

Cyborg Cooks: Mothers and the Anthropology of Smart Kitchens

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Abstract

Future kitchens are increasingly imagined as smart. Wired food processors offer a choice of recipes and prepare food for busy cooks while smartphones or intelligent fridges promise to shop online autonomously. Whatever the futuristic image, so-called “smart technology” is depicted as rescuing domestic cooks too busy or inexperienced to cook. Social anthropology is suspicious of such one-directional and hegemonic visions of technological impact on everyday life and ideally positioned to explore the entanglements of social, cultural, economic and political dimensions in increasingly digitally mediated human-machine interactions in the home. Yet, an ethnographic understanding of how humans and kitchen technologies interact in this rapidly changing context is surprisingly scarce. In this research paper I address this gap from an anthropological perspective on domestic food practices in urban and rural Germany through the feminist notion of the cyborg cook. In doing so, I engage with and challenge the above futurist visions as well as scholarly debates around the smart home and the domestication of digital technologies. I draw on multisensory participant observation of domestic cooks’ interactions with the digital kitchen robot Thermomix to demonstrate that smart kitchens are already a reality and that cyborg cooks are firmly established among us. I argue that especially mothers should be considered as early adopters of digital technologies in diverse domestic kitchens and contest the assumptions in futurist visions and in the literature that women, including those from cultural or class minorities, are tech-averse marginal users.

Keywords

domestic cooking; smart home; digital kitchen technologies; feminist technology studies; Germany

Introduction

“The kitchen is dead” a much-cited report recently declared (Jo at Cookpad 2018), stating that cooking robots and app-controlled delivery services predestine us to a kitchen-free future. In fact, as an architect argues in a Swiss report about kitchens, “we ought to be glad that kitchens are still built at all” (Vollenweider 2006, author’s translation). Others argue that kitchens are morphing into new status symbols (Rützler/Reiter 2017): such “hell’s kitchen[s]” are becoming ever bigger and high-tech, yet often unfit for “real” cooking (Matzig 2016). Yet others assume that future domestic cooks, who grow up using digital technologies, will re-centre their social life around the smart kitchen (GfK 2017: 91-102). According to these visions of designers and marketers, app-controlled smart fridges assist the cook in ordering food while connected food processors empower him or her to quickly prepare elaborate dishes from scratch. Whatever the futuristic image, so-called “smart technology” is invariably depicted as coming to the rescue of domestic cooks who are too busy or inexperienced to cook. Social anthropologists are suspicious of such one-directional visions of technological impact on everyday life and ideally positioned to explore the complex entanglements of cultural, economic and political dimensions in human-machine interaction in the domestic kitchen, an interaction which is increasingly digitally mediated.

The research project upon which this paper is based is an ethnographic study of how digitally assisted cooks actually cook in what could be called the digital age: a time that is marked – but not necessarily determined – by a growing presence of digital technologies, virtual connectivity and a perceived acceleration of life (Wajcman 2015; Koch 2017). While the knowledge of nutrients in food, of beneficial and detrimental diets, or of how consumer choices reflect social status is growing steadily, there is scarcely an anthropological understanding of how cooks know how to cook in this rapidly changing context (Sutton 2016). This gap is especially noticeable in Germany (Leonhäuser et al. 2009: 28-35; Barlösius 2016: 30-31). At the same time, Germany has been at the forefront of scientific and technological development in food for more than a century and is reputed globally for producing a vast range of household appliances, increasingly including digital ones, and is changing domestic cooking worldwide. This paper is motivated by exploring this double tension between futuristic visions of food preparation and everyday experience on the one hand, and between global reputation and domestic practice in Germany on the other. Like other feminist scholars studying technology and everyday life, I seek to “question this implicit division between cutting-edge technologies and existing technologies, the spectacular and the ordinary” (Wajcman 2015: 3) through an ethnographic lens.

More recent domestication theory provides a useful starting point for describing the use of and interaction with digital technologies in the home, for instance, in tracing the negotiations between people and things as households rework their “sense of self” (Silverstone 2006: 236f) and the role of “warm

experts” in collaboratively producing knowledge that straddles the bodily and the digital (Bakardjieva 2005: 98f); I also challenge this concept and the conclusions that especially scholars of the smart home are making. In particular, and in contrast to the other contributions to this special issue, this paper questions the basic tenet of domestication theory, namely, that users of (digital) technology are separate entities in the daily practices of engaging with it. I do so through introducing the notion of the “cyborg cook”. Since cyborgs are part human and part machine, and because they have been a productive element in feminist critiques of technoscientific processes and debates, they help me do two things in this paper. First, to study how cyborg cooks defy boundaries of any kind and highlight the connections between people and things, between humans and machines. Second, because of that, to challenge the conclusion of smart home scholars that the digitally connected home is increasingly male-dominated (Chambers 2016: 167; Strengers/Kennedy 2021; Kryger Aagaard 2022).

