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"Alexa, define empowerment": voice assistants at home, appropriation and technoperformances

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Abstract

Purpose – This paper aims to show how the production of meaning is a matter of people interacting with technologies, throughout their appropriation and in co-performances. The researchers rely on the case of household-based voice assistants that endorse speaking as a primary mode of interaction with technologies. By analyzing the ethical significance of voice assistants as co-producers of moral meaning intervening in the material and socio-cultural space of the home, the paper invites their informed and critical use as a form of (re-)empowerment while acknowledging their productive role in human values.

Design/methodology/approach – This paper presents an empirically informed philosophical analysis. Using the conceptual frameworks of technological appropriation and human–technological performances, while drawing on the interviews with voice assistants' users and literature studies, this paper unravels the meaning-making processes in relation to these technologies in the household use. It additionally draws on a Wittgensteinian perspective to attend to the productive role of language and link to wider cultural meanings.

Findings – By combining two approaches, appropriation and technoperformances, and analyzing the themes of privacy, power and knowledge, the paper shows how voice assistants help to shape a specific moral subject: embodied in space and made as it performatively responds to the device and makes sense of it together with others.

Originality/value – The researchers show how through making sense of technologies in appropriation and performatively responding to them, people can change and intervene in the power structures that technologies suggest.

Keywords Value change, Appropriation, Technoperformances, Voice assistants

Paper type Research paper

Introduction

Today, talking to our devices increasingly becomes a common way to interact with technologies. Instead of typing, clicking and swiping, a shift toward voice-first interface promises a natural way of interaction with digital technologies. However, as we will show in

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this paper, the shift to voice-first interaction deserves philosophical attention in view of the profound impact it has on our lives that often goes unnoticed.

Voice-powered technologies promise to accompany our everyday lives through the smartphones or through the smart speakers in our homes (e.g. Amazon's Alexa, Google's Home, Xiaomi's MI AI and others). Voice assistants (VAs) are powered by natural language processing and other forms of artificial intelligence (AI), which allow them to answer users' questions and perform actions on their behalf (e.g. play music, turn on the lights, make coffee or even heat the bathtub, provided these devices and services are linked with the VA). Not surprisingly, people are keen on adopting voice-powered technologies: according to Kinsella and Mutchler (2019, p. 3), one in four US adults owns a smart speaker, with more than 100 million of these devices installed globally (Kinsella, 2018).

VAs deserve ethical attention because of the meanings that their key design features promote. For instance, many of the leading VAs use female voices (e.g. Amazon's Alexa, Apple's Siri, Microsoft's Cortana, etc.) because the users perceive them as warmer than male voices (Mitchell *et al.*, 2011), more trustworthy (McAleer *et al.*, 2014), more soothing and comforting (Corso, 2010) and helpful but not bossy (Nass and Brave, 2005). At the same time, VAs invite curt functional interaction, favoring commands and top-down dialogues suiting a digital butler. However, as Nass *et al.* (1997) showed already in 1997, imbuing VAs with female voices promotes gender stereotypes. On a different note, VAs are supposed to listen and process human speech only when a user says a wake-word (e.g. "Ok Google" or "Alexa"), facilitating the privacy of their users at home. However, recent reports indicate that VAs can start an unsolicited conversation (including random screaming [Manjoo, 2018] and laughter [Liao, 2018]) and record and send the conversations of unassuming users to the third parties (Lee, 2018). Meanwhile, the companies behind VAs employ people to analyze the content of users' voice interactions, complicating the value of privacy (Paul, 2019; Hern, 2019; Day *et al.*, 2019). It seems that VAs do more than their designers promise, bestowing certain values and meanings upon their users and rendering the technology far from neutral (Kudina, 2019a).

These controversies about design features of VAs point to the existential ethical and political significance of the technology: what does it mean to stay at home and be social when VAs are used? How does the technology shape the meaning of privacy, communication and interaction? What does it mean to be raised in an environment where there is always a "female servant?" And, how can and do users appropriate, change and hack the meanings that the VAs promote? In this paper, we will show how the production and emergence of meaning is not only a matter of users but also users interacting with the designers and technologies themselves. By appropriating VAs and in co-performances with them, the users change the suggested meaning and intervene in the power structures of a social context.

