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Making everyday things talk

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Speculative Conversations into the Future of Voice Interfaces at Home

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1 INTRODUCTION

As intelligent things are becoming commonplace in our households, there is a tremendous drive to have human-like conversations with them. Through future visions, we become prepared and accustomed to verbally command a lamp to turn on, a kettle to boil water, or to summon a car to the driveway. Yet, it requires individuals to interact not directly with the things themselves, but rather mediated by AI voice interfaces such as Amazon Alexa, Apple's Siri or Google Home, otherwise known as conversational agents (CA). These allow people to control their smart and connected appliances but also entertain them with their ability to whisper (Parviainen & Sondergaard, 2020), joke and even flirt (Bergen, 2016), opening up an unprecedented space of more-than-human social interactions. However, these emerging voice interactions are limited by the extent of conversations they make possible with intelligent things in the home. As Reeves et al. (2018) argue "*calling interactions with voice interface conversational is perhaps a confusion*" as they actually are limited to sequences of requests and responses, where things are reduced to their mere functionality and used in a human-centric dimension. Current CAs appear to share the faith of many technological innovations employing a type of human-centred perspective focusing on utilitarian aspects of interaction that may constrain our capacity to explore the possible nuances of emerging relationships between humans and things (ref). We find that there is an untapped potential in research concerning the conversational qualities and capacities of CAs that can be explored to attend to other ways in which things –intelligent or not – can *speak* to us and us to them.

This paper investigates a more-than-human design approach to conversational interaction with everyday things or things that are not considered to be intelligent. Through a conceptual shift from human-centered to more-than-human-centered design, and by incorporating a thing perspective, we imagine that things have a 'voice': a voice that preexists the voices that designers and engineers may develop for them. We conducted interviews with things as a way to explore the nonhuman space in the design of conversations with things beyond their immediate use. We began by asking what and how things might speak if they had a voice, which led us to learn about 1) how things in fact already speak to us in their ritualised, situated, and materially-rich embodiments; and 2) the emergent qualities of people's relationships with everyday things and how that might inspire the design of intelligent CAs at home. We share our insights from conversations with things with the aim of enriching the dominant view of 'voice interface' with a more-than-human perspective that could open up opportunities for designing meaningful everyday interactions with things.

2 MORE-THAN-HUMAN DESIGN

With existing market-driven foci on convenience and efficiency, the way intelligence gets implemented and performed by smart and connected things (IoT) is fundamentally different from other creative enactments of AI in CAs, social robots and assistive technologies in the home. Among them, CAs are rapidly inhabiting our households, and in doing so they mediate not only our daily social interactions with family and work life (Luria et al., 2020) but also determine how we interact with everyday things that live with us (Akmal and Coulton, 2020). CAs have come to play a dominant role in our social imagination when we think about the kind of conversations to be had with everyday things. For instance, one might expect that a second-hand kettle might talk about different topics, or have a different worldview, than an existing CA that commands a kettle to boil water. Beyond obvious use-value, our conversations with things could be different simply because of their context, materiality, and relations to humans and other things around them. Aligning with concerns of third-wave HCI (Bødker, 2006), this situation opens up the space to imagine how differently conversations could emerge, which includes how things already talk to us in their own non-lexical way. These questions can be approached from the lens of New Materialism (NM) and here Bennett's eco-philosophy is especially relevant. Bennett theorizes a "vital materiality" that runs across both human and nonhuman bodies, in which agency always emerges as the effect of ad hoc configurations of human and nonhuman forces (Bennett, 2010). It is worth noting here that our focus is on CAs that have voice interfaces, which excludes other non-voice-based instantiations of CAs such as chat bots or holograms.

Grounded in NM thought, there are a range of emerging more-than-human approaches in design and HCI (Clarke et al. 2018; Dew and Rosner 2018; Giaccardi et al. 2016; Wakkary et al. 2017; Kuijer and Giaccardi 2018; Liu, Bardzell, and Bardzell, 2019). These approaches focus on understanding the agency and roles that humans and nonhumans can play in everyday life and the new capacities for action configured at the intersection of humans and nonhumans (Giaccardi and Redström, 2020.; Maller and Strengers 2018). This approach is suitable for our inquiry because it enables researchers to move beyond positioning AI in relation to human activities (as tools for use), and instead, to inquire into non-human agency and possible new relations with things (Redström and Wiltse 2018; Giaccardi, 2020).

