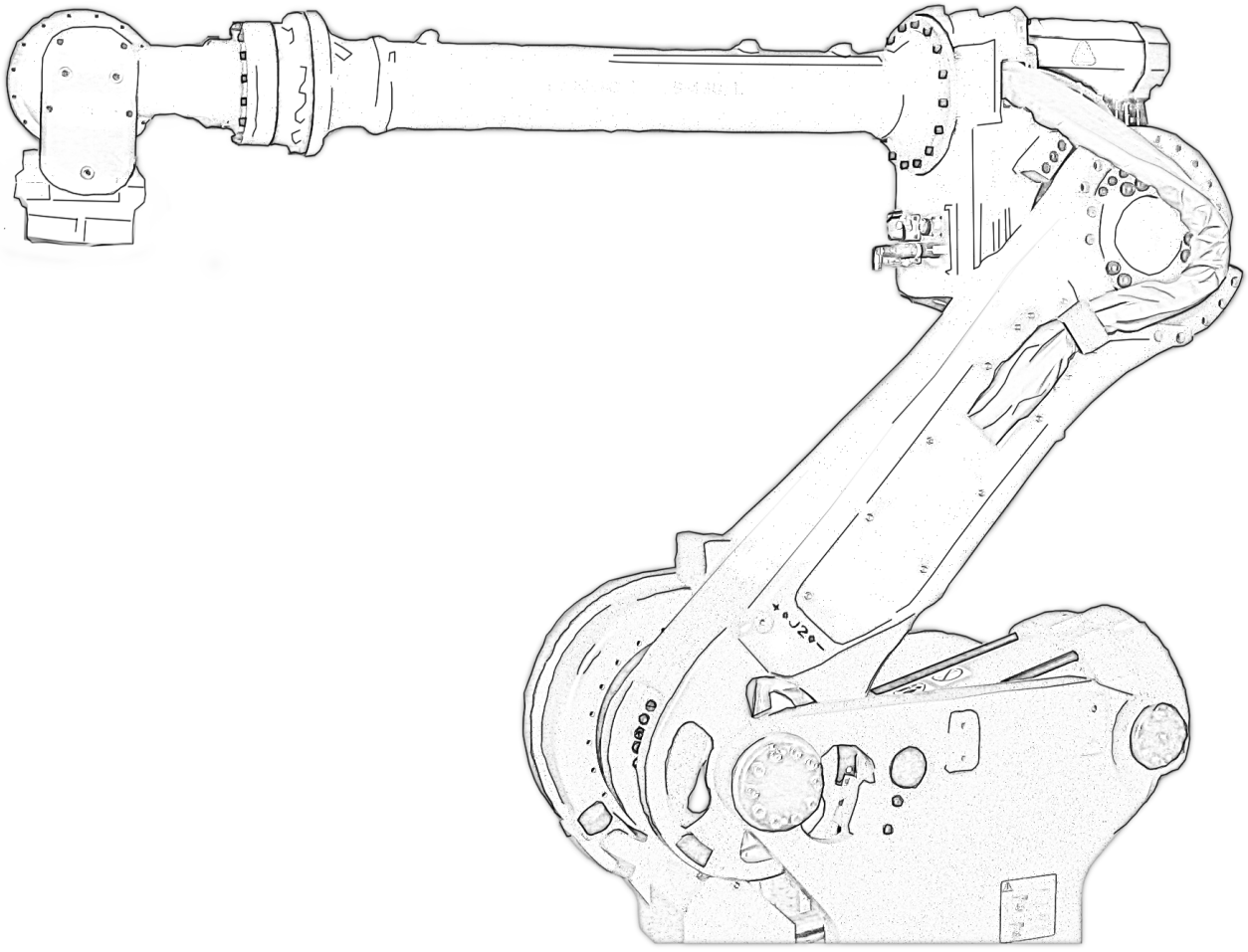
Not to be Human

Understanding movements and interactions made by technological non-human performers in a theatre setting



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Abstract

Since the 19th century, astonishing developments in technology in different fields have been made. The theatre field also started to experiment more with technological objects on stage from the moment they became available. Such objects include television screens, internet connections, drones or in some cases even robots. Technology has can thus become a performer, creating new interactions and possibilities. This thesis analyzes how the movements and interactions of non-human objects allow for an experience of seeing these objects as autonomous performers.

It will be demonstrated that objects can be seen as actors, and even as performers, following Bruno Latour's Actor Network Theory. By discussing the performances *The Internet of Things* of performance collective URLAND and *DANCER #3* of Kris Verdonck on the effects of kinesthetic empathy, the uncanny valley and anthropomorphism, a critical performance analysis is made. A connection is made with Japanese Bunraku puppets, as it is clear that the robots could be seen as puppets. However, in the experience of a non-human object as autonomous, the presence of a human performer on stage plays a big role, even though the stage itself evokes a basic anthropomorphic feeling. It can be concluded that the effects of the mirror neuron system, as it triggers kinesthetic empathy, and anthropomorphism are experienced at the same time, enabling to both understanding the movements of an object and projecting human characteristics on an object. A non-human object that does not resemble a human could easily replace a human performer as the spectator gladly accepts a suspension of disbelief.

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Introduction

Since the 19th century, astonishing developments in technology in different fields have been made. Think about developments in communication as telegraphy and the telephone, machine tools and sewing machines. However, since the 20th century, technology developed so rapidly one almost could not keep up: radio, cars, television, household appliances, spacecraft and airplanes, computers, electronics and mobile phones and, of course, the internet. In this relatively new 21st century, many developments on the field of robotics and drones have occurred already. Now, technologies such as mobile phones, invented barely 40 years ago, become more and more integrated in our daily life. The theatre field also started to experiment more with technological objects on stage from the moment they became available. Such objects include television screens, internet connections, drones or in some cases even robots.

Technology has can thus become a performer, creating new interactions and possibilities. One could think of recent performances like *Web of Trust (2016)* by Edit Kaldor, in which the audience is asked to participate via internet with the performers who are only visible on a screen, *TAGFISH (2010)* from theatre group Berlin, a performance in which none of the main characters is live present, but are all presented via big television screens, or the beautiful choreography *Newton's Duet (2015)* by David Middendorp in which dancers and drones seem to interact and dance together. As technology in the theatre enables making performances in which human performers are not necessarily needed, theatre makers experiment with the presence or absence of a human performer and replacing these performers by a performing non-human object. Examples of those performance are Kris Verdonck's performance-installation *DANCER #3 (2010),* in which a small jumping robot is the only performer on stage, and URLAND's *The Internet of Things/Prometheus de Vuurbrenger (2016)*, where a robotic arm is more visible that the human performers. In my thesis, I specifically focus on a *technological* non-human object, as I want to make clear that I will focus on objects that are available since the advance of digital technology and robotics.

Because of advancing technology that enables stage performances that contain technological non-human objects as performers, possibilities within the theatre field continue to expand. Although many theories about how people understand humans have been written, this is not the case for the perception of the understanding of these new non-human objects.

Can a non-human object become a performer? What effect can this non-human performer have on the spectator? How and when does the spectator understand the movements of this non-human performer?

A tendency can be recognized in understanding the technological non-human object as a performer, which is in line with the ideas of Bruno Latour and the Actor-Network-Theory.[1] Therefore, the spectator can see this object as an autonomous acting object that has feelings and moves in ways one understands. However, it is not yet clear how movement enables the spectator to see a technological non-human object as being autonomous. In this thesis I will focus on the question: *how do certain movements and interactions made by a technological non-human object allow for an experience of seeing it as an autonomous performer by the spectator?*

To answer this question, I look at two case studies that exhibit the use of technological objects in the theatre and introduce these objects as performers. The first performance I analyze is *Internet of things/Prometheus de Vuurbrenger* (2016) made by performance collective URLAND[2]. In this performance human performers are hidden behind a semi-transparent curtain on stage, focusing the attention to the robotic arm 'Fanuc S-500' in front of the curtain. However, as soon as one of the performers appears in front of the curtain, there seems to be an interaction between machine and human. The movements of the robotic arm are definitely programmed to represent certain emotions, a struggle, and thus fit the definition of my main question. Then, there is that moment of interaction between human and machine: a moment when both are present and acknowledging each other's presence.
The second performance I analyze is the installation *Dancer #3* by Kris Verdonck. *Dancer #3* is a jumping robot that performs without the help of a human. The absence of a human performer is a central topic in this performance. The robot jumps and falls completely at random, and is programmed to do so. It produces computer-like sounds when it is lying down and gets picked up by a cord. For some reason, it evokes strong feelings of recognization by the spectator: the object is seen as a creature, a living entity. The sounds it produces and the way it moves, give information about why this robot is seen as autonomous.

From the perspective of puppetry and movement analysis I analyze how certain movements can make the spectator believe that the non-human performer is an autonomous

1 Bruno Latour, *Reassembling the Social : An Introduction to Actor-Network-Theory*, Clarendon Lectures in Management Studies (Oxford: OUP Oxford, 2005).
2 The performance collective URLAND exists of Ludwig Bindervoet, Thomas Dudkiewicz, Marijn Alexander de Jong and Jimi Zoet.

performer with feelings and motivations. In the first chapter, I answer the question *how can non-humans be performers?* by taking a look at several theatre scholars and practitioners who proposed that the use of a non-human object on stage is understood in a similar way as a human performer. Several theatre scholars and practitioners have opted for a non-human object functioning as a performer to let the audience focus on the symbolic universal instead of the human individual. Bruno Latour's ANT theory (2005) will help to discover whether or not an object can be understood as an actor, or performer.

In Chapter 2 I use the concepts of Dee Reynolds (2012) and Susan Foster (2008) both of whom have studied the effect of kinesthetic empathy to understand a (dancing) body. I use their theoretical insights to analyze how we understand the movements made by the non-human performer to analyze the movements of Fanuc S500, the industrial robot performing in URLANDS's *The Internet of Things/Prometheus de Vuurbrenger*. Furthermore, I use Vittorio Gallese's concept of mirror neurons that simulate and activate the muscles the very moment one sees a moving body (2012). Then, I answer the question *what role does kinesthetic empathy play in understanding movement of the non-human performer in URLAND's The Internet of Things?*

In Chapter 3 I focus on the role of anthropomorphism in understanding a technological non-human on stage. Anthropomorphism has been explained by theatre scholar Kristof van Baarle in the context of *DANCER #3* as seeing human characteristics in 'dead' objects (2015). Van Baarle is the dramaturge of Kris Verdonck, the author of *DANCER #*3. The more an object looks human, the more one feels affected, until the uncanny valley is reached. This concept developed by roboticist Masahiro Mori (1970) describes a gap in affinity for certain human-like objects. These concepts help to answer the question *how does anthropomorphism play a role in understanding the movements of Kris Verdonk's Dancer #3?*

To connect the robots on stage with puppet theatre, I will use Roland Barthes' articles on Bunraku puppets. Bunraku puppets are part of the Japanese tradition, known to emerge in the Tokugawa period or Edo period (1603-1868).[3] Bunraku puppets are large puppets that are controlled by three puppeteers (see figure 1). Instead of showing emotions, it is the movement of the puppets that tell the story. In Chapter 4, a connection is made between the Bunraku puppets and the robotic arm in *The Internet of Things.*

To answer the last question, *what effect does the absence of a human performer have in the way the technological non-human performer is perceived in Dancer #3 & The Internet of*

3 Gotō Shizuo, "Bunraku: puppet theatre", in *A History of Japanese Theatre*, bewerkt door Jonah Salz (Cambridge: Cambridge University Press, 2016), 155–83.

