Human-Robot Experience (HRX) Theatre—An Interdisciplinary Methodology For Reimagining Human-Robot Relationships Through Movement

Petra Gemeinboeck
Center for Transformative Media Technology (CTMT)
Swinburne University of Technology
Melbourne, Australia
pgemeinboeck@swin.edu.au

Rob Saunders
Leiden Institute of Advanced Computer Science (LIACS)
Leiden University
Leiden, Netherlands
r.saunders@liacs.leidenuniv.nl

Audrey Rochette
Dance Department
Université du Québec à Montréal
Montreal, Canada
rochette.audrey@yahoo.ca

Steph Hutchison
School of Creative Arts
Queensland University of Technology
Brisbane, Australia
s2.hutchison@qut.edu.au

Kristina Mah
Design Lab
The University of Sydney
Sydney, Australia
kristina.mah@sydney.edu.au

Abstract— **How can we connect with robots without mimicking human traits? Can we build meaningful relationships with nonhuman-like bodies? What if sociality emerges in the encounter itself? The Human-Robot Experience (HRX) Theatre tutorial introduces a participatory methodology for reimagining our relationships with robots through movement-based, experience-centered exploration. Participants will explore how we bodily resonate and make meaning with non-anthropomorphic machines using our Relational Body Mapping (RBM) method, employing robot costumes to facilitate embodied perspective-taking. Adopting a robot's unique perspective to experience its distinct social affordances expands our understanding beyond anthropocentric views, unlocking new modes of nonverbal communication and embodied empathy. Movement and its meaning-making potential are key to HRX. We begin with gentle movement explorations. This heightened sensitivity will shape our first embodied dialogues with artifacts. A live performance with dancers, costumes, and a robot will showcase how RBM harnesses kinesthetic awareness to explore how sociality arises in the encounter. Applying their embodied insights, participants will develop and enact inclusive speculative scenarios through embodied role-play with robot costumes. This tutorial introduces an embodied prototyping approach that leverages the potential of movement dynamics for designing expressive, nonhumanlike robots. Cultivating empathy with machinelike entities could promote the design of more diverse and sustainable relationships that recognize and leverage the differences between humans and robots. *No prior dance experience is required*; participants will engage at their own comfort level. Join us to explore the transformative potential of movement in reimagining our robotic futures! Supported by the Australian Government through the Australian Research Council (FT190100567).**

Keywords—Human-Robot Experience (HRX), embodied prototyping, kinesthetic attunement, non-anthropomorphic robot design, social agency, Relational Body Mapping (RBM)

I. Introduction

Recent advances in generative AI open up new possibilities for social robots, promising more sophisticated human-robot interactions through enhanced communication, emotional intelligence, adaptive behaviors, and personalization [1]. However, these developments often focus on making robots more humanlike, effectively masking the "deep asymmetries" between humans and machines [2].

Mimicking human traits is a common strategy in human-robot interaction (HRI) based on an assumption that meaningful interactions depend on what interactors have in common [3]. The machine's otherness is seen as a limitation, leading to a consensus that it should be softened or concealed [3, 4, 5]. Furthermore, human-robot relationships are often modeled after human-human relationships [6, 7], promoting a conception of sociality that is "amenable to technological intervention" [8].

We argue that mimicry limits the potential of robots and the relationships we can have with them, and that embracing and creatively leveraging human-machine differences offers new opportunities for innovation. This tutorial introduces a non-anthropocentric approach, harnessing dance knowledge to promote *more-than-human relationships*; participants engage in embodied movement explorations and experiential scenario-making to reimagine how we can relate to machines (Fig. 1).

