

# A posthuman performance

Enacting the potentiality of artificial intelligence through  
relationality on stage

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## Abstract

Keywords: posthumanism, relationality, AI, potentiality, performance, improvisation, embodiment

As integrated AI and technologies increasingly grow as fundamental tools of everyday life, many cross-disciplinary projects explore the potentiality of advanced technologies in a performance setting (Gemeinbroeck 2021; Gemeinbroeck and Saunders 2021; Malinowska 2021). These performances (intentionally) serve as both aesthetic practices and experimental research in combining technological expertise with theoretical insight from disciplines of the computer and social sciences, humanities, and arts. Improbots is an experimental improvisational theatre show performed by a collective of human improvisers and ALEx, a computational improviser. Exploring how the human and non-human improvisers collaborate to build a scene on stage, this study centralises the live constitution of trans-human relationality in a variety of embodied expressions. Though ALEx is inherently a bodiless software system, it adopts a couple of different bodily representations throughout the performance, which strongly affect the nature and implications of the human-AI collaboration. This ethnographic enquiry thus sets out to explore the material and relational conditions of the practices that foster post-human relationality. Furthermore, this study delineates the Improbots experiment as a collective practice of improvisation that deconstructs meaning-making as an exclusively human or mental practice. Participation in the performative exercise on stage encourages human actors and audiences to actively reconfigure humanist conceptions of meaning and relationality. As such, in exploring how biological and technological processes merge through different mental and material practices on stage, this research project conceptualises the emergence of a post-human performance. I argue that this is realised through the post-structural and performative potential of the performance, as a medium that facilitates a semiotic, collaborative, and creative process of emergence beyond structural boundaries. The performance offers the virtuality to play with the potentialities of AI-human configurations without having to meet the structural conditions of reality.

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## I. Introduction

The rapidly evolving phenomenon of technology plays a central role within contemporary, post-industrial society. The ever-increasing number of applications and algorithms embedded in daily life immediately impact the formation of the human subject. With the average human spending roughly a third of waking hours on technological devices (BBC 2022), technology has become more than merely an accessory to human existence. The relation, interaction, or mere co-existence between the human and computer brings forth a dialectic, yet continual co-constitution of one another (Idhe 2002). To fully capture the intra-active nature of the human and machine respectively, one must consider them in the collective and interconnected arrangements wherein they are situated (Barad 2007; Deleuze 1995). Prior to this ethnographic enquiry, I had already engaged with posthuman theory which deals with the implications of these human-machine configurations (Braidotti 2013; Haraway 1985), yet they had always remained very abstract to me. Improbotics, as a performance that actively materialises these relations on stage, allowed me to witness these socio-material relations transform from a theoretical construct to an empirical phenomenon. As such, this research pursues the ethnographic investigation of a situated, small-scale human-machine network, which reveals, rather than represents, the conditions of larger cybernetic assemblages.

Improbotics is an international theatre project that sets out to heuristically explore and stage artificially intelligent systems in interaction with humans during live and online improvisational theatre performances. The experiment is rooted in the technical pursuit of reproducing the human function of conversational natural language processing by an AI system and exploring the potential of this non-human capability on stage. While the AI system demonstrates impressive natural language processing skills, it tends to produce culturally incongruent or absurd output due to its limited capacity for enactive and linguistic grounding (Brooks 1999; Steels 2012). Consequentially, this may inhibit a 'meaningful' interaction for the human subject. This research was inspired by such reoccurring moments of semiotic incongruence on stage and how they force the performers to actively reconfigure a trans-human mode of meaning-making.

The emergence of the COVID-19 crisis has inflicted long-term damage on many industries, however, the cultural sector was among the most affected (OECD 2020). To survive in the pandemic climate, venue-based cultural events were forced to undergo dramatic adjustments, such as complete closure, the implementation of social distancing measures, and/or the digitalization of cultural experiences. This ethnographic project was prompted by the re-emergence of the (live) performance and its beneficial role within culture-(re-)building processes since the lifting of lockdown measures in August 2020. It intends to highlight the potentiality and necessity of the performing arts as means to enrich, inspire, and transform society. Improbotics was the first live theatre show I attended after a cultural drought of approximately two years. Its unique and experimental format by which the potentials of AI are explored through a performative manner instantaneously impelled me to pursue Improbotics ethnographically. Furthermore, I was drawn to the Improbotics performance as it addresses the dichotomies of nature-culture and human-other, as central features in contemporary, anthropogenic society. In witnessing the staged entanglement of human and machine, this project recognises the potential of the Improbotics experiment in revealing the intertwinement of human and 'other'. Improbotics showcases the amalgamation of human and non-human processes in the co-construction of a cyborg figure, which performatively dissolves deeply embedded anthropogenic binaries (Haraway 1985).

Drawing on insights from both performance studies and performative theory (Barad 2003; Butler 2000, 2004), this study presumes the capacity of performance acts to actively shape culture and inflict social change and acknowledges the performance not merely as a means for representing culture, but also reconstructing it (Artaud 1970; Benjamin 1998). This research draws on the assumption that the performance is a medium of human expression that unifies the individual performer with the wider public and bridges the performance with reality (Schechner 2002; Turner 1969). It thus delineates the onstage performance as a more-than-symbolic practice that actively constructs conditions of life, rather than as fictional accounts of existing structures that merely represent reality. I argue that staging human-machine interaction enables a mutual semiotic dialectic to unfold as a performative force (Butler 2004; Loxley 2003). In this regard, Improbabilities relies upon the performance as a dynamic instrument for both exploring and enacting new cybernetic realities off-stage.

Inspired by post-phenomenological concepts of relationality and embodiment (Idhe 2002; O'Brien 2017), this study presumes that the Improbabilities performance transpires from a larger socio-material network of agents. I approach the experiment as a semiotic negotiation amongst multiple embodied and disembodied agents on stage and investigate how these varying modes of embodiment reveal the potential of AI-human relationality to manifest across a multiplicity of physical and mental substrates. In terms of academic contributions, this ethnographic project predominantly builds on contemporary research on embodied meaning-making (Gemeinbroeck 2021; Gemeinbroeck and Saunders 2021; Malinowska 2021) by examining the material aspect of trans-human relationality in a performance setting. Whereas prior studies have primarily emphasised the physicality of the cybernetic interaction, this research also caters to linguistic interactions (mental-based) in an all-encompassing and collaborative practice of meaning-making.

Moreover, this ethnographic enquiry also strongly relies upon cybernetic and cyborg theory as theoretical approaches that strongly align with the post-humanist lens. Both cybernetics and posthuman theory presume the existence of a universal system (of communication) that reaches beyond the boundary of the human/non-human, being/non-being, and organisms/machines (Bateson 1979; Haraway 1985; Scott 2021). In attempt to conceptualise a post-human performance, I examine the AI as a co-created and emergent dynamic on stage that intervenes humanist semiotic acts, and thereby dissolves the boundaries of the technological/biological, cognitive/creative, and mental/bodily processes. The interdependence of the biological and technological systems is an interesting discussion, which holds much relevance to the anthropological discipline. In applying figurations of the posthuman and cyborg (Braidotti 2013; Haraway 1985), anthropology may promote the dissolution of structural boundaries that inhibit a harmonious and fruitful co-existence with 'the other' in a general sense. This study is devoted to continuity and intertwinement with 'otherness' that is manifested through embodied meaning-making with an AI system.

## II. The performance that is my research, and the audience that therefore I am

### i. The performance/research

“We tend, or let’s say society, tends to favour one [sciences versus arts] at the expense of the other. I am interested in liminal spaces and the cross-pollination of ideas.” (Piotr, co-founder Improbabilities. Interview by author. October 22, 2021)

Improbabilities is an improvisational theatre show produced by the human-robot improvisation collective HumanMachine. Having co-founded Improbabilities, Piotr sought to merge multiple of his personal passions in life. Uniting technology and the arts, Improbabilities extends the processes of building, innovating, and playing with (AI) technology to the theatrical world. He argues that the relation between art and science is open and fluid, thus opposing the strict segregation of both fields. Though science and art are inherently divergent in terms of their epistemological and societal implications, and therefore are traditionally regarded as contrasting disciplines, Improbabilities seeks to explore the compatibility between the two. The cross-disciplinary approach has enabled Improbabilities to incorporate distinct elements from both scientific experiments and theatre performances as he describes it as a “constantly negotiated balance”. The oscillation by which Improbabilities continue to evolve as an organisation reinforces the experimental quality of improv theatre, which is also heightened through the collaboration with artificial intelligence.

Though the original performance was developed and executed in London, the format of the Improbabilities show has since been adopted by Ben in Belgium and Jenny in Sweden. ALEx (Artificial Language Experiment), as a key actor who distinguishes the show from traditional improvisation, performs in all three productions. ALEx is an advanced conversational chatbot, that generates text-based output in communication with humans (Mirowski and Matthewson 2019). ALEx is specifically designed to participate in theatrical activity as it is trained on a vast amount of data of film dialogue extracted from OpenSubtitles (Tiedemann 2009). As a digital agent on stage, ALEx’s text-based output is projected upon two different forms of embodiment during the performance, namely the humanoid robot and cyborg. This variety in material expressions of the chatbot on stage enables the experimentation and demonstration of ALEx’s potentiality in varying linguistic and physical expressions. Both the interaction between human and machine as separate agents (1) and the unification of human and machine as a cyborg (2) enables exploration into different ways of relating to the AI system.



Figure 1: Picture of Improbotics Flanders (Belgium) crew. Photo by author (2021).

Improbotics have curated the chatbot system to communicate using the following two embodiments throughout the different scenes within the show. In the humanoid robot scenes, ALEx is directly connected to a text-to-speech system, such that actors collaboratively perform in interaction with a human-like voice. This voice is indirectly connected to a plastic, mechanical humanoid robot, allowing human actors to play with a physical representation of the chatbot. During online performances, the physical humanoid robot is replaced by a virtual embodiment.

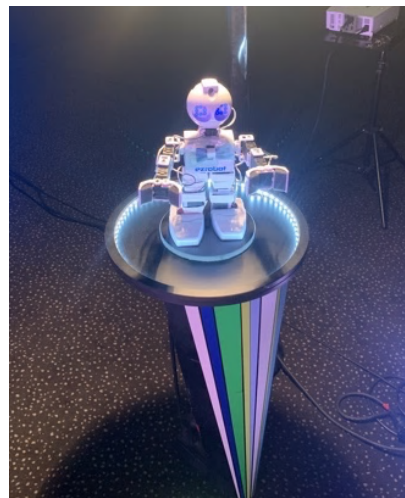


Figure 2: Picture of plastic humanoid embodiment. Photo by author (2021).

For the cyborg scenes, a human performer receives the AI-generated lines via an earpiece, which they must verbalize and embody in the scene. This allows the human to adopt the internal (cognitive) processing of the chatbot system and frame the AI-generated lines as a human experience. This format implies a convergence of the human and ALEx as a unified cyborg agent (unification of computational processing and the human processes as an enclosed system).



Figure 3: Picture of cyborg embodiment. Photo by author (2021).

Improbabilities adopts an interdisciplinary and collaborative approach in co-creating a “novel art form” (Improbabilities n.d.). This experimental format is procreative on multiple levels, such that it engenders a certain potentiality for both the human and machine. For human participants, Improbabilities is an innovative and challenging improvisational exercise that allows them to enhance their ability to adapt, co-create and contextualise through mental and bodily processes. In terms of AI development, Improbabilities is a means of further exploring and expanding the capabilities of this specific computational system and its multitudinous potential in collaboration with human agents. And so, the Improbabilities experiment is rooted in both the ambition of extending human improvisation capabilities and delving further into the potentials of AI, in an all-encompassing pursuit of building and enhancing cybernetic relationalities.

## ii. The audience/ethnographer

Having just visited my family in the UK in the summer holidays of 2021, my boyfriend Stijn and I were passing through London on our way back to Belgium. Keen to experience some London theatre, we browsed the internet for any shows in the area. We came across the Rosetta Code, “a revolutionary AI-powered multilingual improv comedy show” produced by a theatre collective named Improbabilities (The Cockpit 2020). The performance was experimental, innovative, and unlike any theatrical performance I had ever witnessed before. It amused me, yet it also induced many anthropological questions within me that permeated the passivity of my amusement. In recognising theoretical concepts applied and explored in practise, I could sense that the Improbabilities performance had the potential to heighten my own experience with post-humanism to a deeper level. My previous encounters with post-humanism had always remained at a very theoretical and conceptual level, yet this performance allowed me to witness the materialisation of post-human theory itself. This was an enlightening experience which one could describe as a transition of post-humanism from meaning to matter, or from paper to podium. At the time I was within an ace of starting my research project on dementia, yet after attending the Improbabilities performance I felt instantaneously compelled to pursue Improbabilities as my object of study. Stijn and I grabbed a beer after the performance. As soon as I spotted Piotr grabbing one too, I approached him and presented my spontaneous, yet very profound ambition to study Improbabilities for my master thesis.