Using the conceptual frameworks of technological appropriation (Kudina, 2019b) and human–technological performances (Coeckelbergh, 2019), while drawing on the interviews with VA users and literature studies, this paper aims to unravel the meaning-making processes in relation to VAs in the household use. Firstly, we will expand on the theoretical foundations of this paper, specifically why we suggest combining the frameworks of technological appropriation and using performance metaphors to conceptualize technology use. We contend that by looking at the interaction with VAs through the lens of a performative and appropriation framework can help us to better understand and evaluate the ethical aspects of the technology and our interaction with it. It puts the material artifact in a wider context and helps us to critically analyze and open up the possibilities for change.

Based on this framework, we will analyze how VAs suggest certain use patterns and perceptions, staging the way people fit them in the household. We will also show how the process of appropriation is not restricted to the design affordances and intentions. Instead, analyzing how people appropriate VAs at home – attribute them with meaning, fit them in their homes, challenge their existing design scripts and devise new purposes (Kudina, 2019b), opens up the process of producing values. With a nod to Wittgenstein and drawing on empirical studies, we will zoom in on the appropriation process and analyze several cases of human–VAs performances that transcend the intended design meaning. For instance, we will show how people claim the value of privacy while assuming that VAs are always listening. We will also show how meanings and values emerge from specific performances, cast by the users, designers and the technologies themselves (Coeckelbergh, 2019).

Finally, we will discuss the resulting non-neutrality of VAs and invite their informed and critical use while acknowledging their productive role on the values we live by. Although the ethical implications of VAs will not be the main focus of this paper, we will not ignore them as they arise from the analysis of the human–technological performances. As performers and co-performers with technology, users, designers and other stakeholders can change the meaning of technology and indeed the meanings of their (inter)actions and life.

Theoretical background: appropriation and performance

To understand meaning making and meaning emergence in and with the use of technologies, we need a framework that is based on the view that technologies are not neutral tools but are shaping meaning and values. At the same time, such a framework has to account for the crucial role humans play in this process. For this purpose, we use a conceptual framework that relies on a combination of two approaches that have been recently developed by Kudina (2019b) and Coeckelbergh (2019), respectively: an appropriation approach and a performance-oriented approach.

Let us start with performance. Drawing on Wittgenstein's (1953/2009) idea that the meaning of language depends on its use and is connected to activities, games and a form of life, Coeckelbergh has proposed a use-oriented view of technology. Nevertheless, it does not endorse the view that technology is neutral; instead, the main idea is that technology is always embedded in wider social and cultural meanings (Coeckelbergh, 2017). Influenced by Winner's (1986) earlier work, he has argued that we can use Wittgenstein's concepts of "games" and "form of life" as developed in the *Philosophical Investigations* (Wittgenstein, 1953/2009) to describe this. Technologies, understood as technologies-in-use, are always embedded in what Coeckelbergh (2018) has called "technology games" and forms of life. In and by use, they contribute to the meanings that are enacted in our societies and cultures, and at the same time, their use is always shaped by those wider contexts or, rather, what Coeckelbergh in his more recent work calls "con-performances."

In *Moved by Machines* (2019), he has proposed to use performance metaphors to describe technology use. This performance-oriented approach acknowledges that material artifacts play an important role in the phenomenology and hermeneutics of technology use, as postphenomenology shows (Ihde, 1990, 1998; Verbeek, 2005). Additionally, it highlights how technology "choreographs" and "directs" us: how technology shapes how we move, the social roles we play and the illusions machines create. But, it also enables us to theorize the role of humans (not just "things") as embodied, moving, social, improvising and temporal beings in co-shaping the experiences and meanings that emerge in technology use as a performative process. The meaning that is made in, and emerges from, the use of technologies, can thus be conceptualized as co-produced, and emerging from, a performative process in which both technologies (material artifacts and other technologies) and humans

participate. One could hence talk about "human-technological performances" or "technoperformances" (Coeckelbergh, 2019) as the focus of analysis for a phenomenology and hermeneutics of technology. The technoperformances metaphor can adequately describe the experience and meaning making/emerging related to specific technologies as created by and emerging from processes in which not only technologies but also humans play a role and as performative processes, which entail movement, sociality, improvisation, temporality and the making of illusions. For example, VAs can be seen as technologies, software or "devices," but they can also be conceptualized as technoperformances that take place in a social con-text (or rather con-performance), which are designed to create illusions, and that involve both humans and technologies (material devices, software, infrastructure, etc.)

