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Author(s): Parviainen, Jaana; Van Aerschot, Lina; Särkikoski, Tuomo; Pekkarinen, Satu; Melkas, Helinä; Hennala, Lea

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Motions with Emotions? A Phenomenological Approach to Understanding the Simulated Aliveness of a Robot Body

Jaana Parviainen, Lina van Aerscht, Tuomo Särkikoski, Satu Pekkarinen, Helinä Melkas, and Lea Hennala

Abstract: This article examines how the interactive capabilities of companion robots, particularly their materiality and animate movements, appeal to human users and generate an image of aliveness. Building on Husserl's phenomenological notion of a 'double body' and theories of emotions as affective responses, we develop a new understanding of the robots' simulated aliveness. Analyzing empirical findings of a field study on the use of the robot Zora in care homes for older people, we suggest that the aliveness of companion robots is the result of a combination of four aspects: 1) material ingredients, 2) morphology, 3) animate movements guided by software programs and human operators as in Wizard of Oz-settings and 4) anthropomorphising narratives created by their users to support the robot's performance. We suggest that narratives on affective states, such as, sleepiness or becoming frightened attached to the robot trigger users' empathic feelings, caring and tenderness toward the robot.

Key words: companion robots, phenomenology, morphology, simulated aliveness, emotions

Jaana Parviainen, Faculty of Social Sciences, Tampere University, 33014 Tampere, Finland; jaana.parviainen@tuni.fi.

Lina van Aerscht, Department of Social Sciences and Philosophy, University of Jyväskylä, 40014 University of Jyväskylä, Finland; lina.vanaerscht@jyu.fi.

Tuomo Särkikoski, Faculty of Social Sciences, Tampere University, 33014 Tampere, Finland; tuomo.sarkikoski@tuni.fi.

Satu Pekkarinen, School of Engineering Science, Lappeenranta-Lahti University of Technology LUT, 15210 Lahti, Finland; satu.pekkarinen@lut.fi.

Helinä Melkas, School of Engineering Science, Lappeenranta-Lahti University of Technology LUT, 15210 Lahti, Finland; helina.melkas@lut.fi.

Lea Hennala, School of Engineering Science, Lappeenranta-Lahti University of Technology LUT, 15210 Lahti, Finland; lea.hennala@lut.fi.

1. Introduction

Many studies in Human-Robot Interaction research report that people experience confusion as to the apparent aliveness of the new generation of companion robots (Turkle 2011). In this article we consider how robot bodies are specifically designed to provide an impression of ‘aliveness’ through a combination of their material properties and their animate movements. Instead of discussing the resemblance of robot bodies to human bodies in the spirit of the so-called ‘Uncanny Valley’ (Destephe et al. 2015; Mori 1970), we focus on a ‘hybrid robot body’ that can exhibit a collection of emotionally appealing human-like traits like blinking eyes, speech and culturally coded dance movements and non-human traits like plastic coverage, three finger hands and a slow, stiff, robot-like way of walking. In the field of engineering studies, robot bodies are approached from the perspectives of morphological computation and robot morphology in order to consider their resemblance to different types of biological bodies with human or non-human traits (e.g., Hoffmann and Müller 2017). More specifically, morphological computation is a concept used in robot engineering to examine physical bodies in the context of robotics as a means of carrying out computations considered relevant to their successful interaction with the environment (Hauser and Corucci 2017). In our analysis, the attractive aliveness of hybrid robot body depends on the way in which their materiality (plastic, texture, metal, etc.), morphology (shape, figure), lively movements and anthropomorphising narratives, as created by their users, are combined in terms of the robot’s performance. We suggest that the vital impression of a robot body is created by its movements, which appeal on an emotional level to its audience. Relying on Husserl’s conceptual distinction between the physical body (*Körper*) and the lived body (*Leib*), we develop a novel conceptualisation of a ‘double body,’ which could help to clarify how the material properties of robot bodies, including their morphology, are combined with their movements or gestures in order to foster an impression of a ‘living body.’ Our research also shows that the lived body of the robot is also created by narratives of the emotional characters or the physiological needs of the robot that explain, for example, the malfunctions of the robot and attribute them to its lived body.

Due to the Cartesian heritage, emotion theories both philosophy and psychology have a tendency to locate affects and feelings into an inner “psyche,” separated from the body as well as from the world. As William James (1884) already stated, there is no emotion without bodily sensations, feelings and bodily resonance. Our phenomenological account of emotion is based on the assumption

that emotions are regarded as resulting from the circular interaction between affective affordances in the environment and the subject's bodily resonance that take usually physical forms as facial expression, postures, gestures and movements (Fuchs 2013; Fuchs and Koch 2014). Although emotion and affect are often used interchangeably, it is important not to confuse emotion with affect, feeling and bodily sensation.

In some accounts, the concept of affect refers to unmediated, uncontrolled, and unconscious physical reactions, such as sweating, tears, blushing, chills and goose pumps, while emotion is understood more as a consciously felt and named, innate and/or culturally constructed, controlled and performed expression (Brennan 2004). By bodily sensations, we refer to the body's awareness of warmth or coldness, tickling or shivering, pain, tension or relaxation, etc. The notion of feeling refers to social existential states, such as feeling at home in the world and with others, feeling welcome or feeling of being rejected or isolated. Thus, affects, sensations and feelings both motivate and define emotions and the ways in which people interact with other beings and environments through their expressive movements and gestures.