Combining a phenomenological approach with a materialist understanding of human-machine collaboration, in the first section I will introduce my research design, asking how humans and digital technologies interact in contemporary kitchens in Germany. My multi-sensory immersion in what I call everyday cyborg practices seeks to overcome the above-mentioned double tension. Based on the thick description of human-machine interaction in domestic kitchens, in the second section I will then conceptualise domestic cooks as cyborgs, a “cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction” (Haraway 1991: 149). Thus, when sourcing, processing, preparing, serving and disposing of food with tools, a cook becomes more than human (and always has been): a cyborg cook. At a time when human-machine interactions are increasingly digitally mediated, this feminist concept is well suited to consider bodily and digital knowledge as equally constitutive elements of domestic food practices. In the third section, which dissects the continuous gendering of domestic food work, I will continue to describe cyborg cooks in interaction with digital kitchen robots to illustrate that smart kitchens are already more reality than fiction. I demonstrate that mothers in particular are not marginal users of smart home technologies but should instead be considered as early adopters. In the final section on diverse kitchens, I will address some of the intersectional power relations in futurist visions around cooking and built into digital technologies, and advocate for diversifying our understanding of contemporary smart kitchens. I will conclude with a call for more immersive ethnographic attention to everyday cyborg practices.

Research Gaps and Research Design: Studying Cyborg Practices

Until now, food research in Germany has focused largely on verbal data gathered via interviews (e.g., Leonhäuser et al. 2009; Häußler/Meier-Gräwe 2012; Brombach 2017; Klünder 2020) or on survey-style consumer research which relies mainly on recall studies (Max Rubner-Institut 2008; Gose et al. 2016). However, interviews alone can neither capture everyday practices and non-verbal aspects of cooking adequately, nor can they account for the growing role that non-human actors, especially widespread digital technologies such as kitchen robots or smartphones, have in domestic food work. Although some smaller, isolated studies explore the use of smartphone apps for dieting (Kofahl 2016), online shopping (Klyanitskiy 2018) or digital provisioning (Cajic/Brückner/Brettin 2021), to date no published research seems to focus ethnographically on the use of digital technologies in everyday food preparation in Germany. This stands in contrast to the fast-growing ethnographic attention to digital food practices in largely anglophone contexts (e.g., Rodney et al. 2017; Lewis 2020; Schneider/Eli 2021). To address this gap in the German context, I am relying on anthropological approaches to embodied knowledge, especially around food, which are inspired by phenomenology, and which examine concretely how humans and non-humans collaborate in making food. As the short overview below suggests, this body of research questions and widens the human-centric understanding of experience as proposed in earlier research on lived experience and practical knowledge. At the same time, such materialist approaches to food still understand lived experience as the basis upon which thinking and knowing is premised.

Inspired by Tim Ingold's (2011[2000]) work on bodily skill and ways of knowing, food anthropologists such as David Sutton (2014) highlight the sensory and non-verbal dimensions of practical ways of knowing without neglecting the social and symbolic dimensions of bodily knowledge. This ethnographic work draws on the phenomenological premise that doing and knowing are one and the same thing in everyday practices such as cooking (Merleau-Ponty 2001[1945]). By attending not only to the bodily knowledge of humans but also to the constitution of more-than-human interactions, more materialist food scholars demonstrate further that food work and eating necessarily straddle the boundaries between human and non-human, and between organic and non-organic (e.g., Paxson 2013; Abbots 2017; Elton 2019). Similarly, my research focuses on boundary-crossing practices within more-than-human environments which increasingly include digital technologies. This theoretical and methodological approach thus goes beyond the implicit emphasis on the narratives and discourses that are centred in interview-based research, and even beyond observation and a form of participation that is premised on the visual (Graf 2022). I expressly also rely on my multi-sensory experience of human-machine interactions across everyday life both online and offline, something which I call cyborg practices.

Concretely, since early 2022 and probably lasting until early 2024, I have been joining the daily cyborg practices in ten diverse kitchens in urban and rural homes in western Germany; these visits have been complemented by interviews in the kitchens of another ten households as well as expert interviews with market and trend researchers, software engineers, policy makers and online influencers across Germany, Austria and Switzerland.¹ Concerning the choice of households, diversity means a number of things for reasons that will also be explained throughout the paper. First, as the notion of cyborg practices highlights, I engage with all actors in the making of a meal, including machines, algorithms and the food itself. Social and cultural diversity also matter. Those ten households that allowed me to join through participant observation are spread across all income groups; half have children, and the other half are single- or two-person households. Most of the households include members with a background in migration, sometimes with a distinct ethnic identity and distinct cultural food practices. I have also been working with households of minority sexual and gender identities, households that are strikingly absent in representative studies around food and the home in Germany. Of course, different forms of diversity intersect among my research participants, each combining into unique cyborg practices that should be understood more as portraits of a diverse society rather than as strictly representative samples.