In addition, a Wittgensteinian perspective enables us to attend to the role of language. Coeckelbergh (2017) has used Wittgenstein's view of language as a metaphor for understanding technology. But, in the same book, he also pointed out that language plays a role in technological use and in the ways technologies can mediate our experience and action. If language plays a role in VAs, then this is also an aspect that must be taken into account when constructing a conceptual framework for understanding the meaning making and the emergence of meaning in the use of VAs. That meaning also depends on a larger linguistic context. For instance, if the device is connected to AI technology that relies on language data from the internet, then it may also adopt biases that are present in these language corpora and indeed in the particular language (e.g. English).

We propose to combine this performance-oriented framework with Kudina's (2019b) technological appropriation approach. It conceptualizes meaning making in technology use as a temporal and dynamic process that involves humans and that is connected to a wider sociocultural environment. Compatible with the empirical turn philosophy of technology and social studies of science approaches (STS), it has a helpful focus on an empirical investigation of technological practices, for instance, on the role of language. Kudina's approach is tailored to thinking about technology and *values* and can be seen as a contribution and response to thinking about morality in postphenomenology and the mediation theory (Verbeek, 2011). In parallel, it can be used as a framework for exploring the making and emergence of *meaning* in technological practices. Let us unpack this approach and show how it can be combined with the performance-oriented framework and the role of language.

The technological appropriation approach explores how people make sense of technologies and attribute them with meaning to understand the way technologies affect human values (Kudina, 2019a, 2019b, 2019c). Foundational to this is a conceptualization of technologies as mediators of human relations and practices with the sociomaterial environment (Ihde, 1993; Verbeek, 2011). Adopting a non-neutral co-shaping perspective on technologies, the appropriation approach studies how that which is meaningful to people comes to the reflective surface and becomes malleable in the process of fitting technologies in the frameworks of understanding (Kudina, 2019c).

The technological appropriation approach should not be confused with the concept of appropriation in the field of domestication studies (Silverstone and Hirsch, 1994; Sorensen, 2006; Berker *et al.*, 2006). Although the two terms resemble each other by focusing on the process of fitting technologies in the daily lives of people, they have essential conceptual differences. As Kudina (2019b, pp. 65–68) shows, appropriation in the domestication studies requires a physical presence of the technological artifact and focuses on the practical post-factum adoption at a large-group level with incidental normative findings. By contrast, the appropriation approach building on technological mediation explicitly focuses on the values

that the meaning attribution process evokes, adopts a micro-study perspective and covers a practical as much as a projective part of appropriation (when technology exists only as promises and concerns).

As Kudina (2019b, pp. 87–91) suggests, understanding how people appropriate technologies gives us access to explore the dynamic nature of values, or value dynamism. Technologies enable value dynamism by presenting a new set of options previously not available to people or reconfiguring the previously existing ones, uncovering and making available for review the tacit moral beliefs (ibid., p. 6). As a result, technologies can confirm or challenge the existing values that people hold, shift accents between them or make room for new value conceptualizations. The sociocultural environment is of equal importance to people and technologies, helping to develop individual value dynamics to a larger value change or curbing the change to the level of individual human-technological practices. The technological appropriation lens, thus, allows to trace the dynamic nature of values through the process of meaning attribution to a certain technology within a given sociocultural environment. The produced meaning stabilizes when people find an alignment of a new or re-interpretation of an existing technology within their sociocultural embedding. However, the emerged meaning stabilizes only temporarily because the process of meaning making is never complete, being a hermeneutical back-and-forth dialogue between people, technologies and the world around.

This is where we see a close fit and a fruitful interaction between the technological appropriation approach and the framework of human–technological performances. Both theoretical lenses, albeit with different emphasis, suggest a productive interaction between people, technologies and the surrounding environment. The human–technological performance framework allows us to zoom in on a larger process of meaning making and interpretation regarding a certain technology and distinguish specific performances understood as specific instances of appropriation. Additionally, while the appropriation approach brings with it the focus on empirical philosophy in concrete human–technological practices, the performance framework endorses the Wittgensteinian philosophy with a focus on productivity of language in the human–technological interactions. We see a fruitful connection between the two frameworks and their methodological counterparts, especially in the case of VAs that use voice as the primary interface. Joining the two allows us to scrutinize specific ways in which people use VAs in their households, while highlighting the role of language and accounting for the local and business culture that helps to stage individual performances.

