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Shit! Towards an experimental multiple-perspective approach to human-microbiome relations

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\textbf{ABSTRACT}

For HCI to move beyond human exceptionalism requires embracing more-than-humans, humans as parts of ecosystems, as multispecies assemblages and events. In short, decentering the human. Yet, human experience sits at the center of HCI. We report from Shit!, an experimental research inquiry into the relationship between people suffering intestinal dysbiosis and their gut microbiome. We discuss a series of Shitty workshops and the method’s suitability for fostering multiple-perspectives on human-microbiome relations. We reflect on the possibilities and challenges of conducting intimate, more-than-human design inquiries through workshops: carefully curated tasks undertaken collaboratively, in social settings, with facilitation. Our contribution is threefold: (1) we trace the lineage of workshops in HCI and Participatory Design; (2) we highlight and problematize human-microbiome relationships in sensitive participatory health-care contexts; (3) we deepen understanding of how workshops – as method – may be rearticulated in more-than-human design processes. We propose future directions in the work to extend and supplement the efficacy of the workshop with self-experimentation kits. Rather than developing design research methods anew, we argue the necessity of inquiring into and experimenting with the workshop as an established design method in HCI to prompt a re-articulation of situated knowledges and allow multiple voices, perspectives, and species to flourish.

\textbf{1. Decentering design methodologies}

To transcend human exceptionalism in HCI, we need new methodological approaches embracing more-than-humans, humans as part of ecosystems, multi-species assemblages and events. This work can draw inspiration from Alfred North Whitehead’s assertion that “we are in the world and the world is in us.” (Whitehead, 1938, p. 227), a claim that applies both to the philosophical understanding that experiences and being in the world cannot be partitioned into distinct categories such as culture or nature and to the more concrete application in experimental design workshops presented in this article, which seeks to explore human-microbiome co-existence as a “multiplicity of intentionalities” (Wakkary, 2021, p. 13).

Human experience sits at the center of both experimental design and the traditions of HCI. Rather than developing new methods in response to the challenge of decentering the human in these (currently, dominantly) human-centered contexts, we argue about the necessity of inquiring into and experimenting with established methods in ways that prompt a re-

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articulation of situated knowledges and allow multiple voices and perspectives to flourish. To advance this argument, we look to workshops as a site for experimental inquiry. Separated from the vernacular understanding of the workshop as place-where-things-are-made-or-repaired, experimental research workshops such as we focus on here are commonly understood to be delimited “arrangement(s) whereby a group of people learn, acquire new knowledge, perform creative problem-solving, or innovate in relation to a domain-specific issue” (Örngreen & Levinsen, 2017). The workshop as a methodological format has a clear history within HCI, and holds an almost ubiquitous appearance across design research as well as broader swathes of social, organizational, educational, and innovation-oriented knowledge production practices.

We trace the lineage of workshops in HCI to highlight and problematize their potential in participatory, more-than-human research. We discuss current approaches to more-than-human engagements in HCI and Design, where the workshop is a core methodology. We then take the Shit! project as our “ultimate particular” (following Nelson & Stolterman, 2014), focusing on a series of workshops undertaken with members of the Danish Colitis and Crohn’s Foundation¹ and their close family members. As we explain, due to a complex array of gut illnesses, the gut looms large in our workshop participants’ imaginaries, as well as in their daily lives. Indeed, their illnesses demand constant attentiveness to the gut. We hypothesize that this attentiveness may bring new insights into human-gut-microbiome relations, as well as into the workshop itself as a method for multispecies interaction. To deepen our examination of workshops, we reflect on researcher intentions, participant enactments, and the ways that the experimental methods we employ in our Shitty workshop may or may not evoke, let alone engage, a multiplicity of species and perspectives. We extend our inquiry by unfolding the workshop into constituent parts, focusing on the instructions or scripts that are transmitted from facilitator to participant, with the purpose of engaging participants imaginatively, through embodied experience; and with the workshop itself as a facilitated event for the collaborative performance of the game described by said scripts. Our examination of the particularities of Shit! are trained on deepening our understanding of how workshops – as constituted by scripts, embodied imagining and collaborative performance of the game – may be rearticulated in more-than-human design processes.

We note that the Shit! project uses scripts to bring non-instrumental, more-than-human stances to the highly sensitive healthcare context of participants directly or indirectly affected by dysbiosis. Following their participation in the workshops described here, these research participants expressed a desire to re-perform the workshop activities in their homes. This request suggests the need for an extension of the methodological repertoire. This article, thus, considers a reorientation of workshops toward ontological perspectives and, following from this, examines how scripts by extension may be used beyond the boundaries of the facilitated workshop to enact more-than-human entanglement at home – far from oversight or careful facilitation.

The aim of this exposition is to deepen our understanding of how workshops can facilitate the delicate work of considering ethical, ontological, and epistemological challenges of more-than-human self-experimentation in relation to the human body, our multispecies guts and their excretions. Throughout, this work entangles theoretical and empirical inquiry to highlight and problematize the potential of experimental methods in engaging multispecies actors in research questions. This approach recognizes the capacity of participatory research through design to at once emerge from and give rise to theoretical discourse (Wilde, 2020, building on; Redström, 2017). With these commitments in mind, we aim to show how the workshop, as a ubiquitous and overtly human-centered approach with a long pedigree in HCI and PD research, holds potential for further development as a means to think and act relationally alongside and beyond human interests.

¹https://www.ccf.dk
2. The lineage of workshops in HCI and design

The workshop holds an almost ubiquitous position in the toolbox of contemporary design research. To lay a firm foundation for our inquiry, we trace the lineage of workshops in Participatory Design (PD) and HCI. Following, we focus on self-reflexive engagement with multispecies perspectives, and the methodological constraints and potentials of the workshop as a framework and technique. Our objective is to identify characteristics and qualities that might support enquiring into multispecies relations.

2.1. Workshops in participatory design

As a format of collaborative ideation, the workshop was introduced by Alex F. Osborn in his book on creative problem solving, Applied Imagination (Osborn, 1953). The workshop spread rapidly to different domains and developed in different directions with varying aims and degrees of systematic rigor (Jackson et al., 2003). Its uptake in design has been manifold. As a methodological format, it entered design research through Scandinavian participatory design (Ehn & Kyng, 1987) where it was used as a technique of participation between workers, workers unions, and researchers. Its use was influenced by the Future Workshop, which was developed in the 1970s to aid civic action groups and communities in advancing systematic, participatory, and creative solutions to strengthen advocacy (Jungk & Müllert, 1987).

The Future Workshop consists of three phases: a “critical phase” to identify the challenge space, a “fantasy phase” to collectively develop social speculations, and an “implementation phase” for planning (Victor & Vidal, 2005, p. 5). In many regards, contemporary design research workshops are derivative of the structural logic and aims of The Future Workshop. This critical phase might address broader societal concerns but can also be topical, and thus directed toward collaborative analysis of a delimited research question. The fantasy phase has evolved into an array of methods for future scenario building, democratic design experiments (Binder et al., 2015) and rematerialization of dialogue (Erikсен, 2012). The implementation phase can be directed toward specific external actions or advancing and maturing a research theme by attracting and enrolling researchers into a common field of inquiry. As we shall see, the Shit! workshops discussed in this article, while exploratory, nonetheless follow the same scripted narrative structure of (in this case four) distinguishable phases as laid out in The Future Workshop.

A general trait of workshops is that the activity constitutes its own space. Whether the context is a conference, workplace, or distributed in time and space, across multiple sites (including online), a workshop establishes a heterotopia of sorts (Foucault & Miskowiec, 1986); a transformational and interconnected space, distinct from the practices and realities of its participants. This distinction is important insofar as it enables a temporary common that might be organized, convened, and facilitated by designers and provides common ground for all stakeholders to bring their experiences and agendas to the table. Considering PD workshops from the perspective of Science and Technology Studies, Peter Danholt (2023) evokes the notion of ‘Cosmopolitics’ proposed by philosopher of science Isabelle Stengers (2010) to emphasise the recalcitrance of non-human participants, such as microbes. He proposes their recalcitrance be considered a difference-inducing and generative counter-measure to the human propensity for playing along as good participants and ‘reliable witnesses’ (Danholt 2023, 13).