II. Motivation and Background

A. Human-Robot Experience (HRX)

A growing community within HRI emphasizes embodied knowledge and alternative modes of meaning-making; including Seibt et al.'s concept of "sociomorphing" [5], LaViers & Maguire's emphasis on kinesthetic attunement [9], Jochum & Derks' dance improvisation framework [10], and Sirkin & Ju's "embodied design improvisation" [11]. Experience-centered

design promotes embodied interaction focusing on empathic perspective-taking [12]. Gasteiger et al. [13] demonstrate benefits of stakeholder involvement in robot design, while Šabanović [10] highlights a lack of methods for early end-user involvement accommodating their imaginations.

HRX expands experience-centered design approaches by acknowledging networks of nonhuman actors and things that our social relationships are embedded in. It foregrounds dynamics and relational possibilities that emerge in the encounter [14, 12], rather than relying on imitation [15]. In HRX, human-robot relationships are dynamic experiences where both human and nonhuman participants enact meaning and social agency [4, 14]. The HRX Theatre tutorial expands traditional HRI paradigms to explore the social potential of nonanthropomorphic robots through embodied, participatory movement-based techniques.

B. Supporting Sustainable Human-Robot Relationships

The HRX approach seeks to reimagine human-robot relationships, offering practice-based, embodied strategies that address key challenges in sustainable HRI research:

1) Collaboration and Inclusivity: HRX offers a model for developing more inclusive approaches by promoting a relational ontology that repositions sociality as a shared enactment, rather than a predefined attribute. This tutorial is designed to encourage participants to experience and explore the following potentials: (a) **facilitate early involvement of diverse stakeholders** through immersive, embodied design experiences; (b) **probe into how social agency is enacted** rather than given as an attribute of humanlike appearance; (c) **explore a robot's unique relational affordances** by using Relational Body Mapping (RBM) to promote embodied empathy and diverse perspectives.

2) Socially Responsible Robotics: HRX provides opportunities to critically examine and expand notions of social responsibility in robotics by shifting the representational focus toward the performative potential of the encounter [10]. Our approach: (a) **counters gendered, humanlike representations** in robotics by exploring social meaning-making with machinelike forms; (b) **investigates alternative modes of sociality** without mimicking organic forms; (c) **enables participants to experience and navigate diverse relational dynamics**; (d) **challenges anthropocentric views** of social responsibility in human-robot interactions.

III. TUTORIAL OVERVIEW

We seek to build a community around key principles of HRX including the generative potential of movement dynamics, sociality as an enactment, and the integrative methodology of kinesthetic attunement for more-than-human approaches to the design of human-robot relationships. Our tutorial objectives are:

1. Introduce HRI researchers and related fields to the potential of movement dynamics for exploring and experiencing how social agency might be enacted in human-robot encounters.
2. Showcase immersive movement-based methods as an embodied prototyping approach that can inform

participatory strategies for designing social relationships with machinelike robots.
3. Establish an inclusive, more-than-human playground for embracing and creatively engaging with the differences between humans and machines.
4. Generate a deeper, embodied understanding of more-than-human relationships by attending to emergent, nuanced resonances between human and nonhuman embodiments.
5. Harness sensitivity to movement qualities and kinesthetic attunement to develop diverse human-robot scenarios.

To achieve the objectives, we will engage participants in (a) **gentle movement explorations** to expand bodily awareness; (b) **embodied encounters** with machinelike artifacts using RBM; and (c) **collaborative development and enactment** of diverse, inclusive human-robot scenarios through embodied role-play.

Our experience-centered, movement-driven process draws from creative robotics and dance knowledge [4, 14, 16], supporting participants in playful, embodied role-play to explore agency, affect, trust, and interdependency with robots (Fig. 1). At the heart of HRX is the RBM methodology, which uses wearable costumes to stand in for a robot's embodiment and choreographic strategies to prototype relationships in immersive, embodied ways [14]. Central to this approach is understanding movement as a dynamic, relational, and generative force capable of unfolding relational dynamics that are core to social communication [4, 9, 14].

