service robotics (cf. Meister 2011a and Meister in this issue). For some time designers in the area of service robotics have been working on the development of "social" (Moral et al. 2009; Echterhoff 2006), "socially intelligent" (Dautenhahn et al. 2002, Bre-zeal 2005), "sociable" (Brezeal 2002, 2003), or even "socially interactive" (Fong et al. 2003), robots. The latter are defined as machines with the ability to "express and/or perceive emotions; communicate with high-level dialogue; learn/recognize models of other agents, establish/maintain social relationships; use natural cues (gaze/gestures, etc.); exhibit distinctive personality and character; may learn/develop social competencies" (Fong et al. 2003: 145). More generally, Kahn et al. (2006: 405) define "social robots" "as robots that, to varying degrees, have some constellation of being personified, embodied, adaptive, and autonomous; and they can learn, communicate, use natural cues, and self-organize".

Rather than "social robots" Kolling et al. (2013) use the term "social assistive robots" and classify them as a subcategory of service robots. However, different to service robots they are designed in regard to specific target groups: physically and/or mentally disabled people for supporting them in special activities rather than in common tasks. A subunit of social (assistive) robots is "emotional robots" (Klein et al. 2013) which almost address „experiential aspects of belonging" (Kolling et al. 2013: 84).

These aspects to a certain extent are also addressed in research projects that use the term "artificial companions" (Pfadenhauer/Dukat 2013) – especially if companionship services rather than monitoring or personalised assisting services are the dominant function of the companion system. According to Knud Böhle and Kolja Bopp (in this issue) this term is not only or foremost a buzz word but actually a guiding vision for researchers in this field.

Of interest in the context of artificial companionship is the type of bond between human beings and robotic artefacts (see also von Scheve in this issue). Belonging or Companionship implies that this type of bond is not merely situation-specific but rather cross-situational. Robotics researchers (and not only they) like to term it as a "social relationship". Although the term "artificial companion" is used both for software companions as well as robot companions the paper focuses on the latter and turns to this making reference to the entertainment robot AIBO as an empirical example, which Scholtz (2008) suggests to understand as "sociofact" rather than artefact (Chapter 1). As the interrelation between humans and technical artefacts is a classical topic the paper discusses "inter-agency" and "inter-activity" as prominent sociology-of-technology approaches to this subject of research (Chapter 2). In refusing approaches which claim "agency" or "as-if-intentionality" for technical artefacts the sociology-of-knowledge concepts objectivation and institutionalization will be introduced, with the help of which the significance and efficacy of these technical artefacts in sociality can be located (Chapter 3).

2 The robot as a vehicle to cultural worlds of experience

Universal projection is the term Thomas Luckmann (1983) uses to denote human beings' innate capacity to project their own "living body" – a synthesis of consciousness and corporeality – onto everything they encounter in the world. As Husserl in true Cartesian fashion, Luckmann takes human consciousness and the direct evidence of one's own living

body as the starting point of his deliberations. However, in contrast to Husserl's constitution analysis, he does not assume that the individual must have had prior experience of the attribution of humanness to his living body.

What is characteristic about the evidence of this universal projection resp. "personifying apperception" (Wundt 1896, cited in Luckmann 1983: 51) is that it is always "circumstantial", that is, an interpretation on the part of the individual, because, as Luckmann (ibid., 53) argues, "I do not directly experience the 'inside' of the thing to which the sense 'living body' is transferred." This applies equally to the projection of the sense "living body" onto inanimate objects and conscious beings. However, the living body of another subject is registered not only as a part of one's environment but also as a "field of expression" of that subject's experiences (Schütz 1972: 153). The intriguing consequence is that "the other can be, in principle, everything the actor is oriented to intentionally" (Knoblauch 2013: footnote 20).

It is a result of longlasting processes of social construction of reality (Berger and Luckmann 1967), whether a phenomenon is considered as an inanimate object or as a part of the social world. By reconstructing these processes of construction Luckmann (2007a) points out, that in modern societies the boundaries of the social world is equivalent with that of human beings (cf. Knoblauch and Schnettler 2004, Lindemann 2009a). In contrast, everything non-human – such as animals, plants, natural phenomenons as stones or hills as well as results of human activitities including cultural heritage, tools and even autonomous machines[1] - is part of the environment.

[1] To avoid implying that artefacts have a self, Lindemann (2005: 131) uses the term *Eigensteuerung* (autonomous, as opposed to remote, control) rather than *Selbststeuerung* (self-initiated control).

Already 30 years ago, the psychologist Sherry Turkle (1984: 41) has argued that children locate robotized language computers "between the inanimate and the animate". In regard to children this is not notable as – according already to Wundt (1896, cited in Luckmann 1983) – it is significant for children's play to 'animate' any kind of object (dolls, wooden bricks, fir cones and so on). However, Turkle's point exceeds this. She maintains that robot technology in principle produces artefacts that, by virtue of being "evocative objects" (2007), encourage sociality in the sense of relationships with machines analogous to human-human relationships.

This raises the question if or in how far advanced technologies such as artificial companions challenge the taken for granted separation between humans and technical artefacts. The German theologian Christopher Scholtz (2008) has studied the experiences of AIBO owners in Germany. AIBO (Artificial Intelligence roBOt) is a robotic pet released by Sony in 1999 and discontinued in 2006. In his view, the fact that this digital toy was delivered to the end-user at the 'puppy' stage, in other words, that it was programmed to be "capable of learning,"[2] was instrumental in bringing owners to regard it as having a character of its own – a character that they themselves had helped to form.