Through the ethnographic focus on experiences, rather than on public or private discourses, and on ordinary but diverse kitchens, rather than imagined ones, the study of cyborg practices allows to bridge the double tension between futuristic visions of cooking and the global reputation of German domestic technology on the one hand, and between everyday experience and domestic space on the other.

Furthermore, by focusing on the interaction between humans and machines in everyday contexts, I consider bodily and digital knowledge as equally constitutive elements of cooking practice and thereby unravel the “smartness” of digital technologies in daily life. As I will show, bodily and digital practices combine in the interaction with digital kitchen robots that take over key tasks of processing and cooking food, but also in algorithms embedded in smartphone apps that conveniently propose recipes, ingredients or takeaway meals to the domestic cook and predict future shopping or cooking practices. Needless to say, my research has revealed that certain humans or machines also resist interaction. To that end, I work not only with households that own a digital kitchen robot, but also with those that do not. In either case, the question is no longer simply what happens to

1 The sampling of participating households was not limited to pre-determined locations but rather based on reachability from Frankfurt/Main to allow for repeated visits; two-hour train rides one-way being the upper limit. Households are based in three *Bundesländer*: Hesse, Rhineland-Palatinate and North Rhine-Westphalia.

the embodied knowledge of domestic cooks with the rise of so-called intelligent kitchen appliances, smart kitchens or app-controlled food deliveries. Rather, as I will demonstrate in the following section, different forms of knowledge interact and mutually stimulate or inhibit one another in everyday cooking.

The Ethnography of Cyborg Cooks and Feminist STS

The first ethnographic case I would like to present here is that of Inge. Inge² is a mother of three and married to Marco, a second-generation German Italian. Although her own Latin American roots figured prominently in our conversations, Marco's food heritage was much more dominant in this middle-class family's everyday foodways. This impact became tangible one day when Inge prepared pizza, a weekly staple food in her household. When I arrived around noon on a regular weekday in spring 2022, she informed me that she had already prepared the dough in her Thermomix Model TM6 (elsewhere in Europe known as Bimby), a digital kitchen robot made by the German firm Vorwerk that not only blends and kneads ingredients but also weighs, grinds, chops, ferments, cooks or steams food.³ Cooking with it is described as guided cooking because, via the integrated screen, the digital assistant tells the cook what to do step by step (see figure 1) according to a recipe chosen from among thousands of options. Inge explained that since she had not managed to make pizza the previous weekend, her children were increasingly impatient to eat it and she had to prepare it on this weekday instead. Preparing food with the Thermomix, as she did multiple times every day, did not feel like it infringed upon her part-time wage work, Inge told me. It allowed her to continue working or do other things while the machine worked for her. Since she had tried and tested this recipe so many times, she knew exactly how to make it; where to follow and where to divert from the machine's guided cooking to achieve the right kind of dough.

We went into the kitchen, and she began to process the leavened dough; portioning it with her hands she worried that it was much smaller than usual. Then, Inge told me that neither her husband, nor her eldest and youngest children would join us: "It will be just Christiano [her 8-year-old son], you and me." This would make things easy, she rejoiced, as three pizzas could be more easily moved around the oven to bake each to the perfect level of crispness. It also meant she could use mozzarella cheese, which her lactose-intolerant husband would not eat. As she continued to flatten the dough with a rolling pin, she explained that her husband, who used to assemble and knead the pizza dough before they owned the

2 Pseudonyms are used and household details anonymised throughout this paper when requested by research participants.

3 For more information, please visit the Thermomix website: <https://www.thermomix.com/tm6/> (last access: 30/11/2022).

Thermomix, had identified semolina blended with normal white flour as the ideal combination to shape the dough. Assuring herself that I liked it, too, Inge decided to use canned tuna as a topping besides tomato puree and cheese, and, while rubbing her belly, that she would also prepare rocket lettuce and cherry tomatoes for the two of us, “to make it lighter and help digesting”. Although worried that the pizza would not be as good as usual as it had leavened for only about one hour, Inge was pleased with the result.