Things?, and to see what effect absence and presence of a human performer in combination with a non-human performer has, I bring in the theoretical insights of Pedro Manuel (2014) in the fourth chapter. He proposes that the absence of a human performer on stage creates a self-reflexive audience: the audience becomes self-aware of their position, and of reality as presented and as experienced. I compare the two case studies to see what interaction between human and non-human performer takes place and what effect that can have on a spectator.

Figure 1: A Bunraku puppet, played by three puppeteers. Two of the puppeteers cover their heads.

1 Non-humans in the theatre

Why a non-human object can be seen as a performer in a theatre setting in the basis of the Actor-Network-Theory

A common experience is evoked when one is watching a T.V. show, a theatre play or similar situation where non-human objects are moving and seem so real, that it is forgotten that what is shown are not real humans, but merely objects. The moment, for example, that someone brought a stuffed animal to life by moving its head and giving it a weird voice. Or the moment when one watches a theatre performance with puppets and the puppet seems to move all too real. It comes to life. The objects have their own characters, as the human controlling the puppets are forgotten. As puppets and marionettes can become the characters on stage, and execute actions, the question arises whether they are also the performers on stage. Therefore, the main question of this chapter will be: *how can non-humans be performers?*

The research is spread across multiple domains: in theatre but also in sociology. In the history of theatre, a long tradition exists of using masks, puppets, and other non-living objects to replace the human actor on stage. Masks and puppets could hide the imperfect and inconsistent human performer and were considered more accessible for the audience. In 1810, Heinrich von Kleist wrote the essay *On the Marionette Theatre*, in which he pleaded for a theatre without humans. He argued that since the human body is inconsistent and cannot repeat its own movements as perfectly the same as a puppet can:

> Like elves, the puppets need only to touch upon the ground, and the soaring of their limbs is newly animated through this momentary hesitation; we dancers need the ground to rest upon and recover from the exertion of the dance; a moment that is certainly no kind of dance in itself and with which nothing further can be done except to at least make it seem to not exist.[4]

Human actors are limited in their actions, whereas puppets can continue their movements without exhaustion. Elinor Fuchs adds to that thought in her book *The Death of a Character* (1995) as she analyzes that masks and puppets can play more true, without showing the defects of a human body: “One immediate sign perhaps was the avoidance of the actor through

4 Heinrich Von Kleist en Thomas G. Neumiller, “On the marionette theatre”, *The drama review: TDR*, 1972, 22–26.

experiments with puppets, marionettes, and various kinds of mask-work [...]."[5] Puppets and masks are used to eliminate the individual completion of a role.

Closely related to the field of theatre is sociology, in which the addressing of a non-human object has also been studied. Philosopher and sociologist Bruno Latour demonstrates in his book *Reassembling the Social* (2005) that objects can be actors and even have a certain agency. His Actor Network Theory has been used many times in theatre sciences in the past decades.[6] Based on ANT, theatre scholar Christel Stalpaert (2015) introduces the term posthuman composite body, in which 'a' body (this can be human or non-human) is influenced, negative or positive, by another human or non-human body.

In this chapter I analyze what has been written about objects on stage and more specifically, about objects as performer, character, and actor. An actor is merely something that undertakes an action. Every performer that 'acts' is therefore an actor, as it decides independently when and how to undertake this action. However, not every actor is by definition a performer, as a performer acts 'on display', to be seen. Throughout this chapter I demonstrate how objects can be seen as both actors and performers.

1.1 The death of a character and the human performer

A character acted out by a human actor, as seen in most theatre performances, cannot display the same emotions, actions and intentions every performance whereas a robot can do so as it does not have a consciousness. In *The Death of Character* (1996) Elinor Fuchs notices a trend of a decrease in the use of the character known in dramatic theatre. As a shift takes place in the theatre towards modernist theatre, and later on towards the post-modernist theatre, the character as it was known since the 19th century needs to be rethought. Since Aristotle's *Poetics* the role of the character in dramatic theatre is a questionable one. Aristotle stated that character is the least important part of the drama, the theatrical element.[7] Fuchs analyzes the theatre of the 20th century and concludes that characterization points to "the particular problem the human figure presented for advanced dramatic and theatrical practice in the next decades."[8] Symbolist playwrights and theatre makers believed that the character had to go and instead of focusing on characters, the audience should focus on the relationship between levels of dramaturgy in the performance. These playwrights state that since a human actor can

5 Elinor Fuchs, *The Death of Character : Perspectives on Theater After Modernism*, Drama and Performance Studies (Bloomington: Indiana University Press, 1996), 31.
6 Casey D Allen: 2011; Elektra Tselikas: 2009; Christiano Storni: 2015; Marlis Schweitzer & Joanne Zerdy: 2014; Christopher B Balme: 2015
7 Fuchs, *The Death of Character : Perspectives on Theater After Modernism*.8.
8 Ibid. 10.

lead an audience into focusing on the human individual instead of the symbolic universal, he prevents new advanced dramatic and theatrical practices in which communicating symbols are more important that presenting a fully developed character.[9] He cannot undo himself of his own characteristics: his specific individual walk, his way of talking, the color of his eyes and the moles in his neck are all instantly part of the character, which give the character a very different meaning. Fuchs quotes literature scholar Bettina Knapp, who elaborates on the ideas of symbolist theatre writer Maurice Maeterlinck:

> If man enters on the stage with all his faculties and his whole freedom, if his voice, gestures, attitude are not veiled by a great number of synthetic conditions, if even for a moment the human being appears such as he is, there is not a poem in this world which could stand that event.[10]

A human actor thus always takes his or hers own characteristics with him or her on stage, meaning that the actor cannot completely display the character, but always shows a part of him- or herself. As Fuchs appoints, various theatre makers, among which theatre critic Albert Mockel, begin to opt for working with masks to hide the human actor or they start creating plays for marionettes and puppets as part of the Symbolism in the late 19th century. This can be seen as a way to create an autonomous character, without focusing on the human individual.[11] According to Fuchs, Brecht, for example, opts for another way to depict a character: the actor and character are one and "show the two faces overlapping".[12] Because of this, the spectator is able to unravel a critical understanding of the subject presented in the play. As seen, in the 19th and 20th century with the upcoming of the Symbolism, puppets and masks instead of human actors are inserted into the theatre. Objects are, according to symbolist writers, more consistent in showing the universal symbolic meaning in a performance: they do not distract the audience with their personal features as a human actor would. This is a relevant thought for the analysis in this thesis, as in the performances I analyze, also non-human objects are staged to show a certain symbolic that could not have been shown when using human performers.

9 Ibid. 30.
10 Ibid.
11 Ibid. 31.
12 Ibid. 32.

1.2 The natural movements of puppets

A puppet can communicate the symbolic of a performance clearer that a human performer can. German poet and dramatist Heinrich von Kleist takes this though further by analyzing the movements of a puppet. In 1810, he wrote the essay *Über das Marionetten Theater* (On the Marionette Theatre) as a dialogue between himself and the fictive character Herr C. They discuss the role of the puppet in theatre, focusing on the believability of the puppet. Herr C notes that there is a natural grace that manifests itself in the complete absence of consciousness.[13] Von Kleist describes that a puppet is capable of much more than a human, for example, repeating the exact same movement again and again, especially when the puppets are made mechanical.[14] This type of movement is something a human will never achieve. In the discussion, several examples are based on the assumption that natural behavior can be created either by complete absence of consciousness or an 'infinite' consciousness:

> […] so grace returns after knowledge has gone through the world of the infinite, in that it appears to best advantage in that human bodily structure that has no consciousness at all – or has infinite consciousness – that is, in the mechanical puppet, or in the God.[15]

Von Kleist argues here that a human, who has no limited consciousness, can never create a natural movement on stage as a puppet without consciousness can. To build on this thought, my view is that that Von Kleist believes that non-human objects have a more natural way of moving than a human has. Von Kleist thinks that the non-human object is a better performer than a human as it is not conscious of its own being on stage. Especially the use of masks, puppets and marionettes to create an autonomous character is a relevant thought for the current thesis, as the use of robots and other technological non-human performers create an actor without the immediate anecdotal and individual appearance.

1.3 Accepting objects as actors

According to French philosopher Bruno Latour, non-human objects can be seen as actors. He elaborates on the philosophical idea of the Actor Network Theory (ANT) from a social point of view, emphasizing that the "social does not designate a thing among other things, like a black sheep among other white sheep, but a type of connection between things that are themselves

13 Von Kleist en Neumiller, "On the marionette theatre", 23-24.
14 Ibid.22–24.
15 Ibid. 26.

not social."[16] This means that objects that cannot communicate, can become part of a social network. Social is thus not a thing, but rather a connection. ANT is not based on 'true' or 'false' factors, but has as its main goal understanding combinations and interactions of elements to explain why a theory is successful. Most importantly, ANT accepts humans as well as non-humans equally as actors. Latour explains that non-human societies can understand the social world as an entanglement of interactions whereas humans have a restricted repertoire.[17]

Latour describes a shift from anthropocentric thinking to a more post-human thinking. Posthumanism is not something that excludes the humanism, but rather can be seen as something that moves beyond humanism. According to philosopher Francesca Ferrando, posthumanism has already evolved in different subterms that all have a slightly different meaning, among which transhumanism, antihumanism, cultural- and philosophical posthumanism and New Materialism.[18] Prior to ANT, as Latour emphasizes, objects were not seen as actors, not because they do not 'act', but because the definition of actors was chosen differently: action was only seen as something intentional or meaningful, something that humans do.[19] However, do kettles not 'boil' water, do knives not 'cut' meat? Latour argues that although another actor is needed to perform the action, the action of boiling or cutting itself is done by the non-human actor. Therefore, a kettle, a knife and all other objects that can perform an action must be seen as an actor. Latour then elaborates why these objects should be seen as actors as well:

> ANT is not the empty claim that objects do things 'instead' of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored, even though it might mean letting elements in which, for the lack of a better term, we would call non-humans.[20]

The post-human thought thus gives more space to an interplay between objects and humans, and thus also to non-humans on stage. Here the objects do not only become actors as they execute actions, but also an actor in the theatrical meaning of the word.

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16 Latour, *Reassembling the Social : An Introduction to Actor-Network-Theory*.5.
17 Ibid. 65.
18 Ferrando, "Posthumanism, Transhumanism, Antihumanism, Metahumanism, and New Materials: Differences and Relations", 26–32.
19 Latour, *Reassembling the Social : An Introduction to Actor-Network-Theory, 71*.
20 Ibid. 72.

Non-human objects, such as robots or drones, have more in common with puppets that one would think in first instance: they seem autonomous but are controlled by humans. With puppets, this mainly is at the same moment, whether or not on stage. With robots and other non-humans, there are multiple options. With a remote control, a person can control the non-human in real-time. However, to exclude failure and to allow room for experiment in movement beforehand, most non-human actors can also be programmed in a certain way to execute the envisioned movements at exactly the right time in exactly the right way. This might seem autonomous, since there is no need for a human controlling the objects. However, the human's presence can still be felt since a human has programmed the movements the non-human is supposed to execute, controlling the non-human from a distance. The human 'touch' is still tangible.