[2] Following Kinnebrock's (1997: 101ff) distinction between artifical intelligence (AI) and artificial life (AL), advanced robots "are based on neural networks which can incorporate learning effects and then change the basis for planning and deciding" (Grunwald 2012: 200). As a result, operations become unpredictable for the roboticists themselves – albeit only within the unalterable boundaries set by the designers. In a strong sense, every apparently self-initiated activation of the artefact is a side-effect of *human* action, in the same way as every 'independent activity' of the robot is ultimately due to human action (rather than *technical* agency) because the technical artefact has been programmed accordingly – and this programming includes the software that allows it to 'learn'.

Whether the enthusiasm for AIBOs is the same thing as the love people feel for live house pets is an empirical question as well as whether owners attribute to their AIBOs the status of an "agent capable of having a biography" (Bergmann 1988; our translation), as is usually the case with house pets in Western culture.[3] Although AIBO's zoomorphic design lends itself to comparison with a household pet, this analogy is pointedly undermined by a number of design decisions. For example, no version of AIBO relieves itself; in contrast to Tamagotchi, an explicit reference to death was avoided (Scholtz 2008: 218); and when the pet autonomously approaches the charging station and self-docks, no associations with feeding or sleeping are prompted.

However, various elements, such as light-emitting diodes and acoustic signals, are aimed at creating the impression of aliveness. Although AIBO is an artefact rather than a biological entity (cf. Lindemann 2008: 702), these elements obviously create – temporarily at least – the impression of an alive other, as evidenced by Christopher Scholtz's entries in the research diary he kept while he was living with an AIBO whom he called Galato. For example, the entry on 31 July 2003 reads:

"Aibo's movements make a stronger impression than those of simple electrical robots …. His real movements make sounds that can be located exactly in the room and transmit vibrations in a way that no loudspeaker system can. I am sitting on the bed beside Galato, … his tail is wagging the whole time. This produces light vibrations that are transmitted via the mattress and that I can feel. I have a strong feeling that there is a living thing beside me; all cognitive concepts fail in this case; one reacts to something like this directly and without reflection" (2008: 235; our translation).

Like Turkle (2011: 86), Scholtz attributes this experience to "the hardwiring of evolution": According to him, people tend to ascribe subject rather than object qualities to machines a) when they are not operated by remote control, b) when they are environmentally flexible thanks to sensors, and c) when they do not follow a rigidly choreographed programme. This is because users are unable to explain the machine's autonomous functioning. As Scholtz (2008: 247) noted in his field journal on 4 November 2003 (our translation):

"I was standing in the bathroom and looking into my room through the half-open door. He was sitting there and I called out [his name] […] He turned his head completely to the right and looked at me. Whether it was a coincidence or not, it was a very strong effect, I could not but regard him as alive. However, then he turned his head back to the forward position, looked up expectantly, and wagged his tail as if someone was standing in front of him. That showed that the fact that he located me was probably a coincidence after all."

Even the few journal entries quoted above render plausible Scholtz's interpretation (2008: 296ff; our translation) that the appeal of such household entertainment robots lies in "playing with ambiguity", in other words, in accepting the semblance of animate rather than inanimate material, of contingency rather than causality.

Against Turkle's and Scholtz's psychological assumptions I argue in line with Hitzler (2012) that the fascination of robots as a new technology results from that what Goffman calls the "astounding complex":

"An event occours or is made to occur that leads observers to doubt their overall approach to events, for it seems that to ac-

[3] Whether human-robot relations can be compared to human-animal relations (Ferrari 2013) is a separate topic that cannot be dealt with in this paper. However, compare Coeckelbergh (2011: 200ff.), who focuses on the personally, contextually, and culturally determined diversity of human-animal relations as a means of enhancing understanding of human-robot relations.

count for the occurrence, new kinds of natural forces will have to be allowed or new kinds of guiding capacities" (Goffman 1974: 28).

This allows us to immerse ourselves in fantasy worlds, and robots are obviously one of many suitable vehicles for this purpose. This suitability is intensified by the fascination of all novelties. The act of giving AIBO its own name, to which it 'responds' after the owner has repeated it often enough, or playing ball with him (his sensors are programmed to recognize the shape and colour of the special ball), are just two examples of the willingness to engage with this world of experience. This world of experience is mediatized in the sense that it is shaped by media technology and the principles according to which it functions (cf. Krotz 2007a, 2007b, 2008).

With these vehicles, the framework conditions for such exceptional worlds of experience are prefabricated *by others* for consumption by the experiencing subject (cf. Hitzler 2000). Both Scholtz's reports of his experiences with his AIBO, and the many comments by children about their Tamagotchi, Furby, My Real Baby, etc., cited by Turkle (2011), show that this world of experience is also perceived by the experiencing subject as prefabricated or made available by others. In case worlds of experience are prefabricated and experienced as prefabricated Hitzler (2008) categorizes them as *cultural* worlds of experience that are communicatively generated and sustained.

