13 JUNE 2025 09.00 - 11.00

Panel 38. Entangled Theories and Practices: Navigating Relational Ontologies In and Through Design, HCI, STS, and Philosophy of Technology

Convenors:

Chiara Di Lodovico, Politecnico di Milano/Università degli Studi di Milano

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Keywords: cross-disciplinary dialogue, practice-based approaches, relational ontologies, theory-practice divide

In recent decades, disciplinary boundaries have increasingly blurred, sparking a growing convergence between design and human-computer interaction (HCI) on one side, and science and technology studies (STS) and philosophy of technology (PoT) on the other. Central to this cross- disciplinary dialogue are theoretical frameworks—such as new materialism, agential realism, postphenomenology, object-oriented ontology, more-than- human perspectives, and feminist posthuman approaches—and methodologies—like actor- network theory (ANT)—which have profoundly shaped contemporary thought, challenging traditional human-centered viewpoints, highlighting the relational intricate entanglements between humans, technology, and the environment (Fraueberger, 2019; Giaccardi et al., 2024).

Design and HCI scholars advocate for integrating STS and PoT to generate new insights and introduce robust conceptual frameworks that challenge existing norms and assumptions. In turn, STS and PoT scholars benefit from design and HCI research, which offers opportunities to engage in the making and "unmaking" (Song et al., 2024) of technological artifacts, thus enabling more generative and forward-looking inquiry rather than relying solely on retrospective analysis of existing technologies (Wakkary et al., 2018).

Despite this promising dialogue, bridging the gap between theoretical insights and empirical investigation remains a substantial challenge (Redström, 2017). Indeed, ensuring that theoretical and empirical dimensions reciprocally inform each other is anything but straightforward (Sanches et al., 2022; Arteaga et al., 2024). One primary concern is the tension between complexity and reduction. There exists a risk of oversimplifying theories to fit empirical needs; conversely, maintaining theoretical complexity can undermine the accessibility and practical benefits that these insights could provide (Lindley et al., 2023). Moreover, this tension may impede the reverse flow, where empirical investigations contribute to refining and expanding theoretical frameworks (Nicenboim et al., 2023).

This panel invites explorations of how PoT and STS theoretical and methodological frameworks can be engaged in and through design and HCI practice, and how design and HCI in turn can reciprocally contribute to these discussions. We also welcome critical perspectives challenging the role of design and HCI in reconfiguring conversations within STS and PoT. Contributions may include theoretical, methodological, and empirical work, and practice-based narratives, or submissions experimenting with complementary dissemination formats, such as 'Research Fictions' (Chen et al., 2017), including video essays and live performances. Topics include but are not limited to:

- Approaches for conducting STS and PoT-informed research in design and HCI domains;
- Productive tensions and frictions in the trade-offs between theoretical and empirical insights;
- Non-linear, nomadic approaches to bridging theory and practice (eg., "ways of drifting", "productive oscillation") across disciplinary boundaries;
- Methods for integrating or "diffracting" STS and PoT theoretical insights and practice-based ap-

proaches in design and HCI;

- Design potentials and limitations in engaging with theoretical frameworks and reshaping theoretical conversations.

The panel will be structured as workshop-style sessions, featuring interdisciplinary working tables.

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ID 227 - Constellations of Knowing / Not Knowing in Perinatal Care

Paulina Yurman, University of the Arts London

Keywords: ways of knowing, not knowing, maternal, infant care, perinatal, technology, sensorial, maternal machines

When early incubators were first presented to the public towards the end of the nineteenth century, some obstetricians argued that such machines could possibly be safer than mothers themselves, due to their over emotional, excessively stimulant, irresponsible, unstable or uncontrollable behaviours [1, 2, 3]. The idea that machines know better, are more reliable and efficient than humans in spaces related to maternal and infant care is one that can still be implied in many narratives surrounding smart cots, monitors, AI powered strollers or baby tracking devices (of movement, weight, temperature, blood oxygen, breathing, growth, heart rate). Facial recognition apps, for example, for reading babies' expressions or for detecting postpartum depression in mothers stem from ideas that machines can read humans' facial expressions and emotions more accurately than the human eye can (and raise questions about who/what gets to determine how emotions are normatively manifested) [4]. Often being attributed more observational powers than they may have, the selling point of such technological interventions is rooted on notions of machines as providing objective (and implicitly more reliable) knowledge and in opposition to humans' subjective perceptions. Such technologies can be reassuring for some parents, but they also present medicalised versions of parenthood that can undermine bodily and sensorial, cultural and/or ancestral forms of knowledge. At a time when many parents feel vulnerable or are learning to navigate uncertainty and unpredictable outcomes, the promise of control, reliance and surveillance can be very attractive, and profitable. The experience of parenthood, particularly for new parents, is one of constant learning, of recurrent navigation through multiple types of information: advice from medical professionals, grandparents or relatives (who might differ in their practices from official advice), peers, social media, trends. While many monitoring technologies offer numerical readings for assessing wellbeing, such information coexists with ways of knowing that are sensorial, subjective and bodily situated. Not knowing, yet trusting our own abilities to learn, to read babies' body languages in par with their reading of ours and learning of the world through the senses are universal experiences. In the constellation of relations between bodies, their fluids, experiences, knowledges, machines and other entities in perinatal care, a key question raised during my research Maternal Machines: Design Speculations about Fantasies of care [5] addresses ways in which designed artefacts and technologies could support new parents and carers through an engagement with uncertainty and multiple ways of knowing as common experiences in parenthood.