In relation to how things speak to us, design and HCI researchers have attempted to explore the shift from a human-centered approach to that of seeking nonhuman perspectives (for example, see Giaccardi et al., 2016; Wakkary et al., 2017). In these explorations, what is significant is how autonomous AI algorithms are involved as agents, with their unique capacities, to gain access to nonhuman perspectives of the world. Whereas Wakkary et al. (2017) employ machinic "morse code" translations to speculate about what things do, Giaccardi et al. (2016) augment everyday things with autonomous sensors and cameras and cast them in various social roles as co-ethnographers and co-designers to explore their nonhuman Thing Perspectives. *Thing Perspectives* (Giaccardi et al. 2016; Seaver 2017; Murray-Rust et al. 2019; Rahwan et al. 2019)

have since been taken up by researchers in contexts where human perspectives felt partial – undermining the broader ethical implications and the fluid interdependent relations between humans and nonhumans.

More recently, speculative forms of Thing Interviews (Reddy et al., 2020, Nicenboim et al., 2020) where researchers role-play things and interview them have been useful for imagining what roles things play in everyday life, and as a means to re-imagine how things could be different. Central to this method of impersonating things is the awareness it raises about our human biases and limitations, thus giving the method a reflexive and unpremeditated quality. In other words, *Thing Interviews* allow unintended human and nonhuman performances to reflexively inform the design investigation. Furthermore, Nicenboim et al. (2020) embraced the more-than-human approach by conducting *Thing Interviews* with CAs to ask critical questions about the infrastructures, ecologies, roles and relations that sustain CA interactions. Contrastingly, in this inquiry, we use *Thing Interviews* to explore the scope and qualities of conversations one can have with everyday things at home if they had a voice.

3 STEPPING INTO THE THING'S SHOES

We adopted a more-than-human design approach and performed an investigation that combined a *Thing Perspective* exercise with speculative *Thing Interviews*: methods that invite humans to take pictures from a thing's perspective and to conduct an interview with a thing. To run the investigation, the organizing authors composed a design exercise and shared it with the contributing authors. The contributing authors played a critical role in the investigation because they were involved as either organizers or participants in a series of prior workshops that incorporated the *Thing Interview* method within a more-than-human framework (Reddy et al., 2020; Nicenboim et al., 2020). Every author in this paper thus had a prior opportunity to develop sensitivities for engaging with nonhumans and to discuss the nuances and implications of the investigation. While some of the authors have backgrounds in interaction design and HCI, others cover disciplines such as anthropology, STS, and political science. Further, working remotely from home during the COVID-19 pandemic allowed the authors to bring together contributions from their homes located across Europe, Australia, and North America.

The exercise was divided into three parts. 1) The contributing authors were asked to choose an everyday thing from their home – an item that they had an established relationship with, or that they interacted with on a regular basis. They were asked to take four pictures: one picture of the thing in its everyday context seen from a human perspective, and three pictures from the thing's perspective. 2) The second part was an online meeting between six pairs of contributing authors. In this meeting, each pair was instructed to take turns to interview their partner's chosen thing for about 7-10 minutes. The pair assumed two roles: the human interviewer and the thing. The human interviewer posed questions directly to the thing chosen by their partner, who responded on the thing's behalf. The organizing authors further advised the paired co-authors to inquire into the relations the chosen thing has with humans and other things, its

worldview, and to allow the thing's context and materiality to inspire the conversation. Those enacting the thing were invited to position it in front of the computer's camera and record the interview by audio (or video). 3) After the interview meeting, the contributing authors were invited to reflect on some questions provided by the organizing authors, and to transcribe three key conversation snippets from their interview. The reflection included questions on motivation for choosing the thing, the things' roles, their embodied material qualities, personalities, and question choices made by the interviewers.