2.2. Workshops as method in the HCI toolbox

In the uptake of participatory methods in design research, workshops are often integrated into and structured by a sequence of experimental modes. Wakkary (2007) describes workshops as “deeply informed and conditioned by the underlying ideas of participatory design,” and places them within the following sequence: design ethnography, scenarios, participatory workshops, and prototypes. Compared to scenarios, Wakkary asserts, workshops serve as a different kind of “frame experiment”
(Schön, 1984) in which future scenarios are “deconstructed” in collaboration with potential end-users, as participatory explorations of ways to respond through design, e.g. as prototypes. Workshops might also take on a different function downstream in the development process as a means to evaluate interactive qualities and test a design system or artifact in simulation of future real-life engagements (Wakkary, 2007).

It is telling that Wakkery’s description of the role of workshops points to Pelle Ehn’s concept of “design games” in participatory design (see Ehn, 1988), which draws on Wittgenstein’s idea of language games. While design games conceptualize the importance of creativity and design skills as an avenue to enable democratic changes, the inspiration from Wittgenstein thoroughly places language, albeit with and through materials and material practices, as an integral part of life and thus at the center of participatory design activities and thence workshops.

Across the many forms, aims and contexts in which workshops are used, they carry with them a fundamental reliance on conversation and other forms of interpersonal communication. Though they often involve material and embodied interactions, language – verbalized or otherwise – is the central communicative infrastructure, indistinguishable from the actions and interactions involved. This is evident in collaborative activities such as: critiquing the current state of affairs, creatively experimenting with materials, negotiating and speculating preferred futures, integrating the represented viability and livability of scenarios based on participants’ experiences, and assessing deployability, relevance, and effectiveness of prototyped designs. All of these activities are premised on participants’ ability to exert agency and interact with others; build understanding based on experiences; and empathize with and imagine other’s prosocial intentions and probable behavior. The importance of this point, however banal, is made clear in participatory research with people who suffer from cognitive impairments that hinder their ability to communicate verbally, as in the case of people suffering from dementia (Lindsay et al., 2012). This challenge may trouble the way we ensure the representation and attribute stakeholder status to those in the workshop with whom we cannot communicate directly (Jönsson & Lenskjold, 2015) and is at the center of self-reflexive multispecies engagements in workshop situations.

3. A methodological approach to more-than-human and multispecies engagements in design-oriented HCI

Confronted with manifold ecological crises and growing public acceptance of humans’ detrimental impact on the planetary biosphere, a growing critical awareness of the urgency of rethinking design has become evident. While reactions to the nebulous character of the problems we are facing vary widely across the design landscape, a common thread is the uprooting of strong – and hitherto largely unquestioned – historical foundations in Western humanism, with human needs and desires as all-encompassing focal points. This longstanding paradigm of human-centered design is called into question by redirecting attention to the way humans are dependent upon and entangled within more-than-human meshworks (Ingold, 2011) that transgress engrained dichotomies between nature and culture, humans and technology or human and nonhuman organisms such as in the human microbiome (for precise terminology and specifics on terms such as microbiome, microbiota, and more, see Marchesi & Ravel, 2015).

In HCI and PD – the areas of research we report from here – the idioms multispecies and more-than-human, and their attendant theoretical foundations, have been picked up from the humanities and social sciences. These terms are often used interchangeably, but apart from their different intellectual genealogies, an instructive difference suggested by Price and Chao (2023) is that the former “push[es] against notions of human exceptionalism or anthropocentrism [and] draws attention to the ‘species’ as a potentially more generative unit of analysis – including the human as a species”; while more-than-human “invokes a counter-ethos of humility against Western ideas of human superiority” that – with a nod to American anthropologist Anne H Tsing – “acknowledges the existence of a diversity of beings that together participate in the making of our multiplicitous and ongoingly transforming worlds” (2023, p. 179).
The differences between these terms, subtle as they may be, point to the important double agenda of critically engaging design discourse, dominated by Western and modern (Latour, 2012) epistemologies and ontologies, by attempting to re-conceptualize humans as one species among others. At the same time, their use is about invoking a modest experimental stance bearing on experiences developed through situated material and participatory engagements; utilizing existing disciplinary attitudes, approaches, and methods as means of highlighting attunement (Despret, 2008); and partaking in world-making. At the crux of these agendas and interests, we consider the workshop as an instance of a broader subset of interests and engagements in the domain of multispecies and more-than-human design, under the rubric of multispecies participation.

3.1. Multispecies participation

Multispecies participation is burgeoning in participatory design research and HCI. In PD, for example, Lindström and Ståhl (2020) inquire into un/making by involving participants in experimental engagements with mealworms that eat polystyrene; and plants that accumulate metals, drawing these metals out of soil to regenerate damaged landscapes. The multispecies activities designed by Lindström and Ståhl enable participants to engage – in embodied and material ways – with scientific research, with and through other-than-human actors. Akama et al. (2020) raise questions about what participation even is, if we take seriously Arturo Escobar’s (2018) notion of a pluriversal design agenda that “requires us to work with multiple worldviews and link them in our personal thinking and design research practices” (Akama et al., 2020). They provide a rich overview of multispecies research across PD and other disciplines (e.g. Bastian, 2017), such as cultural and social geography (e.g. Pitt, 2017), and examples of multispecies working from Japan, to open new ways of considering more-than-human concerns and pluriversal approaches to PD.

In Design Research, Pauline Yurman (2022) speculates on the impact of the more-than-human by using bodily fluids as a drawing medium. Through speculation, this work connects to the fluid speculations of Karey Helms, Marie Louise Juul Søndergaard, Nadia Campo Woytuk et al., whose research collectively focuses on leaky, pregnant, menstruating bodies, body–environment relations, and the notion of transcorporeality across design research and HCI (Campo Woytuk et al., 2020; Helms et al., 2021; Juul Søndergaard & Campo Woytuk, 2023). Their work explores how and why to design self-reflexively with and for bodily fluids and human leakiness. To complement this, Boer et al. (2020) look to design research methods to externalize experience and reflect on the self through self-tracking, cultivation, and sampling of the gut microbiome from inside the mouth. We see such externalizations as elements in unfolding processes of connectivity. We find further inspiration in Haldrup et al. (2022)’s commitment to approaching other species as co-creators of experiences and knowledge; van Gaalen (2021)’s examination of how fictions might effectively foster multispecies cooperation; and burgeoning efforts to bring together HCI researchers to discuss shared and diverging visions, perspectives, and experiences, of more-than-human-design in HCI (Coskun et al., 2022); and to exchange methods for designerly engagement with “nature,” where nature is approached as an open and ambiguous idea that “embraces diverse kinds of more-than-human entanglements, including (but not only): farming, companion species, microbiomes, body ecologies, forests and other large-scale landscapes (e.g. oceans), or cohabitation in houses,” indeed “all possible relevant vectors of nature-related design: multispecies, cohabitation, posthuman sustainability, posthuman care …” (Tomico et al., 2023).

Additionally, HCI focuses on multispecies participation with animals as mediated through digital interactions and technologically induced environments, for example through digitally enhanced interspecies training with canines and other animals (Mancini & Lehtonen, 2018). Here, participation is considered in relation to animal–computer interaction and how to move beyond anthropomorphic understandings of animals and inherent interspecies asymmetries in interaction design. Biodesign in HCI denotes yet another prominent area of design research with close affinities to the scale and type of life forms such as the microbiome. Kim et al. (2023), for example, conducted
a comprehensive literature review of BioHCI to develop a taxonomy of design considerations for working with bacterial displays. This work aims to make visible the technical, practical, and semantic constraints of working with bacteria, as the authors are concerned with using bacteria as a functional design material in lab settings and as displays. In contrast, we are concerned with what may be the polar opposite – finding ways of relating to the bacteria within us, as part of who we are.

3.2. Our approach to workshops as sites for human-microbiome inquiries

Apart from what we might term more instrumentally engaged multispecies research in the areas of animal-human interactions or BioHCI, the turn toward multispecies participation in HCI listed above opens up new reflective opportunities for engaging with multispecies questions in relation to the self, contextualized by the social reality of living with dysbiosis, as well as new considerations of the workshop as method and collaborative mode of engagement.

Our research examines workshops as an experimental site for human-microbiome inquiries in relation to the self, contextualized by the social reality of living with dysbiosis. The workshop – as methodological format – provides a framework for embodied inquiry, as we seek to understand how the perceptual and conceptual limits of the body might be expanded to incorporate the microbiome – not as something different, but as one and the same. Put differently, we aim to investigate design workshops as a co-exploratory method of identifying and designing with thresholds understood as both boundaries and crossings or relations between humans and non-humans, mediating between social and bio-material conditions at various scales (Paxson, 2023).