In the next section, we will analyze the use of VAs in households as a dynamic process of meaning making and meaning emergence in which humans and language play an important role. We will also show how this process is never neutral in terms of values, given that the use of VAs is always connected to larger sociocultural games and environments. Describing the relevant appropriations and performative processes, we will show how the emerging meanings are not stable but can change and be changed by humans as appropriators and performers.

Making sense of voice assistants

Before we proceed to analyzing the various ways in which people attribute VAs with meaning in their households, we would like to provide a brief methodological explanation. The basis for our analysis consists in eight semi-structured interviews conducted and analyzed by one of us (Olya Kudina) according to the method of Interpretative Phenomenological Analysis (Smith *et al.*, 2009). This method favors the experiential dimension of participants with a certain phenomenon (here, VAs) that reflects their past

experiences and developmental trajectories in view of the discussed phenomenon. The interviews took place in the USA in 2019 with a goal to explore the household adoption of these devices. Most of the interviewees owned (multiple) Amazon Alexa devices, and only one had Google Home. The age of the interviewees ranged within 19–62, with a balanced female–male ratio. All the interviewee names that appear below are anonymized [1]. We will accompany our analysis with the literature studies and the exploration of how VAs appeared in mass media sources in the past years. Together, this will form a basis for outlining several key themes based on the principles of function, numeration and subsumption (Ibid., pp. 85–90). Although there were a number of recurring concerns both for the interviewees and in the literature, for matters of space, below we present the three most dominant ones: privacy, empowerment/power in relation to sense-making and performative epistemology. Discussing these themes through the prisms of technological appropriation and technoperformances, we will highlight their interrelated nature and the way they act as magnets for related but different concerns.

Privacy

Instead of focusing on privacy in relation to protection of one's information or the legal considerations, our analysis discloses the knowledge dimension of this value. Analyzing how the interviewees appropriated VAs showed privacy as related to the lack of knowledge about the device and confusing information from the news pieces. Such moral uncertainty prompted the VA users to devise creative appropriations as practices for maintaining their privacy while still being able to use their smart speakers.

The appropriation of these devices was primarily underpinned by several design features that the VA users were frequently unaware of. For instance, that the microphones of the smart speakers are continuously on to be able to pick up the respective wake-word (e.g. "Hey Google"). Or that VAs record all the conversations the users have with them, which can be reviewed by the designated employees to improve speech recognition software. The news outlets added further confusion by reporting on the cases of a smart speaker accidentally calling someone to transmit on the phone the conversation of its users (Lee, 2018). Even though the users often reported a mistrust in VAs, they nonetheless wanted to keep using the devices because VAs granted them efficiency and ability of natural interaction by voice. Together, this created a climate of moral uncertainty that confronted the users with a problem of finding a proper fit for the smart speakers in their homes and framed the primary privacy considerations.

The theme of privacy in relation to VAs concerned *grappling with the nature of this ephemeral concept and value*. Appropriation of the home-based devices showcased a tension between a localized and distributed privacy. Often, the news about the privacy breaches of VAs came through the VAs themselves. As one of our interviewees, Gwyneth, recalls:

> I remember distinctly as I was listening to the New York Times [. . .] that a smart speaker had recorded umm. someone having a conversation in their home. And I was listening to the news on the smart speaker. So it was very strange. It was very mad. It just felt very odd to be hearing that news and recognize that that could happen to me, using the same device.

Several other interviewees recall discussing the same news piece with family at a dinner table. Keira, who lived with her parents and jointly owned five VAs in their home, echoed her parents' view on privacy as we-have-nothing-to-hide argument. She further approached it from a cost–benefit perspective:

> The things that I ask Alexa are stupid so [laughs] [. . .] I don't think it's [the privacy risk] something that our family is super concerned about, potentially even listening to our

> conversations that are going to have no, like, bad implications to us versus all the good that Alexa does for us.