The submissions included pictures of the chosen things, selected conversation snippets from the interviews, and reflections to the questions. The submissions were analyzed by the authors in three rounds. In the first round, the organizing authors reviewed all the submissions and annotated the transcripts for highlighting the salient conversations in every submission. In the second round, the same authors mapped these conversations, its associated reflections and identified themes for CAs. In the final round, all contributing authors provided feedback on the draft paper.

4 HOW DID THE THINGS RESPOND?

The six submissions consisted of the selection of things as presented in Figure 1, followed by the sample snippets of their conversations with human interviewers: a mug and a tampon, a plant and a coffee maker, a teapot and a perfume bottle, a pair of boots and a door, a window and an ear bud, and toilet paper and a coffee machine (Table 1). Full sets of conversations are available at the Appendix A.
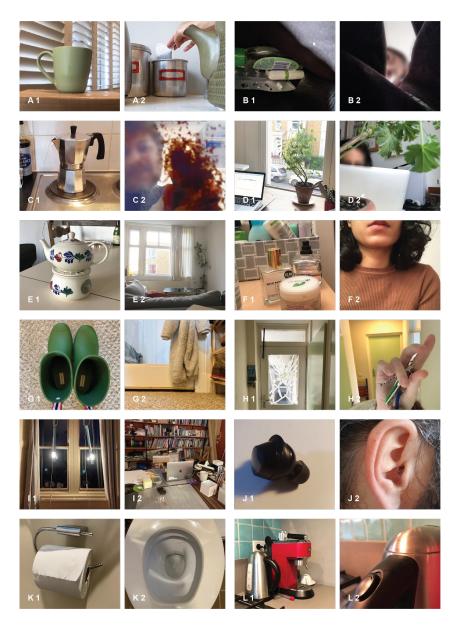
Figure 1. From the top left: a mug (A1 & A2); a tampon (B1 & B2); a coffee maker (C1 & C2); a plant (D1 & D2); a teapot (E1 & E2); a perfume bottle (F1 & F2); a pair of boots (G1 & G2); a door lock (H1 & H2); a window (I1 & I2); an ear bud (J1 & J2); a roll of toilet paper (K1 & K2); a coffee machine (L1 & L2). X#1 and X#2 correspond to human and thing perspectives respectively.

Table 1: List of selected things accompanied by conversation snippets extracted from the transcripts of the *Thing Interviews*, which were used to identify emerging themes (on the right column)

Thing	Questions by Human Interviewer	Responses from Things	Emerging themes
Mug	Do you remember your maker?	[...] I don't really have a strong memory of my maker, but I do have a vague memory of the sensation of being pulled into the shape that I am.	Permanence / Impermanence
Tampon	Do you feel like you're waiting to be used?	[...] while I'm still in my packaging I've never been able to explore to see what it is for. I feel like I've got a lot of potential or growth (*winks*).	Permanence / Impermanence
Plant	Tell me about what you see inside.	Sometimes I can't see her face because there is this kind of silver vertical thing that has some kind of fruit on it, I noticed that other plants also have fruits. This metallic thing sometimes covers her face.	World as perceived by the thing
Coffee maker	Are you a noisy coffee maker?	Yeah, I make a kind of quite loud gurgling sound when I'm making coffee for people. It's loud enough for John to notice that I'm ready.	Breaking silence
Teapot	Do you think about death and are you afraid of dying?	[...] I know she won't put me together. I never saw her repair anything. I think when I break it's all over for me [...]	Permanence / Impermanence
Perfume bottle	What are the most important events or milestones leading up to your role of a gender conforming bottle?	I kind of have an opinion about gender, I would say and I express the opinion through the flavour of my perfumes. That's made me into a more reflective object.	Altered presence
Boots	[...] was it difficult to find a time for you to have this conversation today?	[...] you know, there's a second lockdown, so I'm only technically supposed to go out and do my job once a day. Um, I think there's, you know, some liberties taken with that.	Altered presence
Door (knob)	[...] briefly describe sort of, um, what your everyday sort of, you know, everyday routines and tasks sort of look like. [...] How do you, how do you feel about that?	[...] a window was left open, and a huge draft came through and I was open and then I slammed really hard because this wind gust went through and then just shattered.	Breaking silence
Window	And what are the things that catch your attention for the	Sometimes I see people, and all what Roger notices is that the doorbell is going, but I see	Spatiality and distributed