Equally, people tend to decode the movements of others, including the motions of robots, as emotional states that express their personal passion, desire, repulsion, apathy or coldness. According to the phenomenological philosophy of movement (Sheets-Johnstone 1999), our affective reactions to unknown objects, as well as our experiences of different situations and encounters, are strongly influenced by the ways in which living or non-living objects move. Taking this idea further, robots' motions and their users' emotions can be seen as intrinsically connected. In other words, the user of a given robot can be affectively moved by the movements and 'gestures' of that robot, which causes the user to respond intuitively to the robot's movements as if it was a living being that provokes a variety of feelings. Such an intuitive response might cause either positive emotions like amusement or negative emotions, for example, bewilderment or embarrassment.

Companion robots developed in the last few years, such as "Zora," do not really remind us of humans or animals, but they are not mere objects either. They seem to fall within a new category of 'quite something else,' as characterised by one of the interviewees in our field study. As companion robots represent a type of entity that is completely new to the majority of people, they exist in a grey area between human, fictional and animal entities and their respective characteristics. As the new generation of companion robots are capable of eliciting a strong feeling of aliveness and consciousness, people are not necessarily prepared to treat

them as machines. Cynthia Breazeal (2002) has suggested that we have a tendency to interact with companion robots as if they are people or pets, while Kahn et al. (2006) have stated that there may now be a need for a new ontological category in addition to the traditional distinction between animate and inanimate. Sherry Turkle (2011) also has observed this in her seminal work *Alone Together* as people tended to strongly anthropomorphize companion robots while, at the same time, they pointed out of being aware that the robot is not a living being.

In this article, we use empirical findings of a field study on the use of a companion robot to concretise and illustrate our arguments on the animate movements that simulate a living body. The field study was conducted in care homes for elderly people, with the Zora robot being used as a companion robot during different activity sessions. Zora is a humanoid robot that is advertised as being capable of assisting in mobility activities and rehabilitation. Yet, the robotic capabilities of Zora cannot be equated with human embodied intelligence.¹

Zora is a 57-cm-tall humanoid robot, a health care application built on NAO-robot² (see Photo 1). The NAO robot with this particular software is called, marketed and sold with the name of Zora instead of NAO. Zora can be used,

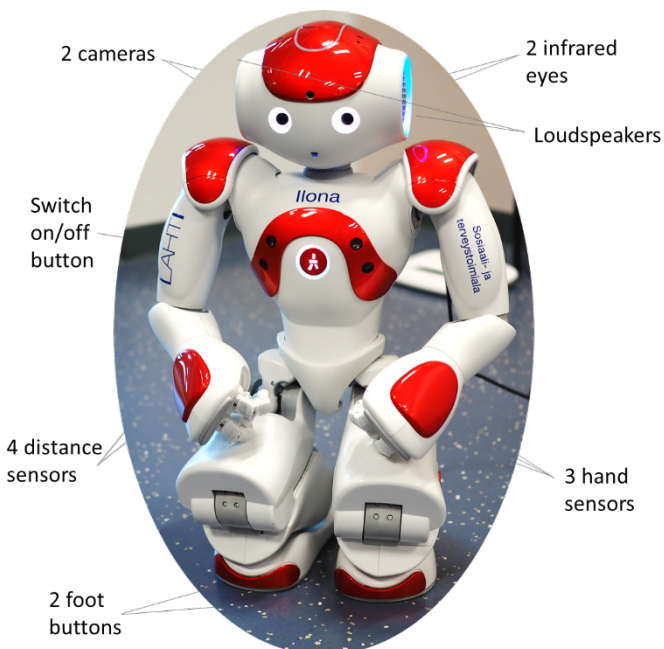


Photo 1. Zora. (Adapted from a photo by Satu Pekkarinen)

for example, to assist with exercising, play music or show dance movements, tell stories, and play memory and guessing games. Zora is one of the first humanoid robots that are commercially available and sold as a care robot. It is steered with a tablet or other computer, and it has sensors, a speech synthesizer, four directional microphones, loudspeakers, and two built-in cameras.³ Zora has human-like characteristics: it walks, moves its hands while speaking and blinks its eyes. It is pre-programmed to perform several functions, but it is also possible to programme the robot with the help of visual icons on the interface; no technical programming skills are required. Before we discuss further the field study with Zora, we begin by looking at the development of social companion robots. We introduce the phenomenological notion of the body in order to highlight the importance or meaning of physical appearance and impressions of ‘aliveness’ and the emotions and emotional reactions related to these impressions, as experienced by the users of companion robots. Then, we introduce a phenomenological concept known as the ‘double body effect’ so as to contribute to the philosophical discussion concerning robot bodies. Finally, we discuss the empirical findings of the field study on how Zora was received by the older inhabitants of care homes, as well as how the staff of the care homes developed narratives to create and sustain shared illusions concerning the aliveness of the robot with their residents. The narratives were often appealing to emotions like compassion or empathy when the robot’s behaviour was explained as if the robot had physiological, social or psychological human characteristics or needs.