In this case of pragmatic appropriation, the users judged in favor of online shopping, listening to music without touching the phone, asking questions and inquiring about the weather over the potential harms of their private conversations being listened to. Hearing the same news piece during the dinner, another interviewee, Joanne, explained the difficulty of explaining privacy in relation to VAs to a child. Her 12-year-old sister, used to turning the lights on with her VA and listening to bedtime stories, got scared realizing that someone might be recording and listening to whatever she says to the speaker by her bed. To tame her fear, the family resorted to explaining information selectively, rationalizing and distancing the surveillance concerns. As Joanne recalls:

> I think we might have lied. I think sometimes she thinks that it's like someone there listening to her as opposed to just like some thing recording the things that she's saying and keeping it somewhere. [. . .] I think the way that I saw her anxiety in her head was like 'Here's a man sitting somewhere within two feet of our Alexa and taking notes and like surveilling.' So when I was trying to explain it to her, I kind of painted it as a very mechanical process. [. . .] Which I think makes sense that she would think that. Especially with like [. . .] I don't know, it's like a human name, Alexa.

This excerpt highlights the complex dimensions of not only understanding what privacy means for oneself without clear reference points, but also explaining it to the others who might depend on your judgment. While such explanations and strategies might not dispel the privacy concern, they show how appropriation of VAs prompts value dynamism: e.g. reflection on what is important to the users, how important it is, how technology relates to that and choosing the best option under the circumstances. In short, the appropriation lens shows how moral considerations take shape in using the technologies.

In response to such privacy concerns, we identified a number of creative appropriation strategies from the interviewees and literature that attempted to balance the use of VAs with the individual views on privacy. The strategies of one of the interviewees, Gwyneth, varied from temporarily refraining from using the device, which frustrated her, to developing a selective use for it, periodically unplugging it. The news stories were complemented with the fact that VAs often speak when unprompted, disrupting the intimacy of the private space with an unwelcome intrusion:

> I think both my partner and I really value time with each other and Alexa in our shared space often can be disruptive. That would be another reason I would unplug it. She would often [. . .] mistake some words as her name or for a command and it would just totally interrupt dinner or another activity [. . .] Especially now that we're in a smaller space where noise travels much more easily and where we're just trying to have conversations and further connect at the end of what can be longer days. [. . .] And so just leaving her out of it can be helpful when we are trying to connect in our home (Gwyneth).

Eventually, the reported privacy breaches, portability of the device and the unprompted interactions made Gwyneth feel less secure in her home, leaving her VA unplugged until needed.

Another notable appropriation strategy came from a design community in the form of Project Alias (2018). The designers used a Raspberry Pi programmable device to take into account the technical features of smart speakers and the privacy wishes of the users. They used Raspberry Pi and a three-dimensional (3D)-printed muffin-top to cover the smart speakers. This device has two main functions. First, it continuously feeds white noise to the smart speaker, preventing it from listening in (if only accidentally) to the private

conversations of its users. Second, it lets users pick their own unique wake-word for the speaker. Once the Raspberry Pi device hears that new designated word, it would remove the sound barrier from the speaker and let it function as intended. The designers behind Project Alias made the code and step-by-step instructions freely available online [2], facilitating its widespread use. Although the project has a certain degree of technical sophistication and limitations, it represents a creative strategy to allow the users maintaining what is important to them while still being able to use VAs. Overall, the privacy theme in relation to VAs discloses its ethical dimension based on critical appropriation: active reflection, negotiation and fitting under the conditions of moral uncertainty and ambiguity. Privacy here concerns the lack of conceptual and technical specificity and how people practically navigate it, confronted with their own desires, conflicts and ambitions.

Power and empowerment

Another concern we identified on the basis of the empirical material is power. Companies clearly exercise power over their users through the device, e.g. by collecting and using their data and by (unintentionally) making them act in different ways than they previously used to. But, the users are not helpless; they can take back some of the power. In their meaning making and appropriation, understood as a performative engagement with the device (often mediated by language), users have a chance to shift the power balance.

The appropriation strategies devised to deal with the privacy problem already highlight how people try to re-empower themselves in the face of a privacy violation risk. Not using or a selective use are ways to regain power. By the performative act of unplugging the device, Gwyneth does not only deal with fear of privacy violation and insecurity but also keeps and experiences some degree of control. In this way, power is not only located in the company but is distributed to the users: not because the company does this, but because the users take back (some of the) power through their (not) use.