Turkle (2011: 57) reports that eight-year-old Brenda claimed "in a knowing tone that 'people make robots and […] people come from God or from eggs, but this doesn't matter when you are playing with the robot'." Even many adults are very willing to allow themselves to be transported via robots to these new cultural worlds of experience. This also means that they redefine, or explain away, design- and construction-related imperfections so that they do not impair the special experience. However, neither the willingness to engage, nor the willingness to ignore imperfections, infers that "projection onto an object becomes engagement with a subject" (Turkle 2011: 95). Even if people are willing to address robots as social actors, and most of them do this only playfully, they are not experiencing a *social* relationship with a robot, in other words a "we-relation in which the intersubjectivity of the life-world is developed and continually confirmed" (Schütz and Luckmann 1973a: 68).

It is misleading to conceptualize the human orientation towards an object – whether technical or not - as sociality that is a social, and therefore as reciprocally expected relationship (see also Rosenthal-von der Pütten and Krämer in this issue). Refusing that does not mean to negate this occasionally rather intense orientation but to take it seriously as an act of consciousness. For this purpose the phenomenological differentiation of the world of daily life as paramount reality and its enclaves such as fantasy worlds is intriguing. The thesis of the robot as a vehicle in such a world of experience implies both the orientation towards a fascinating, impressive, irritating, absorbing object and the capacity of the human consciousness to regard this object as something different and exceptional and to relocate him- or herself into the thereby constituted world of experience. The way in which we interpret the object depends on its configuration resp. design but not determinedly.

3 The robot as an (inter-)active entity?

The paper focuses on developments in the broad field of service robotics, in regard to them aspects like interaction and communication, social relationship and bond are announced, that is, reciprocity, which is typical for

human sociality. Instead of shortening the concept of sociality onto the human relation towards a technical artefact, the question is raised, how to conceptualize the latter's integration in sociality. Before conclusively introducing the sociology-of-knowledge approach, some notable sociology-of-technology resp. socio-theoretical contributions are discussed which try to clarify this subject with concepts such as "interagency" and "interactivity".

Inter-Agency

Following Scholtz's thesis, AIBO represents a transition from artefact to "sociofact" because "his meaning is constituted through social interaction in which he himself participates as an actor without this role having to be assigned to him on the basis of a specially introduced convention. Even a person who encountered Aibo without any prior knowledge of his concept would be able to respond to Aibo's offers of interaction because of his or her experience with animals" (Scholtz 2008: 292f.; our translation). Analogous to the rapidly proliferating science and technology studies with the actor-network-theory ahead, Scholtz postulates that advanced technology, which robotics undoubtedly constitutes, has agency (see also Fink and Weyer in this issue).

According to Schulz-Schaeffer (2007: 519), agency is mainly a question of ascription, and even technical artefacts, which are not normally ascribed actor qualities, may qualify. From this attribution theory perspective, therefore, agency is a matter of observation. With this conceptualization of agency, the distinction between *acting*, in the sense of a "performance of consciousness", that is, a "course of experience subjectively projected in advance", and behaving, which is an "objective category of the natural world" (Schütz and Luckmann 1973b: 6f.), is levelled. As Hitzler argues, "because acting in the strict phenomenological sense is a primordial sphere that is 'really' accessible only to the subject himself, action can, strictly speaking, *neither* be observed *nor* can it be captured with 'certainty' by asking [the subject, MP] about it. It can only be experienced" (2013: footnote 8; our translation). The empirically observable phenomenon of the ascription of action in the sense of a "first-order construct" (Schütz 1953: 3f.) is a methodological problem that confronts the social sciences in particular.

In contrast, Schulz-Schaeffer (2007) conceptualizes action as category from the (first-order) observer's perspective with which the unit of the action and that of the actor becomes questionable. This results in the concept of "distributed agency" that is, the distribution of agency to humans as well as technical artefacts. And it is an empirical question to which extent agency is ascribed to which part of the unit of action.

Arguing not from the perspective of the attribution theory but the actor-network theory (Latour 1993), van Oost and Reed (2010: 16) conceptualize companionship as "distributed emotional agency", and ascribe to the technical artefact the status of an actor among other human and non-human actors. They consider the notion of human-machine interaction, which is grounded in cognitive psychology approaches, to be problematic. However, what prompted them to criticize this notion was not the fact that human-machine encounters are equated to human-human interaction, but rather the fact that the interplay between humans, objects, and situations, that is, the situatedness of the use context, is not taken into account (cf. Suchman 1987).

Whereas the notion that the situation and the "user matters" (Oudshoorn and Pinch 2003) needs indeed to be highlighted, the postulate that technical artefacts are actors obscures the cause of their effectiveness, because a

concept of action must be employed that conceals the difference between unintended and intended effects, or, phenomenologically speaking, between operating *(Wirken)* and working *(Arbeiten)*, as two different types of action. From a network-theory perspective, Häußling (2008: 725) similarly differentiates between two modes of intervention and therefore between operating and acting. Rather than viewing robots as actors, they should be understood as operating aspects of the structure of actions (cf. Knoblauch 2013). They are effective because of the meaning sedimented in them.