2. Companion Robots as Performative Media

The question of embodiment in the field of robot design began to receive attention during the 1990s, when machines driven by artificial intelligence were shown to be capable of emotionally affecting humans (Brooks et al. 1998). This realisation brought about a paradigm shift in both the cognitive sciences and the practical design principles associated with robotic applications. The first prototypes of ‘socially intelligent’ robots (e.g., Kismet) were constructed in order to demonstrate how to utilize natural human cues to interact with and learn from human caretakers (Breazeal and Scassellati 1999). Research concerning morphological computation and affective computing, which developed from the seminal work of Rosalyn Picard published during the mid-1990s (Picard 1997), examined how to understand human affections, as well as how to simulate them when designing robotic movements and functions. Currently morphological computation and robot morphology focus on the resemblance between robot bodies and different

types of biological bodies (e.g., Hoffmann and Müller 2017) and physical bodies are studied in order to develop computations and robots that successfully interact with the environment (Hauser and Corucci 2017).

According to Ryan Calo (2016), a robot can be defined as an artefact that people easily treat as an animate thing. Due to the physical appearances of companion robots, people exhibit a tendency to *anthropomorphise* them and to imagine that such devices are capable of more than they actually are. Anthropomorphism is a process whereby people attribute distinctly human characteristics to non-humans, particularly the capacity for agency in terms of conscious feelings and rational thinking (Gray, Gray, and Wegner 2007). People can anthropomorphise their cars, their computers or even their kitchen tools, but they are even more likely to ascribe human characteristics to pets, which are actually capable of interaction and reciprocity of a certain kind (Turkle 2011).

People tend to consider robots with human-like features and capabilities as being responsible for successful actions and having the ability to perform them with conscious awareness, foresight and planning (Malle and Knobe 1997; Waytz, Heafner, and Epley 2014). On one hand, people can derive pleasure from acting as though a robot has understood them while still being aware that the robot is a mechanical object (Turkle 2011). On the other hand, human-like or animal-like appearances can encourage and mislead people into thinking that robots are capable of a greater degree of social understanding than is actually the case. The appearance and behaviour of robots suggest that they could serve as adequate replacements for human or animal companionship and interaction. Such a reaction does not have to be harmful. Yet, some researchers have noted that the use of social robots with older and/or cognitively impaired people is ethically dubious, since the currently available social robots are deliberately designed to make people believe that they are indeed capable of emotions and reciprocity (Sharkey 2014; Sharkey and Sharkey 2012; Sparrow and Sparrow 2006).

Currently, the majority of robotic functions are described metaphorically in the human-robot interaction literature, which refers to human consciousness capabilities. Robots are said to ‘sense,’ ‘think’ and ‘act’ (e.g., Lin, Abney, and Bekey 2011). Rather than using the intentionalist vocabulary concerning robotics and pretending that robots are people, Johanna Seibt (2014, 2017) argues that research should focus on the consideration of both asymmetric sociality and the simulated reciprocity in human-robot interactions. Here, *simulated reciprocity* refers to the ‘aliveness’ of social robots, and it gives rise to several ethical questions (Turkle 2011). For instance, what is essential about the aliveness of human beings when

compared to the ‘aliveness’ of robots? What is special about being a ‘real’ person in comparison with a social robot that is capable of actions and behaviour that appear real? How can we identify the expression of ‘real’ emotions as compared with simulated emotions that robots display in order to make us feel something?

As social robots have been designed and built with a view to arousing positive emotions in humans, it is not surprising that humans respond easily to these items emotionally and even assume that the robotic interaction partners themselves can experience feelings, such as compassion. Most people want to be heard and listened to, so these robots touch on very basic human needs (Turkle 2011). According to Turkle, people easily connect with social robots, such as My Real Baby, AIBO or Paro, because these robots are programmed to ask for attention and care, and human beings tend to become attached to those whom they take care of. However, an alternative view on social robots is offered by Camille Baker (2018) who suggests that social robots like Zora, Pepper or AIBO could be seen as *performative media*. These robots are programmed to engage with users in a more vivid manner than images on the screens of mobile phones or tablets. For instance, Zora has pre-programmed scenarios to engage in dance movements, to shake hands with somebody or to act as an exercise instructor. Through the tablet control or the Wizard of Oz technique (remote puppeteering), it is also possible to create an impression of an autonomous robot.⁴ However, before we look in greater detail at what we mean by the robot body as performative media, we introduce the phenomenological notion of the body as a ‘double.’

3. The Phenomenological Theory of the Double Body

For phenomenologists, the human body (and the animal body) is never merely a ‘physical thing,’ but rather is the ‘lived body,’ a lived entity several features of which constitute the nature of a ‘conscious subject’ (Husserl 1989). Edmund Husserl clarified the phenomenological notion of the body by distinguishing between two dimensions of embodiment, namely the body as a physical, material and living organism (or ‘Körper’) and one’s own body as experienced by oneself, a conscious subject (or ‘Leib’). Indeed, ‘Körper,’ which is a German word that is etymologically related to the English word ‘corpse,’ is understood to mean ‘physical matter’ and to refer to the materiality of the body—that is, the body as a physical living entity extended in space. The German word ‘Leib’ is usually translated as ‘lived body,’ which carries with it complex meanings regarding the experiential and subjective aspects of the body (Dolezal 2009).

Building on the approach of Husserl, Maurice Merleau-Ponty (1962) regarded the lived body as anchoring the awareness of the world in an ‘incarnated mind.’ Thus, while the lived body can be understood in terms of ‘I can,’ the physical body is concerned with the passive physiological and biological operations that sometimes make (or sometimes do not make) the precise intentionality of the lived body possible. For physical reasons, flying is impossible for the human body without technological support. Yet, in dreams or using imagination, the lived body can develop the feeling of flying through the air.

