

Escaping human experience: an entry into otherness through wearable technology

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Abstract

This paper presents an argument for observing non-human perspectives for the design of wearable technology through a form of speculative post-human transcendence. The paper proposes *Provocative Embodiment*, a more-than-human design approach that supports the wearer in imagining the inner experience of non-human entities by intentionally creating and embodying conflicts between human and non-human perceptions. Articulated as a theoretical framework for understanding non-human perceptions and experiences by combining non-anthropocentric theory and speculative design, an argument is presented for the possibility of humans observing non-human realities through this framework and an accompanied workshop of design activities. The paper concludes with a detailed explanation of the three principles of *Provocative Embodiment* providing concrete guidance on how designers may put them into practice. By contributing a new theoretical and practical framework that attempts to expand the boundaries of human perception beyond the traditional human-centred perspective, this research provides us with new lenses and tools for understanding and exploring the reality of the non-human entities that surround us.

Keywords

Wearable technology, Embodying technology, Body interfaces, Non-human experience, Human-technology interface, Human experience, Provocative embodiment

Introduction

In the evolving landscape of human-computer interaction, the burgeoning field of wearable technology offers an unprecedented opportunity to expand our perceptual boundaries; such as through concepts emerging from smart wearables and the Internet of Things. This paper introduces a concept of *Provocative Embodiment*, an innovative approach that leverages wearables to facilitate a speculative journey into the supposed experiences of non-human entities. This approach is not merely an exploration of technology as a functional augmentation of human capabilities but an invitation to question and transcend human-centric perspectives into more-than human avenues [1].

As digital technologies increasingly permeate our lives, they bring forth new modes of interaction, crafting a network where humans, objects, and technologies are

interlinked in a dynamic system. The prevailing dialogue within this system has been predominantly human-centric, focusing on human objectives and experiences, and often sidelining the non-human elements that are integral to the network [2]. However, recognising the presence of non-human entities and technologies in the network is not merely a human-related phenomenon. These non-human actors not only exist within the context of human experience, but also inhabit the field of their own reality.

The seminal work of Yi-Fu Tuan in "Space and Place: The Perspective of Experience" provides a foundational perspective, illustrating that 'Place' is a complex network of human and non-human experiences, that are inaccessible to each other but exist simultaneously [3]. The concept of 'Place' transcends the mere physicality of space, adopting a variety of perceptual dimensions that shape our collective understanding of the world in which we coexist with these entities. Here we argue that there is an imperative need to explore a more inclusive approach that transcends human-centric limitations and embraces a more than human worldview to enrich our understanding of the diverse modes of perception and experience within our shared 'Place'.

This paper proposes this concept of *Provocative Embodiment* as a means to expand upon human-centred perspectives offering an alternative vantage point for design. This concept is founded on a theoretical framework that synthesises Object-Oriented Ontology [4], Alien Phenomenology [2], and Speculative Design [5]. The framework is designed to facilitate a deeper understanding of 'Place' by engaging with wearable technologies as mediators that enable us to envision and experience the reality of the non-human. Our central aim is to provide a scaffold upon which designers can construct experiences that enable wearers to momentarily transcend human-centric experience and approach the perceptual "Otherness" of non-human entities. Through this work, we endeavour to enrich the collective narrative of "Place" by weaving in the threads of non-human perspectives and experiences.

Our contribution lies in bridging the gap between human and non-human perspectives, challenging the traditional human-centred approach to wearable technology design. We introduce a new design methodology that incorporates speculative non-human experiences into the wearable technology paradigm, proposing a shift towards a more inclusive design process that considers the intricacies of non-human entities. This paper critically examines the potential of

wearables to explore the "Otherness Space" where human wearers can engage with and comprehend non-human experiences, thereby challenging established norms of interaction and perception. Through this approach, we strive to re-define the concept of embodiment in the digital age, extending it to a broader context that encompasses both human and non-human experiences. Our work is a call to action for designers, technologists and philosophers to re-evaluate the anthropocentric biases inherent in current design practices and to embrace a new, more inclusive paradigm that enriches our understanding of the world we co-habit.