Next to switching off or selective use, there are more actions users can take to re-empower themselves, such as laughing at Alexa's mistakes, covering it or bringing it to another room. For example, ridiculing Alexa is not only a way to have fun with friends and entertainment, providing "a new way of keeping us busy," as one user puts it; it *can* also be a way of shifting from intended use to unintended use (use not intended by the company). On the other hand, companies might embrace these uses – ultimately, the device is still used and subscriptions are being paid.

This does not mean that users regain all power. There are still many ways in which they experience powerlessness. There are still many frustrations and the feeling of lack of control. Whatever appropriation strategies users may have, the company nevertheless exercises power by shaping what happens to the privacy of the users. For example, Keira is concerned with privacy but then uses a cost–benefit analysis and decides that the benefits outweigh the risks, mentioning "all the good that Alexa does for us," such as enabling online shopping and listening to music without touching anything. This is exactly what the company wants users to think and do: they should continue using the device.

Additionally, use of VAs is always hierarchical whenever several people use one device or when several devices are used in one shared space. In the latter case, when people want to interlink their VAs across home or have them play music simultaneously in different spaces, VA companies offer Family Plans to connect the devices. In both cases, the owner of the main account has access to all of the devices and the (voice) data they produce, while the access of individual users is by default restricted to their device (unless the main user shares their password or extends access). All the conversations, requests to VAs are recorded in a voice log that users can always access, check and delete, primarily to improve the quality of

interactions with their assistant. However, coupled with the selective access controls, this raises questions of power imbalances, surveillance and tracking potential, particularly in the shared spaces that do not fall under the conventional definition of "family": student dormitories, shared households, offices, etc. And, even in the traditional family setting, ability to monopolize control over smart speakers enables their appropriation for domestic abuse, monitoring the activities of spouses and listening on them in real time (Silva and Franco, 2020).

Moreover, there remains the monetization: in general, because users pay for a subscription, but there are also other specific forms. For example, Amazon monetizes the fact that multiple Alexas in the household pick up on each other's signals by promoting additional subscription services, simply asking the users: "If you want to buy the family plan for fifty dollars, say yes." However, children are often the mass unintended users of VAs (Kudina, 2019a). There is the possibility that children, talking to Alexa, agree to pay for premium services when this is unauthorized by adults. In addition to this, Amazon might use the data for other (undeclared) purposes and sell them to third parties.

People appropriate VAs by speaking to them. There is also the inbuilt ethics that has to do with the language used by the device, and over which, users have no control. For example, Alexa does not push back on negative statements but responds to positive ones. An interviewee Keira says:

> Like if you say like 'I hate you, Alexa!' and she'll be like 'Well that's not very nice.' And you'll be like 'Alexa, you're stupid,' let's say. And she'll be like 'I don't really know.' She's like 'Hmmm, I don't know how to respond to that.' Or like if you try to be mean to Alexa like she won't fight it back, but if you're like 'I love you, Alexa!' and she's like 'Oh, that's so sweet of you!'

or:

> Obviously you can't like irritate Alexa

Here, the user believes that Alexa should respond more in the way a human being would do, e.g. by pushing back with anger or irritation. However, the user has no control over this. Appropriation of voice-first technologies carries a promise of meaningful interaction. Contrary to this, Keira feels that Alexa does not respond in an appropriate way, gives a generic response instead of acknowledging that, e.g. the user's statement was about hate or love. But the way Alexa responds is out of her hands.

There is also a sense in which the device exercises power over the users by making them adapt to "her" language. For example, interviewees report that they started speaking in different tones to other people as opposed to Alexa and learned to distinguish between the tones: "Aha, that's not for me." And one of the interviewees, Joanne, says that in response to Alexa "mishearing" what is being said, she kept asking or rephrasing. Or as Keira describes, when her grandparents speak to Alexa, they suddenly start speaking to it in a very polite and courteous way. As these accounts demonstrate, the nature of interaction itself changes throughout technological appropriation.

Note also that people do not always resist the power of the device and its company consciously. For example, the unplugging can be a gut reaction, rather than an explicit strategy that fits in reflection, e.g. when a user says "I plugged it in on demand" after thinking about the value of privacy in her home. In the latter case, it is more appropriate to qualify the user appropriation as re-empowerment.

Performative epistemology

The way users respond to these issues and appropriate the device can be theorized in terms of a performative and embodied epistemology. Responding to the device and the situation it creates is doing something, as a whole person: it involves not just voice but the whole body and a moving body. It also has material and spatial aspects. The interaction with the device is a bodily, kinetic and spatial performance.