1.4 ANT in theatre performance *END*: creating composite bodies

So, a non-human object can be seen as an actor, according to Latour. However, when does this actor exactly become a performer? Although ANT is a theory that has developed from social studies, there is a lot of interest for the Actor-Network-Theory in the theatre field. This is not surprising: long before Latour developed the ANT, the field of theatre brought objects to 'life' on stage, in such a way that the audience feels a connected with the object. One can think of puppets, but also of objects that do not resemble humans. The ANT sheds new lights on complex relationships not only between humans but also between humans and non-humans. The ANT can, as theatre scholar Christel Stalpaert (2012) points out, call on a responsibility as shared response-ability: the ability of an actor (or *actant*, both human and non-human) to respond in an interconnected network.[21] Stalpaert introduces the term 'posthuman composite body' as a body that "suffers or benefits from the action of another body", be it human or non-human.[22] Even more important is the fact that in an interconnected network of actors one cannot completely learn who was responsible for the action: "The question of who is carrying out the action has become unfathomable".[23] Stalpaert concludes that ANT teaches us that agency is not solely generated in corporeal deeds, but 'dead' materials can also have agency.[24] This idea sheds again new light on the choice of staging puppets, masks and other 'dead' material, as they can get entangled with living actors and their mutual embeddedness

21 Christel Stalpaert, "CREW's O_REX (2007) and Nicole Beutler's Antigone (2012).", *Performance Research* 20, nr. 2 (april 2015): 19.
22 Ibid. 20.
23 Latour, *Reassembling the Social : An Introduction to Actor-Network-Theory*, 45.
24 Stalpaert, "CREW's O_REX (2007) and Nicole Beutler's Antigone (2012).", 22.

can turn a dramatic character into a composite body. This way a shared responsibility derives, "[…] forcing the spectator to open him- or herself up to several possible meanings, relations and identities."[25] A technological non-human as a performer can become a composite body, depending on other *actants* that eventually influence the actions of the non-human performer in the interconnected network of humans, objects and technology.

One of the best examples of accepting and even directing a non-human actor can be found in the process of the work *END* (2008) of Kris Verdonck. In the book *Listen to the Bloody Machine* (2012), written by theatre scholar and dramaturge Marianne van Kerkhoven and dramaturge and theatre maker Anoek Nuyens, the making process of the performance *END* is described.

END is a performance made by Kris Verdonck in 2008, in which several people, some attached to a machine, cross the stage multiple times, as a vision of the end of the world.

The actors who are attached to machines are describing the machines as having personalities. Stakhanov is one of the characters who is attached to a machine and this machine is like a counterweight: it pulls him back, making crossing the stage incredibly difficult and heavy. Dancer Marc Iglesias describes his first meeting with his machine: "I first met my machine in the Kaaitheaterstudios. It was a fight. No, not a fight; more of a checking out of the limits. […] Me and the machine, we had to get to know each other."[26] The actor thus does not see the machine only as an object he has to use while being on stage. Rather, the object defines how the actor can move on stage. The machine becomes an *actant* and the character Stakhanov becomes a composite body. His body and actions depend on the actions of other bodies, in this case of the machine. As one of the other actors put it: "The machine plays a role. […] I want to go in a certain direction, but I don't have complete control over this. I accept the situation and let me lead."[27] The actor has to accept the agency of the machine as a crucial part of crossing the stage.

In *END*, machines and performers have to work together to cross the stage and machines cross the stage autonomously. Even the black snow that is falling during the performance is seen as a character by Kris Verdonck and all those characters are linked to each other via an interconnected network, making characters and performers composite bodies that are dependent on each other to succeed.

25 Ibid.
26 Marianne Van Kerkhoven, Anoek Nuyens, *Listen to the Bloody Machine: Creating Kris Verdonck's End* (Utrecht School of the Arts, 2012), 152.
27 Ibid. 168.

1.5 Conclusion

A non-human object can be seen as an actor, that becomes a performer when it executes actions on stage. Elinor Fuchs and Heinrich von Kleist can be seen as classic voices in this debate. Fuchs argues that non-human objects can function as characters that seem more 'natural' and 'honest' than human performers playing a character. Von Kleist fantasizes about a theatre without humans, only with puppets or even robots, as they can repeat a movement in exactly the same manner, as a human is not capable of reproducing an honest movement, yet puppets and robots are. Since, modern technology has made it possible to introduce more different and complex non-human objects as actors on stage. One can think about t.v. screens that replace human performers, machines that seem to work autonomously, objects that will move or make sounds on specific moments without the intervention of a human, robots, et cetera. Bruno Latour's ANT theory enables a view of non-human objects as an addition to our social world: objects are also *actants.* According to Latour, these non-human objects even have some agency, as those objects themselves are performing actions. Christel Stalpaert adds that both a human as a non-human object can become a composite body when they are dependent on other *actants* who influence their actions. When talking about Kris Verdonk's work *END,* the actors almost all name the intriguing relationship they had with a machine. The human and the non-human performers can be understood as composite bodies, because they influence each other's movements. The human performer is limited in his way of talking and walking. The machine, however, is also held back by the moving performer.

2 Fanuc S500 and the Mirror Neuron System

Figure 2: Fanuc S500, the robotic arm in The Internet Of Things/Prometheus de Vuurbrenger. *Photo: Jochem Jurgens*

2.1 The Internet of Things

On the stage, a big white cloth covers something. What it is, the spectator can only guess. The first thing that comes to mind is an oversized piano or other instrument. But then, it starts to move. First a brisk and short movement, then more movements follow. The thing under the cloth seems to collapse, as if it inflates and deflates. It is definitely not something human. Suddenly it rises up and something that looks like a head moves with smooth and slow movements to the sides, as if it is looking around. Then the cloth falls off and reveals a big robotic arm.

It smoothly moves up and down and from side to side as if exploring its surroundings. The magnetic head glides over the floor and some pillars that standing on the stage. By moving this part in different directions, the suggestion of a 'sensing' head is made. The head

follows the contours of the pillars on stages, seemingly to measure their size or shape. The robotic arm also turns its head frequently to the audience and it almost seems as if the robotic arm is looking at us, even though the spectator can very clearly see that there is no eye present. The robotic arm moves in ways a human can never accomplish, turning its head and 'neck' 180 degrees. The speed with which the robotic arm moves differs: sometimes its movements are slow and computational, sometimes more brisk and unpredictable.

This is the beginning of the performance *The Internet of Things/Prometheus de Vuurbrenger* by performance collective URLAND. It is the last part of a trilogy in which URLAND makes a journey through the history of technology and more specific, the internet. In the previous two parts the performers focused on the exploration of the internet in the '90s and how the internet is ubiquitous nowadays. This last part has the shape of a 'pre-enactment'[28] in which four human performers, a robotic arm, and an A.I that is present via a tv screen are exploring how the future would look like when smart, self-thinking objects are a significant part of our daily life: "But what would happen when *Artificial Intelligence* becomes really self-conscious?"[29] During this performance the performers talk about several philosophers that have thought about this idea of self-consciousness objects, and what it means to 'be'. All in all, they approach the future from a perspective that is decidedly posthuman: the performers offer a philosophical view on existence in the broadest sense.

In this chapter I analyze the performance of URLAND via the theory of the Mirror Neuron System. Neuroscientist Vittorio Gallese discovered these mirror neurons that are responsible for the understanding of movement of our own and the movements of others. This can result in kinesthetic empathy: understanding emotions via movement. I compare these studies with the studies that are done on robotic movement to see what role the Mirror Neuron System, in combination with kinesthetic empathy, plays in the understanding of the robotic arm in *The Internet of Thing/Prometheus de Vuurbrenger.* After this analysis, it will become clear that without mirror neurons and the natural social human brain one would not understand the movement of the robotic arm.

28 This idea of a pre-enactment derives from the theatrical forms of re-enactment and enactment in which events can be acted out again, highlighting different parts of the original event. The most known example of re-enactments are historical battles that are fought again, with a high theatrical layer.

29 http://urland.nl/werk/internet-of-things-prometheus-de-vuurbrenger-1 (own translation), last visited: 26-06-2017

2.2 The Mirror Neuron System as a tool to understand non-human movement

In order to analyze the non-human performer in *The Internet of Things*, it is important to gain knowledge about how humans understand movement and how we understand the movement of other humans. The Mirror Neuron theory may add to our understanding of this phenomenon because this theory explains how mirror neurons are responsible for understanding movement, among other things. Neurophysiologist Vittorio Gallese discovered the mirror neuron system with several other scientists. Mirror neurons are so-called motor neurons that give signals to the brain when an action that involves movement (motor act) is performed or observed as it is being performed by someone else. "Thus, observing an action causes in the observer the activation of the same neural mechanism that is triggered by executing that action oneself."[30] The mirror neurons, or the mirror mechanism, do not only activate the brain when observing or executing movement, but also when observing emotions and sensations. This explains the feeling that everybody has encountered when hearing someone else talk about a painful experience: we cringe our faces and it seems as if we can feel their pain. This Mirror Neuron System (from now on MNS) is part of the Embodied Simulation Theory. According to this theory one understands the behavior of others by simulating them oneself. Furthermore, the affective and emotional neural network is 're-used' to map the emotional and sensational experiences of others. Embodied simulation gives a direct access to the perceptions of others.[31]

The experiment of behaviorist scientist Valeria Gazzola, cognitive scientist Christian Keysers and neuropsychologists Giacomo Rizzolatti and Bruno Wicker shows that the mirror neuron system is not only activated when a human spectator observes movements done by a human hand, but also when these same movements are executed by an industrial robot.[32] The MNS is more active when the spectator observes a for him goal oriented movements, for example, picking up a cup.

When a movement is goal-oriented, it does not make a difference whether these movements are performed by a human or an industrial robot. This is relevant for my question what role the MNS plays in understanding a robotic arm on the stage as it shows that a spectator can just as easily understands the movements of a human performer and of a technological non-human performer:

30 Vittorio Gallese and Michele Guerra, "Embodying movies: Embodied simulation and film studies", *Cinema: Journal of Philosophy and the Moving Image* 3 (2012): 184.

31 Ibid. 185.

32 Valeria Gazzola e.a., "The anthropomorphic brain: the mirror neuron system responds to human and robotic actions", *Neuroimage* 35, nr. 4 (2007): 1683.

> [K]eeping in mind that a lack of significant difference between human and robotic agents does not prove that brain responses are equal in these conditions, the similarity of the activations in our study may nevertheless suggest that the difference in familiarity with the kinematics of the robotic actions had little impact on mirror activations.[33]

The mechanisms in our brain that are designed to understand other humans, are also used to understand the actions of objects, or artificial devices, that do not have to look human. Even an industrial robot, just like the Fanuc S-500 which is used in *The Internet of Things*, "can tap into our social brain".[34] The MNS is activated when one is looking at a robot performing actions that can be seen as "meaningful human actions", that people recognize as human, as long as the actions themselves are not too repetitive.[35]

Gazzola, Keysers, Rizzolatti and Wicker conclude that the arts were for a long time ahead of science, as this technique has been used throughout history for a long time. They refer to the Star Wars Saga, written by George Lucas, in which both robots that look human and robots that do not look human can affect us socially and emotionally (see Figure 3). It can be concluded that humans can understand non-human objects because of the goal-oriented movements they make. Puppets can also not display emotion or human frailty, but, as discussed in chapter one, rather show the symbolic universal: that what people recognize as goal-oriented movements.