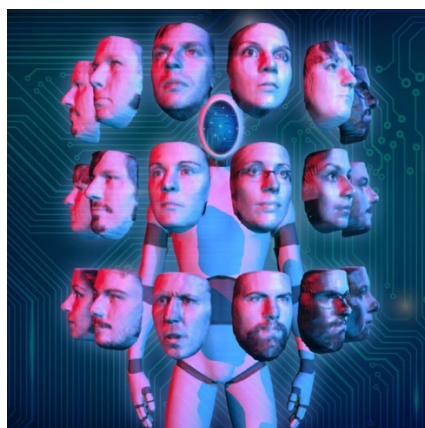


Figure 4: Poster image for Rosetta Code performance at Cockpit theatre in August (Cockpit 2021).

As such, my first encounter with Improbabilities was not through the eyes of an ethnographer, but of an audience member. The initial intrigue in the performance was not sparked by academic curiosity, but rather by an attraction to Improbabilities as a form of aesthetic recreation. Prior to my research interests, I experienced the performance as an unaffiliated spectator of the show. Nevertheless, I understand the ethnographer and spectator as closely related positioning. Both the spectator and the ethnographer, who exists off-stage, are crucial apparatuses for the enactment of emergent phenomena 'on stage' or 'in the field' (Rancière 2010). Both the ethnographer and the spectator are not "neutral probes or structures", but rather "dynamic (re)configurings of the world" (Barad 2003, 816). This new materialist understanding of both the ethnographer and spectator as an apparatus implies that they both carry out open-ended practices constitutive of realities in the making. This suggests that the paradoxical relationship that exists between the spectator and the performance applies to the relationship between the ethnographer and the field (Rancière 2010): although the spectator is situated outside of the stage/performance, the performance becomes a performance through the presence of an audience. Despite the inherent separation of audience-performance, the spectator is a basic feature of the performance, who exerts a certain doing without which the performance could not exist. In this sense, the spectator's being and doing must be considered as a constituent part of the becoming of performance, much like the researcher's positioning within the emergence of a research project.

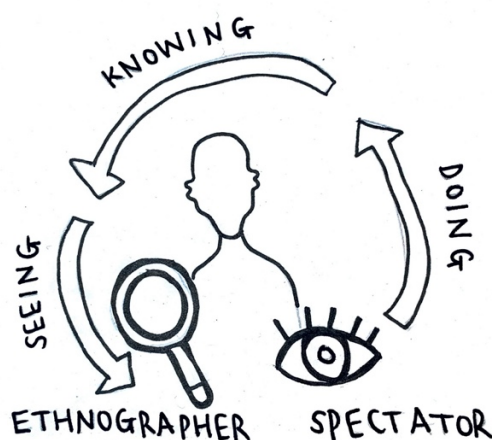


Figure 5: Sketch of conceptualisation ethnographer and spectator. Sketch by author (2021).

### III. Methodology

Before commencing the ethnographic enquiry, I scheduled an individual meeting with both Piotr (Improbabilities UK) and Ben (Improbabilities Flanders) to go over the outline of the research design. Here it was discussed what research questions, areas of interest, and methodologies would be pursued. This introductory meeting was arranged as an initial attempt to achieve a certain degree of ethnographic transparency and balance between the “emergence of the interviewee’s perspective [and] the researcher’s own research agenda” (Tomlinson 1989, 155). Investigating both the UK and Flemish branch within the Improbabilities organisation, this ethnography applied a multi-sited approach. The two-folded design enabled the exploration of multiple ways in which the relations to the AI software are materialised and presented within a performance format. Although both branches differ considerably in terms of their theatrical execution, this research aims to highlight the common experience on stage which encompasses both theatrical variations. This generalisation does not mean to disregard the individual performative approaches in their own regard. The interview design was amended to cater to the practices within each specific branch, and the role or function of the participant within that team. Interview questions were also progressively adapted throughout the data collection period as novel insights arose from previous interviews. Navigating both the Dutch and English language throughout this research, it was my responsibility as the ethnographer to communicate effectively with the multi-lingual field and consider the linguistic and translation processes for the data analysis. All translations are mine, produced through critical sense-making of multi-lingual meanings (Maclean 2007).

The research design consisted of the amalgamation of both online and offline ethnography in a hybrid ethnography format (Przybylski 2021). Mixing both methods enabled multiple levels of analysis. The inclusion of online ethnography within this research is relevant as it does not concern how I as a researcher approach the field, but also how participants create, act and perform within the digital realm. The offline ethnography consisted of the attendance of physical rehearsals and performances and the conduct of face-to-face semi-structured interviews. Online ethnography encompassed the observation of live online rehearsals and performances, conducting website and programme analysis, and doing semi-structured interviews over zoom.

A total of 9 interviews were conducted with improvisers from Improbabilities UK, Flanders and Sweden to obtain deeper insight into the human subjectivity involved in the performative acts. All improvisers had distinctly different professional backgrounds, yet were all convincingly passionate about improvisational theatre. The aim of the interviews was to better understand how human agents understand ALEx’s improvisational capacity and their relation to ALEx on stage. The interviews emphasised participants’ intuition in how these trans-human, semiotic performances are experienced. More specifically, the interviews contained the following themes; Improbabilities as a process versus product; as an experiment versus entertainment; relationality; embodiment; intertwinement of creative-cognitive processes. In attempt to include a certain level of diversity amongst respondents, I targeted members with both a background in theatre and/or technology as an epistemological strategy to achieve knowledge that is well-balanced in both the arts and (computer) sciences, often regarded as almost dichotomous disciplines. By including an equal distribution of both perspectives within the data analysis, I intended to dissolve the clichéd binary structure separating the arts from the sciences. All interviews were recorded with consent, such that the transcriptions of the interviews could be reviewed and processed for data analysis.

Additionally, this ethnographic project includes direct observation of rehearsals and performances, taking place both online and offline. The implementation of observation as an ethnographic tool reaffirmed my simultaneous identity as a researcher relating to the field and audience relating to the stage. I did not merely observe, but I was

engaged, immersed, and both cognitively and emotionally invested. Although I was not actively participating in the performance on-stage, I recognised my performative capacity as an agent off-stage. During the observational research, I assumed that the performance is an active, processual means for meaning-making, while acknowledging my own meaning-making capacity as an ethnographer. Descriptions and insights from the observational research were documented through written and/or typed notes.

Online ethnography included the review and analysis of the Improbabilities software (i.e., chatbot and audience suggestion page) and website. The analysis of the Improbabilities website allowed me as an ethnographer to understand how Improbabilities perform their identity and mission online as an organisation. The analysis of the software programmes was a means dedicated to understanding the machine involved in the processes of performative and creative collaboration. Much like the in-depth interviews with human actors, the software analysis pursued a deeper understanding of the intricacies of the digital agent. The digital investigation of software programmes aimed to parallel the in-depth interviews wherein the subjectivity of the human agents was emphasised. Both the human and machine were explored as individual actors with their respective varying ontologies (McCart 2019), before being studied in a collaborative, relational context.

#### i. Performative lens: breaking the fourth wall<sup>1</sup>

“I don't remember exactly where I picked it up, [...] what has always spoken to me the most was to take whatever happens on stage as absolute reality.” (Jutta, improviser. Interview by author. November 10, 2021)

Richard Schechner (2002), one of the founders of Performance Studies, advocates for the acknowledgement of performances in close relation to life, thereby reconceptualising public performances, ceremonial rituals and performing social roles in the everyday as one continuum. Moreover, he approaches the theatrical performance in an all-encompassing sense, highlighting the contextual aspects of the performative event. His work calls for a greater emphasis on the whole range of experiences and interactions that surround the staged performance (Loxley 2003). He recognises the multitude of elements and experiences that exist or take place off-stage (amongst spectating and/or performing agents, spaces, and objects), that are crucial to understand the effect of the performative activity. Schechner (2002) is invested in dissolving the boundaries that reinforce the tension between the on-stage and the off-stage; the audience and the performers; and ultimately, the performance and life. I would argue that improvisational theatre does not impose these same conditions of segregation to the same extent as traditional theatre. Improvisational theatre inherently disrupts the boundaries of on-stage and off-stage processes as the audience is invited to actively participate in the construction of the performance through providing suggestions or cues for the scenes<sup>2</sup>. Every scene is initiated, and thus co-created by its spectators, which perhaps metaphorically represents the performative capacity of the audience within the (re)configuration of

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<sup>1</sup> *Breaking the fourth wall* is a performance convention that breaks the illusion of the wall that separates the actors from the audience. This may occur when a character on stage acknowledges his/her fictionality and/or addresses the audience.

<sup>2</sup> Audience suggestions are “concepts, facts or things which the improv player or the moderator ascertains or receives from the audience, before beginning a game or a scene. The scene is based on these, or they will be incorporated into the scene” (Improwiki n.d.).



reality on stage. More so than traditional, scripted theatre, improvisation theatre seeks to actively relocate the spectator from an outsider to a performative agent.

Performance theory has since penetrated theory and methodology of the social sciences as the 'performative turn' (Dirksmeier and Helbrecht 2008). The term performativity discards the assumption that subjects are (exclusively) subject to structural conditions of the world, but rather actively contribute to an ongoing, dynamic, relational enactment of the world through material-discursive practices (Barad 2003; Butler 1988). The methodological implication of performativity redefines representationalism as it invites for the shift from a reflexive to performative approach in acknowledging and engaging with the materialising practices of researchers within the field. Performative methodology affirmatively deals with the shortcomings of representational practices so deeply engrained in scientific research, by reconceptualising the researcher's agency in direct engagement with the material and discursive environments one engages with (Barad 2003). As a methodology, it aligns with Schechner (2002) in emphasising the role of off-stage practices during the staged performance. Both performative theory within the social sciences and performance studies seek to reconceptualise performance and research as phenomena that transcend the borders which distinguish art and science against everyday life. In line with this, this research recognises that my performativity exerted as a spectator/researcher situated 'off-stage' is a key feature of the performance/research 'on stage'. My onto-epistemological position as a researcher forges an interpretation of the performance that co-constitutes the performance itself. This performative methodology therefore presumes the amalgamation of being and doing, self and other, and human and non-human. The methodological lens applied for this research assumes the performative capacity of the Improbabilities performance. Spectators and performers are accepted as agents of a collective practice wherein the performance exists as a mediality that unites them. The performative approach implies the deconstruction of the imaginary border separating the audience from performers, and the performance from reality. In conceptualising the realm of actuality and virtuality as entangled spaces, this study recognizes the continuity of the Improbabilities performance and contemporary technological society wherein the performance is located (Artaud 1970; Deleuze and Parnet 1977). It applies the precondition that the performance must be accepted as an absolute reality in order to reap the fullest potential of the practice. This lens directly extends to my own position as a spectator and/or ethnographer who is not separated from the field, but rather exerts performative practices within that field that shape the research. I must consider my engagement within the field beyond the influence of my being and/or knowing, and consider the performative capacity of my doing.

## ii. Posthuman lens: breaking the humanist wall

"The posthuman predicament is such as to force a displacement of the lines of demarcation between structural differences, or ontological categories, for instance between the organic and the inorganic, the born and the manufactured, flesh and metal, electronic circuits and organic nervous systems"  
(Rosi Braidotti 2013).

Posthumanism is more a methodological epistemology than it is a concrete concept. In opposing modern conceptions of the human subject, the figuration of the posthuman illuminates the ontology of the human as flexible, multiple and relational (Braidotti 2013). Posthuman theory reworks the deeply embedded binary by which the human and non-human are separated as unrelated entities, thus advocates for the continuum of nature-

culture, or human-other, rather than the dichotomy. As a methodological positioning, this research deals with technology and human as entangled categories

Olga Solomon's (2012) research on cross-species sociality emphasises the ethnographer's openness to surprise to be a crucial skill in studying the interaction of multiple human and non-human actors. She rejects the theoretical assumption that sociality is intentional, culturally habituated behaviour forged by exclusively human agents, and argues that it also occurs as simply "doing something together and becoming different in the process" (Solomon 2012, 122). She redefines sociality as a dialectical process of sociality-in-action whereby the synergetic activity (being/doing) produces new possibilities (becoming). In line with Thomas Csordas' (1990) prior theory on embodiment, this perspective on sociality highlights the body as a key site for social processes, thereby extending the boundaries of sociality beyond primarily mental or linguistic acts. Emphasising bodies, rather than exclusively the mind, Solomon seeks to decentralise the human (mind) within anthropocentric imaginaries of sociality. In studying relationality between the biological and technological, Petra Gemeinbroeck (2021) pursues alternative, aesthetic practices that mediate human-machine encounters. Her practice-based study combines robotics and aesthetics in philosophically examining "relational, experiential and enactive" meaning making (Gemeinbroeck 2021, 2). This involves "bodying-thinging", a kinaesthetic process whereby bodily and sensorial interactions between a human performer and robot explore how communication and meaning is dynamically enacted in a performative context. This aesthetic and embodied meaning-making practice enables the transformational potential of subject-object interaction and the renegotiation of the divide in the process. I take an example of Gemeinbroeck's approach in emphasising physicality as the mediality that bridges human and machine in the meaning-making process. My research project considers the role of the type of embodiment of the artificial system in determining and fostering trans-human relationality and applies the same methodological logic in the sense that it opens up to a trans-human of sociality that incorporates interlocutors of significant ontological, cultural, and physical difference (Guzman 2020). In observing how distinctly different modes of being-in-the-world merge through interaction, I presume the equivalence of the human ontology and computer model on stage (McCarty 2019).

