Abstract
Every interaction with an AI-powered device invokes a vast planetary network. Operating on temporal and geographical scales that go beyond humans, Artificial Intelligence (AI) systems pose various societal and environmental challenges. These challenges encompass issues such as the extraction of both human and nonhuman resources and knowledge, and the reproduction of inequalities. To tackle these concerns, scholars in Design and Human-Computer-Interaction emphasize the urgency for designers to cultivate non-anthropocentric approaches. In the pursuit of establishing a non-anthropocentric design practice for AI, this paper adopts a more-than-human orientation in the design of conversational agents (CAs). We start by presenting a series of design experiments, including workshops, videos and performances, that shed light on the anthropocentric biases ingrained in CA interactions. These experiments unveil how CAs are designed to recognize and address only specific human voices and concerns. Building upon these insights, we introduce two outcomes that chart an alternative path – the first involves a collection of interactive prototypes for CAs that are capable of listening and responding to more-than-human “voices” while the second entails a tool to support designers in noticing more-than-human entanglements, in the form of a podcast. We conclude by reflecting on how the knowledge gained from our design inquiry can illuminate future design practices and contribute to AI research as a whole.

Keywords
More-Than-Human design
Artificial Intelligence (AI)
Research Through Design
Conversational Agents
Introduction

Interacting with AI has implications not just for humans, but for other species and the Earth as well. As illustrated in the Anatomy of an AI System map (Crawford & Joler, 2018), each interaction with an AI-powered device, such as an Amazon Echo, invokes a vast planetary network that exceeds the geographical and temporal scales of humans. The map makes it apparent how multiple technologies, species, and materials become deeply entangled with humans in AI systems. Understanding AI systems as socio-technical and socio-material (Crawford, 2021) urges designers to seek radically new approaches that transcend traditional human-centred ones (Forlano, 2023; Giaccardi & Redström, 2020). Scholars in the field of Design and Human-Computer Interaction have argued that a more-than-human design approach can be valuable for developing non-anthropocentric practices, as it not only questions human exceptionalism but also includes nonhuman perspectives in the design process (Camicini & Vergani, 2021; Coskun et al., 2022; Giaccardi, 2020; Maffei, 2021; Wakkary, 2021). This paper explores a more-than-human orientation in the design of AI, focusing in particular on Conversational Agents (CAs). Aligned with critical posthumanities (Braidotti, 2019), our intention is not only to challenge human exceptionalism in CA design but also to account for the more-than-human perspectives existing in AI systems and to broaden the notion of “the user” when designing AI-powered agents.

The field of Conversational User Interfaces (CUIs) has rapidly expanded driven by advances in deep learning techniques and the development of Large Language Models (LLMs). While conversational interfaces such as ChatGPT3 are relatively new, chatbots and voice interfaces for products like cars, TVs, and smart speakers have existed for some time. Programmed to share jokes and advice, voice assistants (such as Siri, Alexa, and Home) have evolved beyond mere tools, becoming intimately intertwined with human routines at home. While developments in conversational AI promise personalised experiences and seamless interfaces, these technologies also pose new challenges for society. CAs have faced criticism, for instance, for perpetuating gender biases and stereotypes (Strengers & Kennedy, 2020). This paper extends that critique by unveiling certain anthropocentric biases present in CAs. We begin by highlighting the fact that CAs are designed to listen exclusively to human voices and then proceed to explore how this process might silence other-than-human voices by relegating them to background noise. This design inquiry is carried out through various design experiments and by engaging in the design of an alternative direction — namely, creating a CA that can actively listen and respond to more-than-human voices. 

Experiments for Decentering the Human in the Design of CAs

Our inquiry consists of a series of experiments using a research-through-design (RTD) process (Stappers & Giaccardi, 2017) organised within a programmatic approach (Redström, 2011) Fig. 1. The experiments, conducted by the first author between 2020 and 2023, were conceived to be provisional and exploratory, i.e., not meant to
provide evidence in the same way as traditional design studies might. Instead, their purpose was to help us reframe the problem, position the inquiry, and expand the design space of CAs. However, taking a posthuman commitment to knowledge production (Wakkary, 2021), we considered the experiments as designerly ways of “making” design knowledge (Redström, 2017).