I would like to use this panel's session for discussing these and other theoretical, ethical, methodological and practical issues in my research.

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ID 270 - Desire, Needs, Practices: Designing for Social Practices toward Socio-Technical Transitions

Matthew Wizinsky, University of Michigan

Keywords: Designing Technologies, Social Practices, Transition Design, Socio-Technical Transitions, Urban Technology

The convergence of Design, Human-Computer Interaction (HCI), Science and Technology Studies (STS), and the Philosophy of Technology (PoT) has shaped contemporary discussions on the ethical, political, and philosophical dimensions of technology design (Verbeek, 2005, 2011; Latour, 2005; Suchman, 2007; Ihde, 2009; Rosenberger & Verbeek, 2015). While design has traditionally been theorized as a human-centreed activity, insights from STS and postphenomenology have expanded this discourse, introducing new conceptual perspectives and tensions (Rosenberger, 2015; Verbeek, 2011; Woodhouse & Patton, 2004). However, these domains' philosophical and epistemic connections remain difficult to trace. For instance, although Actor-Network Theory (ANT) shares affinities with Spinoza's metaphysical philosophy, Spinoza's direct influence on design remains marginal. Similarly, while STS and PoT have intersected with sociological theories of practice, practice theory remains underexplored in design methodologies (Shove, Pantzar, & Watson, 2012; Reckwitz, 2002). Thus, while Spinoza has influenced STS, and STS has informed design, both Spinoza's influence and practice theory remain largely absent from design theory and methods. This raises critical questions about how these theoretical traditions might be mobilized to facilitate systemic change, particularly in emerging fields such as Transition Design (Geels, 2019; Grin et al., 2011; Irwin, 2018; Irwin et al., 2015).

In response to these gaps, this paper introduces the Desire, Needs, and Practices (DNP) framework—a theoretical synthesis of three intellectual traditions: Spinoza's theory of Desire (1677/1994), Max-Neef's human-scale development theory of Needs (1991), and social practice theory (Shove et al., 2012). Spinoza conceptualizes Desire as an innate striving to enhance one's power of action. Chilean economist Max-Neef defines Needs as finite and universal, though their satisfiers vary across cultural and historical contexts. Meanwhile, practice theory examines how practices emerge through the integration of materials, competencies, and meanings, positioning them at the intersection of agency and structure (Reckwitz, 2002; Shove et al., 2012). The DNP framework situates Desire as the fundamental driver of human activity, manifesting through Needs that are satisfied via evolving social practices. This theoretical integration offers both an analytical and generative approach to examining systemic and socio-technical change.

The framework's theoretical background is examined alongside empirical engagements, including collaborations with UX and service designers, pedagogical applications in university architecture and urban technology programs, and public workshops developing DIY decarbonisation tools and hydroponics. These engagements have shaped the framework's development, demonstrating its relevance to analytical and generative applications. By articulating the DNP framework's conceptual and empirical applications, this paper contributes to ongoing discussions on the entanglement of human and technological agency. Ultimately, this work aims to enrich practical and philosophical discourses on socio-technical and systemic change (Geels, 2019; Grin et al., 2011; Irwin, 2018; Irwin et al., 2015; Meadows, n.d.).

An accompanying interactive workshop could be offered to demonstrate the framework's application in two ways: (1) as an analytical tool for examining emergent urban social practices shaped by new technologies and (2) as a generative method for conceptualizing new social practices supported by technological interventions in urban contexts.

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ID 421 - Posthuman HCI - Why and How?