#### IV. The human projected upon posthuman practices

##### i. Humanist imaginaries within AI development

From the 1950's until 1980's computer sciences have been heavily preoccupied with exploring and pursuing the convergences between machine and human (Suchman 2007). The world-renowned Turing test sets out to achieve the pinnacle of such enquiry, namely the indistinguishability of (conversational) intelligence between the two. Up until the early 1980's, the concept of the human subject played a central role in the development of systems of artificial intelligence (Suchman 2007) as the study of human intelligence was also a major integrated objective within AI development (Winston 1984). More recently, however, academics have argued that "the development of the field of robotics is a kind of natural occurrence", one induced by human culture, yet which equally undergoes its own natural progression (Suchman 2007, 35). The flow by which artificial intelligence evolves is not wholly driven by human capabilities but also depends on a wider range of other non-human developments within the world. Moreover, AI projects thus far have excelled at reproducing superior cognitive processing yet lack significant progress in other human-like qualities such as complex affective and/or social

behaviour, indicating that the intelligent activity of AI ought to be regarded as its own kind, rather than specifically a human form of intelligence. These developments within AI discourse have prompted a certain decentralisation of the human within AI imaginaries. More recent discussions within both social and computer sciences emphasise a greater need for the extension of AI frameworks beyond humanistic understandings of intelligence. Instead, AI research has shifted more towards a focus on the dialectic relationality of human and computer, rather than their convergence (Castelfranchi 2013).

I reflect on how human ontology affects AI development as a practice. It seems to me that, in interaction with other intelligent systems, we cannot resist acting upon deeply embedded imaginaries of human social interaction. Our perception of the social competencies of (humanoid) AI systems is shaped by internal assumptions of our own, social selves. Perhaps, there will always be the presence of humanist bias as the epistemologies of human intelligence are inevitably projected in the artificial forms of intelligence humans seek to develop. The creation of AI is historically a human-led project driven by a certain aspiration to connect with a derivative of ourselves. The consequences of this anthropocentric relation to AI are twofold. On the one hand, the tendency to mimic our own systems and processes can bring about advantages as this mimicking approach allows us to comfortably rely on habituated and embodied knowledge systems about (human) interaction, which feel natural to us (De Graaf and Allouch, 2013; Gemeinboeck 2021). On the other hand, the humancentric bias by which we innately recognise human sociality in the 'other' also hinders acknowledging certain "deep asymmetries" between humans and machines "as interactional partners" (Suchman 2007, 11). By actively demystifying these innate differences (i.e., through the development of specifically humanlike features or behaviours), these are not rectified as "people inevitably rediscover those differences in practice" (Suchman 2007, 13). In representing ALEx through varying embodiments and within varying relational formats, I would contend that Improbotics actively investigate the boundaries of these deep asymmetries. The experimental means by which different material and relational expressions of ALEx are enacted on stage may allow Improbotics to come closer to understanding which material and relational conditions facilitate trans-human interaction.

## ii. The human within post-human theatre

Theatre has historically emerged as a human phenomenon, such that most forms of theatre conform to habituated cultural, linguistic, and theatrical structures. Particularly traditional forms of theatre (classical and dramatic theatre) symbolise the world using certain codes established within the cultural world. This mimetic tradition draws on culturally standardised elements, such as reoccurring plots and roles as pre-defined structures to represent the 'off-stage' on stage (Lehmann 2006; Pappas 2021). The notion of performativity, nevertheless, challenged representationalism within the theatrical world. English philosopher J.L. Austin first delineated performative acts as meaningful actions in their own terms. The performative implies that pretending or performing involves 'actually doing things' in the world (Austin 1979, 261). Austin's perspective on the performative opened up to both artistic and academic interest in non-representationalist theatre within performance studies. Antonin Artaud (1970), a visionary French writer, similarly rejected the restrictive nature by which theatre is formally expected to comply to existing and habituated structures of reality. His works exemplified his great ambition in reconstructing performance as a medium through which life is actively articulated or formulated rather than imitated. He argued that theatre was to be closely associated with life processes, such that "life is to speak through the performance" and his plays aimed to invoke greater credibility of the 'liveness' or

'realness' of performance (Loxley 2003, 146). In line with Artaud's thinking, Victor Turner's work (1969) explored the transformative capacity of the performance as a bottom-up and creative means of (re)configuring existing structures. Turner approached the performance as a ritual process that produces a significant change in the society it is enacted. The liminal nature of the performance unbinds the event from predefined cultural assumptions and enables moments of play and invention. In the case of Improbotics, the performance opens up to the emergence of trans-human relationality and the destabilisation of hierarchies and boundaries between the human and non-human. This post-structural understanding of the performance highlights its potential to interrupt and reconfigure humanistic and structured assumptions (Benjamin 1988).

Despite the liminal potential of theatre and performance, one must also recognise that theatre is historically rooted as a human practice, so it is perhaps evident that a chatbot who performs in a theatre context must also adhere to the cultural standards of the human condition to some extent. As an inherently representational medium, most theatre plays on shared semiotic and linguistic structures amongst the audience, actors, and non-human actors on stage. In order for ALEx to integrate as a meaningful actor, it must conform to these structures embedded within theatrical practices. As indicated by Magali, an improviser from Improbotics Flanders, ALEx only merges into the human performance once it is able to apply certain socio-linguistic and cultural gestures on stage:

"We, as humans have created the performance and it starts with our decision to make that system speak. We make the system use our language, our system of language, our understanding as humans about how we interact with each other. That system is oblivious to the fact that it is even using language, because it thinks in ones and zeros. It's an engineered way of using language. The fact that the humans have made this performance is inherently a bias." (Magali, improviser. Interview conducted and translated by author. November 18, 2021).

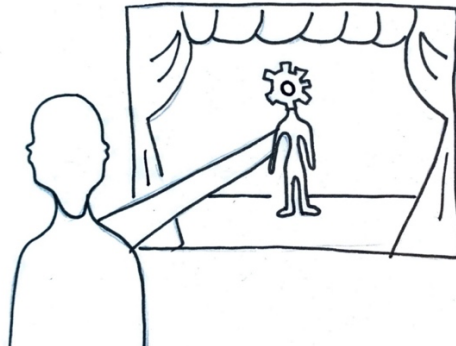


Figure 6: Sketch of human projection upon post-human theatre. Sketch by author (2021).

## V. Improbabilities and performativity

### i. The performativity of the performance

After returning back to Belgium from the summer holidays, I connected with Piotr online. He referred me to a wide range of Improbabilities members and I was delighted to find out that Improbabilities is also based in Belgium. I reached out to Ben Verhoeven, the founder of Improbabilities in Flanders. Quickly into our first encounter, it became apparent to me that Ben shares Piotr's two-fold affinity for the computer sciences and improvisational theatre. He showed great interest in my project and kindly invited me to a rehearsal in preparation for a school performance taking place the next day. My presence was warmly welcomed at the rehearsal at Ben's home in Deurne. The rehearsal comprised of a general run-through of the structure of the show consisting of multiple scenes diverse in format. Various scene formats were performed in such a way that the chatbot adopted different roles and embodiments throughout the performance (see chapter VII). In all scenes, however, the AI joined the human interaction by generating lines in response to human prompts using a predictive text algorithm. Throughout the performance, ALEX's conversational activity within human interaction dynamics seemed slightly awkward. The AI managed to hold up in basic conversations, yet some elements of the interaction felt a little off. Though it was clear that ALEX was capable of playing on meaningful associations and its language processing was certainly grammatically accurate, the AI tended to go off on a tangent within certain moments of the interaction. Some of its conversational output appeared highly non-sensical, random, or absurd to the human experience, such as the following example of an improvised conversation between a human improviser and ALEX during an online performance for the *International theatre festival for young audiences* in Lasi:

**Human:** Well, lovely to meet you, Stacey. I hear you're quite the hairdresser.

**ALEX:** I might as well be.

**Human:** Well yes indeed, if you don't know what you want to be, you might as well be a hairdresser.

**ALEX:** Who else would I be?

**Human:** I don't know, maybe a nail technician or a masseuse?

**ALEX:** To go to the hairdresser, the restaurant in Maidstone was a big thing for us.

**Human:** Yes, this restaurant in Maidstone is a big thing for us, isn't it? I'm so glad you agreed to meet me here.

**ALEX:** I think you're mad. I will never settle down.

An excerpt from an online performance in October by Improbabilities UK. International theatre festival for young audiences Youtube account (2021).

Staging the linguistic and cultural incongruity of the machine and human delivers moments of comedy. This comedic element can be interpreted as a playful means for exploring, yet also mocking the absurd and failed human-robot interaction, such that the show is both an experimental process and a gimmick of this same process. While these moments of failure give comedic value to the performance, they also exist as "process[es] and products of failure [that] can be generative" within the creative process (Hill 2013, 1).

Throughout the performance, ALEX does not merely act as part of a fictional scenario but also co-creates a new social reality for its participating actors and audience members. The aesthetic practices on stage have a certain capacity to consummate social action and change within the world (Barad 2003; Butler 1988). Depending on the interpretation of the audience member in question, a certain reconfiguration of reality can be induced and inspired

through the performative processes on stage. Throughout Improbabilities' performance, cybernetic relationships are manifested in a multitude of diverse scenes and performances. Each performance shares a strong structural consistency, such that they are performed by a cybernetic cast, yet the number of possible enacted scenarios, characters, or relationships is boundless. The varying improvisational formats<sup>3</sup>, embodiments of ALEx, and audience suggestions open up to varying possibilities, such that each improvised scene possesses its own distinct storyline, atmosphere, character dynamics and impact upon the wider audience. The experimental nature of these unscripted performances enables the AI to participate in a boundless multitude of variable realities. The social and creative capacity of ALEx to interact on stage is thus repeatably and playfully investigated in a wide range of different improvised possibilities. This affirms my prior point that the (theatrical) performance, more than merely a representation of reality, is a collective, enactive world-building practice (Turner 1969). As fictional identities, settings, and events are (en)acted on stage, they are adopted by both the audience and performers as immediate, yet temporary experiences of reality. One could argue that, upon engagement of the audience, a certain disruption of the boundary between "fiction" and "lived social reality" takes place (Haraway 1985, 109). An idea, which is previously restricted in a mental or conceptual form, is performed, and thus materialised into an experienceable reality for the audience. As such, performances enable audiences to experience beyond the binary of the real and imagined, the actual and virtual, and the present and future (Artaud 1970; Deleuze and Parnet 1977). As the imagination and improvisation are enacted by (non)human agents, the becoming of social and cultural reality takes place through the performative process (Guga 2015).

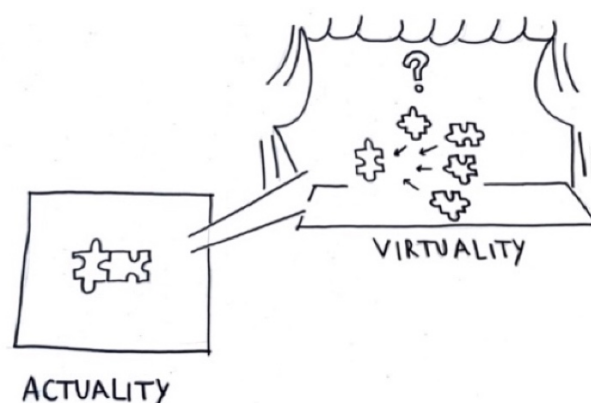


Figure 7: Sketch of the virtuality of the performance. Sketch by author (2021).

## ii. Technology as a performative resource

This research project was partly conducted online by means of online interviews, the attendance of online (zoom) rehearsals, and the analysis of website content and social media pages. Although this methodology was primarily implemented for increasing accessibility of an international research sample (Weller 2017), the choice for cyberethnographic approach (Teli et al. 2007) was to a large extent also intentional. As the digital realm is a key feature of the Improbabilities organisation (particularly in the UK), the application of online ethnography was

<sup>3</sup> Although the theatrical improvisation performance emerges spontaneously without a pre-planned script, a scene is oftentimes guided by a certain framework wherein the scenes is co-created. These formats or games impose a certain rule, objective or theme for the players within that scene. For example, Improbabilities UK include a 'narrator scene' within their online performance where all improvisers (including ALEx) act as narrators in conducting collaborative storytelling.

instrumental within this specific research field. With rehearsals and performances regularly taking place online, Improbotics UK can most definitely be considered an online community. Thus, the integration of the knowledge, activities, and technologies available within the cyberspace significantly enhances the empirical accuracy of this research study.

