



# Intercorporeal Design: Dissolving Self-Other Dualism in Interaction Design

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## Abstract

Historically, technology and interaction design evolved from an information-processing paradigm of the human mind rooted in mind-body dualism. Technologies for social interaction followed a sender-receiver model, mediating the decoding of messages between sender and receiver. Dissolving mind-body dualism, Embodied Interaction and Somatic Turn in HCI offered a paradigmatic shift, prioritizing the role of our acting and sensing bodies in the interaction. We extend this move by proposing Intercorporeal Design. Intercorporeal Design dissolves not only mind-body dualism but also self-other dualism, guiding us to design holistically for the dynamic co-experienced interaction encompassing multiple bodies and their shared environment. We suggest three provisional design pillars that could help realize intercorporeal design: closing the action-perception loop, designing for the felt experience, and considering human bodies as a design material. Finally, we review selected examples of intercorporeal designs to illustrate how this design stance can be embodied in interaction design artifacts. Intercorporeal design is an evolving design stance, which could allow us to dissolve self-other boundary and invite harmonious experiences of interbodily resonance.

## CCS Concepts

• **Human-centered computing** → **HCI theory, concepts and models; Interaction design theory, concepts and paradigms; Collaborative and social computing theory, concepts and paradigms.**

## Keywords

embodied interaction, soma design, intercorporeality

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## 1 Introduction

Human-Computer Interaction (HCI) field co-evolves along with other domains, such as Cognitive Science. The early years of HCI unfolded during the dominance of cognitivism or information-processing perspective in Cognitive Science. The development of computers inspired the view of the human mind as a computer-like software running on the hardware of the brain, with inputs coming through our sensory system, stored and processed in the brain as symbolic representations, and then outputs actuated through our motor system. The development of computers presents a promise for detailing the structure and functioning of the human mind by creating computational models that could simulate mental processes [1] [55, Ch.3]. In turn, the field of cognitive science and the information-processing model provided a design framework for much of the development in HCI [16]. Designs were often rooted in this model, considering the processing of internal representations and supporting the input and output of signals in an exchange between the mind and computer in a consecutive manner. Ultimately, the co-evolution of both fields has been solidifying the mind-body dualism underlying this representational perspective.

Pushing against mind-body dualism, and leveraging the phenomenological perspective of Husserl, Heidegger, and Merleau-Ponty, in both HCI and Cognitive Science, there has been a turn towards an embodiment perspective. Francesco Varela's seminal book "The Embodied Mind" [55] brought the phenomenological and Buddhist first-person perspective on the human mind and experience into the field of Cognitive Science. This shifted the understanding of cognition from a computation processing manipulating representations of the world stored in our brain to the enactive perspective that sees cognition as a living action-perception loop enacted by our bodies. In HCI, this shift could be attributed to Paul Dourish's book "Where the Action Is" [7] that brought a phenomenological perspective to the understanding of technology (although he was not the first, his book was arguably the most influential). This perspective considers the physicality of technology and users themselves that engage in a direct material interaction situated in this physical world. Further Svanæs [49] built on Dourish's proposal bringing a stronger perspective from Merleau-Ponty's phenomenology to discuss the neglected aspect of the corporeal body in Dourish's discussion. Another perspective on the body was offered by Shusterman [44] in his proposal for the discipline of somaesthetics where he presents a broad overview of philosophical perspectives on the body and aesthetics and argues for the importance of practising the aesthetic experience of the body, the appreciation of indispensable bodily feelings. This movement was further adopted in HCI, contributing

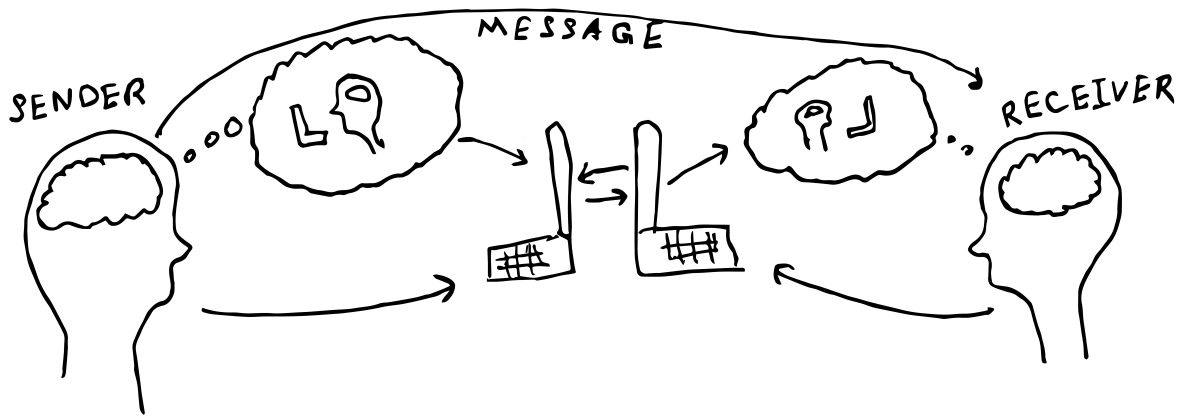
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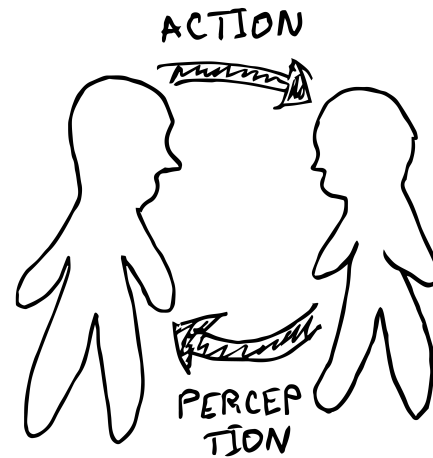