As noted in (Lenskjold & Wilde, 2022), apart from the attendant body of related research in HCI and PD, our work is theoretically informed by understandings of more-than-human entanglements in New Materialism, STS, and feminist technoscience. It builds on Stacey Alaimo’s conception of the body as being porous and transcorporeal (Alaimo, 2018; 2010) – always a body of many bodies. Alaimo, in turn, draws on a range of theoretical foundations, including the “intercorporeality” of Gail Weiss, who emphasizes that “the experience of being embodied (...) is always already mediated by our continual interaction with other human and nonhuman bodies” (Weiss, 2013, p. 99); Donna Haraway’s argument for “situated and embodied knowledges” (Haraway, 1991, p. 191); Barad’s (2007) notion of “Intra-actions”, and their and other’s insistence on nonhuman agencies. Critically, Alaimo’s trans-corporeality “epitomizes the sort of posthumanist ontologies in which there can be no ‘nature’ outside the human.” (2018). It is this collapsing of the human and our microbiomes into a holobiont that draws our attention, and which we discuss in depth at (Lenskjold & Wilde, 2022).

The new materialist theories that we draw on here (Alaimo & Hekman, 2008; Bennett, 2010; Haraway, 2007) serve to enliven the qualities of attention that we as researchers, and our research participants are bringing to the human body and its microbial health, and the ways in which these qualities of relationship are being experienced. In particular, the notion of porousness in relation to the body, brought forward by Alaimo (2018) and people’s sense of where their body might begin or end, assist us in finding new ways forward in a space for which there is little methodological certainty. This attention to what Alaimo calls transcorporeality is not new in HCI (e.g. Juul Søndergaard & Campo Woytuk, 2023), and affords novel consideration of the messiness and multiplicity of the materiality of being human, and having a body that is made up of multiple other living entities that do not necessarily live in harmony.

4. Shit! entanglements and design experiments

In this section, we provide an overview of the Shit! project and discuss what is at stake for our workshop participants, the majority of whom suffer from chronic illnesses and conditions that: involve the gut-microbiome; are riddled with uncertainty; and have serious psycho-social, as well as physiological impact. We elaborate on the particular workshops that this paper is concerned with, to understand the role and impact of the scripts that drive their performance and examine ways in
which these scripts can inform an extension of the workshop methodology into other kinds of spaces. Some elements of this material – descriptions of the experimental work and background on the gut microbiome – have been discussed in prior publications. It is included here to provide a more comprehensive background for the HCI community. In prior publications, Wilde (2022) reports to the Anticipation community how this experimental work enables participants to anticipate harmonious future relationships with their gut microbiome, beyond the shame associated with their illnesses and the taboo of discussing their troubling excretions with others. In (Lenskjold & Wilde, 2022; Wilde & Lenskjold, 2023) we engage the Design Research community, to consider the role of narration in fostering what they term probiotic participation using these embodied methods. These prior publications do not consider the workshop as a method for fostering attentive engagement with the human-gut-microbiome, and the role of instructions or scripts in this work, which is the focus of this article. Consideration of these aspects, and their role in more-than-human or multispecies HCI is completely new. This turn to HCI enables us to examine and advocate for multispecies interconnections and intra-actions, relationality, and relational ethics, in areas of more-than-human HCI research (e.g. BioHCI, Human-Animal interactions), which are predominantly interested in interactions that work from an implicit assumption of a human-nonhuman separation that may be investigated and bridged by interactions and mediations, by means of intermediary devices and artifacts, be these computer-aided or otherwise. What we offer to HCI (along with others cited here) is a different route coming from PD: one that is non-instrumental in the sense that we are working with instruments and artifacts that are not the goal in and of themselves, but that serve as ways and means to explore and support multispecies entanglements from a position of always already relational ontology and ethics. Furthermore, positioning this inquiry in HCI enables us to trouble our own assumptions around the value of the research, as we must place it in relation with different ontologies that, in some cases, are quite other.

4.1. Shit!

The Shit! project is an experimental research inquiry into the relationship between people suffering from intestinal dysbiosis and their gut microbiome. The inquiry to date has involved collaborations with the gastroenterology department of a clinical hospital, philosophers and curators from a medical museum, chefs from a restaurant fermentation lab, and the Danish Colitis and Crohn’s patient organization, which provides support and advocacy for the more than 1 million Danes (of 5.9 million, worldwide) who have a chronic gut disease. These diseases are often debilitating, with little hope of relief for sufferers due to a range of complex phenomena that arise due to the dynamic, living, more-than-human nature of the gut. Rather than intervening instrumentally into the medically understood experience of these diseases, the Shit! project takes a non-instrumental approach. It brings focus to the gut microbiome through experimental and collaborative means, inviting research participants to defamiliarise their guts and illnesses by collaboratively performing gut-related design experiments, as a means to develop new perspectives on their guts, their illnesses, and their lived-experiences of these.

The underlying methodology is participatory research through design (Wilde, 2020), which has as its aim to create circumstances for people to construct knowledge through embodied engagement with physical, conceptual, and metaphorical materials that are – ideally—related to what is at stake. This knowledge construction is an emergent process, released by thinking, through moving, making, and doing, with foraged or carefully curated materials (see Wilde et al., 2022). The project consists of interviews, workshops, reflective thinking, and shared inquiry sessions – philosophical thought

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5Hvidovre Hospital Gastro Unit, DK: https://research.regionh.dk/en/organisations/gastroenheden-ahh
6Copenhagen University Medical Museion, DK: https://www.museion.ku.dk/en/forside/
7Noma, Copenhagen, DK: https://noma.dk/
8CCF, DK: https://ccf.dk
experiments undertaken with diverse experts, including people with vast personal expertise in the experience of gut illnesses. In the case of the shitty workshops elaborated herein, participants were enticed to construct new knowledge by performing scripts that had as their aim to engage their imaginations through their bodies and – from a formal perspective – examine what design research can do in a space where science, medicine, and technology are essentially failing people. The work is experimental in the sense that it engages imaginatively and materially with formal research questions, recognizing the body as the seat of culture and self (Csordas, 1994; Weiss & Haber, 1999), and embodied engagement with the world as key to understanding and acting in the world (Varela et al., 2018).

Research into our often-stained relationship with the gut microbiome is dominated by the medical- and natural sciences. Rather than continuing this tradition, our driving intention in Shit! is to examine ways of developing a broader interdisciplinary inquiry with both medical researchers and lay collaborators, retaining a design research – and by extension humanistic – perspective as the project’s core. The project may also be considered a food-oriented inquiry. As such, in all moments of the research, there are food and foodstuffs to eat, play with, and ponder. The use of food emerges from an ongoing commitment to food as design material, and the acknowledged centrality of food to our research participants’ lives, conditions, and experiences of their gut illnesses. In the next section, we describe those illnesses, their connection to the microbiome and related scientific research, to unfold what is at stake for our participants. We then describe the Shitty workshops.

4.1.1. Gut dysbiosis – what is at stake

As discussed in Wilde, 2022: A plethora of research brings focus to the gut, however, the system itself is incredibly complex and despite recent advances, it remains unclear what constitutes a healthy gut microbiome for an individual, at a specific moment in time (Lozupone et al., 2012; MacDougall, 2012). Each individual’s microbiome depends on their health, history, and circumstances and can change quickly and radically. Humans are multispecies events, composite by-products of collaboration (Gilbert et al., 2012). This complexity complicates care-giving and impacts people around those who suffer from gut dysbiosis, whether chronic or not.

The gut microbiome has been declared ‘our second brain’ (Ochoa-Repáraz & Kasper, 2016); is said to shape our physical health; our emotional and mental well-being; our cravings, desires, moods, and more (Carpenter, 2012; Schwiertz, 2016). The challenges faced by people with gut dysbiosis, chronic gut diseases, and conditions are both physiological and psychological. They include shame and discomfort around how the gut responds to food, how the body behaves in social situations, how it impacts intimate activities and sexual relations, as well as emotional behaviors that can disrupt how we experience and interact with others (Leenhardt et al., 2019). To complicate matters, Irritable Bowel Syndrome (IBS), which affects ~21% of the people worldwide, in every country (Chey et al., 2015), is as much a medical placeholder, as a diagnosis. This diagnosis acknowledges the seriousness of the symptoms, though provides little certainty around what might afford relief (ibid.).