Experiment #1: In Conversation with Agents

The first experiment consisted of a series of workshops in 2020, in which we invited 36 designers and researchers across different fields to interview CAs, enact new interactions and materialise different embodiments (Nicenboim et al., 2020). The interviews were conducted with the smart speakers Alexa, Home, and Siri, using the method Interview with Things (Chang et al., 2017) combined with speculating responses (Reddy et al., 2020; 2021) Fig. 2. The outcomes of the workshops (a questionnaire and a series of videos) illustrated the various ways in which people and CAs were entangled at different scales — from the intimacy of the home to larger infrastructures of labour and power. For example, in the first workshop activity, in which participants enacted CAs, some of the infrastructures and biases of current CAs were exposed in the speculative responses that researchers improvised: “Researcher: Who made you?; Speculative Agent: Amazon made me ... people in Amazon!” (Nicenboim et al., 2020). Beyond exposing the infrastructures and biases of CAs, the workshop also highlighted that CAs were not accounting for the user’s position in the world, nor acknowledging the agent’s worldview. Building on Donna Haraway’s feminist epistemology (1988), we described this as a limitation in being situated (Nicenboim et al., 2022).
Experiment #2: Situated Conversations

To explore more situated responses, the first and second authors invited a group of 7 design researchers (including five PhD candidates and two professors) to speculate on alternative explanations that conversational agents might give when failing to respond, i.e. when they would normally say “Sorry, I don’t know that.” This process resulted in a database of provocative responses, such as “I don’t know that because I am just an algorithm” or “I can’t do that because I am a woman” Fig. 3. To transition from individual responses to entire conversations and drawing inspiration from the Anatomy of an AI System map (Crawford & Joler, 2018), the first author conceived a series of videos in which Alexa provides situated responses that expose the extensive network in which she is embedded. For instance, she reveals where she was assembled and by whom Fig. 2.
Experiment #3: Alexa, What Do You Do When You Are Silent?

The first two experiments showed that beyond situating the user and the agent's position in the world, there is also the need for situating the designer's knowledge and decentering the designer's perspective when researching CAs. To this end, the first author engaged in a collaboration in the field of performance arts and music Fig. 4. The aim of the experiment was to decenter the designer's perspective by enacting alternative responses that go beyond human voices and explore plural and inclusive ways of listening. Using the perspective of *decolonial listening* from Rolando Vázquez (2018), the first author developed a performance art piece with a group of artists from different disciplines and countries (an opera singer, two classical musicians, two actors, two dancers, and a composer), and three Echo smart speakers. To compose the piece, the group conducted activities using techniques from improvisation and deep listening (Cage & Gann, 2011). The score, based only on questions, was divided into three movements. First, the performers do an improvisation with Alexa, then they question Alexa's responses, and finally, they respond to the questions with movement, sound, or voices in different languages.
Designing More-Than-Human Conversations

The experiments highlighted some of the anthropocentric biases of CAs that (re)produce discrimination in the practice of listening. The fact that voice assistants recognize only human voices is not surprising, given that they are designed as tools for humans. However, the experiments uncovered that some human voices were filtered in that process too. Not only were the sounds from the home or non-human inhabitants such as pets filtered out as “background noise”, the voices of children were as well. These biases expanded our understanding of the discrimination that CAs perform in the process of listening, and that goes in addition to the previously documented problem that CAs recognize certain accents better than others (Koebecke et al., 2020; Phan, 2019). Overall, it became apparent that what CAs consider a user’s voice was not neutral. As CAs failed to listen beyond (male, white, able) human voices, we came to realise that the moments in which CAs were silent were not just passive moments in the interaction, but active acts of silencing.

To explore alternative design directions, in what follows we present two outputs of the project: the first is a series of prototypes and scenarios conceived to probe the question of how to design more-than-human CAs. The second is a tool developed for designers to practise noticing more-than-human entanglements.

Prototype #1: Conversation Starters

Based on the insights from the experimental phase the first author and a group of four Master-degree students engaged in a design process that aimed to probe how we might design more-than-human
conversational agents as non-anthropocentric and situated agents. We defined non-anthropocentric as agents that can listen and respond to more-than-human voices. We defined situated as agents that can account for their context of use, and their positionality in relation to both the user and the designer.

The team was inspired by practices of fermentation and brewing because those are contexts in which people lived with agents they did not fully understand, and thus practices of situated understandings could be developed. Moreover, the idea of growing a CA from a “starter” seemed to invoke practices of caring for non-humans and sharing knowledge and materials within communities. The design process combined methods of critical and speculative design (Ivica et al., 2021) with two more-than-human methods: thing ethnography (Giaccardi et al., 2016) was used to look at fermentation practices from the perspective of the bread starter. Noticing (Biggs et al., 2021; Oogjes & Wakkary, 2022) was used to get attuned to the nonhuman voices in different contexts. Ultimately, we produced scenarios and conversations, which we probed by making short videos and low-fidelity prototypes Fig. 5.