Thing	Questions by Human Interviewer	Responses from Things	Emerging themes
	longest?	who pressed it.	agency
Ear bud	Who is in control? You or Bob?	I beat him into a different place by giving him music or stuff to listen to. That is a quite powerful thing to do.	Navigating proximity
Toilet paper	How do you feel when you go down the toilet?	[...] I join with a whole lot of other toilet paper. And yeah, I know it can get a bit smelly, and there are not very nice things that go down the pipes, but it's all just a part of life.	Permanence / Impermanence
Coffee machine	Are you getting along with the kettle?	I don't like her. She gets to do a lot of tea. More than you get to make coffee... Yeah... such a pomp! Always bubbling up.	Breaking silence

5 EMERGING THEMES

5.1 Breaking silences

While there is often a greater value associated with things that are silent or noiseless, we found that several co-authors relied heavily on the sounds things make to impersonate what things do in their everyday environments. The interview with the coffee maker, for instance, revealed that it made a "[...] *kind of quite loud gurgling sound*", even if it only partially conveyed that the coffee was ready. Similarly, the coffee machine was compared to the electric kettle, complaining how the kettle was "*always bubbling up*". Even the door's interview engaged with noises such as the on and off "*clicking*" of the door knob and the "*shattering*" of glass due to a gust of wind to describe what the door's routine has been like. On a higher level, this confirms what we said previously about how things are *already* speaking to us, but digging deeper it reveals differences between things that speak to us on account of the human use of the thing, such as preparing coffee in a coffee maker, and those things that speak to us when they are not in use, such as the door's glass shattering as an indication of nonhuman (wind) activity.

It presents an important reflection for CAs as they are meant to remain silent and only respond when spoken to or used. This perceived "silence" of intelligent things can be considered unsafe or creepy as they undeniably listen to private conversations in households (ref). The experience of not feeling safe due to the silence of things can be compared to smart electric cars that are now mandated by law (in EU) to produce "artificial engine noise" as a safety measure for pedestrians to know when a car is approaching them (ref). As more and more mundane things become inscribed into an artificial logic that values silence over noise, our *Thing Interviews* suggest that the design of CAs might benefit from occasionally breaking silence in the way that

everyday things do. But at the same time, there is a difference between silence and the perceived inactivity of nonhuman things, which implies that proactive sound-making should be aligned with the things' behaviour and its role in everyday and not just for the sake of filling up absences of sound.

At the same time we also emphasize that we do not need a "human voice" to have a conversation with things. If gurgles, clicks, and whooshes are already indications that things converse with humans and each other in their own non-lexical manner (ref), then it demands us to rethink how we make "conversation" in a distributed ecology of humans and nonhumans. Thus, any attempt to include human language into the equation is always inevitably partial. In this matter, one of the co-authors reflected on how difficult it was to impersonate the plant in comparison to the noisy coffee maker, and consequently, she welcomed the idea of employing intelligence for "*listening to the plant's veins*".

What if CAs produced artificial sounds to accompany in their everyday performances? Which human and nonhuman encounters would be under consideration and on what occasions?

What if CAs could understand the non-lexical sounds of things which could further expand the scope and quality of our conversations with things?