Fig. 1: Interacting with the Thermomix (photograph by the author)

The making of this meal bespeaks the ordinary cyborgness of contemporary cooks. To argue with domestication theorists, it involves negotiations of a new “sense of self” of the people and things of a household within a larger sociotechnical frame of values, something that Roger Silverstone and his colleagues described as the “moral economy of the household” (2006: 236f). Inge is given a choice of recipes coded by software engineers to work with this machine but improves or adapts it according to her own embodied knowledge and the preferences or needs of each

family member for any given meal. She incorporates the digital sensors of the machine to measure the ingredients, relies on its motor to work the heavy dough but employs her bodily feeling for the yeast when deciding to portion and roll the pizza base. Moreover, her husband's skills have become a part of Inge's; her children's and guest's taste preferences are reflected in the meal choice and the pizza topping. If attending carefully to the described scene – to the multiple technologies, practices and bodies that make this particular meal on that particular day – it is soon clear that they all are protagonists; and there are many more that cannot be mentioned here.

I offer this case to argue that domestic cooks cannot be (and never should have been) considered as bounded individuals, but are rather composed of a complex material and social web of technologies, practices and bodies, better described as cyborg cooks. Cyborgs cooks are part human and part machine, they “live between the material and the digital. Their selves extend beyond the boundaries of physical bodies, their sensory capacity and ways of knowing about the world blinking across handheld devices and wireless networks, flickering as avatars, photographs...” (Hartblay 2018: no page). In short, cyborg cooks are no longer fiction but very tangible creatures inhabiting contemporary kitchens in Germany and elsewhere (Truninger 2011; Ascione 2014). In meshing bodily engagement with the artificial intelligence of the tool, cyborg practices are creating entirely new forms of knowledge in increasingly smart kitchens, while society fails (or refuses?) to notice them.

Early on, feminist historians of technology revealed the gap or tension between futuristic visions and everyday experiences concerning domestic technological development and challenged the widespread notion of technological determinism. Ruth Schwartz Cowan's (1983) study shows how the introduction of electric kitchen technologies in ordinary homes during 20th century America – hailed as facilitating and speeding up domestic tasks – reorganised women's domestic work rather than reducing it. This reorganisation was due mainly to two things: first, to the shift from largely subsistence economies centred around joint family labour in the home, garden and field to more urban market economies centred around predominantly male wage work outside the home throughout the 19th century; second, to servants and children no longer contributing significantly to domestic work for a number of reasons. Thus, while men and children worked less in the home, women ended up working more. Other scholars show that while new kitchen technologies were marketed as intelligent machines taking over most work, this marketing wrongly suggests that all a female cook has to do is press buttons and set timers. An analysis of instruction manuals for microwave ovens shows that a cook still relies on bodily knowledge to assess the size, cut and shape of meat in order to use the machine successfully (Silva 2000; see also Cockburn/Ormrod 1993; Graf 2022). Chiming in with a growing scholarly interest in (digital) science and technology in everyday life (Beck 1997; Bakardjieva 2005; Michael 2006), these studies and the cases of Inge and other domestic cooks I

have been working with demonstrate how technological developments, including failure or redefinition, are less a total institution than part of a complex socio-technical system, whereby technology and cultural, economic and political processes mutually shape each other in everyday life. These transformations are negotiated with a household's "sense of self that could be justified, more or less, with respect to traditions and the articulation of value" (Silverstone 2006: 236).

Yet, much as they have been doing so for more than 150 years, the futurist visions of the smart home and kitchen still promise a cook's liberation from the drudgery of daily food work through intelligent appliances (Berg 1999; Wajcman 2015; Strengers/Kennedy 2021). The marketing of the "smart" kitchen and the simplistic vision depicted above can thus be considered the latest reincarnation of technological determinism. Although such visions create aspirations and move people, they do so in often unpredictable and non-linear ways and involve users and non-users alike (Pinch/Bijker 1984; Nickles 2002; Truninger 2011). The case of Inge shows that it becomes increasingly difficult, even futile, to determine who the cook is as digital kitchen robots and so-called "guided cooking" enter domestic kitchens.

Domestic cooks are not simply users of digital technologies but become cyborgs in both interacting and collaborating with their digital kitchen technologies to achieve a certain result based on a bodily and shared taste knowledge of what is considered to be a good meal (Graf 2022). In other words, cyborg cooks combine bodily and digital ways of knowing and achieve more-than-human or superhuman abilities in doing so. These cyborg practices do not necessarily alter existing ways of processing or handling food. For instance, Inge and other cooks I have been working with learned to use digital kitchen robots to make the meals they had previously prepared but saving themselves some of the physical labour and reducing the uncertainty of success. Although the Thermomix TM6 has a programming function to adapt or create one's own recipes, my research participants simply remembered the little steps of deviation from a pre-programmed recipe such as replacing an ingredient, adapting quantities or using a certain function or step for a different dish. Equally, the touch, smell or sound of food as it transforms into a meal were combined with the digital sensors of the machine to increase accuracy and reliability.