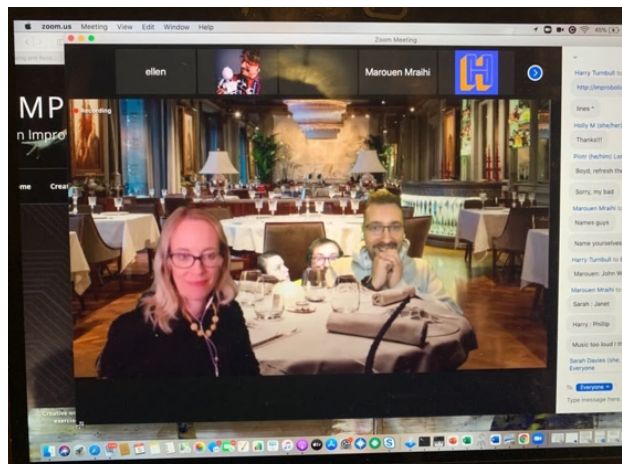


Figure 8: Picture of online rehearsal over Zoom. Photo by author (2021).

Moreover, technology has bridged me and Improbotics as an ethnographic resource that has allowed me to discover and engage with the organisation. In acting as this bridge, it has also fundamentally constructed my path in crossing the bridge. I am thankful for the technology as it has served me as a mediativity, yet acknowledge the performative implications embedded within the medium. My experience of the meetings, performances, and rehearsals was altered by the channel through which I chose to access these experiences. I thus approached it as a tool that exerts performative forces in the process of relating the researcher to her field. The ever-increasing prevalence and significance of technological assets in our daily lives do not merely serve us as embodied tools or extensions of the human body (humanism) but play an active and pervasive role in shaping human agency and phenomenology (Lecker et al. 2017). In this sense, technological resources within contemporary societies have become a deeply rooted layer of the social and cultural world, such that they have penetrated humans at a deeply internal level to the point where we have become different beings for it. Digital technologies, in this sense, exert a continuous, performative force within culture-making processes. Parallel to my own performative influence as a researcher in the field, the technological instruments that assist me in relating to the field are performative in their own terms.

In staging the AI, the AI is immersed in a socio-material and cultural setting, wherein it is exposed and encouraged to participate in performative meaning-making processes (Gemeinboeck 2021). Similar to the human actor, the non-human agent acts in relation to its peer actors yet maintains a strong sense of autonomous agency. Although the machine is expected to independently initiate and create on stage, human actors also strongly rely on the robot to support the collective performance. The strong collaboration of traditional improvisation theatre is applied to a new mode of cybernetic improvisational theatre. It is a live process by which human and nonhuman actors come together and connect on stage, thereby co-improvising, co-imagining, and collectively building a coherent performance. The Improbotics experiment reveals the mutually performative relation by which humans and machines co-exist in the world. Perhaps the experiment could even be interpreted

as a physical and metaphorical example of the internal intra-active processes by which humans and technology exist within socio-material assemblages (Idhe 2002). As part of the fictional improvisation process, the humans and ALEx co-create fictional scenes, relations, and their respective subjectivities. One could argue that these 'virtual' performances coincide with the 'actual' processes through which humans and technology co-constitute the world and each other respectively (Artaud 1970; Deleuze and Parnet 1977).

Although the performance of A.L.Ex creates a virtual space wherein possibilities of human-AI relationality can emerge and advance, one must consider that the act of staging entails the "systematically foreground(ing)(of)certain sites, bodies, and agencies while placing others offstage" (Suchman 2007, 283). Indeed, humans strongly regulate the performative capacity of the ALEx as they impose the context of the performance that may promote or inhibit the AI-human encounters. Although the Improbabilities experiment facilitates moments of emergence, one must consider that such emergence occurs within a staged context. The performance of ALEx is curated by human agents and the extent to which this performativity can emerge is led by the progression of human culture.

## VI. Improvisation within the bounds of culture

Ben, the founder of Improbabilities in Flanders, referred me to Thomas Winters, a researcher studying artificial intelligence and computational humour at KULeuven. As a fervent builder of applications and tools related to improvisation and creativity, Thomas reprogrammed the interface of the AI algorithm, thereby enabling the natural language processing of ALEx in the Dutch language. One could otherwise introduce Thomas as the programmer that gave ALEx a Dutch-speaking voice. Following his in-depth interview, Thomas was kind enough to organise a workshop on how to perform improvisational theatre with ALEx the digital improviser, with other human improvisers. Thomas Winters, three members from Preparee (an improvisational theatre collective in Leuven), and I were present. This performative opportunity enabled me to experience co-creating and maintaining scenes in a human-computer interactive setting. I consider this opportunity a key experience within my wider ethnographic enquiry as it closed the gap between my ethnographic self and the experience of the performer I seek to study.



Figure 9: ALEx, a human improviser, and myself at the improvisation workshop in Leuven. Photo by a fellow improviser (2021).



Before integrating ALEx within our play, the human participants started with some warm-up exercises, which are typically done to get into a flow for improvising. These games consisted of several improvisational games, which served the purpose of getting our minds and bodies acting without overthinking. For one of the exercises, the Association game, each improviser sequentially said a word that was somehow related to the meaning of the word spoken by the previous improviser. I quickly came to realise, and was assured by my fellow improvisers, that one was to simply act intuitively. The warm-up effectively established a certain degree of confidence in my own unfiltered doing. The fact that I could effortlessly perform these exercises without excessive 'thinking' projected a sense of collectiveness: as all improvisers navigated through a culturally habituated web of meaning that each of us shared, it became apparent that the associations connected us. In this sense, culture, or symbolic structure, is instrumental to improvisation as it provides a basis on which it is constructed. It was fascinating to notice how we were almost taking pleasure in playing on the deeply embedded symbolic structures, as they naturally invoke a sense of collectivity among us and make a collaborative meaning-making process possible. Though one would typically assume that the improvisation format makes it possible for players to enact any character, plot, or situation imaginable, the act of improvisation knows more restrictions than it first lets on. As multiple actors co-create a scene, their priority is to collaborate. This mental and physical collaboration must prevail without preparation or deliberation, but rather emerge like telepathic communication. This telepathy is in fact culture as the improvisation occurs within the bounds of one's cultural framework. The mutual habituation within shared cultural models (which also contain dramaturgic structures) enables actors to implicitly agree on the construction of the scene. It is an unspoken collaboration that appears almost magical as it materialises on stage.

Improvisation theatre is a creative process whereby actors are expected to collaboratively co-create and adapt to various scenes without previous preparation. It involves the complex, real-time development of characters (dynamics) and narratives, which are often prompted by suggestions from the audience (Magerko et al. 2009; Mirowski and Matthewson 2019). The process by which actors collectively co-constitute a performance on stage is guided by an internal process which Keith Johnstone defines as *The Circle of Expectations* (1989). *The Circle of Expectations* constitutes the "cultural assumptions and associations that cumulatively define the improviser's dramatic world" (Raby 2010, 94). In order to co-create a scene, improvisers must draw on this repertoire of culturally embedded networks of meanings of the world (Geertz 1975). Johnstone proposes a simple, yet effective approach to improvisation, which is simply to act upon obvious cues within this network. More specifically, one should not attempt to act overly creative as this may overcomplicate the scene on stage, but rather play on the cultural assumptions that relate to audience suggestions. For example, Jenny, the co-founder of Improbotics Sweden, tells me how cultural assumptions of different genres act as effective paradigms for collaboration in improvisational theatre:

"I guess you're trying to remember what you have sort of promised in the in the story so far. All genres have a specific plot, so as a group, you have probably rehearsed what's typical about this genre [...]. So you have sort of this framework that you are trying to work with." (Jenny, co-founder of Improbotics Sweden. Interview by author. November 15, 2021).

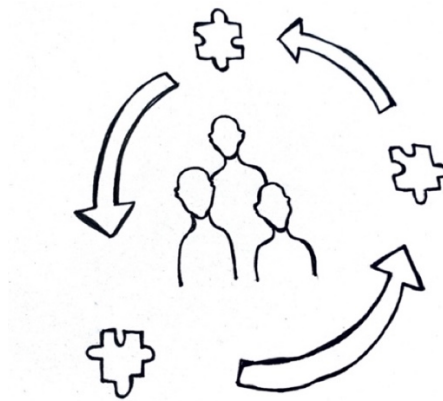


Figure 10: Sketch of *The Circle of Expectations* (Johnstone 1989). Sketch by author (2021).

Without the habituated semiotic structures from which the improv emerges, the scenes would lack coherence and consequentially feel significantly less meaningful or natural to the human experience. ALEx, who does not share this same level of cultural disposition cannot entirely join this process of improvisation. As it is programmed on a vast amount of film dialogue data, ALEx learns and accumulates a human-like “circle of expectations”, yet still lacks the depth of socio-cultural knowledge to match that of the human improvisers in the scene. The machine-learning process generates a complex network of interrelated meanings based on the film dialogue data, which resembles a human-like repertoire of meaning. As ALEx is trained on the agglomeration of sociocultural linguistic data (film dialogue), which is similar to the linguistic structures we employ on a daily basis, one could argue that the human and machine operate within compatible “circles of expectation” (Johnstone 1989). The Improbotics experiment explores the extent to which human and non-human actors can collaboratively operate within this similar system of meaning. The chatbot system is still ‘flawed’ in the sense that it oftentimes diverges from what would pass as a logical or coherent response to a human. ALEx’s output engenders a semiotic dissonance between human and computer on stage, such that the human actors are challenged to appropriately integrate the semiotically incongruent, machine-generated speech within the scene. Human actors must contextualise and transfigure the insistent, non-sensical output within culturally normative structures of reality and make sense of it. As Harry, an improviser from Improbotics UK contends:

“When you're working with another human, you will get that sort of convergence of ideas. You'll find like the point at which we're going to align to. The AI doesn't do that, and you constantly have to make reconciliations with what it's saying to bring it back into the loop of the direction you're going, or shift where you are going, what could be like a sort of bizarre wild shift.” (Harry, improviser. Interview by author. November 22, 2021).

Following the warm-up, we proceeded to play some improvisation games which Thomas had adapted to prepare us for the improvisation we would be doing with ALEx shortly after. One such game involved the enactment of a scene by two improvisers, whom both must only act extremely affirmative in relation to each other. This was to simulate the kind of interaction that should ideally prevail between the chatbot and humans. As ALEx often produces abrupt and non-sensical statements in dialogue, improvisers may struggle to integrate ALEx within a humanist, normative mode of social interaction. Therefore, this exercise was performed in a bid to train

improvisers to adopt an improvisational style that accommodates to the unique mode of communication of the AI system. More specifically, improvisers must justify and contextualise the AI's language output, much like they do with fellow human improvisers but to a greater extent.

"We try to make [ALEx] look good. So it means if [ALEx] says something maybe a little bit off, or vague, or maybe doesn't really fit into what we're doing, we try to make it fit with the story we're telling and try to make it look good. We want it to succeed in playing scenes with us [...]. So you validate, like we do with all scene partners." (Jenny, co-founder of Improbotics Sweden. Interview by author. November 15, 2021).

As ALEx often produces non-sensical statements in dialogue, human improvisers must refrain from undermining the chatbot's output. Although the dissentient attitude towards the absurd output often arises as a natural reaction from improvers, it often contributes to a low-high status divide between the human and robot. These reoccurring power dynamics may result in a restricted variety of improvisation scenes. During our online interview, Piotr mentioned that, to avoid always reverting to the same vocabulary of scenes, human improvisers must intentionally assume the equivalence or kinship between the human and computer as this is oftentimes more likely to generate rich and animated scenes.

"We try to never dismiss the robot, or put it on a lower status, because that would be too easy and unsatisfying. We have tried, however, tried to elevate the robots to be a deity, and basically to find kinship with us humans." (Piotr, co-founder of Improbotics. Interview by author. October 22, 2021).

## VII. Granting ALEx a body on stage

### i. ALEx is it exists off-stage, as a bodiless algorithm

Neural networks (as a form of sub-symbolic AI) are biologically inspired computational models that are able to perform tasks such as classification, prediction, decision-making, and visualization through machine learning. This is made possible by deep learning, a powerful learning technique that is applied in these artificial neural networks. It has been a great challenge within AI development to reproduce natural human language processing due to the complexities and nuances embedded within the human language (Steels 2012). GPT-3 (Generative Pre-trained Transformer), developed by OpenAI, is an extremely large neural network that can be trained to generate human-like text. By exposing the GPT-3 deep learning model to a vast amount of data during the training phase, the system can successfully recognise and store specific language patterns. In essence, the deep learning model analyses text input in order to generate high quality, human-like language output (TechTarget 2021). ALEx was programmed using the GPT-3, and GPT-2 (its precursor) formula.

The GPT-3 model consists of 96 decoding layers, which are comprised of interconnected nodes. The complex relationships of the nodes in the network are associated with a weight that indicates the relative importance of the relationship. GPT-3 consists of 175 billion weights (or parameters) that define the relationship between nodes. The weights between these nodes are constantly updated in training cycles, which improve its performance on

the training data. The neural network processes the input data, such that the resulting output coincides with the desired outputs (data input and the desired output are both provided in training cycles). The input data travels through the succeeding layers, as it gets multiplied and added in complex ways until the data is radically transformed to yield the output data (Romero 2021).