To support one of the fictional scenarios, in which conversational agents listened to the sounds of the home and composed bedtime stories with them, the team edited a series of more-than-human stories. These were created by people from our networks and a fine-tuned model of GPT-3 called Rytr, which often adopted the perspectives of nonhumans. The prompts for people to write the stories were, among others, to take the perspective of a nonhuman when addressing planetary issues, such as climate change or ocean pollution, and to challenge stereotypes by “giving voices” to marginalised (human and nonhuman) agencies Fig. 6.
Prototype #2: Noticing Entanglements

During the experiments, the design team observed that some instruments were more useful than others to help designers move beyond anthropocentric biases, i.e., to decenter the human. For example, in contrast to the limited range of voices that conversational agents captured, the field recording microphone used for the noticing exercises in the process of making Conversation Starters recorded a broader range of sounds than the humans in the team could notice. That highlighted the affirmative potential of decentered listening as a practice for noticing more-than-human voices. To facilitate that, the team developed a tool for designers to listen to more-than-human voices, in the form of a podcast. The podcast guides designers to do noticing exercises while encouraging reflection on possible resistances along the way, — in a progression that goes from still and distinct entities to movement and entanglements (Noticing Entanglements, 2022). By creating the podcast, two strategies for decentering listening were conceptualised: entangled listening, i.e., noticing sounds that we as humans normally do not perceive; and activist listening, i.e., noticing voices that have been silenced because they were not considered “worth listening to”. The entangled strategy highlighted that developing tools to listen to more-than-human voices might imply expanding the range of data they capture and not imposing predefined filters. The activist strategy, on the other hand, highlighted that technologies could be designed to bring to the fore voices that are systematically silenced.
Concluding Remarks

Through experiments and prototypes, this paper explored how designers might conceive situated CAs that listen and respond to more-than-human voices. Reflecting on the broader implications of the project beyond the specific experiments conducted, we discuss how the findings and insights gained from it might inform future research and design practices in the field of AI and posthuman design.

In the field of AI, the experiments showed that the interactions with AI agents could be more situated if the limitations of the agents and the human/nonhuman infrastructures in which they are implicated were exposed. While exposing the limitations of technologies might seem counterproductive for the companies that develop them, our project shows that failures and misunderstandings could be potentially useful opportunities for helping people develop their own competencies for when and how to trust AI agents (Nicenboim et al., 2022). Moreover, through the provocation “how might we misunderstand AI better” (Nicenboim et al., 2023), the prototypes illustrated some ways in which designers could support people in developing sensitivities to trusting agencies that cannot be completely understood.

In the field of design, the project highlighted challenges and opportunities for designers engaging with more-than-human approaches. Beyond using a more-than-human approach in the design of AI, the paper also asked how designers might use AI as a more-than-human agent in the design process, as a co-ethnographer (Giaccardi, 2020) and a co-performer (Kuijer & Giaccardi, 2018). Expanding on the question from Clarke et al. (2019) that asks “How do we make the experiences of non-human others palpable? How do we hear, and how do we encourage others to hear, the non-human voices?” (p. 61), the paper considered how AI might help designers to encounter nonhuman voices that might otherwise be silenced. Our experiments demonstrated that decentering through AI could be facilitated by helping designers bypass preconceived human/nonhuman binaries in capturing a wider range of perspectives they would not have noticed otherwise. However, the experiments also showed that it was important to avoid filtering out those perspectives when making sense of the data captured.

Ultimately, to practise decentered listening, designers need to notice and become attuned to the entangled human/nonhuman relations. Practices of decolonial listening, which are about “hearing the fundamental relationality of all entities before they are formed into subjects and objects through racial, economic, and extractivist logics” (Clark, 2021, p. 1), can be inspiring for designers when trying to move past anthropocentric assumptions. Overall, the process could be conceptualised as developing practices that can capture and make sense of posthuman data, i.e. data that is relational and situated. Recognizing the relational and situated character of data means accounting for the entanglements of the agencies that produce it — as well as the ones that are affected by it. This, in turn, opens up a space for design as a field that can encounter posthuman data within material relations. Our experiments have shown how as a material for design, posthuman data can help to make sense of...
the dialogues with other species and make the relations and hidden ecosystems visible through enactments, listening, and making. While our inquiry illuminated opportunities for designers to engage with more-than-human approaches, it also highlighted tensions. For example, the impossibility of decentering the human completely was made tangible in the metaphors we used: as much as we tried to move away from anthropocentrism, the metaphors of fermentation, still evoked extractivist practices. Thus, our project shows that designers could use metaphors to explain the more-than-human aspects of AI (Murray-Rust et al., 2022), but they need to be critical and acknowledge their anthropocentric limitations.

In summary, this project illustrates possible ways in which a more-than-human approach could support the design of AI, theoretically, methodologically, and epistemologically. Theoretically, this project is grounded in the critical posthumanities, especially in new materialism perspectives and their relational understandings of users, imaginaries, and technologies. Methodologically, the project was enriched by engaging with and expanding more-than-human methods, such as noticing. Epistemologically, the posthuman lens helped us to account for the positionality and agency of both people (users and designers) and AI agents in their interactions, and include more-than-human voices in our design process in different ways, i.e., from making AI agents active participants in our studies to designing agents that can listen to “voices” beyond those of humans, from other species to sounds in the home. We hope this process can inspire designers and researchers to imagine different ways of designing AI.

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