When looking at the robotic arm in *The Internet of Things*, one can recognize movements of exploration. The head that seems to explore its surroundings and the objects on stage is very much related to what a human would do when discovering a foreign environment. Or, as Gazzola, Keysers, Rizzolatti and Wicker argue, one can understand the robotic arm because of the goal-oriented movements it is making.[36] The movements of the robotic arm are understood by the audience and therefore they 'bond' with the object. Their body and mind mimic the movements of the robotic arm by activating my Mirror Neuron System and the spectators therefore see intentions in the movements of the non-human performer.

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33 Ibid.
34 Ibid.
35 Ibid.
36 Ibid.

Figure 3: From left to right: C3PO, R2D2 and BB8, three robots in the Star Wars Saga that evoke affection by the spectator.

2.3 Kinesthetic empathy as a way to connect emotions to movement.

Just as the robotic arm appears from under the white cloth, it seems as if it is exploring the room. It is looking up and down, examining the floor. Its movements are calculative: when examining the floor, it is moving slowly and close by the actual floor. Then, it seems as if one of the pillars scares the robotic arm: as if it did not see it. The movements speed up, and then slow down again. The robotic arm fluently seems to decide to examine the object that startled him.

As the robotic arm is exploring the stage, its movements are becoming more rapid. A low bass sound gets louder and louder. The robotic arm then picks up a geometrical figure and it seems to search where to place it. The robotic arm makes very goal oriented movements by picking up and putting down of geometrical objects and thus the spectator can understand the movements of the robotic arm. The movements the robotic arm makes are similar to what a human would do to put the shapes in a different place: pick them up, hold them and put them down. As a spectator, I do not only understand the movement made, but it is as if I am making the movement as well. This is called kinesthetic empathy.

Closely related to the idea of the Mirror Neuron System is the term kinesthesia. As dance scholar Susan Foster describes in her comprehensive study on kinestheic empathy,

kinesthesia derives from the Greek words *kine*, which means movement, and *aesthesis*, which can be translated as sensation.[37] The term was later replaced by the term proprioception, as this term focuses more one muscular sensation instead of older ideas of a 'sixth sense' or 'muscle sense'.[38] 20th century dance critic John Martin uses kinesthesia to develop his theory of dance expression. He argues that the body of the spectator that watches the body of the dancer move experiences the body feels equivalent kinesthetic sensations. The spectator is in some way 'mimicking' the dancing body.

This 'inner mimicry', as Martin calls it, is made possible by the mirror neurons. As explained before, these neurons activate parts of the brain the moment a spectator witnesses, for example, a dancing body, which makes the spectator's body perform the same movements in their brain and muscles without physically executing them. By doing this, the spectator can understand the dancer as if he is actually dancing along.[39] Alain Berthoz builds further on this thought, stating that perception is a simulation of action. Besides that, he emphasizes the fact that we anticipate movement actively. Susan Leigh Foster describes: "As one is looking at the armchair, one is already simulating the motions associated with seating oneself in it."[40] This means that, while looking at the aforementioned robotic arm, the spectator is already simulating and predicting what the robotic arm on stage will do. The spectator understands the intention of the robotic arm. As long as the performing object follows the prognosis the body of the spectator makes, the latter will understand the object. The moment the object makes a movement a human cannot exactly link to his or her own movements, there is a sense of surprise. This occurs, for example, the moment the robotic arm in *The Internet of Things* turns around and twists his 'head' 180 degrees. A human is incapable of copying this movement and thus for a moment the spectator will feel a sense of surprise.

However, the spectator definitely understands what it is to turn your head and which movements are needed to do so. Gallese argues that "the kinesthetic simulation of others' actions establishes an empathetic connection among all humans who recognize in those actions an equivalent intention and goal."[41] Therefore, it can be said that action directly enables social bonding between humans. Drawing a connection with the preceding

37 Susan Leigh Foster, "Movement's contagion: the kinesthetic impact of performance", in *The Cambridge Companion to Performance Studies*, bewerkt door Tracy C. Davis (Cambridge: Cambridge University Press, 2008), 47.
38 Foster, "Movement's contagion", 47–48.
39 Ibid. 54-55.
40 Ibid. 53.
41 Ibid. 55.

observations on the experiment of Gazzola, Keysers, Rizzolatti and Wicker, I argue that not all actions, but goal-oriented actions enable social bonding between humans and non-human performers. The movements made by Fanuc S500 are understood by a human spectator, thus enabling the human to 'bond' with the robot.

Watching movements – whether made by humans or non-humans – affects people and this can be described as kinesthetic empathy. Yet, as Dee Reynolds explains, kinesthetic empathy is a problematic term. The question as to how one recognizes empathy and how far the concept of this empathy can and might be stretched has been discussed endlessly.[42] "In its strongest form, empathy involves embodied simulation and imagined substitution of one agent for another: for a fleeting moment, perhaps, I simulate your action, and in so doing I imagine that I occupy your place, that I am the vicarious agent of your movement, your experience, your utterance."[43] While observing movements, the spectator thus imagines himself being the dance. He thereby not only understands the moves made, but even feels affected by them.

Because I understand the robotic arm in *The Internet of Things* and simulate its movements, my body is even able to predict future movements, making it even more easy to understand what the robotic arm intents. The speed with which the arm moves and looks around give space to project certain emotions. Since I am mimicking the robotic arm, I put myself in his position. For a moment, I become the robotic arm on stage. I see and feel curiosity, anxiousness, studiousness, doubt and frustration mainly because the movements of the robotic arm are familiar to me as a human, even though this robotic arm does not move and look like a human at all.

2.4 Breaking the illusion

Almost at the end of the performance, Marijn Alexander de Jong, one of the performers of URLAND enters the stage. He holds a remote control. The robotic arm does not turn directly to the human performer that enters the stage. De Jong looks at and types something on the remote control, then looks at the robot, and then back again at the remote control. It seems that he is actively programming the robotic arm on stage. Slowly, the robotic arm turns in the direction of de Jong and the 'head' of the robot comes closer to de Jong's head. Rainbow, the

42 Dee Reynolds and Matthew Reason, "Introduction", in *Kinesthetic Empathy in Creative and Cultural Practices* (Bristol: Intellect, 2012), 18.

43 Reynolds, "Kinesthetic Empathy and the Dance's Body: From Emotion to Affect", 125.

A.I. voice comments on the situation. Rainbow is no more that a t.v. screen with shots of a nature movie projected on it. She comments with a computer-controlled voice on the human performers philosophizing, as she has the knowledge and the will to become an autonomous entity. However, she knows she is depending on those same performers she mocks:

> Enter humanity. In his hands a device that is meant to control the machine. Look at how powerful he feels. Don't you envy him? Is he not attractive with all that power? The machine moves, he is clearly drawn to him as well. Look at how he brings the god closer to him. If that is not love I don't know what is. Look at the tension between their eyes.[44]

The robotic arm is coming closer and moves its head around the human performer, as if studying him. Marijn de Jong keeps his eyes constantly on the head of the robotic performer and follows the movements of the robotic arm with his head. Rainbow continues: "Did you notice how easy it is to see human characteristics in an inanimate object? How easily you fool your mind by believing it is alive?"[45] Rainbow adds an unexpected self-reflective element, and the spectator suddenly becomes aware of way he was looking at the robotic arm.

For a few seconds, this encounter between a human and the character – the robot – the spectator has been projecting emotions on, seems strange. The presence of a human performer suddenly emphasizes that for the last hour we have been intensely staring at an object that cannot feel. A machine without any agency, as it becomes clear that Marijn de Jong controls the robotic arm and probably has been doing that for the past hour. The illusion of an autonomous moving object has been broken. The machine has become a machine. The human 'touch' becomes awfully visible.

Is it true that this machine has no agency? Thinking of Latour's Actor Network Theory (as descibed on page 15) that derives from the idea that all things that 'help' perform an action have agency, one can argue that the machine of URLAND still executes actions, as a knife cuts and a kettle boils water.[46]

At the same time the illusion of a fully autonomous robot has been broken, the power of the stage begins to work. The spectator visits the theatre with the knowledge that what he is going to see is not reality, but more or less fiction – something staged. However, the spectator wants to see and experience this fiction as something real for as long as the

44 Registration Urland *The Internet of Things*. Last seen: 22-05-2017
45 Ibid.
46 Latour, *Reassembling the Social : An Introduction to Actor-Network-Theory, 71-72*.

performance lasts.[47] The theatre space seems to change realities. Theatre scholar Gay McAuley argues that a certain space itself becomes meaningful when transactions between several factors are established. This means that the theatre is a space where a robot that normally is only a machine, a liminal thing, can become a meaningful object "within the particular performance mise-en-scene."[48] So, even though there is a human on stage that breaks the magic moment of a robot that can think and perform on its own, the spectator still wants to believe this robot is capable of doing so. An inner conflict occurs: cognitive dissonance. The spectator has been watching and understanding the robotic arm for over an hour, and will continue to do so.

Although Rainbow explicitly tells the audience that it is a machine, a preprogrammed robot they are looking at, I as a spectator still understand the movements and thus the emotions of the robotic arm. It seems particularly strange because of the human being on stage. The spectator can see who/which of the two is a living human and which is the machine. From the very beginning, we see more in this thing than only a robotic arm. It is a living object, a thing that sometimes does things wrong, a thing that doubts where to put the blocks and gets frustrated the moment it realizes a block has been put in the wrong place. Because this robotic arm has been on stage all alone during most of the performance, this robotic arm has become the main character of the show. We cannot see the performers who are behind the curtain. The only moving thing on stage is this robotic arm.

As Kristof van Baarle observed in other performances where machines are performers: the only role left of a human is that of "a functional operator of non-human entities, just like the operator in the Amazon warehouse."[49] URLAND's human performers have also turned into operators. We cannot see them, we only hear them speak. When the audience watches De Jong, he is not a performer, but merely a puppeteer, with the controls of the gigantic robot-puppet in his hand: a human body that uses his agency to influence the robotic body on stage.

47 Kristof Van Baarle, "The Critical Aesthetics of Performing Objects– Kris Verdonck", *Performance Research* 20, nr. 2 (april 2015): 39–48.

48 Yuji Sone, "More than objects: Robot performance in Japan's Bacarobo Theatre", *Studies in Theatre and Performance* 30, nr. 3 (2010): 342.

49 Kristof van Baarle, "The performer is absent: spaces of absence in the contemporary performing arts", in *CARPA4: the Non-Human and the Inhuman in Performing Arts—Bodies, Organisms and Objects in Conflict*, 2015, 7.

2.5 The absent human

Marijn De Jong clicks something on the robotic head, and the head instantly moves away from him. Then, slowly approaches the human again and De Jong slowly touches the head of the robotic arm, clicking that what he just put on it. It is a light. The moment the light is turned on, the ambient lights go out. The light put on the robotic arm shines on De Jong, who is still on stage. He looks at the robotic arm and then leaves the stage, being no more than a functional operator.