The physical body is often understood as that which is experienced through ‘external’ perception, while the lived body is viewed as that same body, albeit experienced via ‘internal’ perception (Welton 2006). However, this is not exactly true, since we are able to see other people’s lived bodies, to a certain degree at least. The complexity of the phenomenological distinction between *Körper* and *Leib* becomes clearer if we consider the difference between the physiological functions of the body and the expressivity of its bodily gestures or features. For example, when we attempt to interpret another person’s feelings by looking her or him in the eye, we do not expect the pigmentation of the iris (*Körper*) to express the emotional state of that person. Instead, we try to read the look in the eyes (*Leib*) (Flynn 2009). When seeking to interpret those expressions in a person’s eyes, we move around his/her physicality (*Körper*) in order to apprehend the expressions of his/her lived body. Additionally, when we seek to better understand someone’s state of mind or his/her intentions, we try to interpret whether the delivered expression is spontaneous or performed simply to impress us.

Yet, human and animal material bodies (*Körper*) are also expressive outside of their own volition and intentionality. The expressivity of the body does not merely emerge from the conscious gestures, postures and facial expressions of lived bodies. The material body, as a biological entity with its own physical state, expresses certain implications regarding biological age, muscle tone and health conditions. Moreover, different features of the material body (*Körper*), such as its size, height, weight, skin colour and sex, as well as body parts like the arms, legs and head, carry various cultural meanings and values (Gremillion 2005). For instance, the colour of the eyes can hold different cultural connotations that may actually affect the ways in which people try to interpret a person’s attitudes and state of mind. This happens, for example, if someone’s bright blue eyes remind us of ‘innocence’ or ‘honesty,’ which renders us more likely to believe that we can trust that person.

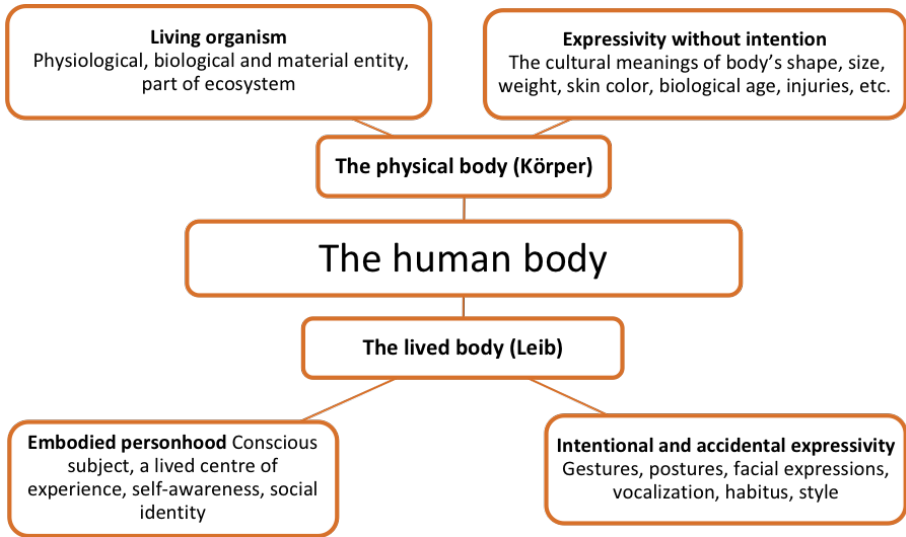


Figure 1: Double body tension in social interaction

The phenomenological distinction between the views of *Körper* and *Leib* forms the expressive system known as the ‘double body,’ which plays a central role in the power structure of social interaction (Parviainen 2014). Helmuth Plessner (1970) has claimed that the *Leib/Körper* distinction is manifested in social interaction, even though most people do not necessarily recognise its significance with regards to the ways they are treated by other people. This distinction, in Plessner’s view, largely makes sense to those individuals who feel that other people make judgements about them based on their physical bodies, while their lived bodies remain deliberately or unintentionally invisible to such people. Interestingly, neither Husserl nor Merleau-Ponty recognised the contradiction or tension that exists between *Körper* and *Leib* as Plessner did.

Next, we apply this phenomenological theory of the double body in order to better understand how the robot body can simulate ‘aliveness’ and consciousness through its gestures, reactions and features. The conceptual distinction between the physical body and the lived body assists us in analysing how the animate movements of robot bodies appeal to human users as a performative medium. Indeed, we claim that the ‘double body effect’ helps us to clarify the nature of social robots in a novel manner.

4. The Double Body Effect of Companion Robots

Human bodies are growing and dying organic beings that are conscious of themselves and their surroundings. Human beings feel their bodies and express their kinaesthetic feelings and affective states through bodily movements. Robots lack lived bodies (*Leib*) as they do not have the capacity for bodily awareness. This is why robots do not have personal intentions, embodied intelligence or personal motives. They are only programmed to make moves or gestures. Neither do robots have physical bodies (*Körper*) of the kind that phenomenologists define as living, biological and physiological entities.

Social robots are material machines that are programmed to simulate different functions. That is not to say, however, that social robots cannot become culturally and socially powerful objects. Indeed, they are designed to be interpreted and encountered as social actors by the humans with whom they interact (e.g., Wada et al. 2004). Consequently, the fields of robotics, morphological and affective computing seek to simulate the impressions of living organisms and lived bodies through proper materials, gesturing, movements and voices. However, the question of what 'social' really means when these artefactual actors are embodied and embedded in human contexts remains unanswered (e.g., Bloomfield, Latham, and Vurdubakis 2010; Jones 2017; Meister 2014).