Critical to the HCI community, technology stumbles in its quest to make the gut knowable. Cameras and other sensors inserted orally or anally, quite literally, only go so far due to constraints in size, scope, sensitivity… or length of cabling. Swallowable capsules – incorporating wireless telemetry for remote monitoring of physiological parameters over distance via radiofrequency communication – show promise, as they provide access to far more than imaging (Toennies et al., 2010; Olano, 2019).

Swallowable capsules provide easy and rapid access for biomarker and microbiota chemical by-products and it is possible for capsules to carry a wide range of biosensors on-board to measure various physical, chemical and physiological parameters such as pH, pressure, oxygenation, impedance (electrical conductivity), temperature, intraluminal gas, and to detect blood. (Toennies et al., 2010)

However, these too are limited, as the sensing technology determines what is captured, and by extension, what is excluded from consideration.

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6see: http://www.daniellewilde.com/publications/
However, perhaps even because of such technological advances, we propose that the human gut remains a black-box system containing a hidden world of microbes, over which we have limited access, awareness, or control. What we can access is what goes in (physically, as well as emotionally) and what comes out (in the form of feces, urine, altered emotions, and behaviors), though it is not possible to reliably measure causal relationships between these. When people’s gut microbiome functions well – reliably pre-digests foods and sends healthy signals to the rest of our system, this lack of access is not a problem. However, few people in overdeveloped societies have consistently well-functioning gut microbiomes (Chey et al., 2015).

4.1.2. The shitty workshop – an overview

We conduct our analysis of the workshop as a method through an examination of two workshops, conducted 2 weeks apart, with members of the Danish Colitis and Crohn’s patient foundation (the CCF). As reported in (Wilde, 2020), the first involved 32 adult participants (26 years and over), including 16 sick people, each accompanied by a healthy family member, who participated alongside them. The second, involved 16 young adults (aged 19–30), all of whom are ill. The workshops were conducted as part of the CCF annual “colony,” a residential four-day weekend that has as its focus social activities that serve to bring the community together in a safe space, where the constraints of their illnesses are understood. The participants in both workshops all knew one another. Many of them had not seen each other since the previous year’s colony. One member of the adult group had died since the previous year. This loss highlights the vulnerability of the participants and the need for this colony to serve as a safe space. The preparatory process was thus critically important, as was the process undertaken with the members of the CCF. We were invited into this safe space the evening before the workshop, to have dinner, sleep over, and share breakfast and lunch with the participants, as well as to conduct the workshops. To further connect with the community, we began the workshops with personal presentations by each of the researchers, speaking to their intimate experiences of gut illnesses. These experiences ranged from misdiagnosed Ulcerative Colitis and Crohn’s, resulting in 100 days in hospital the year prior; through chronic IBS; young children with varying extremes of gut sensitivities; and no direct relation at all.

4.1.3. The role of scripts

The workshops are a four-act process. Each act uses embodied and performative means to scaffold participants into sharing increasingly intimate details of their gut challenges. It affords this growing intimacy by conflating embodied design ideation methods (Wilde et al., 2017) with the well-known design research method: the workshop, using scripts to guide participants in their actions. Critically, these scripts are at once clear – simple and operational – and ambiguous. The operational aspect of their character builds on prior research that demonstrates that simple, operational questions leave critical space for people to find their own way of responding (Wilde & Andersen, 2010); that ambiguity leaves space for meaning-making (Gaver et al., 2003); and that the embodied focus of the instructions – that quite literally ask people to do things – creates unfilled spaces that the imagination is prompted to fill, by virtue of the whole setup. This potent combination is designed to afford multi-sensory experiences, stimulate curiosity, and give rise to surprising insights. Over four acts, participants:

1) paint a portrait of “the gut” using food-based paints; noting the part of the gut they like most and the part they like least. [Paint Your Gut]

2) watch an animated film about the gut microbiome; in a small group, collectively construct a designated part of the gut; then join with the other groups to perform an overscaled model of the mechanical operation of the entire gut, from the mouth to the anus [Build Your Gut]

https://www.ccf.dk
(3) model their faeces out of chocolate cakes developed using (modified) “gut-friendly” recipes, decorated with beetroot juice and superfoods; and present the resulting shitty cakes, using the Bristol Stool Chart\(^8\) as a point of reference. [Shitty Cakes]

(4) reconsider their Act 1 gut portraits and engage in reflective discussion [Reflection & Discussion]

Key to this workshop design is a series of switches between intimate, internal reflection and outward performative sharing, encoded in the scripts that are delivered from facilitators to participants. The scripts are delivered verbally; demonstrated through gestures and performed action; and provided in written form – as recipes, placed on the tables before the participants enter the room and accompanied by the necessary ingredients (e.g. ziplock bags, bananas, biscuits, orange juice, vinegar, stockings, chocolate cakes, so-called “superfoods”, and more). All activities involve embodied and performative aspects and prepare the ground for each subsequent move.

From a formal perspective, the Act 1 request to “note the part of the gut you like most and the part you like least,” is absurd. It serves to destabilize certainty in the participants, catch them off guard, and prompt them to begin thinking in new ways. This process of defamiliarisation escalates as each task requires further commitment, until the intensity of the workshop peaks in Act 3 (Shitty Cakes), when participants are asked to model their faeces from chocolate cake and superfoods, and present the outcomes to each other using the Bristol Stool Chart to support comparative discussion. This entire Act transgresses fundamental taboos of adult human behavior in Western (and many other) societies, yet it does so using a common medical tool that is well known to the participants, and which they take seriously despite its limitations. See Figures 1–4 for an introduction to the scripts, and images of participants performing the corresponding activities.

Our intention in designing the workshop this way was to prompt an embodied and reflective process that brought focus to the gut microbiome. However, we observed little nuanced consideration of the gut microbiome by our workshop participants or evidence of reflection on the idea of themselves as multispecies events. We emphasized the microbiome’s role in the gut at numerous points during the workshop, beginning with the introductory animated film, in Act 2; and again in Act 3, verbally, during the setup, when discussing the modified cake recipes and superfoods. Despite this apparent failure in one of our research goals, the workshop itself was received enthusiastically, and in follow-up surveys, participants reported improved psychosocial well-being. The director of the CCF board described the workshop as groundbreaking: “no-one is approaching our illness in this way, your work changes everything” (personal correspondence), and participants contacted us afterward to ask for the cake recipes, so they could do the workshops again at home with their families, thus taking ownership of the method.

These outcomes prompted us to reflect on the nature of the activities scripted into the workshop, their ability to give access to the microbiome, and what it might take to reorient the scripts for home use. The possibility of people conducting this work at home raises many questions for us as design researchers. Collective, collaborative and self-experimentation in facilitated workshops allows the specter of performativity to protect people from their vulnerabilities. There is little possibility of ensuring that scripts for at-home enactment can do this. The Shit! workshop has been carefully designed to scaffold care, and the ability to be increasingly, radically, open, and vulnerable. It is unclear to us whether our workshop participants – let alone someone who had not been in the facilitated space – would understand how to do this or even recognize that this is what the workshop supported them in becoming. To deepen our understanding of what is happening in the workshop,

\(^8\)Bristol Stool Chart, also known as the Bristol Form Scale, is a diagnostic tool used in gastroenterology to classify faeces and evaluate treatments for IBS and other dysbiosis (Riegler & Esposito, 2001). The chart reduces human faeces variability to 7 distinct types to facilitate discussion, and is a familiar fixture of chronic gut patients’ medical histories. In the workshop, we displace it from its clinical context to underscore a sense of estrangement through defamiliarization. For an example of a Bristol Stool Chart, see: https://pediatricsurgery.stanford.edu/Conditions/BowelManagement/bristol-stool-form-scale.html
4.1.4. The ethical challenge

In the Shit! project, we must consider the ethics of working with vulnerable populations; multi-species collaboration; transgressing taboos; and potentially, biosafety guidelines. Of course, if people are tempted to literally work with their intimate bodily fluids – take samples of their faces, or grow bacteria that they harvest from within or without their bodies – concerns about bio-safety and ethics are well-founded (for a discussion, see Ledford, 2010; Schmidt, 2008). Considering our subject matter, we therefore must pay careful attention to these material matters, as we consider the relocation of scripts from the controlled, social settings of workshops, to the home. No less important, we must be mindful that we are working with vulnerable individuals, whose conditions may cause them to overlook caution, as they consider how to interpret the provided scripts. For our scripts will not be neutral. Here, we might turn to Peter-Paul Verbeek (2008), who urges a consideration not only of the moral decisions and responsibilities of designers but of the morality of the artifacts (in this case, scripts) themselves.