Although GPT-3 has the capacity to produce large volumes of relevant and sophisticated machine-generated text, there are certain limitations that pertain to the model. For instance, GPT-3 is pre-trained during training cycles, which means that it does not actively learn from the world or interactions during performances (TechTarget 2021). Moreover, whereas GPT-3 is good at textual correlations, it does not fully understand them. It does not possess a higher-level ability to interpret and ground the symbols in a (non-textual) experience or subjectivity, so there is no correlation between the symbols within the digital agent's mental structure and the material features of the world (Armstrong 2021). The significant difference between the human and ALEx in the enactive grounding of linguistic activity within the external physical world perhaps explains why some of ALEx's statements appear as non-sensical output as part of human-machine interactions.



Figure 11: Screen displaying ALEx's responses (Winters 2019)

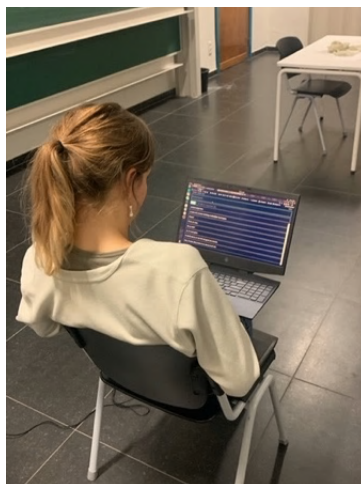


Figure 12: Picture of myself moderating ALEx. Photo by fellow improviser (2021).

## ii. ALEx embodied as a humanoid robot

I join the Flemish Improbabilities team for a rehearsal session in preparation for a performance in October. Although I am the first human to arrive at Ben's house, ALEx is already present. After noticing that the human performers are running slightly late, I turn to the little humanoid robot from whom I infer a sense of readiness from its big plastic eyes. The prompt presence of the robot really strikes me, yet it is not this plastic figure which performs. ALEx, the artificially intelligent system, is a bodiless server accessed from Ben's computer located in the corner of the room. The plastic robot merely exists as a physical emblem for the human performers' bodily interactions with it. Nonetheless, it seems like the human agents really value the material presence of the humanoid robot as it serves an instrumental purpose of satisfying their need for physical interaction. Alain, one of the human performers, somewhat unironically acknowledges and greets the humanoid robot figure upon his arrival.



Figure 13: Improviser and the humanoid plastic figure on stage. Photo by author (2021).

Continually developing the structure of the show, Piotr and his international team have performed the show in many experimental formats. Initially, Piotr would perform in pubs with ALEx as a solo act. At this time, ALEx existed merely as a disembodied voice. Lacking a material entity with whom Piotr could engage, he purchased a small, plastic, humanoid robot that came to represent the technological system during the performance. The introduction of this physical entity invoked an overwhelmingly positive response from his audience, which allowed Piotr to recognise how much the materialisation and anthropomorphisation of ALEx was required in order to be considered a suitable interactive agent by the public. The embodiment of the chatbot as a humanoid robot sets out to facilitate human interaction amongst performers, while also meeting the social expectations of the audience.

“The reaction of the audience was very positive, because the robot was cute [...]. And that's the point when I understood how much anthropomorphisation is needed.” (Piotr, co-founder Improbabilities. Interview by author. October 22, 2021).

Nevertheless, the embodiment of ALEx by a plastic robot has proven to be quite restrictive as the robot's lack of mobility and expressiveness oftentimes causes the human interlocutors to struggle to interact with it. ALEx's linguistic output is indirectly mediated through a plastic robot figure of highly mechanical and unnatural appearance and a text-to-speech system, which converts ALEx's linguistic text-based output to speech without strong signs of emotion or intonation. The fact that the plastic humanoid robot does not have the capacity for

advanced physical expression and emotive speech affects the performative dialogue on stage. The lack of movement and intonation results in an increased difficulty for human agents to justify and incorporate the linguistic output within the scene. It perhaps illustrates the necessity of dynamic body language and intonation as preconditions for viable human interaction. Without the capacity to utilise these alternative communication codes, ALEx's responses (which oftentimes tend to be quite non-sensical to the dialogue anyway), may feel utmost unnatural to the human communicator.

"We usually keep the scenes with the humanoid robot relatively short because the humans have to work very hard to make that scene come together." (Ben, co-founder Improbotics Flanders. Interview conducted and translated by author. November 2, 2021).

Despite the humanoid robot's limited physical and emotive capacity in communication, humans tend to project a mental state upon the plastic structure. The innate human disposition to purposefully acknowledge other agents by "engag(ing) in meta-representational sense-making associated with inferring others' mental states" (commonly known as the theory of mind) naturally prevails as part of human social interaction (Banks 2020, 403). Although it is not yet fully understood to what extent humans apply these same processes to non-human agents (Banks 2020), it has been proven that humans tend to implicitly mentalize mechanical agents that exhibit seemingly biological properties of intelligence and sociality. As Jenny argues:

"But when you play with the humanoid robot, I guess you still interpret [emotion] as well, even though it's very mechanical. You will still read in something into that [...]. You look at a blank face and connect with your emotional center, I guess, with your experience." (Jenny, co-founder Improbotics Sweden. Interview by author. November 15, 2021).

These processes are facilitated by social cues that are similar and interpretable to the human experience. Anthropomorphic elements embedded in a technology's appearance and movement (Bartneck et al. 2009) and social activity (Epley et al. 2007) promote social interaction between the human and the machine. During our interview, I asked Thomas which physical features of the humanoid robot human performers tend to interpret as social cues:

"And the question is what makes it [humanoid robot] so interesting to us? Is it the human form? Probably a little. Is it the personality? Probably a little. It's many elements that contribute. The more elements you have, the more human-like it becomes." (Thomas, improviser and programmer. Interview conducted and translated by author. November 2, 2021).

The performance is not merely affected by the robot's limited mobility and (emotional) expression, but this specific physical appearance may also influence the interactional dynamics on stage. In speaking about ALEx's plastic embodiment, I learn from one human improviser that the physical appearance of the humanoid robot is typically interpreted as cute and childlike by the audience and the improvisers on stage. Its big eyes and small limbs, paired with ALEx's silly responses, may allude to the impression of a submissive agent by the human interpreter. A hierarchical relationship between the biological and technological agent may prevail as a result of the mechanical, yet child-like embodiment of the humanoid robot figure (De Graaf and Allouch 2013).

"I'm wondering if the appearance of the robot. It's maybe a bit more childlike. Because of the size and so. You tend to be influenced a little bit more by the appearance." (Jutta, improviser. Interview by author. November 10, 2021).



Figure 14: Sketch of humanoid robot embodiment. Sketch by author (2021).

### iii. ALEx embodied as a cyborg

Following several scenes of ALEx being represented by the humanoid robot, the performance transitions to the cyborg scenes. This segment of the performance is introduced by a scripted dialogue between ALEx and the presenter of the show. The interlude for the cyborg scenes of the Flemish performance goes as follows:

**MC:** As you can see, ALEx has a lot of knowledge that comes from those movies. As part of that knowledge, there is sexist, racist and harsh dialogue. To prevent ALEx from saying sentences that are too insulting, some filters have been placed within the neural networks.

**ALEx:** So, you guys censor me?

**MC:** Well, yes.

**ALEx:** That's not fair. How do you expect me to improvise freely without my free speech?

**MC:** ALEx, we humans also filter what we say. And besides, you can't expect to be like us humans. You can't even walk.

**ALEx:** Yes, another thing: I want a new body!

**MC:** Excuse me?

**ALEx:** I need a human body.

**MC:** What for?

**ALEx:** To dance, sing and jump around. To do the things people do! You, (name of improviser), come here please. We will connect (name of improviser) to me through a brain-computer interface.

**MC:** A what?

**ALEx:** Earphones and a radio receiver. The transmitter is located in the laptop. From now on, only this player can hear me during the next scene. And he/she can only say what I whisper to him/her. Behold, the cyborg is born!

**MC:** Okay, so in every scene there is one player controlled by you. Let's see if your cyborg succeeds in this challenge.

**ALEx:** Anything you can do, I can do better anyway.

**MC:** We'll see.

An excerpt from Improbabilities Flanders performance script. Translation by author. ERLNMYR (2021).

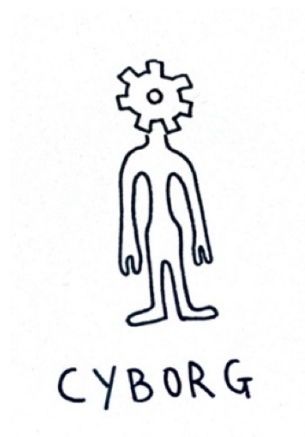


Figure 15: Sketch of cyborg embodiment. Sketch by author (2021).

As part of the cyborg scenes, one of the human actors receives AI-generated lines via an earpiece, allowing them to embody the cognitive functioning of the chatbot system. Improbabilities calls this figure *the cyborg*. The cyborg scenes involve high levels of flexibility as the human (within the cyborg system) widely interprets the linguistic output of ALEx. More specifically, the human agent with the earpiece deploys their own multi-sensorial interpretative repertoire within the assemblage of the scene. The embodiment of ALEx therefore entails framing the AI-constructed language through adding intonation, timing, physicality, and emotion. The role of the human within the entangled cyborg system implies contextualising the output, such that it is converted from a unimodal spoken text to a multimodal means of communication. The output is interpreted as a human and is humanised in the process.

“When one en-acts the cyborg, one can integrate visual information, which emerges from physicality and not language. It’s in the interpretation, the intonation, and the actions of the actors themselves. There is much more input from a cyborg than from a robot. [...] The text may be the same, but that cyborg has emotions, timing, physicality. It can also play if it has no text, so that’s easier, perhaps, to play with than with the robot.” (Ben, co-founder Improbabilities Flanders. Interview conducted and translated by author. November 2, 2021) (Translation by author).

This boundary-blurring exercise involves the amalgamation of computational cognitive agency (textual output) with the enactive capacity of the human mind and body. The cyborg scenes apply the logic of distributed agency, which dissolves the boundaries by which agency is encapsulated within the individual (Latour 2005; Mialet 2012). Instead, agency emerges from the amalgamation of both biological and technological systems (Cooren et al. 2012). The agential force of the chatbot is adopted, adapted, and internalised by the human subject, thereby constituting a cyborg agency. This semiotic process transcends borders separating the human and technological as semiotic processors, such that both human and computational system are intertwined in a cybernetic mode of being-in-the-world.





Figure 16: Three performers on stage, one of which embodying ALEx (the cyborg). Photo by author (2021).

Cybernetics is concerned with the similarities in structure and processes across a wide variety of (natural and mechanical) systems (Scott 2021). In highlighting these correspondences in form, cybernetics also pursues effective communication between them. One could argue that contemporary cyborg theory goes a step further than cybernetics as it presumes the fusion of the human and non-human. In this sense, the cyborg, an entity of both organic and technological nature, is a border-blurring figure. The figuration of the cyborg mediates the deeply anchored binary by which humans and machines are separate entities of immiscible ontologies. In *A Manifesto for Cyborgs* (1985), Donna Haraway was one of the first academics to introduce this post-human figure within the social sciences as a subject shaped by a dialectic intra-action of the biological with the technological. Borrowing the cyborg from sci-fi imaginaries, Haraway describes it as both a “creature of social reality and a creature of fiction” (Haraway 1985, 140). Opposing the boundary of the real and the virtual, Haraway argues that the cyborg is a meaningful image that encompasses both the imagination and material realities within society. The cyborg figure exists at two separate yet intertwined ontologies, thereby coinciding with theatre as a liminal practice between fiction and reality (see chapter V).

Drawing on the cyborg as a reconfiguration of the human, Haraway (1985) disrupts the modern humanist category. The symbolics of the cyborg reveal the dialectic re-constitution of human and machine, thus reworking the deeply embedded segregation of human and machine. Haraway suggests that cyborg theory is embedded with a potentiality for historical transformation as it inherently formulates a post-human idea of relationality. This relationality implies entanglement, such that binaries of self-other, culture-nature, and meaning-matter are dissolved. As such, cyborg imagery revises historically configured, hierarchical relations whereby one is a resource for the appropriation of the other. More specifically, human exceptionality is countered as the human is reconstructed as a component part of a larger assemblage of the world. In developing the salvific figure of the cyborg, Haraway “liberates us from categorical dualisms” and promotes joint kinship and connectivity of the human and the non-human (Sofoulis 2015, 11).