The aliveness of a social robot, as experienced by its user, depends on how its designers balance, in particular, two key aspects: 1) how the material ingredients, technologies (sensors, cameras) and morphology (shape, size) are composed (imitating *Körper*) and 2) how the actions (movements, gestures, voice) are programmed to represent an intelligent, conscious and socially interactive being (imitating *Leib*). Yet, the issue of whether or not a robot may become socially accepted and adopted by humans through its physical appearance or code of conduct remains ambiguous. When companion robots seek to find their ecological niche as new media among laptops, tablets, and mobiles in the increasingly competitive market for smart devices, human acceptance inherently depends on the characteristic style of a given robot body as well as on how reliable a four-dimensional image and representation it provides to users with regards to its capabilities. Interestingly, not all humanoid robots are designed to be clearly either male or female in appearance, since some feature a 'technomorphic' face that does not represent any gender or fixed personality (Parlitz et al. 2008; see Figure 2).

As an example of hardware, robot bodies are made up of a combination of data processors, sensors, video cameras, microphones, wires and rechargeable bat-

teries wrapped in plastic, metal or fabric pods. In addition to the manner in which these components are assembled, the size and weight of a robot, as well as its materials, convey an impression of its cognitive and physical capabilities to its users. The humanoid robot as a bipedal artefact is especially challenging for designers because all its functions have to fit into a small and light shell in as economically efficient a fashion as possible. The concept of the double body effect allows us to capture how the materiality of a robot, including its size, weight, form, and colour, as well as its functions, may provide a different impression of the robot than its software, which is designed to create an impression of a conscious subject through its communication, movements, and gestures (see Figure 2). For instance, a robot’s movements can simulate the smooth and exact movement of a young adult’s gestures, while its material body can represent the character of an animal, a doll, a baby or a cartoon character. Such combinations of human gestures and non-human characteristics may seem contradictory, but they may also allow the robots’ users and audience multiple ways to interpret and define its character, body and features.

Emotions and emotional reactions towards the robot are, in our view, particularly due to the contradiction between the robot’s body, voice, speech, movements and gestures being simultaneously robotic and machine-like but also human-like, culturally coded, gendered and entailing various anthropomorphic aspects. The fact that robots bring up emotional reactions in their users is not only due to mate-

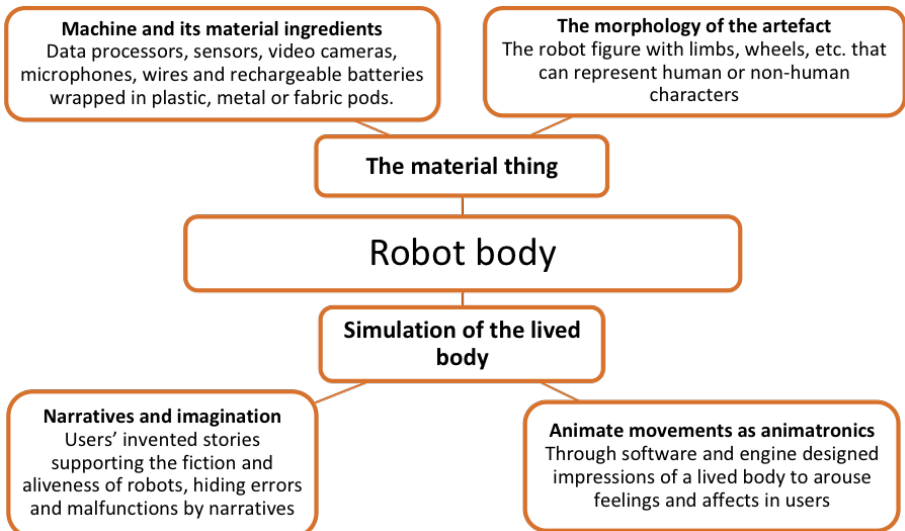


Figure 2: Double body tension in social robotics

rial or animatronic qualities of the robot or the human-like gestures or capabilities of producing utterances. We suggest that companion robots foster emotions and emotional reactions especially because of the way in which humans attempt to try to understand and define their nature and character.

5. Field Study: Zora in Care Homes for Exercises and Entertainment

An intensive single-case field study (Stake 2005) was conducted in two care homes and a geriatric rehabilitation hospital in Lahti, Finland, as part of Robots and the Future of Welfare Services (ROSE) research project. The City of Lahti purchased Zora for its potential with various groups of residents (older and disabled people and children) and its perceived easiness of use, meaning that no specific coding or programming skills are needed to be able to use the robot. The Zora robot in Lahti was the first one of its kind that was taken into use in public residential care services in Finland. The field study took place from December 2015 to April 2016. Technical training concerning the features of the robot as well as various use cases was offered to the personnel, care students and researchers prior to the introduction of the robot in the care units. There was also an opportunity to test-use the robot. Thereafter, the process of using Zora in the care units of the city of Lahti was planned by the project manager and the technology provider together with the personnel in the care units.