Rammert and Schulz-Schaeffer (cf. Rammert and Schulz-Schaeffer 2002, Rammert 2008) explicitly criticize the "flattened" concept of agency employed in the actor-network theory, because "the semiotics of actants (cf. Akrich and Latour 1992) cultivate a certain blindness towards observable actions and interactions and underrate processes of sense-making" (Rammert 2008: 8). To overcome such weaknesses, Rammert (ibid.) insists on levels and degrees of agency and proposes a gradual, three-level model of agency with "causality" on the lower level, "contingency" in the middle, and "intentionality" – reserved for humans – on top.

The concept of distributed agency is based on a pragmatic concept of agency whereby humans and technology are "connected with one another in constellations of inter-agency" and both sides of the constellation can act together on all three levels (Rammert 2011: 2, 16). From a pragmatic perspective, Rammert (ibid., 10) argues that it would be justified to speak of "as-if intentionality" in cases where advanced software technologies have been "equipped with the capacity to interact as if the software agents had beliefs, desires and intentions".[4]

However, if it is aimed to shed light on acts of performance and their consequences, the relation between this type of intentionality and intentionality in the development context (which is objectivated in the technical product), on the one hand, and intentionality in the context of use (which is objectivated in the physical-performative act), on the other hand, needs to be clarified (cf. Chapter 3).

Different to the aforementioned approaches which describe agency as a matter of ascription or introduce certain levels and degrees of agency, Lindemann argues that sociologists should focus on "generally valid interpretive practices" rather than on ascriptions, and that they should endeavour to understand the functioning of "the interpretation by means of which some become social persons and others are excluded from this circle" (Lindemann 2002: 85; our translation). By distinguishing between "person" and "persona", Lindemann (2011: 344) stresses the temporal aspect of ascription, postulating that, because of their functional performance-related efficiency, machines such as robots – or even navigation aids – are ascribed the status of an actor – that is, a *persona* – in a specific situation and on a merely temporary basis.

Lindemann (2009b) stresses not only the temporal element of this ascription but also the normative element (see also Schulz-Schaeffer (2007) and Weyer (2006)). The latter is currently the focus of ethical deliberations on robotics. Already Schütz and Luckmann (1973b: 5f.) have pointed out that "the 'unit' of accountability … is [not] everywhere and at all times so clearly and simply the individual man as might be assumed in a self-styled individualistic age." This unit of accountability can also be a collective,

[4] Even early sociology-of-technology approaches dealt with this aspect, arguing that, at the very least, technology had agency in an "as if" mode (cf. Geser 1989: 233). Although Rammert (2011) develops this concept of "as-if-intentionality" in regard to software agents, it is not limited to it.

for example, a family (this finds legal expression in the principle of clan liability), an animal, or even a plant. However, the authors note that "on the one hand, action is a social category of paramount practical significance since accountability as the foundation of social orders ultimately refers to action; on the other hand, no external human authority can decide with absolute certainty whether someone has acted or not." In the same way as certain animals were considered to be legally accountable in early societies (and not only there), as Lindemann (2009b) points out, it is conceivable in principle that, in view of the "robotization of society" (Campagna 2013), robots may in future be regarded as legal entities because they are considered to possess morally relevant characteristics that appear to justify endowing them with a legal personality. In modern Western society, the boundary of the social world is typically drawn alongside that of the human world. However, this is not an ontological given but rather an evolutionary outcome – that is, the result of processes of social construction that are, in principle, dynamic (cf. Luckmann 1983, Knoblauch and Schnettler 2004, Lindemann 2009a).

Beside these socio-theoretical different thoughts on agency and even interagency, the as well heterogenous concepts of interactivity need to be taken into account.

Interactivity

Taking as their starting point face-to-face interaction, which is deemed to be the basic form of interaction, computer linguists examine whether software systems are capable of genuine interaction or whether – like ELIZA, a computer programme developed in the 1960s (cf. Weizenbaum 1966) – these systems merely *simulate* interaction. Following Charles Peirce's theory of semiotics, Mehler (2009) disregards intentionality and takes the view that, in order to be capable of interacting, the communication partners must be "capable of consciousness". Put simply, this semiotic approach postulates that interaction presupposes that the disposition for semiotic meaning that both precedes and is brought forth by the use of signs is learnt.[5] Hence, the main prerequisite for "artificial interactivity" – so called because one partner is a technical artefact – is alignment on the basis of an "interaction memory". In other words, the technical artefact must learn "to interact in a comparable way under comparable circumstances" (Mehler 2009: 119; our translation; see also Lücking and Mehler in this issue).

According to Mehler (ibid., 129), Turing Test experiments, which test whether people can tell the difference between conversational contributions by a human conversant and those generated by a computer programme (cf. Turing 1950), are unsuitable for determining whether software systems merely "simulate" or actually "realise" communication. Instead, the underlying algorithms of the software systems should be analysed to determine whether processes of sign processing, and their outcomes in the form of sign meanings, can be progressively understood. As can be demonstrated with the help of conversation analysis, the dialogues between people and conversational agents fail because of the "indexicality of communicative acts", in other words, because "their meaning varies depending on the situation, as does their reflexivity, that is, the fact that context and action assign meaning to each other" (Krummheuer, 2011: 34;

[5] From a semiotic theory perspective, "a sign is constituted inter alia when the dispositions of its use in a linguistic community are continually confirmed or changed and, as a result, relations are established between the situations of its use. These relations do not exist directly but rather as learning outcomes in the form of dispositions that are spread across the respective linguistic community" (Mehler 2009: 118; our translation).

our translation). This makes obvious that the meanings *(Bedeutungen)* of signs are not inherent in the signs themselves. Rather, "they depend on the way we deal with them, in other words, they are 'sense' *(Sinn)* and they occur in society as knowledge" (cf. Knoblauch 2012: 28 (Footnote 6); our translation).