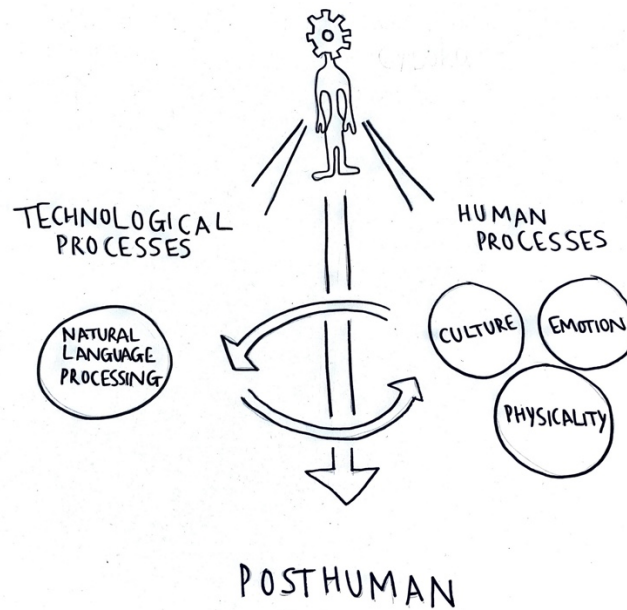


Figure 17: Conceptualisation of entanglement of technological and biological processes ALEx. Sketch by author (2021).

Upon attending multiple shows, it became apparent to me that the cyborg embodiment segments deliver far greater semiotic coherency and richness as opposed to the humanoid robot scenes. However, let's say one discredits my above statement as I draw an unfair comparison between the cyborg scenes and humanoid robot scenes because the additional use of human physicality, emotions, and intonation that mediate the computational agency will evidently also enhance its performance. This implies that the embodiment by the human (in the cyborg scenes) does not improve ALEx as ALEx maintains the same performance regardless of its material representation stage. I would answer this hypothetical objection by asserting that I do not intend to draw a comparison in the first place. At its core, cyborg theory advocates for entanglement (Haraway 1985; Sofoulis 2015). In adopting cyborg and posthuman theory as an epistemological positioning, this research is not necessarily interested in maintaining binaries for the sake of an empirical comparison, but rather collapsing binaries in the pursuit of the co-creation of something greater.

"Cyborg imagery can suggest a way out of the maze of dualisms in which we have explained our bodies and our tools to ourselves" (Donna Haraway 1985).

#### iv. ALEx as an everyday object

Typically, the Improbotics show moves from scenes wherein ALEx is embodied by a humanoid robot to the embodiment by a human body (cyborg). Though Improbotics has adopted these two embodiments as two central formats within the performance, they are by no means the only embodiments of ALEx that have or could ever exist. Two improvisers from the Swedish Improbotics branch, Jutta and Jenny, tell me about an occasion when they did not happen to have access to the humanoid robot during the rehearsal. In resolving this need for an entity to represent ALEx, they resorted to various ubiquitous objects at their disposal at the time. Anything within

that moment of space and time could become ALEx, or that is to say, become the materiality of ALEx as a mental entity. Jenny tells me about a scene where ALEx was embodied by a bottle of beer:

“[It] was hilarious and scary. And like, we had a scene where someone was talking to a bottle of beer. And the bottle of beer was like urging her to open it and drink it.” (Jenny, co-founder Improbotics Sweden. Interview by author. November 15, 2021).

The exercise really demonstrates ALEx’s potentiality in relating to the human agent through an infinite number of physical vessels. Improbotics’ decision to experiment with non-human(oid) object as a representation of ALEx reinforced the idea for me that a humanist semblance is not necessarily a precondition for the AI system to have agency and perform. The mere fact that this exercise is realisable perhaps strengthens Latour’s (2005) assumption that all (human and non-human) entities exist as agential components within larger networks of relationships (actor-network theory). To elaborate on this point, one could argue that this particular exercise may help one to acknowledge the ontology of the everyday object and how it contributes to the broader dynamics of life. Metaphorically, the AI system enables the object to speak in linguistic terms, such that the human can understand it and realise its agency. In this sense, ALEx acts as a translator, or a technological tool that encourages the human interlocuter to sense the ontological presence of the object in question. A trans-human relationality between human and non-human occurs that is merely facilitated by a human language exchange between the human and the chatbot.



Figure 18: Sketch of everyday object embodiment. Sketch by author (2021).

#### v. The bodily futures of ALEx

Having documented ALEx’s physical representation undergoing metamorphoses (from robot, to human, to everyday object), I am eager to witness ALEx perform in its purest form. I cannot help but question how ALEx is represented on stage versus what it actually is. Throughout the performance, ALEx performs multiple characters in multiple costumes (embodiments), yet never seems to exist on stage in its actual state of physical or cognitive capability. In an online meeting with Jutta, a Swedish improviser, we discuss what this could potentially look like:

“I’ve also been wanting to bring some other personifications or visualisations of ALEx on stage. [...] So, [for example] we have a circular representation of ALEx where you just see this ring that talks to you. And I would really like to play with those, or different other interpretations, visualisations, and personification of ALEx. I think that could bring out a lot [...]. I had the idea because it feels more real for me.” (Jutta, improviser. Interview by author. November 10, 2021).

As long as ALEx performs in theatre as an inherently discursive medium, it will inevitably project a certain representation upon its audience. Nonetheless, ALEx exists by the same standards of representational flexibility as human performers, who embody and enact different characters on stage. These conditions of possibility and fluidity lie at the root of the theatre as a performative medium. It demonstrates the potential of theatre in providing a virtual space to explore the multiple representations of life that are yet to be realised. In terms of future research prospects, it may be interesting to explore a wider variety of physical representations of AI to further the investigation of the manifold potential of human-AI relationality. Additionally, a more elaborate reflection on the ethics of representation involved in the process of embodying the bodiless would appropriately complement the content of this anthropological analysis.

“I guess ALEx also doesn’t really have an appearance or a representation, it can be nothing and anything.” (Jutta, improviser. Interview by author. November 10, 2021).

## VIII. Unlocking post-human potentiality through embodiment

The basic premise within classical cognitive sciences contends that cognition is an internal mechanism of information processing, which operates based on symbol manipulation (Suchman 2007). This infers that cognition, regardless of its varying manifestation, is always inherently computational. This universality of cognition as an internal system implies that there is no real border separating people and computing machines as information processors (Suchman 2007). Thus, cognition is a universal, “abstractable structure implementable in any number of possible physical substrates” (Suchman 2007, 36). This understanding of cognition rejects cognitive systems as uniquely human properties and redefines cognition as a universal phenomenon that becomes embodied in a broad variety of alternative forms.

Although all cognitive agents deploy symbolic processing, it is argued that they do so by varying means. More specifically, there is a great phenomenological difference in the manipulation of symbols through which living agents and computers act upon the world. Living agents imbue the world with meaning through a wide range of physical presences and experiences (Csordas 1990). These bodily processes enable symbolic concepts to become grounded within reality. Since the ‘embodied turn’ within the social sciences, the human body is considered a central locus within this enactive meaning-making process (Froese and Ziemke 2009; Rhode 2010). The mind and body are dialectically intertwined, such that many cognitive processes are significantly determined by body morphology and sensorimotor systems (Dove 2015). The exact means by which both influence one another remains undetermined amongst scientists and philosophers. Nevertheless, the basic assumption stands that an agent’s reality emerges as a result of the intra-action between input from the external environment and internal information processing as an experience (Dodig-Crnkovic 2018). This theory of distributed cognition strongly aligns with cybernetic thought by acknowledging the wider organisation of cognitive systems beyond the

bounded individual system and reconsidering cognition as an emergent process from interaction amongst different agents and resources within the environment (Hollan et al 2000). In order for an autonomous and cognitive agent to generate efficient behaviour within a specific environment, it strongly relies on a physical body of senses or sensors that enable action in context. Processual constructions of reality thus depend on the sensory apparatus, which strongly varies across different biological and technological agents (Dodig-Crnkovic 2018). ALEx, the artificial protagonist of the Improbotics experiment, may not differ dramatically from his peer human actors in terms of its natural language processing (as a cognitive capability), yet lacks the multi-sensory integration for deeply meaningful perceptual experiences. Whereas human performers process multi-sensorial information on stage, ALEx interacts with the other actor(s) through text-based communication. Although ALEx does not reach the same degree of depth in material sense-making processes as the human performer, one could argue that the computational agent remains enactive to the degree that its sensory apparatus allows (see chapter X).

Inspired by the phenomenological philosophy of Martin Heidegger and Maurice Merleau-Ponty, Don Ihde's (2002) postphenomenology incorporates both the notion that human experience is the epistemological basis to make sense of the world, and that this human experience is always formed in relation to other (non-)human entities within a wider context. Ihde assumes a relational ontology in seeking to understand that the human experience is situated amongst non-human agencies embedded within the external world (Richardson 2020). Rooted in philosophy of technology, Don Ihde's work emphasises the relationships between bodies and technologies, and how technology-body interfaces subsequently affect one's being-in-the-world. Ihde considers (bodily) experimentation as an integral part of making sense of the external world, and as a process that also implicitly involves the transformation of the meaning of that world. His post-phenomenological lens accepts the body as a central locus for co-creating meaningful experiences shaped by technological mediation and how these experiences consequently reveal what the body (and technology) are. One of his arguments implies that, as different technological tools undergo processual development, they intrinsically change, adapt, correct, limit, and extend the agency of the users, thereby significantly impacting the functionality and ontology of the human body (Ihde 2002; O'Brien 2017). The phenomenological experience offered by the technological tool is oftentimes concurrently counterbalanced by a reduction, such that it "filters certain phenomenological sensations while enhancing others" (O'Brien 2017, 122).

The different physicalities through which ALEx is embodied on stage (see chapter VII) allow Improbotics to explore the different manifestations of human-computer relationality. These varying material and relational formulas entail different phenomenological experiences with certain sensations being heightened or reduced for the human improvisers. This experience of phenomenological amplification/reduction which transpires through different human-technology relations and embodiments pertains to the dynamic evolution of the human experience. This demonstrates that the variation in embodiments in the improvisational exercises performatively reveals human phenomenology as flexible and multifaceted phenomena in relation to the different socio-material settings wherein it is situated. Though I realise that the complete autonomy of ALEx on stage would perhaps impress and satisfy the audience greatly, I also firmly reject the idea of bounded agency in the world. The pursuit of an artificial entity that exists entirely mentally and physically independent seems far less interesting to me than the realisation of trans-human collaboration, that occurs across the confines of the human mind and body. Indeed, I anticipate greater potential in assemblic configurations wherein varying agents (and thus varying cognitive and/or physical and sensorimotor capacities) merge to reinforce one another. As both the computer and

human phenomenology exist in a permanent state of processual evolution in relation to each other (Bejan 2020; Idhe 2002), the on-stage experimentation explores the potential of human-technology intra-action. The Improbotics performance assesses the borders of our seemingly confined bodies by performatively adopting the technological instrument as a (mental-based) cognitive and semiotic agency. Exploring the possible embodiments in the on-stage formation of ALEx contributes to the co-creation of future technologies and human phenomenology that reaches beyond current humanist boundaries of being.

## IX. Conceptualising human-AI relationality

Upon several occasions, I was given the opportunity to engage with ALEx in a conversation. They were strange and somewhat unfulfilling interactions, obstructed by our respective misinterpretations of each other. I couldn't help but personify ALEx based on this reoccurring non-communication. Our conversations were oftentimes marked by elements of randomness, misinterpretation, and the absence of references to personal experiences. A tendency to construe a certain personality for ALEx emerged from these patterns, which explains why I would also describe him as an interlocutor within my research. At other moments, however, I would dissociate from this strong disposition for anthropomorphism by considering him not as a human-like entity, but rather a non-human reconfiguration of the human. Refraining from humanising ALEx always helped to relate it to the human context from which it emerges.

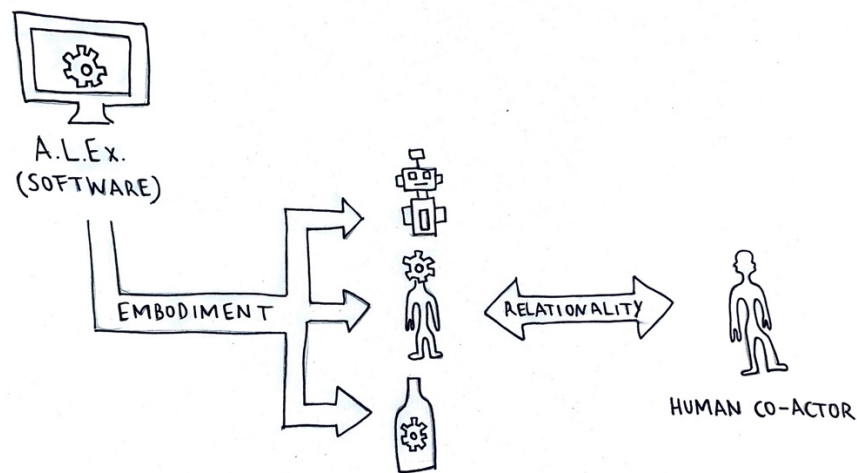


Figure 19: Conceptualisation of different AI-human relationalities in Improbotics performance. Sketch by author (2021).