A debate: understanding non-human experience?

Opinions are divided on whether humans can attempt to understand non-human experience. On the one hand, some argue that the human perspective is always human-centric and that it is impossible to attempt to understand the nature of non-human experience [6]. The environmental world of a non-human organism can only be perceived and interpreted through a limited range of human experiences [7]. On the other hand, scholars and designers are constantly exploring, trying to revisit the reality of non-human objects through the human body. Charles Foster and Thomas Thwaites highlight the transformative power of immersion in non-human experiences. Through their radical experiments, they delve into the sensory, experiential world of animals, challenging the assumption that human perception is the only valid lens through which to understand the world [8, 9]. Furthermore, through the use of props or wearables, designers disrupt or interfere with the human experience by introducing non-human perspectives, perceptions or capabilities [10-12]. As a result, the body temporarily embodies or engages with non-human experience through these designs, blurring the boundaries between human and non-human reality.

Otherness Space

Based on the above research, the argument raised is that access to non-human reality is not an impossibility. This paper proposes a probable way of approaching the non-human realities through the construction of an *Otherness Space* (Figure 1). The *Otherness Space* (Figure 1c) describes the perceptual space of speculative otherness that lies between "human perceptual space" (Figure 1a) and "non-human perceptual space" (Figure 1b). These spaces coexist in what is construed as "Place" (Fig. 1d), a locus with deeper meaning associations exist such as the idea of a *home* as opposed to a *house*. This *Otherness Space* is like a heterotopia in that it is a parallel space that exists outside of human perception and cognition in the "Place" [13]. Here we can temporarily escape our human roles and rules of behaviour to try to understand and experience the possibilities in which non-human entities exist and interact as otherness. Otherness can be seen here as the representation of non-human beings such as animals, plants, objects or technologies. *Otherness Space* challenges dominant human-centred norms and conventions to achieve a fuller and richer understanding of "Place". Entering into *Otherness Space* describes the process of moving

from "Human Perceptual Space" into *Otherness Space* with the aim of getting infinitely closer to "Non-Human Perceptual Space".

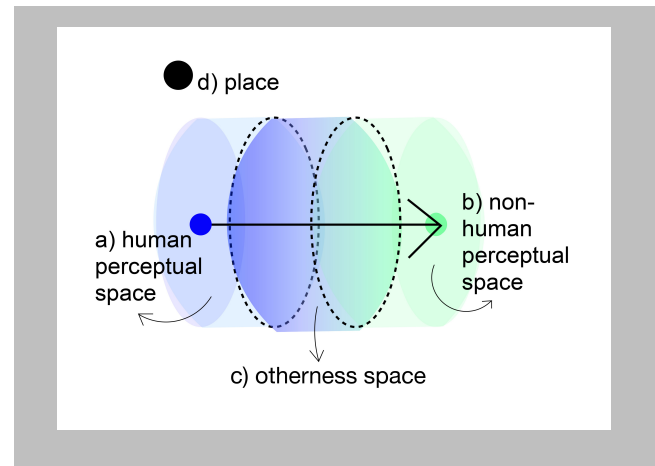


Figure 1. Otherness Space. a) human perceptual space, b) non-human perceptual space, c) otherness space, d) place.

Next, we will elaborate on the theoretical framework, exploring how object-oriented ontology, alien phenomenology, and speculative design combine to guide this research. This theoretical framework helps us to understand and illustrate non-human experiences, while at the same time helping us to transcend human perceptual boundaries and access the *Otherness Space*.