5.2 Navigating proximity

It is possible to view things on a spectrum of their proximity to human bodies. While some things may be placed somewhere in space, others may be wearable on human bodies or even integrated into them. Changing proximity of things to human bodies may have direct effects on the ways in which humans perceive the world. In our interview with an earbud, one of our interviewers mentioned how the earbud has become a part of his body, disappearing from his consciousness: "*It does increasingly feel as part of my ear or hearing sense*". When combined with a degree of intelligence, such highly proximate things with their increasing capacity to alter human perception without us recognizing it make us think about the power dynamics between things and people. Amazon Alexa has already been integrated into earbuds (ref), and there are possibilities for intelligent things and CAs to get much closer and fully integrated into human bodies such as the case of in-body CAs implanted in ear canals as depicted in a speculative AltCHI paper (ref). In addition to how such CAs can alter our perception of the outside world with what degree of autonomy and with what degree of transparency in their action, those highly-integrated CAs raise questions about authenticity and privacy. It is not hard to imagine a scenario where someone we talk to can talk back to us through the suggested responses by its in-body CA or earbud CA, making the human-human conversation potentially less authentic. The first signs of such authenticity concerns about CAs emerged with the Google Duplex CA [ref] which can make restaurant bookings on behalf of its users with a remarkable level of human-like

conversational competence and style, similar to the challenges explored in Our Friends Electric (Rogers et al. 2019). As it might be hard to recognize whether or not the voice on the phone belongs to a CA, such CAs are expected to disclose their identity at the beginning of a phone call. Another probable scenario may involve situations where conversations between two people get implicitly recorded by one person's CA, clearly requiring implementing very strict privacy measures.

> **What if CAs could get integrated into our bodily organs** and we could speak to our own organs? Would that be a new form of personal health tracking?

5.3 Spatiality and distributing agency

The interview with a window highlighted two different dimensions of spatiality: human-thing perceptual gap and thing multiplicity. In the interview, some responses of the window focused on the perceptual gap between humans and things: *"Sometimes I see people, and all what Roger notices is that the doorbell is going, but I see who pressed it."* Such perceptual gaps can be a fertile area to design conversations between humans and things to bridge the gap where needed. One major factor generating this perceptual gap is thing multiplicity. While some things at home have a unique singular presence such as a fridge, some other things may have multiple presences distributed in different sections of a home such as windows. In the case of windows, they exist almost in every room, and this provides an opportunity for humans to interact with multiple windows through a single one and for windows to perceive the different parts of the environment through the perceptual capabilities of all windows in the same home. This multiplicity will most probably require people to construct new mental models for the intelligent conversational things at home. These mental models can be based on the singular/multiple presence of things and how such localized or distributed presence can enable some distributed things to have a collective capacity to perceive and act. Specific to the case of windows perceiving multiple sites both inside and outside of a space, there are also potential privacy and ethical concerns (ref). When should the distributed capabilities be enabled/constrained, when and how should such things explicate such capabilities to whom?

In the emerging landscape of distributed CAs in our environment (from multiplicity of window CAs to benchtop smart speakers to smart earbuds to potentially in-body CAs), there is room for developing a thing ecology considering such things' distribution in the space, their proximity to human bodies, their degree of autonomy and intelligence, and their medium of communication that can go beyond voice conversations. Such an ecology should definitely consider various privacy, safety, and ethical concerns such new things are likely to bring forth.

> **What if CAs could talk to one another to bridge the perceptual gap between humans and things?** How would we imagine the construction of mental models for things sharing a collective capacity to perceive and act?

5.4 Altered presence

While recognizing the spatial and distributed agencies of things, it is equally compelling to acknowledge how things inversely affect the way the outside world perceives us humans. The interview with a perfume bottle can be presented here as an example of a thing that not only distributes its scent spatially but it is also aware of how it is complicit in the way the world perceives the gender of a human. In doing so, the bottle plays an active role in conforming to *a* human gender: *"I kind of have an opinion about gender, I would say, and I express the opinion through the flavour of my perfumes. That's made me into a more reflective object".* This reflective quality in the conversation suggests that things can be imagined to become aware of their own role and how they might have an altered presence that is more attuned to the social and moral context they are part of. This quality was also explicit in the interview with the boots. The boots reflected on sharing its agency with the human by being complicit in breaking the law that requires people to stay at home during the COVID-19 pandemic: *"[...] you know, there's a second lockdown, so I'm only technically supposed to go out and do my job once a day. Um, I think there's, you know, some liberties taken with that"*. These reflective, perceptual tensions point to the fact that conversations with things are not only a matter of distributed agency, but they are also socially and morally suspect in their lived contexts.