This focus on movement dynamics and their generative potential shapes our approach to human-robot scenario-making. Our experiential process unfolds through distinct phases of transcorporeal attunement: *Experience, Emergence, Expansion*, and *Embedment*. Initially, participants explore movement possibilities through attunement. Rather than mimicking familiar patterns, they are invited to attend to differences-in-relation, focusing on what emerges in the encounter. From there, they expand these patterns and relationships by examining their social meanings and exploring potential connections to external goals. In the final phase, we explore how unfolding scenarios are situated within (imagined) environments and timelines that may also be expressed visually or sonically. This embodied attunement process aims to support the discovery of alternative pathways for human-robot interactions, challenging traditional approaches and transcending assumed norms.

Bridging our movement explorations with the scenario development, we will present a short more-than-human performance. The performance aims to demonstrate RBM's potential for harnessing kinesthetic knowledge and embodied perspective-taking. Extracted from our improvisational performance work, *Alloyed Bodies* [16], the performance features two dancers, two cube artifacts, and one cube robot and will be open to all conference attendees. In our research practice, performance-making serves as both a mode of inquiry and an embodied prototyping tool in our HRX approach, revealing connections between human and robot bodies we may not otherwise imagine [14, 16]. As part of the tutorial, it will serve as a platform for choreographic facilitator and dancer, Audrey

Rochette, to demonstrate RBM principles and to engage tutorial participants in transcorporeal meaning-making.

Fig. 1. Snapshots from participatory audience interactions with cube costumes and cube robot (bottom left), with dance artist Felix Palmerson (bottom right). Photos: Kris Mah, Sydney, 2022 (top) and Jade Ellis, Brisbane, 2024 (bottom).

Discussions, reflections, and the use of a novel 'more-than-human body-map' tool will capture participants' bodily sensations and more-than-human experiences, further deepening our exploration of human-robot relationships. By inviting participants to explore how we bodily resonate and make meaning with machinelike entities, the tutorial seeks to open human-robot interaction design to new modes of empathy and more-than-human communication.

A. Target Audience

This tutorial is designed for researchers, practitioners, and students from HRI, Embodied Cognition, Interaction Design, Somaesthetics, and related fields, interested in embodied prototyping, nonanthropomorphic robot design, and participatory design strategies for human-robot interaction.

B. Maximum number of participants

The maximum number of participants for this tutorial is 16.

C. Tutorial Schedule

TABLE I.   FULL-DAY SCHEDULE FOR THE TUTORIAL

Session	Activity
Morning 1 (9:00–10:30)	• Initial body map • Introduction to HRX Project & HRX Theater • Keynote: Prof. Kate Stevens, Western Sydney University
Morning 2 (11:00–12:30)	• Movement exploration & kinesthetic awareness • Introduction to RBM and cube costumes • Transitional body map
Afternoon 1 (13:30–15:00)	• Performance with Audrey Rochette, Kristina Mah, and the Cube Performer (robot): *Alloyed Bodies [MEL-2-2-1]*, soundscape by Adam Nash; • Demonstration & transcorporeal perspective-taking • Introduction to scenario development using RBM
Afternoon 2 (15:30–17:00)	• Speculative human–robot scenario development • Scenario enactments and discussion • Reflections, final body map and wrap-up

IV. SPEAKER'S BIOGRAPHY

Catherine (Kate) Stevens is a cognitive psychologist investigating psychological processes in creating, perceiving, and performing music and dance. A **Professor in Psychology and Director of Research and Engagement at the MARCS Institute for Brain, Behaviour and Development, Western Sydney University**, Kate conducts basic and applied research into learning, perception, creation, and cognition of complex, nonverbal sequences. Her work illuminates how dancers and choreographers externalize cognitive processes through movement. Her research projects investigate human-machine interaction by applying methods from experimental psychology (e.g. design/evaluation of auditory warnings; human-avatar and human-robot interaction). Kate has authored over 140 publications, including an e-book on creativity and cognition in contemporary dance.

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