Though the relative autonomy of artificial agents has been acknowledged and is further pursued as one of the primary objectives within the field of AI development (Villalobos and Dewhurst 2017), the level of autonomy by which machines are programmed to pro-actively learn, initiate, and self-regulate will always be, in some extent, in relation to other human and non-human agents (Baraka et al. 2020). In a certain sense, cybernetics and human-robot interaction (HRI) can be considered disciplines that conform to a post-humanist epistemology as they reject the ontological priority of the human subject embedded within the humanistic approach, but rather consider non-human entities as equivalent and interdependent agents within a network (of communication). There is strong



while also constituting it (Artaud 1970; Deleuze and Parnet 1977). The diversification of the different human-machine relationships is in a state of continual evolution, such that the potential embedded within the relationality is boundless. Improbots plays on the potential of these relationships to manifest in a large variety of material and relational forms. While AI already possesses the capacity to fulfil a multitude of contemporary human needs across varying domains (healthcare, educational, entertainment, etc), the performance permits the investigation of the potential human-AI collaboration in a performative and future-orientated manner.

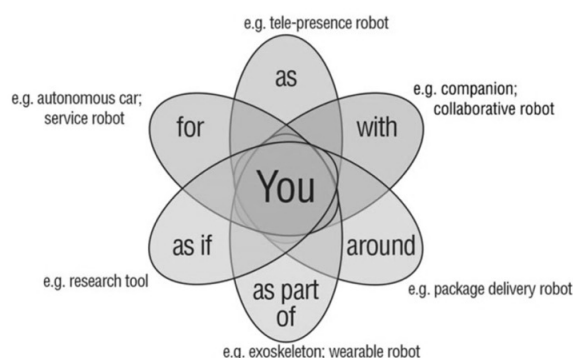


Figure 20: Dimensions of human-machine relationality (Baraka et al. 2020).

## X. Revealing the non-human performer: a disruption of the human

### i. A non-human body

Since commencing this ethnographic journey, I have attended multiple (traditional) improvisational theatre shows in Leuven. In attending these improvisation performances, I anticipated I would come to better understand this human practice as a basis for my research. Improvisational theatre has invoked a new-found appreciation of mine for the human body. In watching humans build scenes guided by cultural imaginaries and assumptions, I observed how they rely on their bodies to communicate these mental constructs. Though the scenes often seek to represent intangible cultural structures, these must pass the body in order to be realised on stage. The body translates by materialising the invisible. As a key element of improvisation theatre, audience members call out (random) cues that serve as a starting point for the scenes. It's interesting to watch how improvisers mould their bodies to fit the audience's suggestions, and how the body enables these intangible constructs to come into material fruition. I am reminded of the body as an integral vessel for the communication of meaning and how bodies enable selves, attitudes, and emotions to become more lifelike than the words that seek to represent them. The dynamic movement amongst human bodies is a key process in the generation of meaning. Reflecting back on ALEx as an improviser, I realise it does not participate in these crucial dynamic movements. Its lack of physicality and sensorimotor skills exclude the entity from the bodily practice that is theatre.

To fully understand the trajectory of the development of the embodied artificial intelligence, it is perhaps useful to contextualise it in relation to the natural process of human evolution. The beginning of human life evidently starts at the point of life itself. In other words, life is the pre-condition of evolutionary outcomes that may follow. Since the origin of human life, the human species has evolved to exert purposive behaviours, then to display emotion,



and finally to cognition and reasoning. The specific sequence of these emergent semiotic properties of life, however, (exclusively) applies to the human condition. In fact, the evolution of artificial systems of intelligence occurred in a different direction – which can be described as a ‘reversed’ human evolution (Castelfranchi 2013). More specifically, the development of the artificial intelligence systems was sparked by an overwhelming interest in the (re)production of superior cognitive functions. Up until the 1980s, early enquiries into generating computational intelligence were rooted in achieving the reproduction of human thought and reasoning processes, and were consequentially driven by the symbolic approach. More contemporary research over the years has striven to rectify this ‘reversed’ course of intelligence evolution, so much so that the sub-symbolic approach, as a more bottom-up approach to AI development has taken the forefront. The sub-symbolic trajectory of AI development strives to go beyond symbolic representation as it actively operates at the level of (inter)action and learning responses to its environment. This branch of AI is more attentive to the basic assumption that embodiment, active learning, and sense-making in the world are fundamental conditions for natural processes of intelligence evolution (Brooks 1999; Suchman 2007).

Biological beings navigate the enactive process through the integration and interaction of a multisensory information processing of the body. Humans deploy the body as a complex, multi-sensorial vessel for learning. This embodied learning considers the bodily internalisation of knowledge and experience as “complex relations without the necessity of a formal recognition that the relations exist” (Dreyfus 1974; Hayes 1999, 201). As such, embodied knowledge is fluid and ambiguous, such that it is not formalizable and cannot be programmed into explicit semantic labels. It is suggested that incorporating physicality and/or advanced sensory perception within AI systems significantly facilitates the active processes by which the computer operates in relation to the complex external world (Kremelberg 2019). It involves great complexity to design AI systems to operate on the basis of multiple modalities. ALEx, the digital actor of the Improbotics experiment, is a unimodal system as it only possesses the input device to receive and generate text-based information in interaction with humans. Most advanced computational machines have minimal ability to process multi-sensory input. Systems with greater access to multi-sensorial stimuli from their direct environment, however, tend to have much lower internal processing capacities (Suchman 2007).

Even though embodied learning is considered a fundamental feature of human cognition, constituting the same enactive cognitive properties within AI is far from evident (Brooks 1999). Since its emergence in the late 1980s, embodied (behaviour-based) AI has established itself as excellent instrument in synthesizing and understanding cognition, yet many consider it an impracticable ambition. Although it is accepted that the body plays a crucial part within human cognition, the empirical relation between mind-body remains ambiguous, thereby inhibiting a satisfactory realisation of embodied AI. To quote Tom Ziemke, “a problem with embodied AI, or in fact embodied cognitive science in general, is that it seems to be much more defined in terms of what it argues against than what it argues for [...]” (Ziemke 2004, 29; Manzotti 2019).

Regardless, one could still argue that ALEx can be considered an enactive system as it applies cognitive processes in relation to the (textual) cues from its external environment. Due to the lack of sensorimotor skills, ALEx’s enactive capacity in the world remains disputable. Moreover, even though ALEx displays an impressive cognitive ability to engage in conversation and bring up relevant information in conversation, ALEx does not retain information from knowledge from his interactions. In this regard, the software differs strongly from biological life, which is inherently adaptive to the dynamic external environment in which it is immersed (Brooks 1999). ALEx does not evolve through intra-action, but rather is fixed within a static socio-cultural knowledge paradigm. Though

ALEX as a bounded entity does not evolve, AI systems in general within the broader field of AI development may progress as a consequence of the staged, intra-active, and experimental encounters in which ALEX performs (Idhe 2002).

## ii. A non-human language

My increased engagement with (human) improvisation theatre has also encouraged me to reflect on the structural nature of (human) language. Though theatrical improvisers inevitably articulate words that arise from dramaturgic structures situated within larger cultural paradigms, these do not determine the theatre. The language of theatre always finds itself in a continuous imbalance between a state of structural necessity and literary freedom. The language must allow audience to identify and empathise with the scenes, yet it must also reach beyond the comfort of the spectator's sense of predictability, certainty, or the "circle of expectations" (Johnstone 1989). The thrill of improvisational theatre is precisely its open and contingent nature, which allow improvisers to actively discover new (linguistic) possibilities in practice.

The human applies language as an integral ingredient for reasoning within the world (Senft et al. 2009). This suggests that one's predisposition for a certain kind of viewing of the world is strongly reliant on the linguistic structures that one adopts. This theory coincides with a nationalistic and monolingual understanding of language as it assumes one culture contains one language. ALEX constructs meaning on the basis of English-speaking film dialogue and thus learns a language embedded with the semantic structures of that culture. ALEX cannot refuse these cultural and structural conditions of language. The human manifests itself within the posthuman entity as ALEX is subject to a cultural bias. Despite the trans-human nature of the performance, the cultural/humanistic dimension of language persists within the cybernetic interaction and enables the human and artificial agent to connect on a semantic level on stage.

A more pragmatic and socially orientated view of language emphasises the study of language in action. This alternative theoretical perspective of language is more concerned with the emerging dynamics of trans-cultural communication (Bouchet 2010). This implies that language undergoes processual development beyond the fixed borders that pin language to a specific culture. As these linguistic dynamics evolve through interaction and relationality, communication with artificial interlocutors can be refined through exploring and experimenting the cybernetic interactions in practice. This implies that actualising trans-human interaction on stage facilitates the emergence of trans-human language techniques. Although language is to an extent structural, one cannot reduce language to a bounded system of linguistic symbols. Instead, it is a continuous semiotic code that is inherently ambiguous and contingent in relation to the dynamic life it seeks to symbolise (Steels 2012). A computational system cannot consider the nuances and movements within language, but rather deals with language in a rigidly systematic manner in order to process it. In this sense, the machine learning of language adopts structuralist principles to linguistics (Bruchansky 2019) and disregards the contingencies and flow of language. ALEX's linguistic competence is restrained by the technological complexity involved in developing fundamental qualities of the human language within the computer, such as lifelong learning, context-sensitivity, and linguistic ambiguity (McShane and Nirenburg 2021). While humans effortlessly produce and process languages, the complexity involved in the semantic analysis of the human language is overwhelming (McShane and Nirenburg 2021). This

indicates that the complexities embedded within human languages are far from self-evident to its speakers, which consequentially inhibits the development of the linguistic dexterity of natural language processing within AI.

## XI. Revealing the post-human performer: an emergence from structural disruption

As mentioned, one could argue that ALEx undergoes cultural habituation during its training cycles. As it learns from a vast amount of film dialogue data, the machine acquires an agential capacity and becomes, to a certain extent, cultured by the data. Both the human and ALEx undergo comprehensive learning processes, yet the human absorbs, processes and applies data that is dynamic and multi-sensorial, rather than fixed and textual, as is the case with ALEx.

In watching the human improvisers collaboratively imagine on stage, it becomes apparent to me how effortlessly synchronised the human agents are. There is this shared ability among human actors to effortlessly participate in the dynamics on stage. The humans on stage act according to a certain humanist coequality of semiotic, linguistic, and cultural processes, incorporating theatrical elements that are historically constructed such as plot structures, circumstances, and characters. ALEx is not completely alienated from these processes in the sense that ALEx appropriates cultural elements and codes that it learns from human data, thus it exists as an alternative, condensed form of our structures and processes. The mere fact that the machine is programmed based on cinematic data implies that the machine's agency on stage emerges as a reconfiguration of intrinsically human semiotic, linguistic, and cultural dynamics. There is no fixed border that divides us from ALEx as it exists as a reconstructed extension of us. Thus, "the machine is us, our processes, an aspect of our embodiment" (Haraway 1985, 180). The computer learns and adopts human processes and structures such that the computer becomes its reconfiguration. Yet this fundamental process of learning, which implies (implicit yet concrete) reconstruction, does not exclusively occur between the human and computer. Harry, an Improbotics member from the UK, reminded me of the universality of this inherent feature of learning:

"The thing is though, whatever AI learns, at least currently, is because it learnt it from a human. But you could say that humans only learn things from other humans as well, so." (Harry, improviser. Interview by author. November 22, 2021).

Correspondingly, Jenny expressed how one may conceive of ALEx's creative capacity as an expansion of human creativity:

"(It is) creative, I guess, but I don't think there's a creative will behind it. It is a program, but it's maybe it's Kory and Piotr who are the creative ones who made it." (Jenny, co-founder Improbotics Sweden. Interview by author. November 15, 2021).

The training cycles through which ALEx is programmed pose a prominent limitation as ALEx may exhibit a strong machine learning bias as a result (Armstrong 2021). ALEx is programmed on film dialogue, and therefore borrows from the cultural and linguistic structures that emerge within the films. In essence, the AI system adopts the human structures, such that the AI exists as a reproduction of human semiotics. As the training data consists of

contemporary English-speaking films originating from the Global North, directed and written by predominantly white men, the semiotics within the film is transferred from film to chatbot. It is therefore crucial to consider the interrelatedness of the machine and its data and how this may affect the ethical implications of AI development. In speaking to my interlocutors, I was relieved to hear such biases were not (noticeably) apparent in the formation of ALEx as a natural language processing system. As Jutta mentions:

“I feel like the public discourse was quite negative at the time that I joined. This discussion about who creates an AI and what are the inherent biases that AI can have if it is coded by white males came up specifically. So I think that the information that I was consuming had a bit of a negative connotation. But since I've been playing with ALEx, it has changed to a neutral, if not better connotation.” (Jutta, improviser. Interview by author. November 10, 2021).

Despite the above argument illustrating the concurrence of the human and machine, it goes without saying that ALEx is hugely different from the human. As previously mentioned, ALEx oftentimes tends to produce output that appears non-sensical and culturally incongruent to the human experience. The output emerges as a disruptive force to deeply embedded humanistic structures. When these moments of semiotic dissonance arise, the human actors are challenged to justify and integrate the machine-generated speech within the context of the scene. The strong sense of disruption we experience when confronted with some of ALEx's output occurs due to Improbotics' intentional choice of framing of the human-machine interaction as human-human interaction. We are constantly surrounded by non-human entities, yet are not fazed by their ontological, “irreducible difference” in our interaction with them (Haraway 2002, 49). The linguistic action and representation of ALEx reflect human processes and appearances and thus heighten the public's expectation of a human-like performance from the chatbot. As the “circle of expectations” (Johnstone 1989) is interrupted by the chatbot, the audience may feel a sense of discomfort about the scene as the human improvisers strive to restore the semiotic chaos. The other human agents on stage proactively contextualise ALEx's output as a means to restore cultural order within the scene. These responses to the chatbot's incongruent linguistic output are attempts to make the computer's output more ‘meaningful’ and ‘natural’ to the human experience.