Reflecting back on existing CAs such as Amazon Alexa and its multiple instantiations (one for the kitchen, one for the living room, one in the car, and one for the ear), they hold some responsibility for the outside world's perception of humans with respect to norms, laws, and accepted practices taking place across their distributed spatiality. CAs would then require a level of cultural and moral sensitivity to perceive the impact they have on humans in morally sensitive situations that can inform the conversation.

> **What if CAs could reflect on the impact they have on morally sensitive human situations** to make conversation? How might its altered presence trigger human awareness of it?

5.5 Permanence/Impermanence

In our interviews, some of the things were short-lived and others had longer life spans as they were handed down over generations. For example, the tampon and the toilet paper lead very short lives once put to use, and on the other hand, the mug and teapot lasted longer than their expected single-person use. This essentially questions how people relate to things beyond their

use value. As such, discussing things from the perspective of their permanence and impermanence allowed the co-authors to consider different life cycles of things other than those of humans. Instead of reducing the toilet paper to its one-time use, one of the co-authors mentioned a life beyond the ephemeral use of the toilet: *"Well I just think of it as the next stage of life, you know, maybe humans think about it in terms of, you go to a better place. For me, I join with a whole lot of other toilet paper. And yeah, I know it can get a bit smelly, and there are not very nice things that go down the pipes, but it's all just a part of life, and its only disgusting if you're a human I think... because humans associate all of that with waste, but I'm part of this system which keeps humans healthy, which creates degradable products that go back into the environment in a way that's sustainable. So, I feel like I have a really clear purpose"*. This interview suggests the idea that a thing can go beyond its own short lifespan and immediate context, and instead connect to its future and past incarnations. One could imagine that the toilet paper embraces a collective consciousness and continues its sustainable mission through future toilet papers and transfers its "experiences" to next generations. The conversations with such a thing could then plumb *(pun intended)* into memories of its life processes that humans do not think about or encounter in their own lifetimes, as projects like "Anatomy of an AI System" carefully remind us (ref).

Another way in which impermanence played a role in engaging a thing's perspective was related to the tampon's desire to experience its own potential: *"While I'm still in my packaging I've never been able to explore to see what it is for. I feel like I've got a lot of potential or growth (*winks*)"*. As this tampon was reserved for emergencies only, its short life was countered by a longer time span of waiting for its use. This meant that the essence of this tampon rested on what it could potentially do, rather than what it was supposed to do. In contrast to how things are designed, which tends to assume that maximum use and engagement is always better, the absence of use in the tampon's case did not imply its inability to act or perform. This idea of non-use then challenges how we think of things that are not used, rarely used, or simply waiting to be used. It is common that people feel guilty because they own things they don't use often, particularly CAs. They might even think of their value being diminished because of infrequent usage. In this matter, the tampon's perspective helps to understand that short-lived, one-time, infrequent, anticipated, and rare uses are all part of how people relate to things. The nonhuman perspective, in this sense, raised questions about taken-for-granted assumptions that permanence is a positive life-inducing quality in things, and conversely, impermanence a sign of fragility and death. In relation to the latter, the interview with the second-hand teapot that led a long life over several generations was very aware of its own fragility and warmly embraced how easily it could break and die. It further suggests how design of CAs can benefit from not only long-term thinking (over generations) but also thinking along the lines of disposable interactions in the short term (ref).

What if CAs could speak about their past? Could they express their collective memory,

going beyond their life span? What if CAs were passed on over generations?

What if CAs take a responsible social role according to their collective consciousness?

What if CAs have disposable interactions in both short and long term? What do more permanent, long lasting interactions look like? What would less permanent, short lived interactions look like?