From the very beginning, as a spectator, I try to relate myself to the robotic arm on stage. It is a machine, and I cannot see directly what it is doing. By the movements it is making, it is very clear that the spectator is invited to understand the upper part of the arm as its head and, even more specific, the part of the magnet, the flat top of its head as its eye. The movements of the robotic arm are constructed around this idea of having a head. The robotic arm follows objects and measures them, while moving the eye-part back and forth and to both sides.

This code, of presenting an object with a clear head, is something that instantly understood by people. The best example is object theatre, in which almost every object can be brought to live. Using different techniques, among which letting the object breathe and deciding what part of the object has the function of the head or eyes, a puppeteer can easily give life to a coat rack or a lamp. Pixar's lamp Luxo JR. comes to mind. The desk lamp that jumps around, using its light bulb as 'head' or 'eye' (see Figure 4).

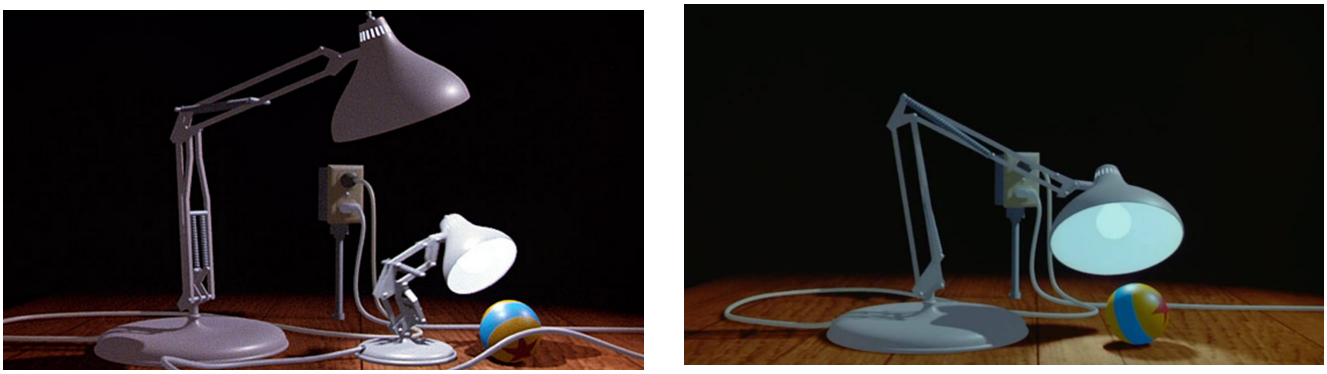

Figure 4: Two stills from the movie "Luxo JR" on Youtube

Movement plays a big part in bringing an object to life. As Masahiro Mori explains, movement is essential to create affinity.[50] Everything that is alive moves. That does not mean that

50 Mori, MacDorman, and Kageki, "The uncanny valley [from the field]", 98–100.

everything that moves is alive, but the moment something moves, humans tend to project life on a 'dead' object sooner.[51]

Since the robotic arm in *The Internet of Things* seems to mimic the movements a human would make during moments of hesitation, frustration, anger and curiosity, we project those feelings. As long as there are no humans on stage, the robotic arm is the only thing we can actively relate to onto the object. The moment the human performer enters the stage, we can relate ourselves to a human. However, we have been bonding with the robotic arm in the last hour, and this is the first time we see this human on stage. We don't know who he is, we don't know his role and we don't know what relation he has to 'our' machine main character. And thus, we perceive the actions of the human via the robotic arm. We see his actions through the non-existing eye of the robotic arm.

With no humans visibly present on stage, the interaction of human actor and audience is interrupted. Theatre scholar Pedro Manuel states that without this interaction a turbulence is created that makes the audience self-aware, their surroundings and also of what is real or not: is this robotic arm really feeling? Is it really a character? Or only a machine? Manuel states that a new kind of presencing is possible because of this self-awareness: "[…] one that disperses the gaze by mediating its production to bring into view a new kind of spectacle."[52] The spectator becomes aware of his own modes of looking and can reflect on these modes, creating a new way of looking.

The robotic arm on stage is nothing more than a Bunraku puppet: a large Japanese puppet that is controlled by three puppeteers. He might not resemble a human, but his movements are giving him a 'soul', as Barthes describes.[53] The difference is, that the puppeteers of a Bunraku puppet are visible, and pretending that they are not there. In the case of *The Internet of Things,* the human puppeteers are partly invisible, but still controll the gigantic puppet.

2.6 Conclusion

What role does kinesthetic empathy play in understanding movement of the non-human performer in URLAND's *The Internet of Things*? I demonstrated that in *The Internet of Things*, several things happen. First, the spectator has to bond with the robotic arm on stage to

51 Ibid.
52 Pedro Manuel, "Absent Audiences", *Performance Research: A Journal of the Performing Arts* 19:5, nr. Journal Article (2014): 76.
53 Roland Barthes, "The Dolls of Bunraku", *Diacritics* 6, nr. 4 (1976): 45

understand it. The Mirror Neuron System enables this bonding by signaling brain and body to mimic the movements the robotic arm makes. The spectator understands and recognizes the goal-oriented movements. Because the robotic arm is making movements with expressions that humans are able to understand, the spectator will project emotions and a personality on the robotic arm. Then, the spectator has bonded with the robotic arm and this can all be seen as kinesthetic empathy. Dee Reynolds elaborates on this bonding in her explanation of what a subject experiences inside and outside his body while watching a dance performance.[54]

Since the robotic arm is the only thing on stage, the spectator is forced to identify himself with the robotic arm. There is nothing else that appears to perform. The minute the human performer enters the stage, the spectator can relate to two performing bodies; one human and one mechanical. The illusion of an autonomous performing robotic arm is broken. The robotic arm is dependent on the human character who has the remote control in his hands. The object appears to have lost its autonomy, even though it never was autonomous. The spectator can compare the 'real' human with emotions and intentions with the robot, on which the spectator merely projected these emotions and intentions.

54 Reynolds, "Kinesthetic Empathy and the Dance's Body: From Emotion to Affect" 124.

3 Dancer #3 and anthropomorphism

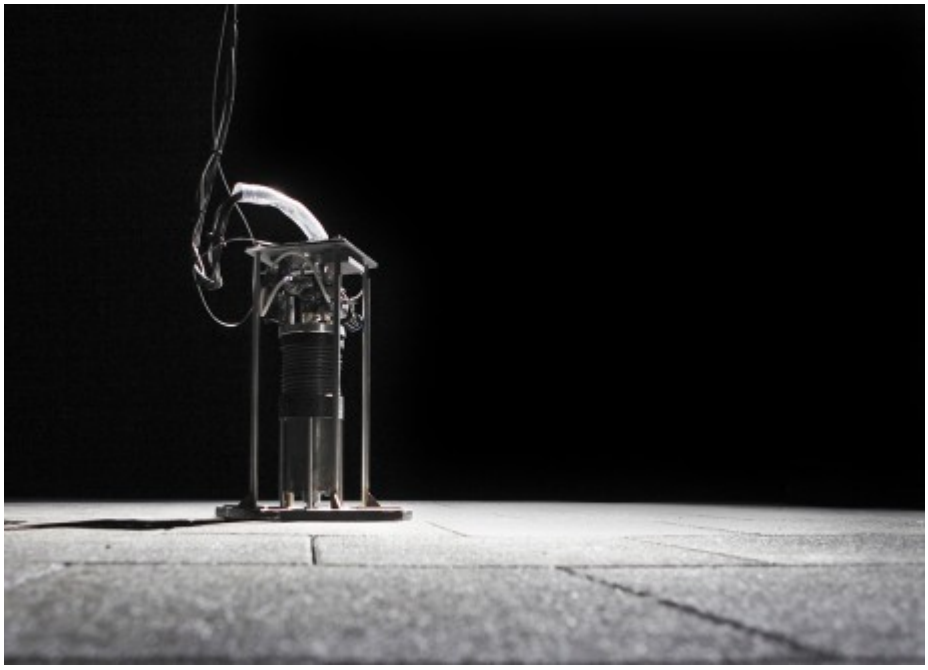

Figure 5: DANCER #3*. Photo made by Reinout Hiel*

3.1 DANCER #3

The room is dark and standing on a small stage is a weird object standing in a spotlight, as can be seen in figure 2. Most of the object is cylindrical and it stands up straight due to a square metal plate. It is attached to wires that go up to the grid of the theatre, there where only technicians can go. This object does not look human at all. Unlike the robotic arm in *The Internet of Things*, discussed in chapter 2, this robot has no identifiable eyes or head from which it looks. The only thing the spectator identifies, is that the square part is its feet, since that part is standing on the ground.

Suddenly, the object starts to jump. It moves up and down in different tempi. Sometimes it jumps up high and sometimes it is barely off the floor. Sometimes the jumping robot tends to go to the right and sometimes to the left. After a few jumps, however, the robot falls on its back. It cannot jump anymore and it is lifted up by a machine. When this happens, computer sounds or robotic calculating sounds can be heard that can be described as high pitched *beeps.* Then the robot starts again and again and again in different rhythms, with a different energy, but it never manages to jump a long period of time without falling over.

This is the third part of Kris Verdonck's performance-installation *ACTOR #1* and is called *DANCER #3*. The whole performance-installation addresses the relationship between living creatures and matter. The spectator sees three different performance-installations in different rooms, three variations on the metamorphosis from chaos to order.[55]

In this third chapter I will analyze the performance *DANCER #3* to see how anthropomorphism on the one hand enables to see the jumping robot as a human character while on the other hand the uncanny valley, a theoretical concept of roboticist Masahiro Mori, makes the audience more aware of the fact that they are looking at a 'thing' and not a human performer.

3.2 Projecting human features on non-human objects

The spectator begins to see this robot not as an object, but as a living thing, by projecting human emotions on the robot. This is called anthropomorphism. Anthropomorphism is a term that refers to two different and at the same time related ideas. The first idea of anthropomorphism refers to something that looks or acts like a human. The second idea is about humans' natural tendency to see human characteristics in objects and animals.[56] When people observe animals, one has the habit to connect human emotions and motivations to the behavior of the animals, even though it is known that they most likely do not have these emotions or motivations. Bruno Latour calls this behavior *projection.* One does not only project emotions, motivations or action on animals but also on objects. Latour gives an example of a hydraulic groom that stopped working. Instead of saying that the groom is not working, one tends to say for example that the groom is 'on strike'. Of course the groom is not protesting literally, it is just a human action projected on the object.[57] This might seem the same as the goal-oriented movements I described in Chapter 1, but there is a difference. Here, it is not the movements *per se* that one understands, but rather the recognition of the situation as being human. Latour separates two different meanings of the word anthropomorphism. The terms "*anthropos* and *morphos* together mean either that which *has* human shape or that which *gives shape* to humans."[58] In the case of the groom 'on strike', it is clear that one recognizes that which gives shape to humans: the unpredictability and the ability to protest is

55 http://www.atwodogscompany.org/nl/projecten/item/155-actor-1?bckp=1
56 Richard Allen en Shaun May, "Encountering Anthropomorphism.", *Performance Research* 20, nr. 2 (april 2015): 1.
57 Bruno Latour, "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts", in *The Object Reader* (Oxon: Routledge, 2009), 159-160.
58 Ibid. 160.

typically human behavior. As for the jumping robot *DANCER #3*, the spectator cannot help but to project emotions and maybe even a drive onto the robot. As performance scholar Edward Scheer concludes:

> The "*DANCER #3*" robot itself does not need to mimic human actions or gestures because the HRI (Human Robot Interaction, red.) is where the real action in this work lies: the circuit of affect between robot and audience that forms the basis of an oddly satisfying theatrical experience, with no living actors in sight.[59]

Scheer follows the thought of political theorist Jane Bennett when she argues that anthropomorphism is a necessity that enables a productive and vital aspect of materialism.[60] Bennett states that "a touch of anthropomorphism" can facilitate a certain sensibility that creates a world in which things are not categorized in subjects or objects but rather is a place where "variously composed materialities" form alliances.[61] This is what is interesting when analyzing *DANCER #3* on its anthropomorphic qualities. According to Scheer and Bennett anthropomorphism is the catalyst to blur the line between human and non-human. That would mean that the spectator is no longer interested in the fact that the performer is not human, even though he is perfectly aware of the fact that the object is not human. For the spectator, this illusion is a willing suspension of disbelief.