Indeed, one of the themes that emerged from the interviews is that Alexa is, literally and socially, given a space: a space in the home and a space in the life of the family. Some people want an Alexa in every room: "Whatever room in my house I'll be, there will probably be an Alexa" (Keira). Some even design a home with Alexa in mind. Joanne recalled how in her family they got so used to ask Alexa to turn on the lights that when one day Alexa was rebooting, "we were sitting in darkness until Alexa figured stuff out." Thus, Alexa reconfigures the routines – something that is also interesting for the power issue – and is also integrated in the material environment, which is no longer a part of the know-how of people. As Joanne mentioned: "It never occurred to me that we stopped using the light switch"; they did not remember where it was. In terms of performance, we could say that Alexa creates a different performative space, which enables specific appropriations and interactions, and which changes the knowledge people have in terms of know-how.

Performance also relates to social aspects: the interviews show how Alexa intervenes in the social fabric, how family members interact with one another. It is about fitting in Alexa as a device, but also about disruption. In this sense, Alexa is an agent and a "speaker," not just a device. For example, people had problems fitting the wake word "Alexa" in their household because the device would turn on and speak when a friend named "Alexis" visited the house. In another case, someone's daughter was called "Alexa," which caused similar confusions and challenges. The performative problems, thus, also relate to linguistic integration.

Another specific instance of performative epistemology in relation to VAs concerns how they weave the power structures and balances amid users. As we identified in the previous sub-section, when several VAs were shared in a household, our interviewees acknowledged and abided by the apparent hierarchy. Often, the father of the household was the owner of the overarching VA account, as in the case of Kiera, who framed her father's use of their Alexas as a priority "because it's his money, it's his Amazon account" and the rest of the household, children and wife, "we're just kind of extra users." In Kiera's case, her father used the "What did I miss?" function of Alexa every morning to make sure – and show – that he cannot miss any transaction from the account: no secret Amazon purchase can go unaccounted – so better not tempt it: as Kiera contends, "I don't think we're gonna test it [laughs]." Here, the hierarchical appropriation of VAs is embodied in specific performances, a ritual morning voice recap of activities that also produces a structured expectation of how others should use the shared VAs.

Some parents use Alexa's voice logs to monitor their children: to see how they talk to Alexa and what they ask. However, not all children know about the voice logs and see voice interaction as another convenient way to exploit online knowledge, e.g. for using VAs to cheat on their homework. The user interface of VAs fosters such a creative appropriation to bypass the parents by inviting a "Why not?" attitude – ask me anything, I am always here to answer whatever questions you might have, 24/7. While modern-day kids may know about written search histories online, and that their parents can check them, they may be less aware that VAs work with the same principle, converting spoken language to written. As our interviewee Suzan recalls:

> I know some people who caught their children cheating on homework from looking back at Alexa's log and seeing that they actually asked Alexa for every answer to their homework without them knowing, they wouldn't have known unless they looked at Alexa logs.

Cheating on homework by children can also be seen as empowerment, not toward the company but toward their parents: by asking Alexa for answers, they bypass the parents. In response, parents may use voice logs to monitor their children. Alexa, thus, reveals and interferes in the social canvas, in the power hierarchy of the family, and people respond to the new power situation. Alexa offers new ways for parents who are aware of the voice log controls to exploit the knowledge gap in monitoring their children and keeping them within the desired lines. As Suzan put it: "I do think that whoever Amazon's account it is that they're all linked to has a bank of all the things that people have asked the devices." By using a "bank" metaphor to compare a trove of voice logs in the VA managing app, Suzan illustrates how within the household and beyond, voice becomes a new digitized asset enabling new structures of interaction and power disparities, where VAs become a tool for power games.

Discussion and conclusion

Our aim in this paper was to analyze the ethical significance of using VAs at home. By combining two approaches, appropriation and technoperformances, and zooming in on the themes of privacy, power and knowledge, we have shown how these technologies help to shape a specific moral subject: one that is embodied in space and is made as it performatively responds to the device and makes sense of it together with others.

The VA technology can play this important (but not deterministic!) role in the practices of sense-making because it has anthropomorphic features through its design and its use as a voice interface. By working via spoken language, VAs connect to one of the most important cultural technologies and media we have and by which our communities live.