Keywords: posthuman, human-computer interaction, design

Christopher Frauenberger, Interdisciplinary Transformation University Austria

Posthuman theories have made significant impact in the fields of design and human-computer interaction (HCI) with increasing interest in a wide range of literature that is associated with science and technology studies (STS) and philosophy of technology. If a core feature of these theories had to be identified, it would have to be subscribing to a relational ontology, the idea that anything becomes what it is through the relations it performs (e.g. Giaccardi and Redström 2020).

This panel aims to focus on precisely this intersection between posthuman thought, design and HCI, specifically drawing attention to the tensions around the need for pragmatic formulation and potential over-simplification in search for impact in design practice. With this contribution, I would like to offer two interconnected provocations that relate to this tension: first, practitioners in design are likely to disregard the lofty ideas of a relational ontology as purely academic if there is no clear reason as to why it is beneficial or needed. The fact that things make humans within larger socio-technical systems is no big news and methodologically a well-executed human-centred design process that is attentive to context, careful about outcomes and self-reflexive, may still come a long way to design meaningful interactions. While I am not denying that in fact what practice often does is ontological design (e.g. Winograd and Flores 1987), the need for conceptualising it in this way may well be regarded as unnecessary over-thinking. Thus, the challenge here might not be the over-simplification of posthuman theory, but a murky picture of its practical benefits.

Second, design practice prides itself to have a handle on complexity in a more productive way than what engineering has on offer. Thus, I remain unconvinced that "oversimplifying theories to fit empirical needs" is at the core of the challenge. Rather than complexity, I have the suspicion that what is hardest to embrace is the inherent politics of a posthuman practice. In search for a how, a methodology for posthuman HCI, the rush for formalisation and pragmatism may be driven not so much by the needs of empirical application, but by escapism that aims to avoid the difficult agonistic, political work that knows no shortcuts or model processes. Design has always been political in the sense that it has been quite willing to be instrumentalised by various ideologies, but what may be different is that posthuman design requires design to show up as a political actor in its own right (c.f. Escobar 2018). Negotiating technological futures in political arenas is what posthuman theories put centre stage and what needs to be baked into methods of design. Participatory Design may serve as a path forward here, if the political qualities can be strengthened while core challenges like engaging agential systems of scale, transfer of situated knowledge and facilitating non-human participation can be addressed (Frauenberger et al. 2024).

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ID 482 - Caring Bodies and Machines: Exploring Care Epistemologies in HCI Through Narrations of Birth

Marine Zorea, 京都工芸繊維大学 (Kyoto Institute of Technology)

Keywords: Maternal care, birth, bodily knowledge, feminist technoscience, posthuman

In the fluid tectonics of maternal care, technological devices have emerged as central agents that encode bodily, biomedical, and sociocultural knowledge. With the medicalisation of birth over the past two centuries, tools such as ultrasound imaging, fetal heart rate and contraction monitors are only a few of an array of objects designed to provide certainty into this uncertain process and render it manageable. Yet, a new reality transpires when we resist reading these devices as mere neutral conduits: rooted in scientific paradigms that privilege accuracy, standardisation, and objective measurement, these technologies risk occluding the embodied ways of knowing inherent to the maternal experience. What alternative visions

emerge as we examine the epistemologies inscribed in these machines? How do these devices both reveal and obscure complex materialities of care?

This research explores the potential of feminist technoscience as a critical lens to birthing technologies. Scrutinizing the hybrid networks comprising maternal wards - from mothers to infants, medical systems, and machines - it seeks to shed new light on these devices as central sites of knowledge, reconfiguring subjective and collective imaginaries. Centreing around the experience of three postpartum mothers, this research uses their stories as a case study - a key methodological approach in STS, and through deductive narrative analysis traces technoscience theoretical grounds as they materialize in these lived experiences. Three thematic entanglements of human-machine emerge: submission, resistance, and re-appropriation, demonstrating how these machines translate the maternal experience to fit standardized medical narratives while also revealing how mothers reclaim these technologies to affirm their agency. By challenging the 'god's trick' of absolute objectivity and drawing from notions of non-anthropocentric care, this research troubles established binaries in present scientific discourse that separate the living body from technological advancement, to open an alternative design space in HCI.

This study, engaging the timely context of birth medicalisation and resonating with the broader trend of biodata monitoring in HCI, demonstrates how STS theory and methods might contribute to understanding and reimagining technologies of care. Through birth as a unique case study of human-technology entanglement, this work not only seeks to advance maternal health, but also to illuminate the interweaving of STS within our ever-transforming technological landscapes and its profound generative pathways.