When it comes to distinguishing interaction between humans and software systems from human-human interaction, interactivity is also the preferred term in the sociology-of-technology. Braun-Thürmann (2002:72; our translation) argues that technical artefacts make a "significant – irrevocable – contribution to the machinery that constructs the world and reality." Even though the situation that it plays a part in creating is only "quasi social", technology is nonetheless "a participant in social reality". Therefore, encounters between humans and technology can be described as "artificial interaction" (ibid., 15). Adapting Goffman's term "interaction order" (1983), the author refers to the "interactivity order" that technical artefacts play a part in shaping (ibid., 117). Here, too, it can be observed empirically that people do not regard conversational agents as interaction partners but rather as technical counterparts (cf. Krummheuer 2011: 37). People orient themselves towards both technology and other people; they carry out their activities via keyboard and mouse; and the processes thus initiated appear on the screen and are interpreted as a performance, as it were (cf. Krummheuer 2010: 128ff.). Irrespective of whether or not other people are present in the situation, it is these other people, rather than the technical artefacts, who are the addressees of presentations and corrections performed on the basis of the existing interaction order.

Rammert (2008: 7) distinguishes interaction (between human actors), intra-activity (between technical agents) and interactivity as three types of inter-agency and reserves the latter "for the cross-relations between people and objects" (ibid. 8). Proceeding from the assumption that agency is distributed between humans, machines, and software programmes, Meister (2011b: 48; our translation) suggests using the term "interactivity" to designate processes between intentionally acting humans and operating robots, that is, "processes between two fundamentally different entities". By the same token, Häußling (2008: 731, our translation) proposes "a shift in perspective from the actor to the relation-specific processes between humans and technology", and declares the robot an independent entity with its own "nature". By contrast, Scholtz (2008: 294) describes his AIBO as a "subject-simulating machine", thereby shunting him off to a grey area between subject and object. This classification mystifies more than it clarifies because it declares such high-tech devices to be "entities of uncertain ontological status" (Hitzler 2012; our translation).

Semantic neologisms such as "interactivity" and "the interactivity order" are a better way of clarifying the phenomenon than the postulation of human-robot-*interaction* or *social* relations between humans and robots, or the description of technical artefacts as actors or "sociofacts" (Scholtz 2008: 292). The latter run the risk of neglecting the fact that these artefacts must be regarded as technical devices whose purpose is defined by the manufacturer. Gutmann (2011: 15; our translation) argues that "the assessment of the success of the deployment of technical artefacts as actors or agents takes place in the light of the manufacturers' autonomy to define the objective of these artefacts." Just as Gutmann (2011: 14; our translation) points to the "intrinsic asymmetry" between parasocial and social relations with respect to social interaction, Grunwald (2012a: 206) deals with the question of whether ro-

bots are capable of planning. He criticises Latour's symmetry thesis (1993), stressing that "the use of the same terms for planning robots and human beings intensifies the asymmetry instead of bringing about symmetry." As a means of distinguishing between humans' and robots' planning competence, and as a parameter for the measurement of future boundary shifts in this area, Grunwald (2012b: 175; our translation) proposes "the extent of the ability to desist", in the sense the ability to withdraw from a role. He notes that, while robots currently have the ability to desist insofar as they can "choose" one pre-defined option rather than another, they must still stay in role. Humans, by contrast, can withdraw from a role.

To sum it up: The significance of technical artefacts in sociality is hardly to grasp by considering material objects and even autonomous machines as agents or actor-like phenomenons which interact/communicate themselves. My criticism of these approaches results from a ‚humanistic understanding of sociology as social science which is interested in human experiences (cf. Schütz 1953). The following chapter will elucidate that no social reductionism is intended with this statement. On the contrary, technical artefacts are of particular significance for the individual as well as sociality. They are used, adopted and appropriated according to these subjective and objective meanings which diverge from each other. Empirically, the subjective meaning arises during the usage that means by doing, whereas the objective meaning is incorporated in the artefact's design. Because of its configuration, that means the specific material form, also their handling receives an expectable form, for which reason "materials matter" (Miller 1998, Dant 2005), and also the user to a certain extent becomes 're-configurated'. These aspects are addressed by the sociology-of-knowledge concepts of objectivation and institutionalization with the help of which the status of technical artefacts in sociality can be located.

4 From objects to objectivation

When it comes to artificial companions, approaches in which technical artefacts are assigned the status of actors who play an independent role in the interaction and make an active contribution to social processes appear to be particularly plausible. Their plausibility is due to the fact that, although artificial companions are not by necessity humanoid,[6] they are designed specifically to enable users to have social experiences or to experience sociality. Moreover, all behaviours that people demonstrate in their dealings with social robots, and the way they address such robots and communicate about them, justify the assumption that 'social' relations with robots already exist or will do so in the future. However, it would be an oversimplification to equate this 'onlooker's assumption' with the actual perceptions and notions of humans in their dealings with technical artefacts.