Whether we consider a metaphorical engagement with the gut-microbiome or the literal, material use of food in our workshops as a stand-in or proxy for the vibrant materiality of our guts, we must acknowledge multispecies collaboration. Turnbull and Van Patter (2022) provide a useful methodology...
for ethical multispecies engagement. Their fieldwork with dogs and coyotes unfolds at a very different scale from our concerns in Shit! Nonetheless, the dimensions they propose can support careful deliberations. They include negotiating expertise and positionality; making visible or concealing the anima; and intervening in animal worlds. Further, they point to Kohl and McCutcheon’s (2015) “kitchen table reflexivity” as an approach for working through ethically important multispecies moments, as opposed to simply “staying with them,” as in Haraway’s (2016) exhortation that researchers “stay with the trouble” of multispecies worlding. All of these ways of thinking about the morality and ethics of what we are doing and what is at stake seem critical in considering the facilitated performance of the workshop space, as well as in moving beyond this space to somewhere else.

5. A workshop and its constituent parts

To assist us in considering a move from workshops to scripts-for-home-use, we break down the workshop into its constituent parts, namely: scripts, embodied imagining, and the collaborative performance of the game. Of course, in the workshop itself, these parts are fully entangled.
Considering them as distinct entities is useful for our analysis, for which we use the ultimate particular of the Shitty workshop to gain specificity.

5.1. Scripts

The term script refers to a concept brought forward by both Madeleine Akrich (1992) and Bruno Latour (1992) to describe the influence that material things have on people’s behaviors. Just as the script of a film or play prescribes what people should do or say at a given moment, an artifact can also prescribe action, or have a script (see also Verbeek, 2017). Whereas scripts in design, following Latour and Akrich, are inscribed in the designing of artifacts, we may think of the workshop as a designed socio-material thing (Binder et al., 2011; Latour, 2005) performatively unfolding a script. In our case, the scripts themselves serve as artifacts, in particular when they take material form, which they may do within the bounds of the workshop, and must do if they breach these bounds. In the Shitty workshops described above, scripts are delivered verbally, through gesture, and in written form. We lay out our Shitty scripts in the next subsection, in Tables 1–4 for consideration, including scripts delivered to participants for enactment, as well as those enacted by the research team.
5.1.1. A shitty script, act by act, with form and purpose

The full script of the Shitty workshops, provided below, requires two rooms of similar size, each with tables and chairs, one with a projector (room 2), and an additional space with running water to store and prepare diverse elements. Performing the scripts requires various functionally useful items that are used to set the scene – foodstuffs and simple implements such as ziplock bags, stockings, plastic tubs, cutlery, disposable lab coats to protect clothing from food, nitinol gloves to protect the food from the human skin microbiome and other, perhaps invisible, fellow travelers. Acts 1 and 4 take place in the first room, Acts 2 and 3 in the second. Between each act there is an interval – refreshment breaks following acts 1 and 3; a lunch break following act 2. All refreshments and lunch are provided to ensure that participants remain together, in relation to the workshop spaces, with related influences on their gut microbiomes. As discussed below, this helps in maintaining the magic circle that delimits the game.

In addition to the scripts meant to be enacted by participants, the researchers have a number of scripts running – some theoretical, others operational. From a theoretical perspective, a key underlying script is the research agenda for investigating how workshops can serve as a vehicle for interrogating ways of relating to the microbiome. This script was ingrained into the material, but only made explicit to the workshop participants on a few occasions, as noted in the previous section and below. In terms of pragmatic scripts, one notable script guiding researcher action was to take polaroid images of participants throughout the first three acts, either focusing on the hands or the faces. These polaroids are gathered and used in Act 4, where they are offered to the participants to take home. The purpose of this script was to give participants the opportunity to take something that either directly or indirectly captured their experience, from the workshop into their daily lives. We hypothesized that this would at once breach the boundaries of the workshop and extend its impact.

5.1.2. Embodied imagining

Every script in the Shit! workshops serves to frame participants’ embodied engagement with the materiality of what is at stake for them – both in and beyond the workshops. Each script carefully shapes a tangential inquiry into more-than-human practices that unfolds when they are performed by the participants through their bodies. As discussed in Wilde (2022), this process reconfigures embodied design methods around, with and through food, to engender a fertile space in which participants may move through vulnerability and taboo to rehearse alternate possibilities. Fundamental to this process, is the incorporation of food into the workshop not only as research
Table 1. Score: act 1: paint your gut.

<table>
<thead>
<tr>
<th>script</th>
<th>form</th>
<th>tools?</th>
<th>purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 setup: Room 1 Long tables, seating 10-12P each, are napped with brown paper; jars of food-based colors, water and paintbrushes are arranged along the center of each table, to be within reach of all Ps. At each seat is placed a lab coat, a project description, a consent form and a pen. Seats and consent forms are numbered to ensure consent preferences can be honored when handling documentation. All but one table have video and audio devices positioned so that participant activities and discussion can be captured. Drinking water is provided.</td>
<td>sceno-graphic (Sc) + audio/visual (A/V)</td>
<td>Y</td>
<td>to shift from the everyday; clearly delineate the research from what happens outside of the room.</td>
</tr>
<tr>
<td>1.1 researchers (R) dressed in university lab coats, invite participants (P) to: – find a seat at a table, put on the disposable labcoat</td>
<td>verbal (V)</td>
<td>Y</td>
<td>to open the circle of the game (Caillois, 2001)</td>
</tr>
<tr>
<td>1.2 Rs line up at the front of the room. PI introduces the project, then they each describe their personal relationship to gut dysbiosis. To finish, R invite P’s to read project description and sign consent form</td>
<td>V</td>
<td>Y</td>
<td>uses language to perform the integration of researchers into the CCF community (Austin, [1962] 1975); uses action (the signing of the consent form) to ritualize the entry into the game.</td>
</tr>
<tr>
<td>1.3 Rs collect signed consent forms and inform P’s that all but one of the tables will be video- and audio-recorded. If they do not wish to be captured in the recordings, to indicate clearly so they can be reseated if needed. R’s manage seating, and correct numbering on changed seats and consent forms.</td>
<td>V</td>
<td>N</td>
<td>to ensure that wishes regarding consent and privacy can be honored both during the workshop activity and long after, as documentation materials are handled; analyzed and reported.</td>
</tr>
<tr>
<td>1.3 Ps instructed to use the food-based paints to paint a gut portrait</td>
<td>V</td>
<td>Y</td>
<td>externalize their focus, and create a collision between their knowledge and their understanding of the extent of their knowledge</td>
</tr>
<tr>
<td>1.4 Ps instructed to identify and mark on the gut portrait the part of the gut they like most and the part they like least</td>
<td>V</td>
<td>Y</td>
<td>the absurdity of this request destabilizes certainty, and prompts participants to begin thinking in new ways. the purpose is to implicate them in their newly formed representation of the gut and create an opening for the P’s to attach emotions to their gut portrait, thus shifting it from a generic portrait to a self-portrait.</td>
</tr>
</tbody>
</table>

REFRESHMENT BREAK – coffee, tea, water provided, snacks available in the hotel lobby

subject or object, but following Bennett (2010), as vital materiality (as activated elsewhere in workshops that leverage the materiality of food, f.x. Altarriba Bertran et al., 2019; Dolejšová et al., 2020; Wilde et al., 2022). This stance opens up new ways of thinking, and enables all of a participant’s senses to be leveraged in the emergent design space. Methodologically, the whole is held together using the foundational methodology of participatory research-through-design – an embodied approach that draws on phenomenology (Husserl, 1999; Merleau-Ponty, 1962) and related theoretical frameworks such as pragmatist aesthetics (Dewey, 2005; Shusterman, 2000), embodied cognition (Varela, Thompson, & Rosch, 2017) and embodied, embedded, and enacted minds (Clark, 1998, 2010; Gallagher, 2012, 2016; Gallagher & Zahavi, 2012; Kiverstein & Clark, 2009). As discussed in (Wilde, 2020; Wilde et al., 2017), participatory research through design leverages performative
Table 2. Score: act 2: build your gut.