In line with the methodological triangulation approach (see Denzin 2006), the collected data consist of: 1) semi-participatory observations (see e.g., Ahrenkiel et al. 2013) when introducing Zora and using the robot during group activities (27 sessions), 2) photographs as visual material and 3) six focus group discussions (see Krueger and Casey 2015) conducted with the care professionals and one with the older residents. In total, 35 care professionals and five care home residents participated in the focus group discussions. The sessions in which Zora was introduced to or used for the activities with the older residents were planned by groups of 2–4 nursing or physiotherapy students or care professionals. To make it easier to approach and talk about the robot, it was given a new name, “Ilona,” as a result of a name competition among the City care personnel. Ilona is a Finnish female name containing the word “joy.” Perhaps the red color guided the suggestions for a female name.

The observations consisted of twenty-seven one-hour sessions wherein Zora was either introduced to users in a special session or used as part of group activities, such as physical exercises or literature groups. In all, five to twenty older inhabitants and two to ten members of staff and care students attended the

group activity sessions. The majority of sessions were observed by at least two researchers. One researcher typed down everything that was said, while the other two observed the non-verbal action, made notes and took photographs. Both of the note files (concerning verbal and non-verbal communication) were combined into a single document after each session. The researchers were thus observers at the background, but also partly participated in the exercises instructed by the robot, talked with the residents and helped them back to their rooms after the sessions, if needed. The care professionals worked with the robot as part of their normal working days; no special compensation for their (or residents') time was given.

The field study was planned by the researchers and the city officials together and a research permit was obtained from city authorities responsible for older-care services. The researchers observed three different sets of sessions in which the robot was used. The robot was first used in one of the care homes for two weeks, then in another care home for four weeks and finally in a geriatric hospital for four weeks. The research interviews were conducted after the last set of observed sessions in the hospital. In sessions, the robot was operated to instruct simple exercises, play music, tell stories, perform short dances, and play memory and guessing games with the older residents. The robot was also operated to approach the residents by walking towards them and shaking hands with them while they were seated in a circle. It was also possible to hold the robot in one's arms. In practice, Zora needs to be operated by a person in order to be capable of interaction. However, as this was done with a Wizard of Oz (WoZ) technique, the older residents could not distinguish the autonomous capabilities of the robots from the capabilities that were remotely controlled by a person operating the robot. Thus, the residents could have thought the robot capable of much more than it actually did.

Since the city of Lahti purchased the Zora robot for the use of municipal care services, it has been possible for care units to book the robot from the technology unit of the current joint authority of municipal social and health care services. Thus, the care units can avail themselves of the robot for a few weeks' period at a time. The care units in which our field study was conducted have occasionally used this opportunity over the past three years, but the robot has not frequently been included in their activities.

6. The Robot Body as a Performative Medium

When Zora was first introduced at one of the care homes in 2016, a member of staff characterised its body in the following way:

You have to see immediately that it is not a human replacement, not a cat or a dog, but something quite different. (Interview with a member of staff)

This extract demonstrates people's puzzlement when they cannot choose the proper category for a robot between inanimate things and living beings, and so remain perplexed as to its nature. The older residents offered a variety of terms to describe their impressions of the robot, referring to it as a 'baby,' 'toy,' 'puppet,' 'space creature,' 'ghost' and 'little fellow.' When they saw the robot for the first time, they commented on it by asking 'Did it blink its eyes?' or exclaiming 'Oh, look how nicely it is sitting.' Most older residents perceived the robot to be amusing and cute, wondering whether Zora wore diapers and asking if it had a boyfriend. When they made contact and talked to the robot, they treated it as if it was a living being capable of hearing and seeing them. When the residents approached Zora, they squatted next to it, talked to it or held it in their lap as it was a child or a pet (Photo 2). This implies that Zora was emotionally appealing to the older persons and they were handling it as if it had feelings and should therefore be treated kindly. The residents seemed to be intuitively attached to the idea of the robot having a 'lived body' even though Zora had been introduced to them as a robot, of course. With the Wizard of Oz technique, Zora was steered by the care workers or



Photo 2. A resident holding Zora (photo by Satu Pekkarinen)

students via a laptop. Thus, they were operating all interaction between the robot and the residents. When the robot was talking and walking simultaneously, two people were involved in steering it. One operated the robot and another repeated the speech if the residents did not hear it or the robot's microphone had failed to capture a user's voice.

The operator was responsible for the talking, that is, writing the robot's speech on the laptop, for example, asking general questions like 'How are you today?' The human operator also made the robot react to the residents' responses. This required that the human operator could type fast and without mistakes. The members of staff also encouraged the residents to participate in the activities with the robot, and they provided individual guidance during the exercise sessions, if required. The human operators made the robot to refer to people by name and to respond to their utterances in order to foster interaction. This was also a means of intentionally creating an impression of the robot being capable of social interaction and having human characteristics, like taking interest in others, which call for emotional bonding. The sessions involving the robot at least partly turned into performance scenes on the part of Zora even if the initial aim was to provide rehabilitation activities and use the robot to instruct exercises or memory games, for example. This implies that, beyond its assistive role as an instrumental device, the robot transformed into a performative medium. The experiments followed Camille Baker's (2018) suggestion that novel digital devices gather around performance practices as a new collaborative medium. One of the main indicators of a robot being treated as a performative medium was the residents spontaneously applauding after Zora's dance shows and using salutations and compliments such as 'bye-bye' and 'thank you.'