However, it was important for us to show that while technology is an actor in these meaning-making and performative processes, it is only a co-actor: the human being remains important. The technology "offers" and encourages specific dispositions, specific modes of appropriation, but people performatively respond in ways that may not have been intended. In the dance between the human subject and material technologies, different performances and moral meanings take shape.

Furthermore, the human subjects in question are always embedded in a social-interactive environment. Analyzing technological appropriation allows us to reveal not just the dynamics of sense-making but also a variety of technoperformances. The relevant performances take place in a social context and in turn also shape it. In particular, we have shown how the device – through the meaning making and performative responses it elicits – intervenes in the social power structures. But here too, there is room for variation; various appropriation strategies and performative responses are possible.

These findings are not only interesting for understanding the specific problems in the use of VAs, but also contribute to the further elaboration of the mentioned approaches. For the appropriation framework, the performative dimension puts more emphasis on the embodied and active aspects of sense-making. For the performance-oriented approach, the aspect of sense-making is developed and the moral dimension is shown in more detail. Together, the appropriation and dance revealed here show the fluidity of moral sense-making and the dynamic–hermeneutic dimension of technoperformances.

The technological mediation theory (Ihde, 1993; Verbeek, 2005) can also help us to describe a part of what goes on in the household practices with VAs. However, the specific contribution we made through the appropriation and technoperformances frameworks

enabled us to trace and analyze the precise and very tangible effects on meaning and power. To do so, we connected the materiality of the devices to sense-making and performance by subjects in a spatial and social context. Moving beyond an analysis in terms of mediation and effects, we have shown how the meaning and indeed the politics of these devices are produced. Our focus has been on "the making of" rather than the outcome of the human–technology relations, and portrayed their dynamism in contrast with a more static model in the mediation theory. Unlike much theory in STS (Latour, 1996; MacKenzie and Wajcman, 1999), we have provided a dynamic two-way model (using the metaphor of dance) of how human subjects and non-human artifacts are related and interact in the hermeneutic and performative contexts. More specifically, our emphasis has been on the agency of the human users, who performatively shape the meaning and respond in a variety of ways to the material artifacts.

Additionally, more can and needs to be said about how these dances of sense-making and technoperformances are related to the larger wholes, such as language and culture. First, we have seen that language plays an important role in the ways people made meaning and performed. Language mediated the communications, but was also crucial in discussions about meaning, e.g. the meaning of privacy, or about – literally – the place of the artifact. Through interaction with the device, but also through interaction with language and via language, the users became aware of issues such as privacy and power. The meanings were not fixed, but were made in and during appropriation. This coincides with what Wittgenstein said about language; here, we show that the same happens with technologies and values. There is fluidity, there is room for variation through use.

Second, as we have seen, the Wittgenstein-inspired performance framework already made connections between individual use and larger cultural wholes, using terms such as language games/technology games and forms of life. This is also true for the meaning making, which also takes place within, and contributes to, wider cultural wholes. However, in this paper, we have shown that already at a "lower" level, e.g. the family, there is a cultural shaping by technologies. What privacy means is produced by uncertainties and (mis)communications, and indeed by the performance of these people who are embodied and socially situated within the family. There is also interaction with the larger culture (e.g. media that tell us what privacy is), but our analysis and interpretation show in particular how the local culture of the household is shaped through concrete appropriative sense-making responses. In that local culture, related to a specific space (e.g. the house), the meaning of privacy is clarified: privacy is performed and made sense of by people as they interact with the device. It is not simply given. There might be a game, but the game is changed at the micro level, in the many cultural bubbles we are performatively and hermeneutically a part of.

The local appropriation, sense-making at the micro level within specific performative spaces and cultures, also intervenes in power structures. However, both the value meaning and the power structures are fluid. To understand devices and their use as embedded in larger cultural wholes (local and global) does not mean that people have no freedom whatsoever to change meanings and perform in different ways. As they make sense of technologies through appropriation and performatively respond to them in different ways, they can also change the games and change the power structures in which they live. Things do things, but humans make meaning and perform in response to the things. Or, to finish with the same metaphor we started with: what humans and technologies do is a dance, but technologies are not the leading partner.

Notes

1. This empirical research was approved by the Human Research Ethics Committee of the Delft University of Technology.
2. www.instructables.com/id/Project-Alias/

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