But algorithms and codes also create new forms of knowledge. The algorithms in recipe apps such as Vorwerk's Cookidoo or Whisk helped my research participants get new ideas that matched their interests, taste preferences or levels of skill. Shopping apps speed up online shopping or the selection of a meal each time a cook uses a digital service to order food or a meal. Thus, knowledge and convenience are collaboratively achieved between humans and machines. Just as cyborg cooks learn more with each meal planned, processed, prepared and eaten, so do the algorithms that track their choices and digital practices. While the public rightly calls for more critical scrutiny of "food codes" and demands more regulation in digital realms around food production, distribution and consump-

tion (Deiniger/Haase 2021), I propose instead to study the broader “algorithmic systems”, the “intricate, dynamic arrangements of people and code” (Seaver 2019: 419). Based on his anthropological foray into music recommendation algorithms, Nick Seaver cautions us against black boxing codes and algorithms as untransparent and dangerous. Focusing on algorithmic systems as heterogenous socio-technical systems allows us to understand the dynamic and imprecise nature of what are often informal ad-hoc processes.

Thus, as algorithms are fed more digital data with each interaction, ethnographic attention is required to study how algorithms contribute to shaping cyborg practices and a cyborg cook’s engagement with new forms of knowledge. At this stage of my research, it is yet too early to say how algorithms and the assumptions made by app developers and software programmers around consumers and their needs or preferences are built into cooking apps or kitchen robots. Given the messiness of everyday life, the context specific human-machine interactions and the recurrent imperfections and glitches that inevitably accompany the incorporation of new technology in everyday life as I will show below, I would be careful to assume that smart kitchen technologies simply work. Without wanting to dismiss the legitimate warnings about the commoditisation of digital food data or of “Big Mother” in increasingly smart homes (Lewis 2020: 171; Sadowski/Stengers/Kennedy 2021: 8), I doubt that digital kitchen technologies like smart fridges or cooking robots will collect complete or even legible data about domestic food practices, and that this data in turn allows software engineers or marketers to draw straightforward conclusions. I also suggest that we take seriously and try to understand why so many domestic cooks do not perceive their digital food practices as risky or problematic.

Nevertheless, it is clear that the technoscience that informs, creates and enables digital kitchen technologies is biased by gender, class and/or race, as Yolande Stengers and Jenny Kennedy (2021) show with respect to smart home voice assistants such as Alexa or Google Home. Thus, although the notion of the cyborg cook seeks to undo various boundaries and instead highlights interactions as well as (dis)connections, studying how people and code interact in cooking still requires attending to the multiple power relations underlying digital domestic practices similar to Haraway’s feminist notion of the cyborg.

Cooking Mothers: Marginal Users or High-tech Superhumans?

The scholarship on food and cooking is fairly united in arguing that today’s cook is still predominantly female, and likely a mother (e.g., Glucksman/Nolan 2007; Cairns/Johnston 2015; Bowen/Brenton/Elliott 2019). Despite the domestic science movement and a modernist intervention in domestic design a century ago, both of which have been contributing to transforming practices and perceptions around domestic labour until today – if not to altering the underlying values associated

with the home as I pointed out above – women remain responsible for domestic cooking across cultures and continents. This also seems to hold true in digitally assisted cooking (Lewis 2020: 107, 116). Contemporary cooks in Germany are no exception (e.g., Leonhäuser et al. 2009; Häußler/Meier-Gräwe 2012; Brombach 2017): Despite women's education, wage work and various reform movements, everyday cooking remains largely a mother's work. Men cook mostly for leisure during weekends or as professionals (e.g., Frerichs/Steinrück 1997; Baum 2012; Ray 2016). Importantly, as this and the next section will show, mothers, with their detailed knowledge of food and the wider material and social context within which it is prepared, remain expert practitioners even as digital cooking robots are taking over some of their work.

While this overview suggests a saturated research field, the gender, ethnicity and class of cooking in Germany are less well studied, certainly with regards to digital kitchen technologies. In contrast to the doubly burdened female cook described in the above-mentioned literature, the 21st century cook circulating in the German imagination is a digital native who relies on a smartphone app to order dinner via drone delivery, asks her intelligent fridge to replenish her stocks via online shopping or downloads a recipe onto his wired food processor to cook from scratch (GfK 2017). According to market research, the generations of Millennials and iBrains (ibid.) who grew up using digital communication technologies are keen to depart from "conventional" cooking and harness new technologies to cook. This one-directional vision is problematic on at least two accounts. First, by omitting the question of who the future high-tech loving cook is, it remains blind to questions of gender, age, class, race and ethnicity and thus for social inequality and the uneven distribution of digital literacy as highlighted in the contributions by Weibert et al. and Kucharski/Merkel to this volume. Second, by assuming the use of digital communication technologies is directly translatable into the use of digital technologies for cooking, it disrespects the context-specific socio-material construction of scientific knowledge and technologies and the complex entanglements of cultural, economic and political dimensions of their (dis/mis)uses. Even more problematically, it hides from view those who make sci-fi happen every day in their kitchens.