Theoretical Framework

Drawing on Object-Oriented Ontology (OOO), Ian Bogost's alien phenomenology, and speculative design, this research constructs a new framework for design thinking that allows us to explore and understand ways of being that are beyond direct human perception [2, 4, 5] (Figure 2). This theoretical framework helps us to understand how non-human experiences influence and extend our understanding and experience of "Place". Furthermore, the framework provides guidance on how to construct *Otherness Space*, including how to embody the inner experiences of non-human entities in the design process and bring them to life, so that *Otherness Space* becomes an experienceable reality through the artefacts created.

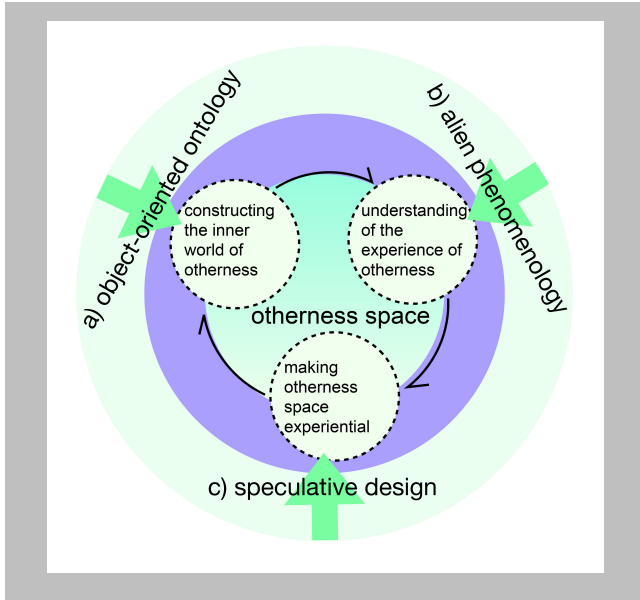


Figure 2. Theoretical Framework. a) object-oriented ontology, b) alien phenomenology, c) speculative design.

Object-Oriented Ontology

By emphasising the equal reality of all entities, both human and non-human, OOO [4] (Figure 2a) provides three important perspectives for understanding *Otherness Space*. First, human perception and experience of “Place” is limited, and our experience is only one way of making sense of the world. OOO emphasises that, as an entity, humans are not privileged over any other entity [4]. This perspective reveals that human perception is influenced by multiple factors such as physiological, cognitive, cultural and linguistic factors, and therefore our experience can only be seen as one observation among many entities, rather than an absolute description of the world [4]. Second, the otherness has its own unique way of being and perceiving, which allows it to participate in the “Place” in a completely different way from humans. OOO asserts that all entities - be they human beings, other creatures, objects, concepts, etc. - have their own intrinsic modes of being and perception, and that these entities are only affected by their own definitions or understandings, not those of other entities [4]. Although the otherness may be experienced in ways that are completely different from human experience, and even beyond our understanding, OOO asserts that these experiences are all valid, and that they all shape and affect the “Place” in their own ways. Last, OOO further emphasises that we cannot fully understand or grasp the totality of an object’s existence and experience [4]. No matter how deeply we interact with and investigate an object, there will always be parts of it that are hidden or incomprehensible to us, which fits with the concept of withdrawal in OOO emphasizes highlighting the inherent inaccessibility of objects from direct knowledge or perception [4]. This means that there are aspects of objects that have

properties that we cannot fully understand thus are not fully perceived or understood by humans.

Alien phenomenology

Alien phenomenology (Figure 2b) recognises that the experience of objects is ultimately unfathomable and inaccessible from the outside [2]. Just as we cannot fully understand what it is like to be a bat or a rock. However, Alien Phenomenology seeks to creatively describe the possible experiences of becoming these objects on the basis of an object-oriented ontology, moving away from ontological claims about objects to phenomenological speculations about object consciousness or lived reality [2]. This provides a theoretical basis for us to imagine and construct the subjective experience and inner perception of otherness in the *Otherness Space*. According to alien phenomenology, we can concretise the imagination of otherness alien perceptions, realities and experiences in the “Place” through “carpentry of things” in several ways [2]. First, consider otherness’s unique mode of perception that represents their experience of “Place” from a first-person, embodied perspective. Imagine, for example, how being a bat using echolocation gives us a very different sense of spatial volume and shape. Secondly, constructing physical objects or artefacts as a way of imaginatively probing and evoking the subjective experience of otherness. Finally, attempting to understand how non-human entities actively engage with and shape the “Place” in which they are located according to their own capacities, needs, and relationships with other entities. This helps us to portray the otherness not just as a passive presence, but as a participant with the capacity to actively shape the “Place”.