This willingly disbelief can also be seen in the relationship between child and stuffed animal. Verdonck explains that the most intimate thing a child can have is a teddy bear or some other stuffed animal: the child takes it to bed and tells secrets to it, it comforts the owner in moments of loneliness or sadness. Verdonck concludes in an interview with theatre scholar Peter Eckersall and Edward Scheer: "I think… objects don't need to produce our emotion. We will project emotion towards them."[62] I agree with Verdonck's thoughts as this is one of the reasons why the Japanese Bunraku puppets can be so life-like: the puppeteers don't let the puppets show 'real emotions', but rather a very stylized version of emotions, produced by movement. The spectator then projects emotions onto the puppet. Clearly, people tend to project emotions not only on animals, but actually everything that seems to have a face or

59 Edward Scheer, "Robotics as New Media Dramaturgy.", *TDR: The Drama Review* 59, nr. 3 (2015): 147.
60 Ibid.
61 Jane Bennett, "Political Ecologies", in *Vibrant Matter: A Political Ecology of Things* (Durham: Duke University Press, 2010), 99.
62 Scheer, "Robotics as New Media Dramaturgy."

seems to have a goal. Therefore, an object does not need to produce emotions for an audience to project emotions on it. *DANCER #3* obviously has a drive and is constantly trying to achieve it, without showing any emotions. However, the combination of movement and sound that functions as a way of communication encourage the spectator to project emotions on the object.

In theatre, anthropomorphism occurs even more quickly than outside the theatre space. According to Kristof van Baarle, this occurs because a theatre stage can be considered as a "space for presence".[63] A theatre setting can provide a non-human object with a sense of presence. Placing an object in a theatrical setting is giving it a presence and allowing it to be more than an object, based on what the spectator will project on it. The effect of intimacy can be amplified by being on stage and both non-human and human actors reflect the projections of the audience. With this, a feedback loop arises in which reflection and projection of emotions means that the ontological difference between robot and human is no longer relevant. *DANCER #3* could have been a human, and the reaction of the audience could have been similar: there would be an empathy for the jumping and failing human as there is now for the robot. This would mean that the distinction between human and robot is getting blurred, even though it is visually very clear that *DANCER #3* is not a human.

However, I argue that the absence of emotion in the jumping robot makes it more appealing for the spectator to look at and easier to feel empathy for and project emotions on. It shows a determination while leaving space for the imagination of the spectator. A human actor that 'acts out' emotion is never real, but the jumping robot is only acting in the moment: showing reality. The jumps and the sounds are not acted, but merely happening. Because it is not human and not producing any emotions itself, the imagination of the spectator can speak more freely. The robot is like a blank page that the spectator can fill in. The theatre setting lastly, amplifies these feelings.

We have seen that anthropomorphism plays a big role in understanding a non-living object as an actual creature, as people are constantly projecting emotions on objects that move and seem to have a goal. This goal-oriented movement, about which I spoke in chapter two, apparently makes it easier for a human to see a moving object as something with a free will. In *DANCER #3,* the object does not look human at all. Still the spectator has no trouble to see this

63 Van Baarle, "The Critical Aesthetics of Performing Objects– Kris Verdonck", 40.

object as a performer and a creature instead of dead material because anthropomorphism blurs the line between human and object for the spectator.

3.3 The eeriness of objects resembling people

One would presume that the more human a robot looks, the easier it is to feel connected with it and thus to feel empathy for it. However, this is not the case and it can even lead to what roboticist Masahiro Mori calls the *uncanny valley*.[64] As the idea of the uncanny valley is a valued theoretical idea that is often cited when talking about the development of humanoids and robots, be it on stage or in other social situations, it needs to be addressed here. I analyze whether or not an encounter with the uncanny valley takes place in *DANCER #3*.

The projection of human characteristics, the aforementioned anthropomorphism, can result in one experiencing the uncanny valley. This concept, developed by Japanese roboticist Masahiro Mori, describes a curve of sympathy and empathy towards a non-human object. The more human-like a robot becomes, the more eeriness it can evoke in someone. One aspect which can amplify the peaks and valleys of the uncanny valley is movement. A moving object thus can evoke more affinity, but also can evoke a stronger feeling of eeriness (see Figure 6).

The replacement of human actors by non-human actors as robots, machines and objects is a movement away from anthropocentric thinking because it decentralizes the human. Theatre scholar Kristof van Baarle argues that the uncanny operates in two directions: “There is the recognition in non-human things of what have up until now been considered to be human features, but also the display of the non-human nature of properties that we consider to be solely human.”[65]

It is not only about recognition, but also about showing human qualities in a not living object, while people tend to believe those qualities are exclusively human. So even though people naturally project their feelings and emotions on non-human objects, objects that closely resemble humans are considered eerie. It seems as if one does know better how to relate to an object that definitely is not human than to an object that closely resembles a (part of a) human.

64 Mori, MacDorman, and Kageki, “The uncanny valley [from the field]”.
65 Van Baarle, “The Critical Aesthetics of Performing Objects– Kris Verdonck”, 41.

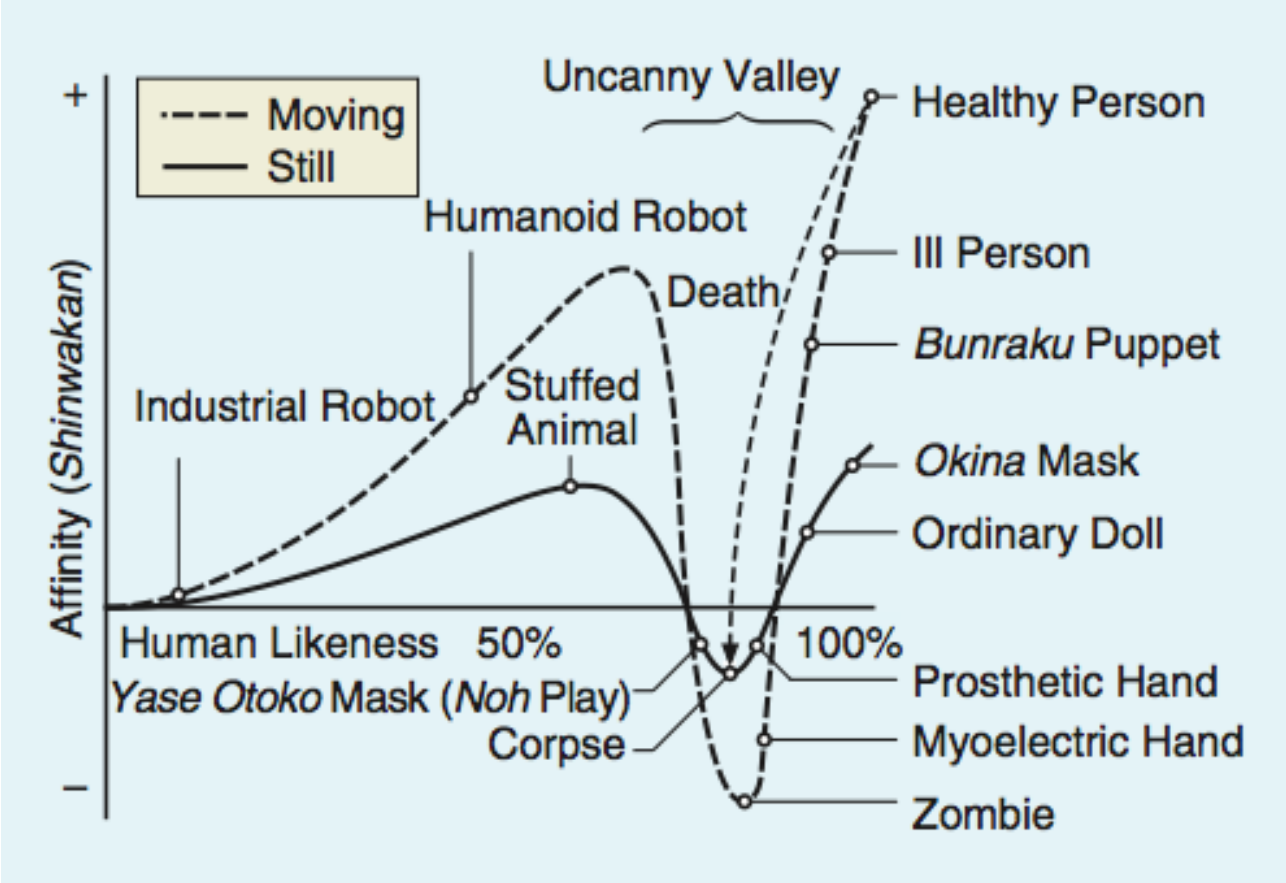

Figure 6: The uncanny valley

A moving object will evoke more affinity, but can at the same time increase the eerie feeling of the uncanny valley. Yet, the Bunraku puppets from Japan do not resemble a human as close as a humanoid robot, yet still can create more affinity. In my opinion, this effect is the result of the power of the stage presence. Masks and Bunraku puppets are made for performing on stage. The spectator therefore has the urge already to feel more affinity for what is on stage, creating a basic anthropomorphic effect.[66] The stage seems to break down the differences between human and non-human performers: the spectator wants to lose himself in the fiction that is being presented. Therefore, the spectator accepts more easily non-humans that still present the 'symbolic universal', as described in Chapter 1. As Van Baarle points out, the sympathy the spectator experiences due to anthropomorphism, can only exist because there is a clear distinction between the abilities of the human spectator and the performing robot. When this line between human and machine is blurred, the eerie feeling of experiencing the uncanny valley occurs.

66 Ibid, 40.

Therefore, I argue that because the jumping robot does not looks human enough to cause confusion whether the robot is actually human, one can strongly project human emotions on it. As the object is very clearly not a human, the spectator will not experience the uncanny valley. Verdonck shows with his jumping robot that one does not have to aim to make a robot that looks perfectly human to feel affinity for it. Rather, with making humanoids that resembles a human even in the smallest details, the uncanny valley is reached faster and the eerie feelings are more intense. Because *DANCER #3* avoids the uncanny valley, this performance achieves to show a human frailty of failing again and again.

3.4 Sound as language

Sometimes the jumping robot surprises by jumping up very high, very long or very short before falling over. Sometimes it seems as if it will lose his balance, but then he manages to keep himself up for a few more jumps before falling over. Nothing changes: the robot jumps, falls, gets lifted up and starts all over again. The software of the robot is programmed in such a way that its movements are random. The robot thus seems to decide how many times it will jump and when it will fall over.