<table>
<thead>
<tr>
<th>2.0 setup: Room 2</th>
<th>script</th>
<th>form</th>
<th>tools?</th>
<th>purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables are placed on angles around the space, with video and audio equipment positioned to capture all but 1. (^9) Each table seats 6–8 Ps and contains 'recipes' and equipment (zip lock bags, buckets and bowls, stockings, food materials and nitinol gloves). A total of four different recipes are provided. Additionally, four empty tables are placed end to end along one wall.</td>
<td>Sc + A/V + written (W)</td>
<td>Y</td>
<td>to establish the game in the new space, and set the tone for this act.</td>
<td></td>
</tr>
<tr>
<td>2.1 as in a circus or cabaret, Rs guide Ps to find a seat and don lab coats.</td>
<td>V + G</td>
<td>Y</td>
<td>reopen the circle and raise the stakes</td>
<td></td>
</tr>
<tr>
<td>2.2 R's introduce an animated film on the gut microbiome,(^10) which is then projected onto the wall where the Act 2 performance took place. Everyone watches the animation.</td>
<td>V + A/V</td>
<td>Y</td>
<td>to bring focus to, and prompt reflection on, the gut microbiome.</td>
<td></td>
</tr>
<tr>
<td>2.3 Ps to follow the recipes, and using materials provided, collaboratively construct a specific section of the gut.(^11)</td>
<td>V + G + W</td>
<td>Y</td>
<td>to externalize the focus and edge people towards performing</td>
<td></td>
</tr>
<tr>
<td>2.4 4 groups representing each of the four sections of the gut go to the front of the room, line up behind the empty tables and perform the entire gut from mouth to anus, passing the food elements from one group to the next.</td>
<td>V</td>
<td>Y</td>
<td>to begin to place their illnesses into the oversized gut models, still keeping them external.</td>
<td></td>
</tr>
</tbody>
</table>

LUNCH BREAK – warm and cold buffet lunch provided

traditions to extend these theoretical understandings of embodiment into practice, drawing on design researchers’ and participants’ first-person experience to ensure potent relevances. The approach affords enriched opportunities for knowledge generation and experience creation, relying on estrangement to enliven the ideation process and bring into being new ways of designing, imagining, and rehearsing – or practicing – new ways of living.

5.1.3. The collaborative performance of the game

In Man, Play and Games, Roger Caillois specifies a number of characteristics for games:

"they are engaged in by choice; they are separate from the routine of life, and occupy their own time and space; games are uncertain: the results cannot be pre-determined, players’ initiative is therefore required; games are unproductive: they create no wealth and end as they begin; games are governed by strict rules that suspend ordinary laws and behaviours; and, finally, they involve make-believe that confirms in players the existence of imagined realities that may be set against “real life”. (Caillois, 2001)"

He notes that games are delineated by a magic circle that at once creates and describes a space in which the normal rules and reality of the world are suspended and replaced by the artificial reality of a game world. Linser, Lindstad, and Vold provide principles for designing games and role-play simulations using this idea (Linser et al., 2008). Critically, our participants are not playing roles, unless they are as some new kind of gut researcher, investigating themselves, with their disposable lab coats, nitinol gloves, and embodied expertise in the subject matter. Dressed thus, in character, they perform inquiries into the collision of their personal, intimate experience and medical knowledge, by constructing new material realities – paintings, objects, performances, presentations, and sculptures. This way of approaching magic finds commonality in philosopher and sociologist,
Richard Sennett’s, discussion of magic in The Craftsman (2009), where he asserts that it “raises the stakes of unforeseen events, gives changes in form a compelling power to command wonder and fear.” Leaning on such thinking enables us to approach “a difficult subject in an equally difficult or convoluted manner” (Wilde & Andersen, 2009, 2010). It also resonates with American theater director, Anne Bogart’s (2003) applications of Rollo May’s (1994) work on creativity, and the underlying assumption that “to ‘free up’ the creative and expressive body to respond to the unanswerable, we must first ‘busy’ the reasoning part of the brain so that it will not interfere” (ibid.). The specificity and, at times, (seeming) absurdity of the scripts delivered to the workshop participants serve to render the gut unfamiliar. Each script leverages Viktor Shklovsky ([1917] 1965)’s notion of the artistic-poetic power of “defamiliarization” – incrementally increasing the difficulty and length of perception of an activity, to “awaken” or enliven the relationship between the person and their gut. Collectively, the scripts act as an emerging scaffold for the participants to become increasingly bold in their playing. The whole experience plants the idea that desires may indeed reside within our body and reach out if we let them (Wilde & Andersen, 2009). Bringing participants into the game, this “place of magic” thus creates a kind of opening for whatever will follow.

### 5.2. A narration failed?

In Shit!, each act was planned to engage participants in collectively re-narrating their lives with dysbiosis through different experiential modes and qualities of interaction. The workshops were

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**Table 3. Score: act 3: shitty cakes.**

<table>
<thead>
<tr>
<th>script</th>
<th>form</th>
<th>tools? Y/N</th>
<th>purpose/impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 <strong>setup: Room 2</strong> Tables are in the same position as for Act 2. Each table has chocolate cakes of varying colors and textures (e.g. brownies and blondies) and diverse ‘superfoods’ (bee pollen, acai berry, freeze-dried raspberries, etc) and edible glitter, artfully arranged along the center, and a laminated Bristol Stool Chart placed facing up. Each seat has a cake plate and a pair of nitinol gloves. The entire room smells like chocolate.</td>
<td>Sc + A/V</td>
<td>Y</td>
<td>to establish the tone for this act. reopen the circle and raise the stakes</td>
</tr>
<tr>
<td>3.1 Ps instructed to model their faeces using the foodstuffs as sculptural material</td>
<td>V + G</td>
<td>Y</td>
<td>to further destabilize assumptions, to turn focus inwards and to enable them to perform a radical transgression of taboo.</td>
</tr>
<tr>
<td>3.2 P’s instructed to present their Shitty cakes to their fellow sculptors using the Bristol Stool Chart to try to describe and position their cake within this ubiquitous Western medical model</td>
<td>V + W</td>
<td>Y</td>
<td>to connect their intimate personal experiences with the reductionist Western scientific models in a way that enables them to critically consider the usefulness of the models.</td>
</tr>
<tr>
<td>3.2x <strong>Participant initiated script:</strong> At some point during this session, a participant typically asks if they can eat the cakes. The research team all have safe food handling certificates, and have been handling the food in ways that ensure it remains edible. Permission is therefore granted.</td>
<td>V</td>
<td>N</td>
<td>This action has radical, emancipatory impact on the participants, and precipitates the intended instruction to ingest the cakes in Act 4</td>
</tr>
<tr>
<td>3.3 Ps are instructed to break for refreshments, and to take their cakes with them into Room 1, where they will find fresh hot beverages</td>
<td>V</td>
<td>N</td>
<td>connect the two rooms, prepare to close the circle.</td>
</tr>
</tbody>
</table>

**BIO BREAK – fresh coffee, tea and water is available in Room 1**

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12NB during Act 2, on their own initiative, participants began to bring their illnesses into their models, so this process of turning inwards, while not formally prompted, had already begun.
scripted with the intention of bringing human-microbiome relations to the fore, as a perspectival reorientation of the participants’ ailments, toward an understanding foregrounding multispecies relations. The first attempt at bringing focus to the microbiome was in Act 2, Build your Gut, which began with a short animated film with a voice-over describing the biomechanics of the digestion process, including the role of the microbiome. As a result of dealing with the medical system for years, many of the workshop participants had an in-depth understanding of their condition and related medical terminology. However, despite denoting the microbiome as a specific area of interest on our part, the participants seemed to pay scant attention to it. After the video, participants were divided into groups tasked with building a section of the digestive system from mouth to anus using a collection of foodstuff and materials (for more, please see: Lenskjold & Wilde, 2022). The gut did not figure in any of the models, though signs of their illness did – through activating reflux in the esophagus, and in the form of blood in the intestines and bowels – showing a breach of the threshold between the workshop and the rest of life, a porousness of this boundary.

In our second attempt to foreground the gut microbiome, in Act 3, Shitty Cakes, we ask participants to model examples of their (personal) faeces using a selection of organic foodstuffs, arranged along the middle of each table. Components included three kinds of cake with different tastes, looks, and consistencies, and a variety of sprinkles, spices, and so-called superfoods to add color and consistency. All of these foodstuffs contained prebiotics, probiotics, and polyphenols; selected in accordance with their gut-health properties (Marchesi et al., 2016, p. 332). We clearly unpacked this intentionality for our participants as we introduced the task, and they responded with appreciation. Indeed, it was the recipes for the gut-friendly cakes that they requested in order to do this work at home themselves. We might therefore surmise that the importance of this element was not lost on our participants, for if it had been, they may happily have substituted any chocolate cake for this task. Nonetheless, the presence of the microbiome seemed to recede into the background, at least in terms of what was outwardly performed, as our participants grappled with the radical task of modeling their faeces out of chocolate cake, in a room full of people doing the same.