To begin with – and perhaps not surprisingly –, in the households examined, women, especially mothers, remain responsible for and carry out most routine domestic food work, certainly during the working week from Monday to Friday. This holds true across socio-economic and cultural backgrounds and irrespective of the specific food practices. What might seem more surprising, though, is that the women in my study are more avidly acquiring and interacting with digital kitchen technologies than men. Whereas most male domestic cooks in both family and single-person households highlighted the use of their hands and bodies in our interviews and often explicitly rejected digital technologies when planning, processing and/or preparing food, mothers in particular emphasised that digital technologies saved them time and effort in what they perceived as

often stressful everyday routines. Although I also study the widespread use of smartphones and apps in this context, in the following I remain focused on digital kitchen robots like the Thermomix. Indeed, many women recounted how they had acquired a kitchen robot when having their first child in order to “free the hands”, as Anna, a representative and self-employed saleswoman of the Thermomix and a mother herself, confirmed in an interview.

What is more, when owning a digital kitchen robot, women cook more – a finding that resonates with Cowan’s argument from nearly 40 years ago. Inge’s ambivalent conclusion during one of our conversations sums up a trend that other interviews confirm: “It’s funny, I don’t cook less since we have owned the Thermomix, I cook more!” Inge used the example of making pizza and pasta dough as a prime example of this: “Before we had the Thermomix, Marco used to knead the dough, it’s hard work. But now the Thermomix does this work, so Marco no longer makes any dough at all.” Crucially, her husband also no longer does the work around dough-based meals such as shaping, portioning or processing it, none of which can be done with a kitchen robot and which is now done by Inge. Just as older domestic technologies like the microwave were touted to liberate women from the drudgery of daily food work, digital kitchen robots similarly reorganise previously complementary gendered work in the home, while standards of hygiene and appreciation of homemade foods rise simultaneously, leading to less work for men but “more work for mother” (Cowan 1983). On the one hand, my female research participants all emphasised how the robot saved them time and physical effort. On the other hand, they also reported to be spending more time cooking than they did before owning it, because the machine provides them with the possibility of doing so. This is due to both a longstanding emphasis of eating together in family households in Germany (Mintel 2005; Brombach 2017) and a renewed valuation of homemade foods and homecooked meals across middle-class Germany and other highly industrialised countries, a renewal that emerged with the onset of the Covid-19 pandemic in spring 2020. Once again, for better or worse, mothers end up working more to feed their families.

But I also want to propose an important positive spin to this finding, one that moves on from Cowan’s pessimistic portrayal of middle-class mothers tricked into more domestic work by advancing a more experience-based vision of mothers as high-tech and more-than-human cyborgs. Thus, although the domestic media practices of mothers are often hidden from sight, they are anything but marginal as Chambers (2016) or Strengers/Kennedy (2021) suggest. Rather, I argue that especially female domestic cooks should be considered as early adopters or heavy users of digital technologies.

The decision to explore, buy and interact with a digital kitchen robot in all of the households I have worked with and that own a digital kitchen robot (nine out of seventeen households interviewed and visited at the time of writing), was made by women, often against their partner’s explicit scepticism. Anna, the Thermomix saleswoman, confirmed that in the vast majority of cases her female clients use

her cooking demonstrations – the standard way of selling the Thermomix/Bimby in Europe (Truninger 2011; Ascione 2014) – to convince their husbands to make the investment of ca. €1,300. Women also install and maintain their Thermomix and solve problems related to it, often with the help of the saleswoman who sold them the machine in the first place and who stays in touch with most of her clients via social media. Thermomix saleswomen are frequently friends or relatives and could be considered as “warm expert[s]” who “mediate[s] between the technological universal and the concrete situation” (Bakardjieva 2005: 99). Indeed, the entire marketing structure and after-sales service around the Thermomix is largely in the hands of women, who are bonding through friendship and mutual trust (and defy standard marketing procedures based on one-click online purchases, remote customer services and planned obsolescence).

Cyborg practices involving the Thermomix – though perhaps less so the more conventionally marketed comparable kitchen robots – are thus challenging the commonplace assumptions and depictions of women, especially mothers, as tech-averse and dependent on their male counterparts to envision, set up and maintain a smart kitchen. On the contrary, my research suggests that kitchens in Germany are already smart and female cyborg cooks are firmly established among us. However, their needs and ideas for adequate technologies are rarely addressed in designing and marketing futurist visions of the smart home and kitchen: men have been and still are leading the technical and academic work on smart home technologies (Strengers/Kennedy 2021: 9). It is to the aspect of diversity when imagining the smart home and kitchen that I will turn to in the following.