Speculative design

If OOO identifies the possibility that *Otherness Space* exists, Alien Phenomenology seeks to reveal how otherness might perceive and experience “Place”. Speculative design (Figure 2b) further provides realistic tools that enable us to translate these theoretical concepts into actionable practices that invite us into the *Otherness Space* through artefacts. Although this access may be localised or temporary, it provides three novel ways for humans to approach and probe the reality of otherness.

Speculation on Non-human Embodiment First, speculative design stimulates our thinking and imagination about future possibilities by creating fictional scenarios and narratives. This approach can help designers move beyond the limits of human-centred thinking, thereby broadening our imagination of how to experience “Place” to construct other understandings of “Place”. This involves developing a narrative that is rich in detail and open to access from the perspective and intention of the otherness. More specifically, we can build an immersive scenario and narrative of the otherness experience, based on the unique ways in which otherness communicate with each other, their modes of interaction with the “Place”, and the inherent purpose and proactivity of the otherness.

Using the Human Body as a Metaphor An important strategy in speculative design is the use of metaphor as a tool for exploring unconventional perspectives through imaginative association [5]. Metaphor here acts as a portal between the reality and *Otherness Space*, transforming non-human alternative realities into a form the human body can inhabit. We see the body as a metaphor that can be shaped and transformed into an effective tool for understanding otherness. This means that we see the human body as an object that can be transformed, redefined and recreated. To develop this further, we place the human body in scenarios and imagined narratives in *Otherness Space*, exploring the new purposes and meanings given to the body. Cyborganic, for example, is a wearable device that reconfigures the wearer's body so that they can temporarily sense their environment like an insect [10].

Props for Interventions: wearable provotyping In this research, the future tools of speculative design are seen as physical manifestations of hypothetical scenarios and alternative otherness space, providing a tangible form and physical evidence for our imagination [5]. Drawing on the strategies of speculative design, we consider the combination of these props and the body as a way of exploring Otherness perception through the development and creation of a series of interventionist props, wearable provotyping. Provotype relies on provocation as a tool for revealing problems and catalysing new thinking, it allows designers to embody their ideas and concepts in tangible forms that can be experienced and interacted with [14]. The aim of wearable provotypes is to get as close as possible to the reality and experience of non-humans in the "Place", expanding the scope of our perceptions by intervening or replacing the natural perceptual capabilities of humans.

In the next section we explore a new design approach - *Provocative Embodiment* - based on the theoretical framework discussed earlier. This design approach further elaborates on how to transcend the human experience through wearable provotypes as a tool to enter the *Otherness Space*. Our discussion will focus on three core design principles: 1. discarding the experience of being human, 2. entering the first-person perspective of non-humans, and 3. Provoking the embodiment of otherness. These three design principles work together to achieve the unifying goal: Entering into *Otherness Space*.

Provocative Embodiment

Discarding the experience of being human

The first design principle suggests a temporary departure from anthropocentric perspectives setting aside preconceptions and biases associated with human embodiment and avoiding anthropocentric assumptions about the privilege or superiority of human embodiment and experience. By reconfiguring the human bodily experience, the body is conceptualised as an ontologically equal object-oriented "unit" that configures itself and makes sense of the world through its own internal logic [2]. The body is viewed as an