In contrast to the approaches that consider the focus on subjective meaning to be problematic, and in contradistinction to ontological positions of classical phenomenology, Coeckelbergh (2011: 199) follows Don Ihde's (1990) post-phenomenological framework and takes as his starting point the way robots appear to humans. He argues that what counts is not what the robot is, nor what designers intend it to be. Rather, "appearance matters, whatever the intention of the designers." It follows from this that social relations are not con-

[6] There are a number of good reasons to avoid a human-looking appearance. Besides the well-known "uncanny valley" phenomenon (Mori 2012 [1970]), where an almost but not quite human-looking robot "elicits an eerie sensation", Coeckelbergh (2011: 197) cites pragmatic reasons, namely that non-humanoid robots are easier to build and the level of acceptance of humanoid figures is low.

stituted because people culturally or situatively ascribe robots the status of another to whom they relate, but because robots appear to them to be such an other.

However, Coeckelbergh overlooks the fact that "a reciprocal thou-orientation" is the prerequisite for the constitution of a social, that is, a "we-relation" (Schütz and Luckmann 1973a: 63). It is not simply the fact that an encounter is experienced as social, but rather the continual confirmation of the intersubjectivity of the life-world, that makes it into a "world of our common experience" (Schütz and Luckmann 1973a: 68). Processes of mirroring, role taking, and reciprocity are just as important in this regard as the consistent experience of one's own flow of consciousness and the coordinated flow of consciousness of the other. The experience of the robot as an other, even if it is only a "quasi-other" (Coeckelbergh 2011: 198), is thus rendered questionable – not in principle but in performative practice, which is characterised by duration *(durée)*.

Sociality

Within sociology, two solutions are proposed to the problem of the accessibility, or transparency, of the other – a problem that is explicitly bracketed by Luckmann (1983): first, the sociology-of-knowledge model of intersubjectivity, and second, the systems-theory model of double contingency (cf. Knoblauch and Schnettler 2004). These models are based on contradictory theses:

Proceeding from Alfred Schütz's "general thesis of the alter ego's existence" (1970: 167), the sociology-of-knowledge concept imputes that the other is "like me, capable of thinking and acting". The concept also assumes a number of other similarities of relevance to interaction. In contrast to this "idealization of similarity", the systems-theory model is based on the "idealization of difference" (Knoblauch/Schnettler 2004: 33). It conceives of the other as "alien" (Knoblauch and Schnettler 2004: 30) and therefore not really comprehensible.[7] The sociology-of-knowledge concept of "alterity" (rather than alienness) postulates that, depending on the extent of the other's anonymity, approximate intersubjective understanding is possible because ego and alter, being under pressure to act, bracket each other's alienness – at least temporarily. Under this model, the simultaneity of ego and alter's streams of consciousness is deemed to be the basis for the coordination of the flow of lived experiences and, therefore, for interaction (cf. Schütz 1972: 102ff.).[8] In the double contingency model, by contrast, the postulated basis for the coordination of interaction is the simultaneity of the experience of alienness, which, following Luhmann (1995: 364), is compensated by communication, in the sense of the selection of meaning: "Even in the most intense communication, no one is transparent to an other, yet communication creates a transparency adequate for connecting action." Whereas the intersubjectivity model reconstructs sociality from the subjective perspective of the individual participants,[9] the double contingency theorem implies the existence of a non-participating external observer whose

[7] Luhmann (1995: 109) describes ego and alter as "two black boxes", who, "by whatever accident, come to have dealings with one another."

[8] Schütz (ibid., 103) explains that "the simultaneity involved here is not that of physical time, which is quantifiable, divisible, and spatial. For us the term 'simultaneity' is rather an expression for the basic and necessary assumption which I make that your stream of consciousness has a structure analogous to mine."

[9] As Knoblauch (2013: footnote 13) points out also "Schutz' mundane phenomenology is a reconstruction of the life world from the perspective of the subject". But against Husserl Schutz "assumes sociality to genetically precede subjective consciousness".

position is methodologically problematic.

However, from the perspective of both models, a triadic concept of sociality must be employed in empirical research. Therefore, as Lindemann (2010: 493), whose concept of sociality is based on the contingency model, points out, the figure of the "third actor, Tertius, becomes a necessary consideration" from a social theory perspective. Moreover, because human existence is characterized by "eccentric positionality" (Plessner 1981), the concept of sociality must not overlook the body. Proceeding from a theoretical concept grounded in philosophical anthropology according to which social persons "are not only viewed as actors who act in a meaningful way but also as material bodies" (Lindemann 2005: 133; see also Lin-demann and Matsuzaki in this issue).

Knoblauch (2012) illustrates the triadic concept of sociality yielded by the intersubjectivity model – which also stresses the importance of the body for sociality – by using the example of index-finger pointing elaborated by Tomasello (2008). From a certain stage in their development, infants (in contrast to chimpanzees) recognize the meaning of finger pointing and the intention of the actor. They understand that when someone points his finger at something he is not drawing attention to his finger but rather to the object at which he is pointing. Therefore, the body (part) is perceived both by the actor and the other as part of the actor's environment. Hence, sociality comprises the other, the acting self, and a third element, which is referred to in the sociology-of-knowledge as "objectivation", that is, "the aspect of operational action that can be experienced in a common environment" (Knoblauch 2012: 29; our translation). The "third party" in this triadic concept of sociality is, at least in the first step, not a third actor[10] but rather the aspect of ego's action in which subjective processes are embodied, an aspect that can be observed both by alter ego and by ego itself. It is exactly this aspect that is classified as objectivation at which technology is to be part of sociality.