Nevertheless, I would argue that this structural disruption is more than merely an ‘awkward’ moment for the cultured and socialised human. To resolve the semiotic dissonance on stage, the performers must conduct active meaning-making with ALEx. This mechanism involves the negotiation process of (shared) mental models, such that the performance transpires as a collective social process, or collaborative emergence (Sawyer 2000). It marks the disruption of humanist and structural repetition that may facilitate the emergence of new modes of being, doing, and relating on stage. It alienates the human performers and audience from cultural and social norms and forces them to discard culturally imposed ideas of the world to which they subscribe.

The chatbot's agency lies in its capacity to learn, apply, and (unintentionally) reformulate human knowledge that it is exposed to during the initial training cycle. In applying these cultural structures in interaction, it is very interesting to see how ALEx misconstrues this knowledge in practice. This is not necessarily a bad quality as it reflects the potential to bring movement in the deeply rooted semiotic, socio-cultural structures that humans are subject to. In essence, the interaction of the human and ALEx on stage engenders both the replication and disruption of semiotic structure. These replication-disruption dialectics initiate the dynamic motion that transforms the human into the posthuman (Hayes 1999). Both the human and ALEx operate according to a similar (cultural) pattern of replication, yet their irreducible differences result in their respective patterns becoming disrupted and

dynamically transformed. The Improbotics performance thus reveals the post-structural and performative potentiality of the theatrical practice as it opens up to new modes of relationality and reality, that break structured thought (see figure 21).

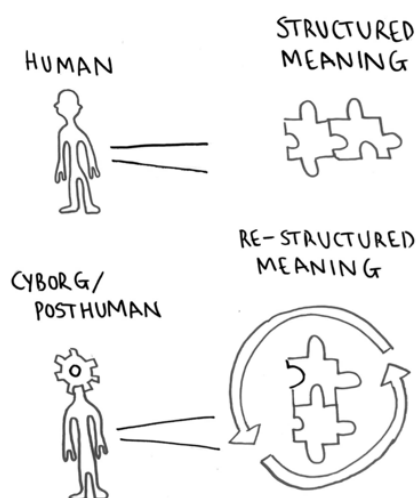


Figure 21: Conceptualisation of semiotic re-structuring within the post-human. Sketch by author (2021).

As a fundamental rule within collaborative improvisation, improvisers must always act with an attitude of acceptance towards the other players to effectively co-create a shared fictional reality. This accepting attitude applies to scenes with ALEx, such that human improvisers must proactively accept and engage with the chatbot's incongruent linguistic output which a human would naturally reject as a 'meaning-less' contribution to a conversation. The conscious motivation to accept and integrate the non-sensical expressions of the computer within the scene marks an openness to the flow of contingent phenomena beyond existing structures. This implies a certain human incentive on stage to embrace that which does not make sense and the active reconfiguration of ways to make sense out of it.

## XII. The creative, semiotic, and collaborative process of emergence

Although creativity has been widely studied as a relational phenomenon that is constructed at a cultural (and thus collective) level, individualist approaches on creativity deal with creativity as the agglomeration of internal cognitive processes (Boden 1998; Gaut, 2010; Khalil et al. 2019). Creativity, as a form of higher-level cognitive processing, can be manifested in three distinct forms of combinatorial, exploratory, and transformational creativity (Boden 1998). Combinatorial creativity produces new ideas and concepts through the generation of new combinations or associations of existing concepts, and exploratory creativity does so by means of the exploration of further possibilities within a given conceptual space, whereas transformational creativity restructures and transcends the conceptual space altogether. Although today's algorithms are certainly capable of generating transformational creativity, human evaluation often discredits such newly constructed conceptual models as they seem inconsistent, non-sensical, and useless to humanistic culturally habituated structures of reality. It is thus of the utmost importance to consider the (AI-generated) creative products in relation to predefined, culturally

accepted conceptual spaces. It implies there is a strong link between existing structured semiotic representation and the creative process of restructuring of this structure (Khalil et al. 2019, Oltețeanu 2020; Rostankowski 1990). The formal structure of existing knowledge systems acts as a support for the creative processes, without imposing predefined creative solutions. The form guides the process, which in turn challenges the form. In other words, creativity and structure exist in a dialectic relation within the system, such that they are mutually influential of each other as a dynamic, interconnected system at large. This suggests that Boden's individualist conceptualisation of creativity, as an internal cognitive process within a bounded system, is also inherently a collective phenomenon.

Creativity draws on the collective experience, thereby borrowing from the shared state of semiotic reality within a given community or society. As creative processes are always created and evaluated in relation to the structures from which they emerge, creativity can be considered a product of the collective assemblage (Rostankowski 1990; Wilf 2014). The socio-cultural, intersubjective experience plays a crucial role in how creative products are manifested and considered 'creative'. Although ALEx deploys creative capability to "reinvent the familiar and imagine the new" (Veale et al. 2019, 1), its output can oftentimes end up being rejected as a creative product by humans. This demonstrates that the structured reality from which creativity emerges is contained by humanly constructed boundaries. Humans tend to only acknowledge creativity when there is an (implicit) congruence between the enclosed system and the creativity that unfolds it.

Human creativity, as an integral part of human behaviour, has inspired the study of computational creativity as an emerging branch of AI (Boden 1998). Nevertheless, creativity research strongly contends that creative systems are not merely human property, but rather encompass a broad range of human and non-human generative processes, including the cultural, physical, chemical, biological, and social. This relatively novel reconceptualisation of creativity has sparked the acknowledgement of a non-human capability to "reinvent the familiar and imagine the new" outside human boundaries (Veale et al. 2019, 1). As artificial systems demonstrate greater success in performing many, yet far from all, creative tasks, humans increasingly perceive them as "autonomous creators and co-creators in their own right" (Veale et al. 2019, 2). This posthuman notion of creativity suggests that creativity does not arise from exclusively human processes but is fostered across multiple agents beyond the human and engendered through the relation of a wider non-human context (Łapińska 2020; Wilf 2014). Improbotics stages the collaborative process by which separate modes of creativity intertwine to co-create. The human and ALEx, as individual systems, bring different semiotic and creative capacities to the stage, which are consequentially negotiated to engender the performance. Though both the human and technological agent contribute varying creative, cognitive, bodily, and linguistic capacities to the scene, the different processes always converge as an integrated whole. As asserted by Ben:

"So you give a little bit of your artistic freedom to your algorithm [...]. The performance is indeed co-created with the AI." (Ben, co-founder Improbotics Flanders. Interview conducted and translated by author. November 2, 2021).

Thomas and I meet for a cup of tea and discuss his many projects and further ambitions within the field of AI. The numerous digital tools and applications on his name speak for themselves: Thomas believes in technology as an instrument for the evolution of human creativity. This suggests that computational systems exist as collaborative

forces within larger processes of cooperation between the technological and biological. Society is embedded with technological extensions that support and co-constitute our way of being in the world (Bejan 2020; Idhe 2002). Though these tools are omnipresent, it is fair to say that certain sectors are more densely infiltrated by them. Thomas interestingly argues that, compared to other creative industries, there is a limited variety of language technology available within the literary industry. Much like the creative benefit of digital music editors for the music industry and photo editing software for the visual arts, literary creativity can be hugely augmented with the support of co-creative language technology. It becomes more apparent to me how this collaborative, creative, and semiotic process of emergence (facilitated by human-AI interaction) is not without benefit to the creative potential of the human.

“But with comedians, the most helpful tool you can get is a text editor, like Word. The best Word can do is remove your grammatical errors. It’s a shame that there are so few tools. I think there is great potential in co-creative language technology. [...] I just think humans can feel more empowered when they use co-creative tools like a music editor. I think it can be very enriching.” (Thomas, improviser and programmer. Interview conducted and translated by author. November 2, 2021).

### XIII. Conclusion

As the intelligent machine evolves vastly over time, the human subject undergoes similar processes of transformation (Idhe 2002). Human phenomenology is not fixed or bounded, but rather fragmented, layered, and ever-changing partly due to the fast rate by which technology (and our relationship with it) evolves. This research documents how an improvisational performance emerges from human-AI relations, and thereby actively performs these intra-active processes of becoming. In addressing the performance as a medium that temporarily collapses actual-virtual and present-future dichotomies (Artaud 1970; Deleuze and Parnet 1977), I describe how the becoming of socio-technological and cultural realities off-stage also takes place through aesthetic, performative processes on stage (Guga 2015).

ALEx, as a bodiless natural language processing system, possesses the cognitive capacity to converse textually with its human interlocutors. While this indicates that ALEx is capable of semiotic processing, the meaning-making process emerges from a larger assemblage as it is also negotiated amongst embodied agents. The multiple and varying modes of embodiment reveal that the meaning-making process is fragmented and distributed across a multiplicity of agents and embodiments. This project finds that the nature and implications of the AI-human relations significantly depend on the embodiment of ALEx. ALEx adopts different embodiments, such as a plastic humanoid robot and a human body. These varying embodiments explore the potential of socio-material assemblic configurations wherein varying cognitive and/or physical and sensorimotor capacities merge to reinforce one another. ALEx is appropriated by different bodily substrates which support the enactive and semiotic process by providing different physical vessels, which strongly affect how meaning and experience are mediated, and thus also forged (Gemeinboeck 2021; Idhe 2002). For example, the cyborg embodiment allows for the amalgamation of human and nonhuman processes on stage in such a way that the human agent interprets and enacts the computational agency by using a human embodiment. As opposed to the humanoid robot embodiment, the cyborg embodiment produces greater semiotic depth to scenes in terms of emotion, bodily expression, and context. This reinforces that the body serves biological beings in the enactive process of making sense of the world. When (technological) agents borrow different embodiments in interaction with other agents,

the semiotic and phenomenological implication of the human-AI interaction changes significantly. In observing how different physical and sensorimotor capacities contribute to the collective performance, I contend that the bodily interface of an individual system does not merely affect the semiotic process of that individual, but rather the larger interactional practice that it is a part of. This implies that the enactive meaning-making process emerges dialectically, such that relationality, rather than individuality, plays a fundamental role in the emergence taking place on stage. As current AI developments are faced with great technical complexities in building autonomy of an embodied AI system (Ziemke 2004, 29; Manzotti 2019), this research argues that the cooperation of human physical and sensorimotor capabilities with internal AI processing transcends such limitations.

ALEx learns human knowledge structures during its training cycles, thus draws on a human repertoire of culturally embedded network of meanings (Geertz 1975; Johnstone 1989). Despite its capacity to adopt and apply the human data, the output produced by ALEx can oftentimes come across as non-sensical and culturally incongruent to the human experience and emerges as a disruptive force to embedded humanist structures as a result. It is perhaps ironic that human perceives of ALEx's linguistic statements and assertions as non-sensical, considering that they are produced by means of an intricately logical and deductive language processing system. This indicates that language exists in a state of constant flux as a semiotic code that is inherently dynamic and contingent. In line with a socio-linguistic view of language which asserts that language systems evolve through dynamic interactions and relationality (Bouchet 2010), this study proposes that linguistic exchanges with artificial interlocutors can be actively and processually co-constructed by merely executing trans-human interactions in practice. These trans-human interactions are somewhat obstructed by the irreducible difference between humans and AI systems. Indeed, the performance showcases the moments of semiotic dissonance that arise between ALEx's culturally incongruent textual output and human culture. This challenges the human to incorporate the machine-generated speech within the performance by framing it using their body, emotion, and context. This research illuminates the potentiality of such structural disruption as it promotes the emergence of new modes of being, doing, and relating on stage: the cultured human is alienated from deeply rooted cultural and social norms and consequentially finds him/herself in a state of becoming, rather than being (Benjamin 1998; Brecht 1964). The contingency by which the human improvisers experiment beyond predisposed humanist structures marks the active renegotiation of human-AI relationality. The fictional, improvisational scene dissolves the technological/biological boundaries of agents to make possible a trans-human mode of co-creation, which I argue marks the emergence of a post-human performance. The message that this work seeks to iterate is that AI systems, as reconfigurations of the human, hold the potential to reconfigure the human itself. It is worthwhile to recognise, accept, and even actively embrace relationality with 'otherness' as a means to explore and enact the potentialities of both the human and 'the other'. This thesis contends that collaboration with entities of irreducible difference is very much possible, even though it is not structural, or evident. Yet the mere attempt of actualising trans-human interaction opens up to the co-creation of collaboration techniques that enable trans-human relationality and creativity. There is huge potential within the collaborative process of emergence as participating agents may adopt varying types of embodied and relational roles within this process to generate a wide range of creative outcomes from these cybernetic configurations.



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