alternative metaphorical object that is easily alienated and disconnected from ordinary human experience. It forces us to step back from familiar human experiences, challenges our inherent understandings and expectations of human experience, and stimulates our imagination and speculation about experiences of otherness. For example, the "Who Wants to be a Self-Driving Car?" project and the "Smart Rituals" project disrupt typical human experiences and perceptions, trying to provoke a discarding of human experience by having participants simulate unfamiliar embodiments and sensoriums. Wearers may be equipped with headsets or VR devices that convert environmental data into a human-perceivable form that mimics the sensory inputs of the car. This may involve visual, auditory, or haptic feedback based on data typically processed by the self-driving car, such as distance to nearby objects, speed, or navigation commands [11]. In addition, everyday human activities may be altered through the use of technology in ways that challenge the traditional ways in which we perform these tasks. Wearables may deviate from the normal human experience by introducing new steps, actions, or providing unusual feedback during these activities [12].

In this process, wearable provotypes can help to reconfigure our experience of the body. They can be used to create alternative sensory experiences that disrupt or limit the human senses, thus facilitating the discarding of elements of the human experience. However, attempting to discard the human experience does not mean denying our humanity. Instead, we acknowledge that our human experience is only one of many possible perspectives, recognising that there are other forms of consciousness, embodiment and subjective experience besides ourselves. This design principle is to alienate our everyday human experience and to make room for the next step of speculating and understanding the reality of the experience of non-human entities.

Entering the first-person perspective of otherness

The Alien Phenomenology perspective emphasises that our experiences and perceptions are intimately linked to our physical manifestations and biological identities [2]. In other words, our perceptual experiences and subjectivity are shaped by the characteristics and constraints of our physical existence. Therefore, attempts to reconfigure the human body not only involve physical changes to the body, but also require a metaphysical shift in our subjectivity and experience of it [2]. This means that wearable provotypes, while changing the experience of our bodies, also require a change in the way we think, the way we perceive ourselves and the way we understand and perceive the world.

This unfolds our discussion of the second principle, an attempt to understand and imagine non-human modes of perception from the first-person perspective of otherness. This involves reasoning and speculating about the material properties of otherness and how they create alternative modes of perception, subjectivity and agency. For example, in Thing Ethnography, the first-person perspective of a kettle reveals the object's experience within its ecosystem, which would likely include how the kettle is used within the household,

its interactions with other objects and spaces, and possibly its patterns of movement [15]. It is worth noting that this speculation should avoid literal anthropomorphism and focus more on an alienated experience derived from the actual properties and capabilities of otherness. Anthropomorphism is avoided because we want to understand and respect the uniqueness of non-human entities as much as possible, rather than simply projecting human experiences and perspectives onto them [4]. This requires designers to speculatively imagine, based on the attributes of otherness, the ways in which alien beings experience and perceive things that are quite different from the human model.

Developing engaging narratives and scenarios behind the wearable prototypes can give us insight into the experiences of non-human characters from a first-person perspective. For example, Wen-Wei Chang et al. attempt to explore the world from the perspective of a scooter allows us to try to consider what it would be like for us to try to understand the form of experience and perception that exists as an inanimate, non-sentient entity [16]. A scooter may “experience” the world through its interaction with the road, the weight of its rider, the weather conditions and its maintenance history. It may “experience” time not as a continuous flow, but as discrete moments of use and inactivity.

Provoking the embodiment of otherness

The third design principle suggests that we deliberately create and embody contradictions and conflicts between human and non-human perception, allowing the wearer to experience this difference directly through their body. *Provocative Embodiment* is particularly focused on embodying provocations around perception, using the human body to reveal cognitive conflicts that can provoke perceptual shifts towards otherness. By forcing themselves to adapt to this non-human way of perceiving, the wearer may feel disconnected from their existing experience, their traditional way of perceiving disrupted.