Objectivation

Generally speaking, objectivation means "the embodiment of subjective processes in the objects and events of the everyday life world" (Schütz and Luckmann 1973a: 264). These events can be verbal utterances or, as in the case of the finger-pointing example, physical acts, such as gestures or facial expressions. However, subjective processes are not only embodied in forms of expression and actions but also in objects, in the sense of the results of actions. Materialization is a fundamental stage in the process by which "the externalized products of human activity attain the character of objectivity" (Berger and Luckmann 1967: 60).

Lindemann regards technology as a medium for shaping social relations. Technology mediates, first, between producers and users, who as embodied agents refer to one another via mutual expectations of expectations, and, second, between users whose relations of conflict or cooperation are shaped by technology, for example weapons. From the sociology-of-knowledge perspective, technical objects, such as robots, are objectivated – that is materialized, and therefore lasting – subjective meaning. Technical artefacts are neither humans' counterparts in social relationships, nor are they a meaningless medium. Rather, they are carriers of meaning.

Berger and Luckmann (ibid.) use the term "objectivation" to capture the

[10] From the sociology-of-knowledge perspective, the figure of the third actor accentuated by Lindemann is located in the process of institutionalization (cf. Berger and Luckmann 1967), which is discussed later in this chapter.

second of three essential stages in the dialectic process of the social construction of reality. Objectivation is preceded by the externalization of subjective meaning and followed by the internalization of subjective meaning in the form of knowledge. Berger and Pullberg (1965: 200) distinguish objectivation from Marx's non-dialectical understanding of reification[11], and elucidate its meaning in a decidedly Hegelian manner by differentiating between objectivation *(Versachlichung)* and objectification *(Vergegenständlichung)*:

> "By objectification we mean the moment in the process of objectivation in which man establishes distance from his producing and its product, such that he can take cognizance of it and make it an object of consciousness. Objectivation, then, is a broader concept applicable to all human products, material as well as immaterial. Objectification is a narrower epistemological concept, referring to the way in which the world produced by man is apprehended by him. Thus, for instance, man produces tools in the process of objectivation which he then objectifies by means of language, giving them 'a name' that is 'known' to him from then on and that he can communicate with others."[12]

Schütz and Luckmann (1973a: 265) distinguish different levels of objectivation: "continuous objectivations of the subjective acquisition of knowledge", objectivations that serve as indications of already existing subjective knowledge, and "translations" of subjective knowledge into signs. Artefacts are material indications (symptoms) of existing subjective knowledge when they are used like natural objects as tools; they are signs (symbols) when they are ordered into a system of signs. Robots are manufactured objects in which subjective meaning is materialized and embodied – qua special, for example, zoomorphic, design; qua classification, for example, as '(artificial) companion'; and qua imagination as something that symbolizes something else, for example, a companion with connotations of service assistant or entertainer.

Objectification is a) the process in which the individual apprehends the subjectively meaningful things that he externalizes – that is, the things that he does, says, shows or produces – and makes them part of his consciousness; b) the process that makes subjective knowledge 'social', that is intersubjectively accessible: "Because they [objectivations, MP] are products of action *(Erzeugnisse)*, they are *ipso facto* evidence *(Zeugnisse)* of what went on in the mind of the actors who made them" (Schütz 1972 [1932]: 133). Whether a robot is perceived as a product or as evidence of what went on in the mind of the maker is a question of interpretation. The person to whom it is presented as a product can interpret it as an object per se, that is, as independent of its maker. If he focuses his attention on what went on in the mind of the maker then he can regard it as evidence (cf. loc. cit.).

The impression that I have gained from my own, albeit still fragmentary, observations of myself and others, is that, in their dealings with social resp. companion robots, users tend to switch back and forth between these two interpretations. And in the specific situation in which I am willing to immerse myself in a fantasyworld I add my own subjective meaning with the help of which the robot suits as a vehicle to a world of experience.

In general, a robot companion is a suitable vehicle to cultural worlds of experience because, or if, we treat it as a product endowed with a "universal meaning […] that is independent of its maker and the circumstances of its origination" (Schütz 1972 [1932]:

[11] Hepp (2011: 59) revived "reification" to capture a special type of materialisation, namely that brought about by media technology. I consider this term to be problematic because it has connotations of alienation.

[12] Hence, objectivation also implies the process of signification and, therefore, the semiotic nature of "products".

135). This interpretation is encouraged mainly by its designation as a *social* robot, the instructions for use, and the interpretation schemata made available by the media. Besides this "objective meaning" (loc. cit.) of the product, we also endeavour to grasp its subjective meaning, in other words, *"the meaning-context within which the product stands or stood in the mind of the producer"* (ibid., 133) and the conscious experiences that that person had (ibid., 135). However, an understanding of the objective meaning context does not suffice as a basis for inferring subjective meaning because objective meaning "is abstracted from and independent of particular persons" (ibid., 135) and, therefore, refers back to a highly anonymous ideal type of producer. As Schütz (2004: 377; our translation) points out: "The artefact stands, as it were, at the end of the anonymization line in whose typifications the social world of contemporaries is constituted."