As the peak of the experiential arc in the Shit! workshop, Act 3 is carefully constructed to contravene social ordering, by empowering our participants to embrace the inappropriate. They begin not only to materialize their faeces but also share what would otherwise be deemed taboo-laden intimate details, which faeces out of its contained and controlled place is deemed. Like dirt for anthropologist Mary Douglas, faeces – on a plate, no less – “is the by-product of a systematic ordering and classification of matter, in so far as ordering involves rejecting

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This method of opening space for reflection has been shown in prior research to create a space for participants to fill with intimate details. The level of intimacy is predicated on the trust that has been created, and has also been found surprising. See (Wilde & Andersen, 2010 for further discussion).
inappropriate elements” (Douglas, 1966, p. 36). The invitation to make poo-cakes and thus turn the visibly and tactile abject into something edible and savory opens up a performative “as-if” moment that potentially transforms the situation that participants feel with their co-participants across the table.

While the workshops on the whole succeeded in collaboratively surfacing new perspectives on the participants’ situation (e.g. engendering issues pertaining to feelings of loneliness and shame related to living with dysbiosis) our ambition of bringing attention to the microbiome proved decidedly less successful. However, and encouragingly, the experiential modes and qualities of interaction used to render the microbiome a participant and future ally served other ends well. For example, through material tinkering and sensory experiences, the handmade cakes styled after their faces helped participants confront feelings of disgust and loneliness, and became prompts for new conversations. Across the different modes of experiences, the interactions we propose as gateways for access to other realms of shared experience inevitably led back to conversation and thus discourse as the primary vehicle for (collaborative) knowledge production. When it comes to engaging multispecies perspectives, we discern that language and discourse as the workshops’ modus operandi, while perhaps very good at fostering critique, analyses, and speculation, are seemingly less adept at manifesting multiple realities outside of the discursive space constituted by the workshop itself.

These outcomes raise questions about whether it is the methodological form (workshops) that is preventing a multispecies exploration or the ultimate particular of their instantiation (the design of the Shitty workshops and its collision with their intimate challenges) that is misdirecting our participants? We reflect on this question by considering the workshop methodology, then discuss future experimental inquiries that bring in instrumental methods that provide direct access to the microbiome, for example experimenting with taking swabs from inside the mouth and samples of spit, and examining what might be living in these samples, insofar as can be measured by available scientific instruments. We do this by returning to questions pertaining to multispecies design and more specifically how workshops can facilitate the ethical and ontological challenges of more-than-human self-experimentation in relation to the human body and our multispecies guts.

6. Re-articulating the workshop toward more-than-human design

In light of the experiences gleaned from the Shitty workshops (described in the previous sections), and the shortcomings in bringing attention to the microbiome in part, we ponder ways of extending the methodological repertoire through the generative concepts of thresholds and attunement. We then consider how the workshop as a method may be extended to, and complemented by, more-than-human inquiries in the private sphere. Finally, we outline a direction for future work by proposing the development of human-gut-microbiome at-home self-experimentation kits.

As elaborated in this article, the central aim of exploring human-gut-microbiome relationality is governed by an ontological interest shared with more-than-human and multispecies research in design and other disciplines grappling with interspecies coexistence, world-making, and its effects on human well-being. With these intentions at its core, the Sh! workshop’s constitutive elements (scripts, embodied imagining, and collaborative performance of the game) were utilized to form a combination of experiential and interactional modes, including speculation, conversation, presentation, material tinkering, and sensory experiences. These modes were aimed at engaging human-gut relations discursively, materially and experientially. However, our analysis shows that direct awareness and interest in the microbiome among participants was difficult to establish. We suggest that further development of design workshops with a multispecies agenda, and in collaboration with groups of affected participants, could benefit from a greater emphasis on identifying thresholds between and attunement to what is at stake.
6.1. Cultivating multispecies awareness through thresholds

We lean on anthropologist Heather Paxson’s understanding of thresholds as “processes and activities that mediate or regulate border crossings, that test the limits and capacities of various sorts and scales of boundaries, and that may reveal hidden or overlooked borders or regulating mechanisms” (Paxson, 2023, p. 18). With this broadly framed and malleable definition, thresholds and border-crossings can be scripted, brought to attention discursively and materially, and performatively staged in workshops in a variety of ways. With regard to the microbiome, we can identify and explore, for instance, the mouth as threshold between inside/outside, self, and other; chewing as a precursory activity for passage through the gastrointestinal tract; and taste as a switchboard between microbial needs, cultural codes, and bodily protection against pathogens; to name but a few.

By seeking out and integrating thresholds into the workshop setup and design or by developing the workshop into collaborative “thresholding” exercises, we hypothesize that existing modes of organizing and conducting more-than-human workshops can reinforce the presence of, and interest in, other-than-human species as constituent parts of the human. As Paxson points out, “thresholding projects push up against and may expand established ways of doing, being, feeling, relating” (ibid), and it is with this arsenal of potential outcomes that thresholds as a conceptual tool can redirect attention and perhaps spark curiosity toward the microbiome amidst or in conjunction with other, at times more pressing, agendas.

When related to the experiences of the Shit! workshops, an approach mindful of uncovering or denoting thresholds could most likely be applied to future developments of all existing activities. As a case in point, Build-your-Gut exercises at present as a collaborative and performative game by which to demonstrate – somewhat didactically – the transportation and transformation of matter from mouth to anus. There is ample opportunity in this reconfiguring to reconsider the focus on movements and, instead, interrogate the various steps as a thresholding process in which multiple actors, perspectives, and agencies are simultaneously present, identified and performed as such.

6.2. Embodied imagining as attunement

The gut microbiome is characterized by its containment in, and symbiotic relationship with, the human body. This porous relationship makes it difficult to distinguish the microbiome from the body itself. It is roughly speaking accessible only as abstracted knowledge or through its effects on our wellbeing; impossible to sense on its own; and quite simply difficult to imagine despite containing around 10 times the number of cells as the human, in the human body and in some estimations weighing as much as 2 kilos in human adults (Flint, 2012). Moreover, composed of colonies of bacteria, viruses, fungi, and other biological entities, it is difficult to relate to the gut microbiome with empathic identification, as one might do with an animal. Its complex topological distribution along the entire gastrointestinal tract makes the microbial biofilm difficult to pinpoint and thus imagine, as evidenced from its absence in the drawings resulting from the Paint-your-gut exercise.

In comparison with other compounded symbiotic cultures such as the gelatinous cellulose-based biofilm or Symbiotic Colony of Bacteria and Yeast (SCOBY) of Kombucha fermentation – a favored subject of more-than-human research in HCI (e.g., Bell et al., 2023; Ng, 2017) – the gut microbiome does not resemble a discrete object in the slightest. Whereas the majority of design research regarding kombucha SCOBYs are interested in microbial-computer interactions, material properties and uses, and the prospects of designing with living matter (Ofer & Alistar, 2023; Senyildiz and Veselova (2022) have investigated how kombucha brewers attune to the microbes, and conversely how the microbes exude agency through ongoing interactions. They report how “ethical doings” and a sense of care for the microbes would arise not from apriori ethical principles or discursive understandings of the microbes as living, but through practical and situated engagements with and caring for the SCOBY’s well-being. What Senyildiz and Veselova relate as attunement to microbes would be expressed by one kombucha grower as a “feeling of
attachment” and “in the fear of causing the death of microbes” (p. 9). Importantly, caring for the SCOBY is not caring for all microbes. Attunements, thus construed, is a reciprocal relation that also entails the exclusion of unwanted interference from microorganisms and molds, to uphold interspecies interdependence.

According to philosopher of science Vinciane Despret, attunement is best understood as a movement of partial connections between species by which they make themselves available to each other (Despret, 2004, 2008, 2013). As a generative concept for engaging the microbiome in a workshop setting, a sense of attunements or embodied empathy may be achieved by designing material engagement that do away with attributing the microbiome with “meaningful” intentions and begin by constructing partial affinities residing in experiences. As an example drawn from science, Despret (2013) recounts an experiment by Canadian biologist Farley Mowat, who in his attempt to understand the dietary habits of arctic wolves, replicated their penchant for foraging mice during the winter months. By carefully crafting recipes and consuming mice himself, Mowat constructed partial bodily connections and experimental affinities with the wolves through his own body (p. 61).