Specifically, we can use wearable prototypes to enable conflicting experiences by embodying incongruous alternative sensory functions. On the one hand, this can come from very different physiological structures or physical characteristics that make the current human experience unfamiliar. For example, the Appendix is a wearable tail that is connected to the Helsinki’s transport system and the Baltic Sea, acting separately from the body in response to changes in the external world. The Appendix implant makes the familiar human body unfamiliar by creating conflicting sensations between a person’s internal bodily senses and the external data reflected in the movements of the attached robotic tail [17]. In addition, incongruities and heterogeneous sensory experiences can also arise from the different ways in which otherness interacts with each other, blurring the original human experience and making it increasingly invisible. Smart Rituals, for example, is a series of smart garments embedded with various sensors and IoT technologies that allow the wearer to collect data in the city and send it to the internet by performing certain ritualised body

movements [12]. The wearer has to perform the action through the way the sensors interact with its surroundings.

Overall, *Provocative Embodiment* allow us to reconceptualise what we have taken for granted from a new non-human perspective. While the experience may be disturbing and even disruptive, it may also provoke a new understanding of our own perceptions of ourselves in relation to the non-humans in the “Place”.

Future research

In future research, the three design strategies proposed in this paper will be further developed and tested through practical design activities. This research is guided by the theoretical framework presented in this paper and is divided into three phases to investigate the concept of *Provocative Embodiment*, which include the construction of design strategies, the implementation of design practices and the analysis of design outcomes.

Conclusion

In summary, this paper explores the concept of understanding non-human experience in the context of “Place”. It emphasises the limitations of human perception and argues for a more inclusive approach that takes into account the experiences of different entities. And it asks whether there are humans capable of abandoning their human experience and approaching the worlds and realities of non-human entities. The literature reviews contrasting perspectives, with some scholars emphasising the impossibility of humans understanding non-human experiences, while others have conducted experiments and designs that challenge this assumption. We also propose a new design strategy that seeks to imagine perceived experiences inside non-human entities through the design of wearable technologies that reveal unfamiliar perspectives on human understanding of the outside world. We call this design strategy *Provocative Embodiment*. The design strategy offers the human body the opportunity to temporarily inhabit or engage with non-human elements and disrupt the original human experience. While acknowledging the inherent limitations of human physiology, these alien embodiments expand our understanding and perception of non-human perspectives and encourage us to challenge and move beyond human-centred perspectives.

As the exploration of *Provocative Embodiment* through the Research through Design (RtD) process is slated for the subsequent phase of this study, this article primarily focuses on clarifying the theoretical underpinnings and articulating the design principles. Specific wearable forms and functions that encompass embodiment-design will be investigated in the forthcoming stage. Furthermore, the nuances of this study’s limitations are expected to become more apparent throughout the course of practical exploration. Two foreseeable limitations can be highlighted at this point. First, the human-centred view is inherently fluid, as human needs and objectives are not static. Consequently, our endeavours to

depart from the human perceptual space may inadvertently expand its scope rather than facilitate entry into the Otherness Space; a common counter argument for object-oriented philosophies. However, from a constructive standpoint, the act of challenging and altering the scope of human-centred experience can itself be seen as a step towards changing the initial point of human-centred views. Second, there is variance in perception between individuals, making the human perceptual space inconsistent across different people. This variance affects how individuals might experience and engage with the Otherness Space. The design process should therefore aim to mitigate or account for these individual differences to foster a more inclusive and representative exploration of non-human experiences.

In short, this article explores avenues for attempting to understand non-human experiences, which has interesting implications for our understanding of the world and our relationships with non-human entities. By proposing a design approach of *Provocative Embodiment*, it challenges the established human-centred view of the world and encourages a more inclusive, holistic perspective. The notion of interacting with non-human elements through props or wearables offers exciting possibilities for expanding the boundaries of our perceptions and fostering deeper levels of diverse experiences of other entities. The aim of this paper is not to advocate for the complete elimination of anthropocentric influences, but rather to provide a possible alien perspective for re-examining and experiencing the world. We hope to allow objects and technologies to “flourish” on their own terms, leading to more diverse connections between humans, objects and technologies.

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