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ID 499 - PhD research project (methodology) presentation: 'Co-working with Self-Service Technologies: A design ethnographic approach to the future automated supermarket'

Paulina Noches, Monash University

Keywords: Automation & work futures, Speculative Design & Design Fiction, Design Ethnography, Troubleshooting, Hope

My research investigates the expectations and anticipatory experiences of frontline employees in Australian supermarket chains as they envision a future workplace increasingly shaped by automation. Self-Service Checkouts (SSCs) and surveillance systems have become pervasive in retail industry (Deloitte, 2016). However, the perspectives of employees who supervise, troubleshoot, and assist customers with these technologies remain overlooked in future automation strategies. My research adopts an interdisciplinary approach at the intersection of Design Anthropology, STS, HCI, and Media Studies to address this gap, examining how workers reflect on their role in a possible automated future and how their insights can inform more sustainable design and policy decisions.

My study is theoretically grounded in sociology of expectations (Brown & Michael, 2003), repair and maintenance (Jackson, 2014), troubleshooting (Duque et al., 2022), and the ethics of care in technological mediation (Puig de la Bellacasa, 2011). It also engages with future-oriented frameworks, particularly hope as an anticipatory concept (Pink, 2022a), offering a lens to explore employees' imaginaries, anxieties, and desires amid increasing automation and policy trends (DISR, 2023).

The research is guided by two central questions:

- How does the anticipatory concept of hope manifest in frontline supermarket employees as they imagine a possible automated future workplace?
- What automated technologies do employees expect to co-work with in a potential future supermarket, and why?

To address the research questions, my study employs a multi method approach combining Design Ethnography and speculative design futures methodologies (Pink, Fors et al., 2022; Candy & Kornet, 2019; Dunne

& Raby, 2013). The methodology unfolds in three interconnected phases:

- Ethnographic Fieldwork: Short-term immersive fieldwork in six Melbourne supermarket locations, including visual and sensory ethnography through observations and informal interviews with 18 employees, examining their current interactions with SSCs.
- In-depth Online Interviews: Semi-structured interviews with 25 employees from different supermarket chains, broadening insights into automation-related concerns, aspirations, and expectations.
- Speculative Design Future Workshop: Using design fiction media, virtual reality (VR), AI-generated speculative images, and abstract material prompts, these immersive workshops engaged 8 employees in experiencing and co-creating speculative work futures, ranging from remote assistance of SSCs to fully automated in-store interactions. Themes explored include automation, robotisation, surveillance, wellbeing and customer service.

My panel presentation will contribute to STS and related fields discussions by engaging in a theory-practice dialogue, reflecting on how relational ontologies and practice-based methodologies can integrate worker perspectives into automation debates and future tech designs. My study expands theoretical discussions on automation and work futures while demonstrating the potential of design and creative methodologies in making invisible work—such as troubleshooting and customer service—visible within dominant automation narratives about possible futures.

By positioning supermarket employees as active co-worker agents in shaping automation imaginaries, my research invites further exploration of how interdisciplinary, practice-based design approaches can bridge the gap between theory and practice to help shape a more sustainable and meaningful supermarket futures.

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ID 759 - Practicing 'Moral Mindfulness': Slowness, Trust ... and more ethical entanglements in an AI-era Design Education

Simona Kicurovska, Universiteit Voor Humanistiek

Keywords: Emergent Design Research, Care Ethics, Response-ability, Trust, Situated Practices

In my PhD research, Designing with Uncertainty, I investigate how design (& pedagogy) can foster response-ability (Haraway, 2016) and keep moral space open—not by improving AI, but by rethinking design methodologies in the context of AI-driven transformations. This project situates design as a relational and processual practice where meaning is negotiated collectively, requiring new ways of working, teaching, and collaborating that integrate care ethics.

For this panel, I propose to present my research in a format that reflects my methodological stance: as both practice and theoretical reflection—inviting participants into an experiential exercise before shifting into analytical discussion. Through this oscillatory movement between experience and theory, I show how my methodology embodies the tensions at stake in bridging STS/PoT and design practice. My practice-led research does not sit squarely within one domain, but moves fluidly between (graphic) design practice, pedagogy, artistic research, design research, care ethics, STS and PoT.