If we, by comparison, consider the Shitty cake activity in the Shit! workshops, the recipes were deliberately developed to contain both pre- and probiotic ingredients and polyphenols, as an attempt at establishing partial connections and a sense of direct attunement with the microbiome (for more on this, see Wilde, 2022). This aspect of the design, however, was largely subdued by a strong (and equally important) emphasis on collectively and materially confronting taboos and developing a liberating sense of shared experiences. The discursive and socio-cultural levels of engagement simply took precedence and left little room to focus on and explore interspecies connections. With a more pronounced focus on honing in on the microbiome or other critters through partial embodied connections – in particular, with food as medium – we speculate that it may be possible to strengthen a sense of multispecies attunement. One challenge to overcome in this endeavor is the temporal constraints of workshop activities that follow different timelines than the process of consuming, digesting, and excreting bodily waste, and thus the time involved in waiting to receive a bodily reaction.

In this section, we consider thresholds and attunements as generative concepts that each in their own way latch on to the experiences gained from the Shit project and, we contend, point to ways of further developing the workshop as a method for more-than-human explorations. In the next section, we consider how these aims may be extended beyond the workshop itself.

7. Extending human-microbiome inquiries beyond the workshop

Our interest in the workshop as a method for multispecies inquiry was initiated by the combination of a lack of visibility of the microbiome in our participants’ performances of the shitty scripts we provided, which we address throughout this paper, and a request to support them in taking the scripts home. In this section, we consider the difference between the locations of workshops and non-workshops when performing scripts, recognizing that we cannot control how, where, when, or with whom scripts are ultimately performed if they are provided for home use; and the need to determine how scripts might be delivered, considering the lack of facilitation. The ethical challenges to be considered are raised in section 4.1.4.

7.1. Location, location, location

Workshops i) traditionally operate at the level of socio-political concerns; ii) are structured through discursive and conversational forms of interaction; and iii) function as heterogeneous spaces connected to, but simultaneously, distinct from, the sites of participants’ (and their guts) lives and practices. In the case of the Shit! workshops, this third point, in particular, may inhibit important
points of access related to possibilities of multispecies relations. We therefore see value in developing scripts for home use. We also look at a number of challenges.

Workshops may be characterized as heterogeneous spaces removed from everyday practices, stressing the importance of developing workshop activities or scripts to enable participants – including designers and other researchers – to “position themselves as embodied actors within [the] problem and sensitize[ ] them[ ]selves to the realities at stake and develop solidarities” (Nold, 2018, p. 63). This characterization can open up spaces for improving workshops. Nold, also points to the limits of the workshop in experimentally engaging “everyday life as a site of politics where multiple realities are at stake” (Ibid), and points to the need to expand the methodology beyond its current form if workshops are to be relocated to the home.

If we consider the constituent parts of workshops (scripts, embodied imagining, and collaborative performance of the game), we find that scripts serve to support the emergence of the latter two parts. It therefore follows that, if these parts are no longer contained within the workshop as facilitated events and locations, we must address how scripts are contained, packaged, provided, and and delivered to the research participants. We therefore propose looking at the kit in (and slightly beyond) HCI to inform this move.

7.2. Extending the methodological repertoire from workshops to kits

As Correa and Holbert (2021) note, aside from synthetic biology, the development of kits for biodesign is rare, and despite “the lens of interspecies creativity, these technologies maintain an instrumental approach to life inherited from rationalistic science and mechanistic engineering.” This positioning is the antithesis of our intentions with Shit! which is committed to supporting curious, vulnerable, and playful engagement with ourselves as multispecies entanglements. To build on such intentions in the context of HCI, we might look to Cultural Probes for inspiration (Gaver et al., 1999). Cultural Probes support guided exploration by participants, often through the use of ambiguous or absurd prompts. Their intent is to gather inspirational material about how people experience themselves and their relationships with the world, bracketed by research concerns. Design researchers then used this material as inspiration for developing designs. The method builds on artistically informed social movements such as The Situationist International (Plant, 2002), and art movements such as Fluxus (Friedman, 1998; Higgins, 2002), for whom scripts and instruction sets serve as a key methodology. They thus connect readily with the commitment to action inherent in embodied imagining discussed earlier, even if in the Shit! project, we are not seeking inspiration for design. Rather, our objective is to prompt particular embodied experiences for our participants so that they might reflect on and reposition themselves in relation to a core concern.

To broaden our search for inspiration, we might therefore look to science kits, developed to engage people of all ages in craft-like scientific activities, and the growing availability of recipes, kits, and instructions for growing, brewing, and experimenting with biomaterials; or kits in HCI, in the context of culturally responsive computing. In discussing the latter, Roque et al. (2021) emphasize that the possibilities and limitations of the tools that make up such kits emerge as people create with them “in relation to [their] experiences, histories, and futures with them” (Tzou et al., 2019; in; Roque et al., 2021). This notion builds on Tim Ingold’s understanding of material interaction as a generative and improvisational process between the material and the maker (Ingold, 2010), and

There are many examples online, for example, hands on science kits: https://www.carolina.com/browse/hands-on-science-kits; kombucha brewing kits: https://designtorget.se/kombucha-kit-1-l; https://www.thekombuchashop.com/products/kombucha-brewing-kit; kits to grow your own mushrooms at home: https://hackrosgarden.com/collections/mushroom-grow-kits, or to feed mycelium, if you prefer a more DIY approach to growing mushrooms or mushroom-based products: https://grow.bio/products/grow-it-yourself-material. There are also a range of open source repositories that include recipes and kits for a broad range of biomaterials: https://materiom.org/commons; and bio-based approaches: https://class.textile-academy.org/tutorials/ https://materiability.com/education/, to name but a few. A full review of such resources is beyond the scope of this paper, but we believe would make an important contribution to HCI.
recognizes that “what is defined as ‘material’ and how relations to particular materialities are narrated and enacted are shaped by knowledge systems and shape culturally and sociopolitically consequential constructions, orientations to, and practices with materiality” (Barajas-López & Bang, 2018; in; Roque et al., 2021). Or, as Donna Haraway reminds us:

It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories. (2016, p. 12)

Our interest in participation within the workshop, as well as within its proposed expansion, lies at this mutable threshold where embodied engagement with/and the materiality of what is physically and conceptually at stake unfolds.

8. Conclusion

To interrogate the role of the workshop in supporting intimate multispecies engagement, our article traces a methodological inquiry from historical developments of workshops in HCI through the ultimate particular of Shit!. This process makes visible that despite their discursive, social, and collaborative history, workshops hold relevance in an ontological turn that seeks to support the development of multiple-perspectives on human-microbiome relations. Such a move is at once methodological and political, and stands as an extension of the method’s propensity for multiactor engagements from the Future workshop, to its present use in HCI and PD. Or, as we have explored in this article, a shift of focus in participatory design actions from people and their politics toward more diffractive, inclusive, and ultimately multispecies ontologies. Our research suggests that this shift might serve as a kind of switch to make accessing other realities possible.

Undertaking this inquiry in a sensitive medical context, with vulnerable participants who are wellversed in the vagaries of the gut, enables us to enroll an extreme user group in consideration of the questions we are posing, and thus access other – highly informed – perspectives. To our surprise, this public seemed far from in thrall with their gut microbiome, expressing little obvious interest in it. However, they were definitely curious, as exemplified by their request for recipes that would enable them to enact the workshop in their homes. This simple-seeming request positions the cakes – with their unique recipes – as stand-ins for re-opening the circle of the game, and thus as a reminder that what we are conducting is magic.

To explore these ideas further, we use the Shit workshop to at once highlight and problematize the potential of human-microbiome relationships and thereby deepen our understanding of how workshops – as method – may be rearticulated in more-than-human design processes. We then discuss future directions in this work that seek to supplement the efficacy of the workshop by focussing on the generative concepts threshold and attunement, and extending the engagement beyond the workshop to include self-experimentation kits.

In doing this work, we recognize that people may simply not care to breach their multispecies entanglement. However, we believe that workshops play an important role in opening more-thanhuman perspectives and interests for diverse groups of participants and suggest that this method complements the rise in interest in biology and self-experimentation in HCI. We therefore continue our methodological inquiry in an attempt to uncover how such a move might be supported in non-instrumental ways, speculating – through the ongoingsness of Shit! and our attempts to take the work to new publics and locations – on the affordances of workshops and scripts as sites for radical experimentation.

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