It is constantly making typical robot-like sounds: little beeps that one can quickly relate to a computer or other technological apparatus. According to Kristof van Baarle those sounds "[…] give *DANCER #3* a more friendly and recognizable appearance, which demonstrates the importance of sound in the process of identification."[67] I agree that the sounds gives the robot a more friendly appearance. Who doesn't know the sounds the famous robot R2D2 in the Star Wars movies makes? The sounds function as a language, a way of communicating. The quick and high pitched sounds are friendly and thus a spectator tends to 'like' this robot instinctively, as it seems to talk to him. This sound symbolism, as it is called, allows a universal understanding of the use of sound.[68] Van Baarle states that sound helps the process of identification. Sounds can thus be interpreted as parts of a language and thus with the aim of communication help the process of identification.

3.5 Conclusion

Human beings tend to recognize faces and human emotions in almost anything: animals, bricks, lamps, and thus also in robots. It can be described as that what looks human or that

67 Ibid.

68 Leanne Hinton, Johanna Nichols, and John Ohala, "Introduction: Sound-symbolic processes", in *Sound Symbolism*, (Cambridge: Cambridge University Press, 1995), 1–12.

what makes one human. When encountering anthropomorphism, humans assign agency to a non-human object, such as *DANCER #3*. This machine's determination to jump is almost human-like, enabling the spectators to project human motivations and emotions onto the robot. There are three factors that increase the anthropomorphic gaze of the spectator during this performance. The first factor is its production of computer sounds which makes it look as if its communicating. The sound functions as a language, making it in the eye of the spectator a social being. The second factor is the fact that this robot is seen in a theatrical situation. This amplifies anthropomorphism, as Van Baarle points out, since the theatre is a 'space for presence'.[69] In the theatre, a basic anthropomorphism exists, as the spectator wants to follow a story, whether that is with puppets, dead objects or human performers. The third factor is that *DANCER #3* is performing alone, without the help of a human performer. The effect of the absence of humans on stage will be explored further in the next chapter.

What is unavoidable is that, as discussed in Chapter 2, the MNS will be activated the moment one sees this jumping robot. The goal-oriented movements it makes, recognizable for the spectator, help to project a drive onto the robot.

Although anthropomorphism is applied quite easily on objects, the exterior of the object itself determines whether or not an eerie feeling is felt by the spectator. Objects that resemble the appearance of a human too closely, have a risk of being in the uncanny valley: the spectator cannot see whether it is human or not and will experience a feeling of discomfort. *DANCER #3* does not evoke the eerie feeling of the uncanny valley. In the scheme of Masahiro Mori, the industrial robot is on the left side of the uncanny valley: it does not resemble the appearance of a human and creates just a little bit of affinity. However, the anthropomorphic factors enables to feel just as much affinity for a jumping robot as for a Bunraku puppet, mainly because of the theatrical setting these objects are watched in. Anthropomorphic feelings enable to see the jumping robot *DANCER #3*as a living entity that decides for its own.

69 Van Baarle, "The Critical Aesthetics of Performing Objects– Kris Verdonck", 40.

4 The effect of presence: Co-presence or a self-reflective audience

In the previous chapters I have looked at different ways a non-human entity can be understood and even perceived as an autonomous being by its audience. This works partly via the activation of the Mirror Neuron System, which allows people to understand movements by activating the same neurons that are normally activated by performing movement. Kinesthetic empathy ensures that people 'translate' movement into emotions. The other important way to understand non-human objects is via anthropomorphism. Humans, being social creatures, are constantly projecting their human feelings, drives, and emotions on animals and 'dead' objects that only have to look the slightest bit like something that evokes recognition: projecting a face in a building might be enough to feel empathy for it. These observations were supported by the performance analysis of *DANCER #3* in Chapter 3.

In this last chapter I look at the role of the human in combination with a non-human performer. As I pointed out it Chapter 2, during URLAND's performance the illusion of a robot that is performing all alone is broken when Marijn de Jong enters the stage. Whereas *DANCER #3* stays alone for the length of the performance on stage. I argue in this chapter that the robotic arm in *The Internet of Things/Prometheus de Vuurbrenger* is like a puppet and De Jong becomes not only a puppeteer when he enters the stage, but also becomes an actor – a character. Furthermore I explain how the total absence of the human performer leads to a reflective audience. This will help me answer my main question as it dives deeper into the way the audience will be activated in two situations: when a human performer is on stage or when the human performer is absent.

4.1 A reflective mode of looking

DANCER #3 is performing all by itself on stage. No humans are needed for this jumping robot to perform its jumps in front of an audience. Van Baarle, who was closely involved as PhD student and dramaturge with the development of *DANCER #3*, emphasizes that the software of the machine is programmed in such a way that the movements of the robots happen at random. There is not a pre-programmed sequence that the robot performs over and over. So even for the computer and the robot itself it is unknown what and how it will jump. This "[…]

creates a sensation that it has a certain control over its choreography."[70] This is merely an illusion as the movements are selected at random. The robot cannot influence at all its own performance.

And still, as Edward Scheer concludes, it seems that the performing robot is more about humans than one would think initially.[71] By deconstructing robotics, the human aspect becomes visible: A human frailty of trying and failing is more valuable than successful completing a task. I argue that this effect is increased by the absence of a human performer. The absence of a human on stage has an effect on the spectators. Theatre scholar Pedro Manuel describes how playing with non-human audiences or having no performers on stage, creates a different mode of looking by the audience. When a performer is removed, a reflective audience is created: here, the spectators will reflect on "their communal and individual selves"[72] and will question their relationship to the stage. The dramaturgy in *DANCER #3* is focusing on the anthropomorphic feelings the spectator projects on the jumping robots: the addition of Star Wars-like computer sounds, which seem to give the robot a voice and the inexhaustibility of the robot that only seems to fails and still does not give up. However, the fact that there is no human performer present makes the spectator self-reflexive. Theatre maker and dramaturge Helena Grehan describes this inner conflict she is having while looking at *DANCER #3.* Grehan notices that it is necessary to see the machine on stage as the 'other' – the performer:

> The dramaturgy in part three draws us in so that we respond to the figure emotionally. Yet as we do so we realize that this is perhaps a limited mode of response, one reliant on the trope of subject/object in crisis […] rather than one that is capable of listening to the machinic other.[73]

With the absence of a human performer, the spectator has to rethink his position and that of the performing machine. As Van Baarle notices, the absence of the human performer can be seen as a strategy to reflect the so-called 'decentering' of the human being. It shows a very post human perspective in which the human disappears and a reflection can take place between man and technology.[74] This, in turn, raises questions about the basic principles of

70 Scheer, "Robotics as New Media Dramaturgy." 40.
71 Ibid, 41.
72 Manuel, "Absent Audiences", 71.
73 Helena Grehan, "Actors, Spectators, and 'Vibrant' Objects.", *TDR: The Drama Review* 59, nr. 3 (2015): 138.
74 van Baarle, "The performer is absent: spaces of absence in the contemporary performing arts", 1.

theatre. Do you applaud at the end of the performance-installation *DANCER #3*? When *does* it end? And who are you applauding? The invisible maker of the performance? Or the robot that, at the end of the performance, is no more than a 'dead' object?

Substitutability of humanity in the current technological world comes to the mind. It is a common Western fear that robots will replace humans, and, to a certain extent they most likely will.[75] According to an Oxford study form 2013, almost 50% of all existing jobs can and will be replaced by robots that can work more efficiently.[76] Although choreographers only have a 0,4% probability of being replaced, the probability that actors will be replaced is already up to 37%, making it a job with one of the highest risks to be replaced by a machine of the cultural sector (see Figure 7). [77]

We can no longer deny that humans can be replaced by robots. Van Baarle draws partly on the conclusion that Manuel also made. Absence gives space to reflection: "Absence or spectral presence, combines a reflection on a current condition and a claim for post-anthropocentrism, for acknowledging these nonhuman entities' place in the world and taking them up in 'politics'."[78] This is also what I observe when looking at *DANCER #3*: it evoked an awareness of the capability that I can identify with a jumping robot, and feel affinity for it. For as long as the performance lasts, this is not an object but an entity. At the same time it is a reminder that this situation of a performing robot, without the help of any human is the future. The absence of a human being allows non-human objects to be viewed as full entities and also activates a more reflective mode of looking.

75 Frédéric Kaplan, "Who is afraid of the humanoid? Investigating cultural differences in the acceptance of robots", *International journal of humanoid robotics* 1, nr. 03 (2004): 465–80.
76 Carl Benedikt Frey en Michael A. Osborne, "The future of employment: how susceptible are jobs to computerisation?", *Technological Forecasting and Social Change* 114 (2017): 254–280.
77 Ibid.
78 van Baarle, "The performer is absent: spaces of absence in the contemporary performing arts", 11.

Rank	Computerisable Probability	Label	SOC code	Occupation
1.	0.0028		29-1125	Recreational Therapists
2.	0.003		49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers
3.	0.003		11-9161	Emergency Management Directors
4.	0.0031		21-1023	Mental Health and Substance Abuse Social Workers
5.	0.0033		29-1181	Audiologists
6.	0.0035		29-1122	Occupational Therapists
7.	0.0035		29-2091	Orthotists and Prosthetists
8.	0.0035		21-1022	Healthcare Social Workers
9.	0.0036		29-1022	Oral and Maxillofacial Surgeons
10.	0.0036		33-1021	First-Line Supervisors of Fire Fighting and Prevention Workers
11.	0.0039		29-1031	Dietitians and Nutritionists
12.	0.0039		11-9081	Lodging Managers
13.	0.004		27-2032	Choreographers
14.	0.0041		41-9031	Sales Engineers
15.	0.0042	0	29-1060	Physicians and Surgeons
16.	0.0042		25-9031	Instructional Coordinators
17.	0.0043		19-3039	Psychologists, All Other
18.	0.0044		33-1012	First-Line Supervisors of Police and Detectives
19.	0.0044	0	29-1021	Dentists, General
46.	0.009	0	29-1111	Registered Nurses
47.	0.0094		21-1015	Rehabilitation Counselors
48.	0.0095		25-3999	Teachers and Instructors, All Other
49.	0.0095		19-4092	Forensic Science Technicians
50.	0.01		39-5091	Makeup Artists, Theatrical and Performance
51.	0.01		17-2121	Marine Engineers and Naval Architects
257.	0.37		39-4021	Funeral Attendants
258.	0.37		47-5081	Helpers–Extraction Workers
259.	0.37		27-2011	Actors
260.	0.37		53-7111	Mine Shuttle Car Operators
261.	0.38		49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
262.	0.38	1	17-1022	Surveyors

Figure 7: Parts of a bigger scheme of the Oxford study "The Future of Employment". Displayed are jobs with a probability from 0 to 1 of being replaced.