Disconnected Cyborgs: Diversifying the Smart Kitchen

While advocating for the cyborgness of female cooks in what are already smart kitchens, it is equally important to highlight the intersectional power relations inherent in digital technologies and how they affect who can become a cyborg and under what conditions. The case of Diana is illustrative. A mother of German origin with two young children, married to a second-generation German Moroccan man, she is what could be called a reluctant cyborg. Her mother-in-law gifted her the latest Thermomix model in early summer 2022 “to finally learn how to cook Moroccan food for the family” as Diana recounted somewhat wearily during our interview in her home at the end of summer. Although keen to use it, within those months she had used the robot only occasionally and so far not with great satisfaction or success. She had just started to work part-time again and wondered when she would find the time to learn how to use it. She felt the gifted machine ought to be used “since it is so expensive and I do want to learn to make Moroccan meals”. She had not yet benefitted from a personalised cooking demonstration, because her mother-in-law had purchased the machine via her sister-in-law, thus distancing the usual direct contact between customer and saleswoman; she lacked a “warm

expert” (Bakardjieva 2005). In this lower middle-class household, forced to move to a cheaper neighbourhood outside of Frankfurt after the birth of their children and stuck with a kitchen that Diana repeatedly complained was too small, the Thermomix occupied the only free counter space and appeared quite out of place (figure 2). Indeed, although the Thermomix is also being marketed to lower-income households through various payment schemes, including the option to receive the robot for free if selling it to four other households, in Germany it targets largely white, middle-class consumers who are more likely to be connected to warm experts.



*Fig. 2: Covered Thermomix on reduced countertop space
(photograph by the author)*

Furthermore, Diana was surprised to find no suitable recipes when searching for typical Moroccan dishes like *harira* [a thick tomato-based soup] or *loubia* [a cream of white beans]. Instead, her sister-in-law shared a pdf via smartphone containing a poorly photographed Moroccan cookbook published with the French Thermomix of the previous model. Since her sister-in-law, who grew up eating and cooking Moroccan food and speaks French, incorporated the Thermomix in her routine food preparation so successfully, Diana’s mother-in-law decided it had to be a suitable gift. However, Diana did not speak French, and she also struggled to apply the recipes in the pdf and designed for use with the previous model to her own German-language machine. Stuck with an expensive machine that blocked her reduced counter space and unable to access Moroccan recipes via the German-language recipe collection, Diana was at a loss as to how to interact with the Thermomix while feeling increasingly pressured to do so by her in-laws.

Diana’s cyborgness was hampered by a number of things. First, she had only limited access to the relevant networks of knowledge via the machine itself and the wider socio-material environment in which she could learn how to combine

bodily and digital knowledge, largely due to linguistic barriers and a lack of warm experts. Second, as a German domestic cook and wife of a Moroccan German, she operated within two different moral economies of the household: her Moroccan in-laws asking her to incorporate their practices and broader values around food in her own family's daily practices. Taken together, this case points to the disconnections that also mark techno-scientific fields such as domestic cooking and underlines the double tension between imaginations and everyday experience on the one hand and global reputation and actual practices on the other. The machine itself as well as its software, support networks and digital recipes were clearly not designed with users like Diana in mind, confirming what other scholars have highlighted with respect to the highly gendered, class-based and racialised imaginations and designs of smart home technologies as predominantly male, middle-class and white (Berg 1999; Chambers 2016; Strengers/Kennedy 2021; Kryger Aagaard 2022).

Through the circulation of not only gendered, but also class-based and racialised visions of the smart home and kitchen as well as their material manifestations in science and technology, certain food practices are normalised while others are marginalised, for instance, what is considered as healthy food, appropriate kitchen size and appliances or access to recipes and food knowledge in cookbooks, websites or apps. In anglophone contexts public figures such as Michelle Obama or Jamie Oliver hope to teach a lifelong love for home-grown foods and cooking among young children, assuming – like social reformers before them – that good cooks make for good citizens (Hollows/Jones 2010; Biletkoff 2013). The German public also wonders whether domestic cooks will finally cook and eat what science recommends (e.g., Gose et al. 2016; Sarah Wiener Foundation 2019). These discussions, which bespeak the double tension I addressed above, are implicated in assumptions about class and ethnicity. Although income and educational status are considered in some related studies (e.g., Frerichs/Steinrücke 1997; Leonhäuser et al. 2009), they rarely interrogate how gender intersects with class, ethnicity or culture and thus risk marginalising alternative values and practices (Dyer 1999; Wilcox/Kong 2014).