The older residents offered perceptive observations of the robot's body, addressing its peculiar physical features when compared to human looks and gestures: 'Where have you lost your two fingers?', 'Its mouth is not moving [when the robot was talking]' or 'It walks like it has boots that are full of water.' These observations were often found to reflect incoherent features in relation to the human physical body (*Körper*). In addition, the older people exhibited a tendency to offer an explanation for these physical differences, for example, assuming that the robot had originally had five fingers but had lost three of them.

These explanations can be interpreted to have also an emotional aspect. Paying attention to stiff walking and explaining it with having boots filled with water could be either a humoristic way of describing strange walking or a sign of empathy for stiff movement. However, the explanations for the robot's features

were very human in nature: boots filled with water are very unpleasant to wear and losing three fingers would be tragic for a person. A robot cannot actually lose fingers or share a human understanding on how does it feel to walk with comfortable boots or with ones full of water.

Further, narratives and stories were composed as part of the explanation for (or rational reasoning behind) the robot's physical morphology and gesturing. The attempts to understand, interpret and classify the robot seemed to be related to curiosity and partly bewilderment but not so much to emotions such as empathy or sympathy.

The inventing of narratives, explanations and reasons for the physical features of the robot's body, as well as the meaning of the robot's gesturing, evolved as a collective endeavour through which new interaction occurred between the staff and residents. Thus, as Corry Kidd, Will Taggart and Sherry Turkle (2006), and Sherry Turkle (2011) suggest, the sociability dimension of companion robots is not limited to individual-robot interaction, but is more concerned with developing interactions between people who gather around the robot. New interactions emerged between the older people and the care professionals within the group sessions as well as when the older people's relatives visited the care homes. During these negotiations, the main focus was on solving the enigma that arose due to the contradictions between the strange physical features of the robot and the gestures it made. Who or what is the robot? Is it a girl or a boy, female or male—or something else?

The care professionals tended to reinforce a female character for the robot when it was performing for the older residents. One reason for this might have been the fact that the robot was assigned a female name. However, interestingly, some of the residents questioned this gender construction due to the robot's morphology: 'It looks like a man. It looks like a man because of its legs.' Even if the staff dampened their enthusiasm by saying that the robot is neither a human nor an animal, several older residents still referred to the robot as 's/he'.⁵ The following short conversation offers an example of how the gender of the robot was discussed between an older person and a care worker:

Older woman: "Yes, I liked it. It is a handsome boy."

Care worker: "Could it be a girl? It is red, and its name is Ilona."

Older woman: "Well, it could also be a girl."

The older persons seemed to be flexible when pondering the gender of the robot. Despite having a female-sounding voice, the round humps on its arms and legs could be interpreted as muscles more likely to belong to a man. This rendered Zora's gender ambiguous or fluid (Dekker 2015). Surprisingly, this ambiguous 'transgressing' gender of Zora did not seem to bother the older people, but did make them curious about the robot's sex.

The role of narratives as an element of the construction of the aliveness of Zora became more evident when the robot had a malfunction or its battery ran out. In particular, the staff tried to hide any malfunctioning on the part of the robot by explaining it as being caused by the lived body of Zora. They described Zora [Ilona] as having embodied capabilities and weaknesses, just like a human: 'Ilona is tired,' 'Ilona is acting up,' 'Ilona has not woken up yet' and 'Ilona is having a thought.' Additionally, the older people actively constructed a narrative about the robot as a living creature: Zora was assumed to be frightened by a flash of light or to suffocate when wrapped in plastic for transportation and storage. These kinds of interpretations of the robot's lived body called for emotional reactions like feelings of sympathy or empathy for the "little fellow" who is tired, afraid or having difficulties to breathe.

The use of narratives concerning the 'tiredness' and 'sleeping' of the robot represents also a means of offering reasons why the movements of the robot are slowing down. The fact that the battery is running low can be hidden and explained away by human-like bodily needs. Similarly, the notion of 'acting up' was used instead of talking about a software bug (Turkle 2011). The technical problems that occurred with Zora were often funny, for example, talking too fast, although they were sometimes also bewildering. The operators were required to maintain vigilance when steering the sessions with Zora in order to avoid any problems becoming overly confusing or frightening for the older residents. The narratives that supported the conception of Zora as a performative medium attempted to maintain the illusion that the robot's functions, including its malfunctions, were its lived feelings and sensations. In trying to provide a coherent, dense and undistracted experience for the older people as an audience, the operators had to improvise in order to maintain the illusion—or perhaps avoid the deception—of the robot until the end of the show.

However, not all the malfunctions could be hidden behind the narratives of the lived body when Zora was used as a reader and a fitness instructor. When Zora was steered to read a story to the older people, they struggled to hear or understand what it said. A human storyteller was needed to bond the listeners with the robot so

as to support the older people's attention and motivation. When the robot was used in a rehabilitation session, one of the participants described the music it played as 'space music.' Moreover, even if Zora was programmed to gesture with its hands while talking, both the participants and the observers felt that Zora's contact with the audience remained limited.

7. Conclusions

In this article, we have addressed the human-like features, gestures and movements of companion robots from the perspective of phenomenology. We turned to the phenomenological theory of the double body to evolve a novel understanding of robot embodiment. Using the illustrations of the double body effect derived from experiences during our field study, we indicated that a hybrid robot body like Zora's is a combination of human and non-human traits that create a simulation of a lived body through its movements, voice and gesturing. In addition, people tend to socialize with the robot in ways that resemble their socializing with living beings: they try to define and categorize its nature, assume that it has a personal history and interpret its actions through bodily needs.