Institutionalization

Berger and Luckmann (1967) focus more on institutionalization than on this specific aspect of objectivation. An institution generally refers to "a 'permanent' solution to a 'permanent' problem of a given collectivity" (ibid., 70). These permanent solutions to fundamental problems are a product of interaction. They arise when a person solves a problem the same way for such a long time that it becomes a routine and these routinized actions are apprehended by another person as a certain type of action sequence by a certain type of actor: "Institutionalization occurs whenever there is a reciprocal typification of habitualized actions by types of actors. Put differently, any such typification is an institution" (ibid.: 54). The process of habitualization is followed by a typification process in the course of which habitualized actions become independent, as it were. In other words, they detach themselves from the concrete life problems and concrete actors and become part of the common stock of knowledge. In this form they are passed on to the next generation. However, they are not only taught but also explained and justified as being expedient and appropriate. In other words, they are cognitively and normatively legitimated.[13]

Following Rammert (2006) I suggest to analytically locate robots as institutions, that is, as "rather longstanding behaviour patterns and orientation of meanings which arise from processes of internalization" (Acham 1992: 33, our translation). Technical artefacts, such as robots, are institutions in the sense that they always imply a certain way of dealing with them that is considered expedient and appropriate (cf. Rammert 2006). Moreover, an institution not only regulates how an activity is typically carried out, but also what actors (for example, technicians, nurses, consumers, patients with dementia) participate in the execution of these activities. And these actors participate as role players – in other words, with only part of their personality. Robotics brings forth institutions that "regulate steps to be taken with regard to certain objects and give them a predictable form" (Knoblauch 2012: 37).[14]

In this regard, Dautenhahn's (2007) analysis of the two main paradigms underlying "socially intelligent" robots is particularly instructive (see also Weber in this issue). Under the "caretaker paradigm", humans take

[13] "The objectivated meanings of institutional activity are conceived of as 'knowledge' and transmitted as such" (Berger and Luckmann 1967: 70) – by certain, socially defined types of transmitters to certain types of members of society, whereby the structures of the knowledge distribution (which types transmit which knowledge to whom) vary from society to society.

[14] In this sense, Rammert (2006: 95) calls for a shift in perspective from technology and its structure to technologies and their means of production in processes and projects of mechanization.

care of robots and learn social behaviour in the process. The "companion paradigm," by contrast, regards robots as caretakers who respond to humans' needs. However, under this paradigm, the artefact is conceived of as a companion only in the narrow sense of the word, namely as an assistant or a servant.

According to a recent study conducted by the Centre for Technology Assessment (TA-Swiss) in Bern (cf. Becker et al. 2013), the robotic devices currently established on the market – such as AIBO, Pleo, and, above all, PARO, the baby seal pet-therapy robot designed for use in nursing homes and hospitals – fit the caretaker paradigm. This is because artefacts suited to this purpose make high demands on the outer appearance – which is often zoomorphic – whereas the demands on sensors, active components, and mechanics are lower. By encouraging people to take care of a technical artefact, devices of this type are supposed to stimulate the kind of pro-social behaviour that people with autism have not developed and people with dementia gradually lose. Robots that fit the companion paradigm must be able to support individual behaviours through personalization. This calls for high-tech machines that can operate safely in a relatively unstructured environment.

The norming character of this technology as an institution seems to be inversely proportional to its sophistication: In the caretaker paradigm humans are required to adapt to the robot, whereas the companions paradigm holds out the prospect of a technology that can adequately adapt to human idiosyncrasies and relevancies. To put it bluntly: robots that fit the caretaker paradigm seem more to activate the aspect of coercion coming up from institutions, whereas robots that fit the companion paradigm offer several options for usage. And as the latter firstly respond to humans' need, they secondly tend to be more personified and thirdly are more sophisticated, it suggests itself to being ascribed transitionally the status of a "persona" (Lindemann 2011: 344). By distinguishing between "person" and "persona", Lindemann (2011: 344) stresses the temporal aspect of ascription, postulating that, because of their functional performance-related efficiency, machines such as robots or navigation aids are ascribed the status of an actor – that is, a *persona* – in a specific situation and on a merely temporary basis. However, with this it needs not to be said that robots which fit the companion paradigm are superior as vehicles to worlds of experience.

5 Concluding remarks

The sociology-of-knowledge approach adopted in the present article constitutes a change of perspective. Attention is shifted away from the question of what robots (allegedly) do – namely, communicate and interact – and what they (allegedly) do to us – namely, transform us into beings who expect less from sociality (cf. Pfadenhauer 2014). The focus is directed towards the question of what we do with robots when, or to the extent that, we incorporate them into our activities. Of particular interest here are a) the meanings which are objectified in technical artefacts, b) the importance which materiality gains via institutionalization and c) the meanings that users associate with these technical artefacts by using them as vehicles in cultural worlds of experience.

Since social robots resp. artificial companions are taken for granted in every-day life, we need to investigate whether, or to what extent, users reduce these artefacts to the rank of ordinary everyday thing or elevate them to the rank of status symbol. In the former case, they could become tools, taken for granted and invisible, whereas in the latter case they could

become goods, coveted and highly visible. But in both cases they will prove resilient in their materiality – not only in the case they operate differently than expected.

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