5.6 World as perceived by the thing

The interviewers' questions to things showed a wide range of topics from feminism to activism to sustainability. This suggests that the interviewers made a strong connection between the capability of being able to talk with that of being intelligent. However, it can be argued that we may not prefer to have very smart everyday things around us. How much do we want or expect our kettle to know about us or the outside world? Does conversational competence require being intelligent and knowledgeable? In the interview with the plant, one of the plant's responses involved a description of a laptop without having the knowledge of what a laptop is: "*Sometimes I can't see her face because there is this kind of silver vertical thing that has some kind of fruit on it, I noticed that other plants also have fruits. This metallic thing sometimes covers her face.*" Here, the plant sees the laptop as a rectangular metal surface with a fruit on it and that's actually sufficient for the plant to express its idea. The plant's response is a good example of how things can communicate with a limited amount of knowledge about its surrounding environment. This response is important as it demonstrates how one could go beyond anthropomorphised views and actually embrace how a thing may perceive the environment from what we may otherwise refer to as a thing's viewpoint.

The thing's viewpoint or the world as perceived by the thing can be an important concept for designing CAs as it suggests that we can imagine intelligence emerging with things differently, one that does not rely on knowing everything. Perhaps, things only need a uniquely constrained capacity to describe the world and communicate with us. Ultimately, this theme asks us to re-think a thing's viewpoint of the world. What kind of representations there may be to support the communication needs between humans and things and potentially how such new thing representations may offer benefits in design factors such as privacy, safety, and agency. Deictic representations (Agre & Chapman, 1990), focused on representing only the relevant entities or parts of the environment according to the current situation, can be a useful starting point to formulate thing viewpoints. Understanding what a thing viewpoint would involve and look like presents an exciting research direction.

What if CAs could learn about the world in a gradual way through their interaction with humans?

What could be alternative forms of communication for things that require a minimal amount

of knowledge about the outside world?

What could be some alternative forms of representations that things may employ to communicate ideas?

6 FINAL THOUGHTS AND REFLECTIONS

The original intention behind this paper was to investigate what might happen if everyday things had a voice interface. We wanted to know what conversations we could have with them and how our relationships would change as a result. These questions were informed by the limitations we experienced with current CAs for talking to things at home. We were interested in conversing with things through a more-than-human approach so that we could sensitise ourselves to other forms of intelligence and communication to speculate on future voice interfaces. However, when we stepped into the thing's shoes, we realized that our original intention was missing a fundamental understanding of human and thing relationships. As a result, our focus shifted from what and how everyday things could be supported with voice interfaces to the emergent qualities of people's existing relationships with everyday things as an inspiration for intelligent CAs. In other words, we needed to backtrack and re-discover relationships to and of things *before* we could think of their voice-based interactions. The *Thing Interviews* method allowed "conversation" to become the channel through which we could get to know things and imagine future possibilities when these things have higher degrees of intelligence, agency, and communication capabilities.

One of the limitations of the speculative *Thing Interviews* method is that we privileged human voice and human-like interview settings over approaching things in their ordinary settings and engaging them alongside their everyday performances. This led the human interviewers to go back and forth between the thing perspective and their own human perspective of the thing. Methodologically, we see two opportunities emerging from it. One tactic could be to deliberately separate the two perspectives, which could allow researchers using more-than-human design methods to address questions of anthropomorphisation. While we somewhat obtained visual thing perspectives showing how a thing might view its environment, the things' responses in the conversations were usually how a human being would perceive and describe the outside world. Even the concerns, worries, and curiosities expressed in things' responses could be seen as human concerns, worries, and curiosities. In some interviews, for example, instances of anthropomorphisation were clear when things were sad or jealous because they were left unused for some time. Recognising these instances would allow us to ask how, or in which situations, a thing perspective could become more visible? The other opportunity is to think of a shared perspective that lies in between humans and things. This shared perspective does not have a precise line in the middle, but an oscillating one. Based on our *Thing Interviews*, we see the middle as a generative design space, where people use their own experiences and relations

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they have with things as a speculative tactic to imagine what it is like to be the thing. In that attempt, what emerges might not be a thing perspective, but a more-than-human perspective for design practice.

To conclude, our paper identified several themes characterizing the emerging design space of people's relationships with everyday things imagined to have conversational capacities through a more-than-human design approach. We believe the themes presented here may work as the preliminary steps to understand this design space and inspire future research on designing everyday conversational things at home.

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A APPENDICES (TBD)

In the appendix section, three levels of Appendix headings are available.