The double body effect of Zora, that is, its white plastic pod with its ambiguous gender and Disney-style fictional morphology, combined with its innocent childish gesturing and teenage female voice, creates an equivocal impression of its nature. Zora's animate movements simulated human gestures, while its material body represented a toy or an animated figure. However, the ambiguousness in terms of both the gender and the age of the robot body did not trouble the majority of older residents, although they did sometimes adopt a conservative attitude towards the gender of human bodies. This view suggests that the contradictory aspects of the robot body were not necessarily confusing for these users, since the enigma of a hybrid robot body was seen as attractive.

Robots like Zora are designed to provide an impression of aliveness. We suggest that the simulated aliveness of companion robots results from four key aspects: 1) material ingredients, 2) morphology, 3) animate movements provided by software programs and 4) narratives created by users to support a robot's performance. The emotions that the robot brings up are related to all of these features and especially their combinations. The size, voice and morphology may remind of a child or a pet and call for empathy or compassion, the gestures and movements may amuse or irritate, and the narratives explaining what the robot is and why it acts in a way or another build emotional bonding and interaction, even if they are one-sided or simulated.

The robot raised positive emotions in older residents who considered the robot having human needs like need to sleep or considered it cute or assumed that it has a life history which explains why it has only three fingers instead of five, or whether or not it has a boyfriend. Also, the robot's actions and malfunctions are explained by narratives which entail an understanding of the robot having human needs and emotions like tiredness, changing moods and temper or joy and interest in social relations and connectedness. People talked about the robot as a conscious subject who is sometimes "acting up" or being "frightened." Robot bodies can encourage and mislead users into thinking that robots are embodied intelligent agents that are more physically and cognitively capable than they really are when the lived body is well simulated and offers a convincing impression of a living creature. We have suggested that the 'aliveness' of the robot is at least partly constructed by the users, who tend to exaggerate the robot's capabilities and refer to it as if it was a person. The functions and actions of the robot are interpreted through anthropomorphising in the form of a dialogue with the people who are present and that which is socially appropriate. An example of this can be seen in the narratives that disguise the technical problems of the robot in stories as if the malfunctions were caused by the robot's embodied needs, temper and emotions.

Our article contributes to theoretical discussions concerning the robot body by introducing the concept of the double body effect to this field of research regarding companion robots. By applying this notion, we suggest that, on one hand, the material features of the robot and, on the other hand, its gestures and movements, may have different, perhaps even controversial connotations. For example, the material ingredients and morphology of the robot can represent fictive characteristics, while its movements can simulate human gestures and movements, including genuine (but child-like) communication. This impression is not necessarily confusing, although it is captivating from the users' perspective.

Finally, a central element of a given companion robot's sociability is related to its role as a mediator between different groups of people, rather than to the interaction between an individual and a robot. We should not assume that people really consider the robot as a living being and conscious subject even if the emotional reactions of amusement, bewilderment, delight or even empathy and compassion towards the robot are very real. The narratives and explanations may be a way to try to define and understand the nature of the robot, but they may also serve for socializing and interacting with the people taking part in the activities with the robot.

Notes

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1. In the research field concerning artificial intelligence (AI) and robotics, the concepts of embodiment and ‘embodied intelligence’ are understood differently than in Merleau-Ponty’s phenomenology of the body. Merleau-Ponty (1962) argued that thinking and cognition should be associated with bodily movements as ‘motor intentionality.’ Pfeifer and Bongard (2006, 25) followed Merleau-Ponty’s notion in their book *How the Body Shapes the Way We Think*, stating that human walking and ‘locomotion business’ have something to do with both intelligence and thinking. They pointed out that intelligence has traditionally been seen to encompass only abstract behaviours, thereby excluding sensory-motor processes. By the notion of intelligence, Pfeifer and Bongard (2006) refer to “...agents that are embodied, i.e., real physical systems whose behaviour can be observed as they interact with the environment” (Pfeifer and Bongard 2006, 18). They further stress that “...intelligence requires a body” while “software agents, and computer programs in general, are disembodied” (Pfeifer and Bongard 2006, 18). They conclude that due to being intelligent, robots only need to have a physical platform that is able to adapt to their environment, sense, feel and learn in order to categorise and recognise objects. However, this type of machine is not a conscious and living being like a human, who can give birth, grow and die. The machine cannot move intentionally as humans and animals can. Therefore, robots’ ‘intelligence’ is completely different from the embodied intelligence of human bodies. In this article, we do not take part in the discussion concerning embodied intelligence in robotics, but instead discuss robot bodies by drawing on Husserl’s (1960) and Merleau-Ponty’s (1962) notions of embodiment.

2. Zora is based on the NAO robot of Softbank Robotics. NAO serves as a platform and Zora robot is physically NAO but with a special Zora software.

3. For more information, see <http://zorarobotics.be/index.php/en/>.

4. The Wizard of Oz technique refers to a research experiment in which users interact with a computer system that users believe to be autonomous, but which is actually being operated or partially operated by an unseen human being.

5. The Finnish singular third-person pronoun ‘hän’ refers to both men and women alike. So, it is not possible to distinguish if people referred to Zora as ‘he’ or ‘she.’ However, the use of this pronoun shows that Zora was discussed as if it were a person, not a machine or an animal. In Finnish, ‘hän’ is clearly referring to a person; objects and animals are referred to by using it (‘se’).

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