4.2 From being a puppeteer to creating a co-presence

The notion of presence and absence is very different when analyzing URLAND's *The Internet of Things/Promeutheus De Vuurbrenger.* Since the performers are sitting behind a semi-transparent curtain, their physical presence is easily felt. The robotic arm is not completely alone on stage, rather, there is a kind of co-presence between the 'invisible' humans and the

performing machine. This feeling is akin to what also can be felt and seen during a puppetry performance. In chapter one, I noticed that robots on stage can be seen as a form of puppet theatre, as it is the human that still has control over the robot. A relation of 'self' to the 'other' between two beings takes place. The puppeteer as a conscious subject and the puppet as a 'dead' object together create what Paul Piris calls an 'ontological ambiguity': the puppeteer is the conscious subject, and the puppet the lifeless object.[79] However, with ontological ambiguity, the puppet actually is presenting the living subject despite being no more than an object. "Co-presence stresses this ontological ambiguity by confronting the puppet with a human protagonist"[80] It is the puppeteer who will focus all his attention on the puppet and eliminate himself despite being visible. Roland Barthes notices that during a performance with Bunraku puppets, the puppeteers are "visible and impassive at the same time": they move without expressing any emotion toward to the puppet, elegant and swift.[81] "[…] there is nothing to be read", concludes Barthes.[82] The puppet stresses the ontological ambiguity, as the object becomes the subject.

The same happens to a certain degree in *The Internet of Things/Prometheus De Vuurbrenger.* The spectator can clearly notice that the performers are present, although not visible. Since the curtain is semi-transparent, the performers can see what is happening in front of them. This gives the impression that the performers *have* to see what is going on in front of the curtain. As a spectator, one already suspects that the performers are mixing all their sounds and music live, so why cannot they also not program the movements of the robotic arm live? Whether this is actually the case, cannot be seen. This thought, however, makes from the human performers puppeteers that try to make themselves as invisible as possible, without losing the control over the puppet. Just like the Bunraku puppet has three people to make it alive, this robotic arm now seems to have four puppeteers who are hiding behind a curtain. The thought of programming the robotic arm on the spot is confirmed when Marijn Alexander de Jong appears from behind the curtain with a remote control in his hands.

At that moment the relationship between puppeteer and puppet changes drastically. When De Jong enters the visible part of the stage, he is no longer only a puppeteer, like the Bunraku puppeteers are: he is not making himself invisible to point the attention to the robot.

79 Paul Piris, "The Co-Presence and Ontological Ambiguity of the Puppet", in *Routledge Companion to Puppetry and Material Performance* (Oxon & New York: Routledge, 2014), 30–42.
80 Ibid.
81 Roland Barthes, "The Dolls of Bunraku", *Diacritics* 6, nr. 4 (1976): 45.
82 Ibid.

He is actually is doing the opposite. A co-presence is created, in which De Jong is a different character than the robotic arm. The robotic arm, and the spectator with it, is confronted with a human protagonist. Piris argues that "[…] Co-presence is different from the simple visible presence of puppeteers on stage because, in this case, puppeteers do not bear any dramaturgical presence."[83] This means that the puppet is, dramaturgically seen, the only one that tells the story. The puppeteer is subjective to the puppet he controls. This corresponds with Barthes' description of the Bunraku puppeteers: the leader's head doesn't have any make-up on, which makes him looks nontheatrical. The head of the other puppeteers are covered with black cloth. They are not acting, but just 'being' there and moving the puppets. There lies the difference with creating a co-presence: When the puppeteer has to create both a character for the puppet and for himself, he is more than a puppeteer, he is also an actor. The co-presence De Jong creates is a special one because he does not have to have a physical connection with the robotic arm: the only evidence that he is giving movement to the robotic arm at that moment is because of the remote control in his hands.

4.3 Conclusion

The absence and presence of a human performer in the two works that are of central concern in this thesis, both provoke a different reaction. The robotic arm in *The Internet of Things* is not alone on stage, but the performers are barely visible. This semi-presence can be felt and seen by the spectators and ensures that the robot can be seen more as a puppet rather than an autonomous entity. The puppeteers stay almost invisible behind the curtains, up until the moment that Marijn de Jong appears from behind the curtains. From that moment, a co-presence is formed, in which Marijn is not just the puppeteer with a control in his hands but becomes an actor, a character. The *DANCER #3* performs during the whole performance on its own, without any humans on stage. This absence of a human performer makes the audience self-reflective as it projects human feelings and drives onto the jumping robot. It makes the spectator aware of the replicability of a human and at the same time, the jumping robot shows features that are normally only attributed to a human: perseverance and the ability to communicate. Absence of a human performer adds to a self-reflexive audience, that will become aware of its own modes of looking: in the case of *DANCER #3*, the audience becomes aware of their own anthropomorphic feelings towards a 'dead' object. Furthermore, the spectator is able to make a link from the performance to reality. The jumping robot can learn

83 Piris, "The Co-Presence and Ontological Ambiguity of the Puppet", 31.

the spectator something about what it is to be human. When the human performer is on stage, this whole self-reflectivity disappears. The robotic arm in *The Internet of Things* becomes a puppet, because it is revealed how the mechanism operates: a control transforms the non-human object into a puppet.

Conclusion

This thesis answers the question *How do certain movements and interactions made by a technological non-human object, functioning as a performer, allow for an experience of seeing it as an autonomous performer by the spectator?* In four chapters I discussed how non-human object can be seen as performers, why a spectator can experience a robotic performer similar as a human performer and what effect the (co-)presence of a human performer on stage has for the understanding of a non-human performer.

As discussed in the first chapter, both Elinor Fuchs and Heinrich von Kleist notice that a human performer is unable to repeat his movements or acts his intentions out exactly the same as he did the first time. Human performers prevent the spectator to focus on the relationship between levels of dramaturgy of a performance instead of the individual qualities of the human performer. They cannot undo themselves of their own characteristics and are not able to perform the same movement exactly the same with exactly the same intention. Therefore, puppets, masks and objects are used to replace this human individual and to create a symbolic universal: a symbolism that every spectator understands.

Bruno Latour argues that objects in daily life also are actors, as they execute actions and are part of what he calls the Actor Network. The technological non-human objects in *The Internet of Things* and *DANCER #*3 can be seen as actors and performers as they are actors placed in a theatre setting, performing actions intended to be seen by an audience.

In Chapter 2 and 3, I discussed two different ways how the spectator experiences a non-human performer. One is based on movement and the recognition of movement via the Mirror Neuron System (MNS). Mirror neurons copy and execute the movements seen by a spectator and thereby the spectator will understand the movements that are being made by a dancer, an actor or a non-human, as the robotic arm in *The Internet of Things*. Goal-oriented movements are important as this gives the spectator a clue in what it is the robotic arm wants to do and also in how it feels. The MNS evokes kinesthetic empathy: empathy that derives from the movements made. Because of this, the body of the spectator understands the movements the robotic arm makes and the spectator projects what emotions the robotic arm displays. The MNS can be seen as an interaction between spectator and performer, as the movement of the robot triggers a reaction in the spectator.

The second way of seeing a non-human performer as an autonomous performer is through the theoretical lens of anthropomorphism. People tend to project human characteristics on animals and objects. The stage enhances a basic anthropomorphism, since it is the 'space for presence', as Kristof van Baarle notices.[84] However, an object that looks very human, can provoke an eerie feeling by the spectator. Because of this effect, known as the uncanny valley, there is a point where objects give people an eerie feeling rather than that they evoke feelings of affinity. That does not mean that anthropomorphism is not felt: as social being, people project anthropomorphic feelings on anything that seems slighty human. Movement makes the affinity for an object stronger, yet it can also make the feeling of eeriness more intense. The jumping robot *DANCER #3* makes computer sounds which can be seen as a way of communication. This gives it a friendly appearance while it jumps and falls. This repetition of action is read by the spectator as a certain –enlargement of what is human– determination to complete its goal.

After seeing the performances *The Internet of Things* and *DANCER #3* I conclude that both ways of understanding a technological non-human performer as autonomous happen at the same time. The MNS is a physical reaction that lets one understand the movements of an object, whereas anthropomorphism is a more mental process, in which one projects that what is human onto non-human objects. The MNS is activated in different situations throughout the whole day. When one sees a cup, the MNS is activated, ready to pick it up, When one sees a robot jumping around, it too is activated to let one understand the movements its making. At the same time, a spectator would project human emotions and feelings to both the robotic arm and the jumping robot. Both robots evoke an anthropomorphic reaction by the audience.

I conclude that in order to achieve an experience of a non-human performer as autonomous, three conditions should be met. The spectator's MNS is activated and kinesthetic empathy is felt. Actively, anthropomorphic characters are ascribed to the non-human object on stage. Key to understanding of a non-human performer as an autonomous performer is the absence or presence of a human performer. Co-presence is not desirable, as it disables the full understanding of the object as autonomous performer. Lastly, the object must not appear too human-like, as the uncanny valley must be avoided. Of course, the feeling of eerieness can also be aimed for in the theatre. However, to vividly experience a non-human object as an autonomous performer, this uncanny feeling is not desirable.

84 Van Baarle, "The Critical Aesthetics of Performing Objects– Kris Verdonck", 40.

This thesis broadens the understanding of non-human objects in a theatrical setting. By analyzing performances with a theatrical setting, one understands that non-human objects can easily replace the human actor. The spectators understand its movements in the same way as they understand the movements of a human dancer. It evokes kinesthetic empathy in the same way that a human performer does. The most striking observation perhaps is that the spectator does not care. Even though he is aware he is looking at a non-human object, he gladly accepts this suspension of disbelief.

At the same time, the line between human and object is blurred, not only in the theatre, but just as much in daily life. It seems as if we are wired to understand robotic movements the same as human movements, as Gazzola et al. describes.[85] People are confronted with objects that communicate with them and influence them on a daily basis. Computers, smartphones, cars, and also real robots find their way into society. This analysis of understanding non-human objects is also valuable in fields where robots are actually used in a social context. Think about PARO, a therapeutic robot shaped like a seal which is deployed in hospitals and elderly homes to elicit emotional responses. It is designed to have a calming effect on patients, meaning that the movements and sounds that PARO makes should be recognizable and affective to the 'spectator' (see Figure 8). Robots and other non-human objects that are more than only actors, enter the human domain even more in the future and therefore it is necessary to understand how one can identify with and feel empathy for a non-human object.

As it is clear that non-human actors are not only present in the theatre, but also in daily life, this thesis opens up to different subjects to follow-up research to understand how robot for example can be understood outside the domain of theatre. Roboticists are currently investigating how robots can imitate human movement in such a way that it does not evoke the eerie feeling of the uncanny valley. For this, the Laban movement schemata are used. It could be interesting to focus on Laban to investigate how roboticists inbed Laban into the movement of robots. Laban is seemingly seen as *the* way to create movements for robots. I think it might be worthwhile to invenstigate why Laban is seen this way and what other movements, not based on Laban can be usefull. Megumi Masuda et al. (2010 & 2009), Tino Lourens et al. (2010) and Heather Knight et al. (2014) are examples of publications on this topic. In addition, the field of theatre can be used as a laboratory to examine how non-human

85 Gazzola e.a., "The anthropomorphic brain: the mirror neuron system responds to human and robotic actions", 1680.

objects can establish a social connection to a human. Cynthia Breazeal et al. (2003) started to experiment on this in a very practical way by placing several social robots in a theatre setting in which the audience could interact with the robots. As robots enter our social domain more and more, research that is done within a theatrical setting can become relevant for studies in our daily life.

Figure 8: PARO the robot seal and an elderly woman. Photo: Motonari Tagawa

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