The panel's focus on the tension between complexity and reduction aligns with a central concern in my research: In addressing AI in design education, sustaining trust requires more than just predefined ethical frameworks—it demands an ongoing, situated negotiation. Trust is, indeed, a distributed concern (Lindley et al., 2023). I turn to care ethics as a framework that foregrounds relationality, emphasizing that responsibility and trust are not predefined but emerge through expressive-collaborative—and embodied—negotiation (Walker, 2007). Following Leget et al. (2019) I approach care ethics as a practice shaped by negotiating responsibilities and lived experiences, where individuals continuously attune to themselves, others, and their environment. This methodological commitment to a practice as a site of ethical reflection resonates with Gaver et al., (2022) framing of practice-based research as emergent, exploratory process. 'Emer-

gence-friendly' research remains responsive to the dynamics of situated encounters, unfolding in relation to material conditions, social entanglements, and uncertainties.

A series of co-creative workshops I conducted with design students, practitioners, and researchers reveal that trust—as a core part of response-ability—emerges not just as an interpersonal exchange but as a lens for examining broader societal shifts surrounding AI. Through structured, sensory-based exercises inspired by collective movement practices (Brown, 2022; Cocker, 2013, 2019; Friedman, 2022), participants explore how trust is built—or broken—through embodied interaction and improvisation (Brinck, 2021). These workshops function as "sites for unlearning" (Krauss, 2017), where ambiguity, breakdowns, and negotiated forms of trust become generative of strong concepts (Höök, K., & Löwgren, J., 2012). Here, Margaret Urban Walker's expressive-collaborative model offers a foundation for rethinking design's ethical engagement with AI. In this framing, moral mindfulness becomes a guiding principle—foregrounding trust as an emergent, collectively negotiated practice rather than a technical guarantee.

By bringing these methodological insights into dialogue with HCI, STS, and PoT, my contribution directly engages with the panel's broader questions on bridging theoretical complexity with situated, embodied inquiry. Inspired by bell hooks (1994), I see care in education as an active, critical, and collective practice—a means of creating spaces of freedom, dialogue, and shared responsibility.

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ID 842 - Latour, Gaia, and Immersive Design of Visualisation Experiences for Science

Nagida Helsby-clark, UNSW; Commonwealth Science and Industrial Research Organisation

Keywords: more-than-human design, Latour, Facing Gaia, immersive design, immersive visualisation

Designers are increasingly confronting the limitations of human-centred approaches when navigating the ecosystemic contexts and impacts of our practices. Prominent STS theorists, such as Bruno Latour, complicate binary distinctions between elements such as nature and culture, envisioning these as interwoven relational structures. In response, the design research community has developed methodologies to translate these theoretical insights in practice. I present my contribution to these explorations in more-than-human methodologies, applied to two practice-based design case studies. My research explores how being immersed in data supports communities, in particular scientist researchers, to experientially make sense of it. I focus on turbulence in both oceans and wildfires: chaotic, unpredictable, fluid flows. Examples include extreme wildfires interacting with the atmosphere or generating their own spiralling weather systems, ocean eddies and gusts of wind. To explore this question, I take a research through design (RtD) approach, envisaging and constructing future ways of exploring data, and reflecting on how these may be applied in scientific practice. I draw on the theoretical perspectives of Latour in Facing Gaia (2017). Latour conceives of nature/culture and subject/object as indivisible elements. The figure of Gaia replaces the now defunct notion of "nature", emblematic of the layer of interactions taking place within a critical or metamorphic zone which we all inhabit. In this zone there are no barriers between agents; Latour describes permeable linkages within flowing "waves" of interaction, in which one actor's intentions or compulsions bend or disrupt those actors in their vicinity. Under this conception, fluid dynamics of wildfire, oceanic and atmospheric processes become part of the distributive agency of both human and nonhuman forces. This expands interaction design parameters for both of my case studies. A designerly notion of flux here entails the complex dynamics, not only of the physical processes of these phenomena, but of the human and nonhuman actors, including intermediary sensing equipment, immersive apparatus, human users and AI agents.

My approach extends human-centred approaches, experimenting with techniques to invite more-than-human participation and reflection. These include a co-creation workshop with oceanographers using musical instruments to evoke turbulence; my time recording sound and images at a fireground in Montana to contribute to an immersive fire soundscape for a 3D cinema; and constructing a virtual reality ocean visualisation where participants may feel ocean currents as vibrotactile feedback through haptic gloves.

My methodologies became increasingly embodied, relational and tangible as I became aware that my own attempt to understand and translate turbulence into immersive environments were their own embodied sensemaking process. This reflects the parallels of sensemaking within both design and science, as iterative, active ways of constructing meaning. My practice embraces the aesthetic, provisional and aspirational as unique strengths of design research. Here, an RtD approach imagines the possibilities of immersed, somaesthetic sensemaking, placing these future-facing interventions in the hands of scientists in an applied setting, to generate new knowledge through construction and reflection. This is one way STS theoretical perspectives may expand design theory.