Conclusion

In sum, then, futurist imaginations and scientific and technological development contribute to standardising the perception of the ideal cook; not only is she decidedly no superhuman cyborg, she also is not poor, a person of colour or otherwise diverse. It is no accident, feminist technology scholars argue, that the development of science and technology and the gender question have emerged in parallel in Western society (Cockburn/Ormrod 1993; Bray 2007). Wajcman argues that “Western technology, like science, is deeply implicated in [the] masculine project of domination and control of women and nature” (2010: 146) and I would add a

long list of intersecting power relations. Although a growing body of work demonstrates how certain notions of femininity, but also of class and race, have been reconfigured over the last century, ranging from modernist re-designs of kitchens as women's *Taylorized* workspaces to cooks as domestic scientists (e.g., Bell/Kaye 2002; Freeman 2004; Heßler 2009), with a broader societal wish to emancipate cooking from gendered, class-based or racialised conceptions of domesticity, these movements often have the opposite effect. Women, the poor or the migrant today are rarely positively associated with technology, and their kitchens are scarcely considered as the forefront of futurist ideals or of scientific and technological development (Parr 2002; Carney 2015). Against this background, it does not surprise that so-called digital natives, when transposed into the futurist smart kitchen, are rarely explicitly gendered or tethered to "traditional" images of the domestic cook as hard-working, let alone a poor mother in a culturally diverse household. Perhaps it is because mothers, often intersecting with minority cultural and class backgrounds, are currently revolutionising contemporary kitchens, that we refuse to notice that cyborgs are among us.

As this paper has demonstrated, the notion of the cyborg cook allows to conceptualise the many elements that contribute to the preparation or consumption of a meal and does not limit itself to identifying the cook as purely human, nor simply as female, middle-class and/or white. Although some concepts of domestication theory prove useful when understanding domestic negotiations and knowledge reproduction around and with digital technologies, the underlying tenet of domestication theory – i.e. that a technology user is separable from the technology and the technoscientific web enabling its existence – seems absurd when confronted with the notion of the cyborg. Since this research started with cyborg practices through experiencing the interaction between humans and machines – between the skilled touch of the cook and the intelligent machine that measures or blends ingredients – it has to be reconsidered who the cook is. By breaking with multiple dichotomies – between humans and non-humans, between men and women, but also between rich and poor, and between ethnic majorities and minorities – cyborgs enable an awareness of the culturally, economically and politically constructed differences of groups and the variety of cyborg possibilities and practices. Depending on gender, income, cultural background, age and experience, the cyborg cook will likely be made of very different organic and non-organic materials, and the ingredients that go into a meal will be correspondingly diverse.

This paper also problematised visions of smart homes and the role of digital technologies therein through an immersive and multi-sensory foray into everyday practices around cooking in Germany. It sought to provide an anthropological perspective on the "taming" of digital practices in contemporary homes. Through grounding the use of digital technologies in diverse contemporary kitchens, it challenged the double tension or division between futuristic visions around domestic food preparation and the reputation of Germany as a high-tech nation on the one hand, and between everyday experiences and actual practices on the

other. In contrast to the public imagination of the smart kitchen as a place of the future that is increasingly male-dominated, the multi-sensory ethnography of cyborg practices illustrates that contemporary kitchens are already smart and that especially mothers should be considered as cyborg cooks; a material and social web of multiple technologies, practices and bodies. The ethnographic cases thus contribute to previous scholarship on domestic technologies and the smart home in two ways. First, they confirm that although digital technologies like the Thermomix alleviate and alter some of the daily workload, women, especially mothers, are still largely responsible for everyday domestic food work. Second, rather than considering domestic cooks as bounded individuals or distinctly separable from the technology they use or from digital forms of knowledge such as algorithms or codes, this paper suggested that they should be understood as cyborg cooks when interacting and connecting with machines and their wider social and material environment to prepare the daily meal. Doing so, this paper showed furthermore how contemporary kitchens are already smart, and that female cooks, especially mothers should thus be recognised as the drivers of socio-technical change that they are in everyday domestic life.

In other words, when adopting the perspective of the kitchen, the story of the smart home and domestic IoT can become a story of female and other marginalised cooks' mastery of technology – contrasting with the perspectives told in the literature and the news around the smart home warning us of the increasingly male control of domestic technology. Without wanting to suggest that we have overcome the 1950s ideal of white, middle-class and heteronormative domesticity and its implicit division of labour within the home (Cowan 1983; Strengers/Kennedy 2021: 3), the smart kitchen and cyborg practices within it help to nuance and complicate narratives around perpetuating gender norms and the perceived and actual marginalisation of certain groups in our society, without at the same time silencing and/or reproducing the power imbalances that lead to these narratives. To better understand the constantly changing field of the connected smart home and its human and nonhuman inhabitants, more immersive ethnographic attention to everyday cyborg practices is needed. Ultimately, the notion of the cyborg cook and the anthropology of the smart kitchen presented here advocate for a more diversified understanding of who cooks in Germany and how they are doing so every day.

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