**Figure 1: Sender-Receiver Communication Model underlying traditional interaction design for social communication**

to a somatic turn [32], for instance, exemplified in somaesthetic appreciation or soma-design introduced by Schiphorst [42] and further developed and popularized by Höök et al. [20].

When considering social interaction, the mind-body dualism perspective creates two dichotomies: of mind and body and of self and other. Now, we have two separate minds that interface with technology which mediates the interaction between these two minds. Traditionally, within a dualism perspective, social psychology explains social interaction through a Theory of Mind [1]. Theory of Mind includes a Theory Theory and a Simulation Theory, which explain how to achieve an understanding of another person we would need to develop a “theory” about their behaviour. This theory would allow us to reason about what they might be thinking or feeling. Or, according to Simulation Theory, we run a simulation of other’s perspective by imagining ourselves in their shoes. This theory again sees our minds as computational processors that manipulate internal representations of the world, now complicated by having to make an internal representation of another processor—the other’s mind. In accordance with this perspective, technology needs to facilitate the exchange of information between the minds in a consecutive manner. Accordingly, much of the technology has been designed in accordance with the sender-receiver communication model (e.g. Schirmer et al. [43]). Within the sender-receiver model, technology is mediating a “message” being sent between users, that needs to be encoded and decoded on each end in a sequential order (Figure 1). For instance, much of mediated touch technology has been designed within this sender-receiver paradigm, where a touch signal is sent as a message between two users. Huisman makes this argument in his survey of the social touch technology [21], arguing that the sender-receiver model should be replaced by an interaction theory perspective [22], which ultimately is an enactive view of social interaction.

Taking the enactive perspective can help us to dissolve the mind-body dualism, as we will no longer consider minds as computation machines processing internal representation, but instead will consider the interaction as a dynamic action-perception loop (Figure 2). However, the enactive perspective by itself still retains the self-other distinction, as one of the agents is ultimately an object of the action and perception of the other user, who is the subject. Within



**Figure 2: Embodied Interaction perspective on social interaction. Embodied Interaction considers the action perception loop between the material bodies. The focus is on the interaction, not the felt bodily experience**

this paradigm, technology would be designed with the focus on the embodied interaction, but from each individual’s user’s perspective, rather than considering the whole system holistically. In this paper, we propose to extend this embodied position further, by dissolving the self-other dualism through the lens of intercorporeality (Figure 3).

## 2 Related Work

### 2.1 Intercorporeality

The notion of intercorporeality was proposed by a French phenomenologist Maurice Merleau-Ponty [34, 35]. Merleau-Ponty regards our interaction with others and the world as a dynamic entanglement between our bodies. Intercorporeality describes interaction as spatially situated in a shared environment and explains how bodily expressions of emotions intertwine in an action-perception

loop between embodied subjects to create what is called *interactivity*, giving rise to mutual understanding and connection [11]. Merleau-Ponty posits that we perceive others' emotions and intentions directly in the expressions of their bodies and as a feeling and intention felt within our bodies. For instance, when we perceive the anger of another person, we typically don't need to imagine their perspective and reason about their thought process. The social interaction is enacted by *compresent* bodies sharing an environment. This offers an opposing perspective on social interaction than the cognitivist's Theory of Mind [1], which assumes that we represent others' emotions, intentions and thoughts as a theory or a simulation of another's mind constructed in "our head". Here, instead, the social interaction is described as immediate and dynamic, directly between our minded bodies [11, 51]. For example, to perceive anger in another person, we don't need to simulate a scenario of ourselves being in their shoes to infer which emotions we would experience in that scenario. Instead, we immediately feel the anger expressed in their posture, tensing of the muscles, and in our own very viscerally felt sensation of tensing up, discomfort, gasping air, and preparedness to fight, flee, or maybe console. Merleau-Ponty says: "...the other person's intention inhabited my body, or as if my intention inhabited his body... I understand the other person through my body" [35, p.190-191].

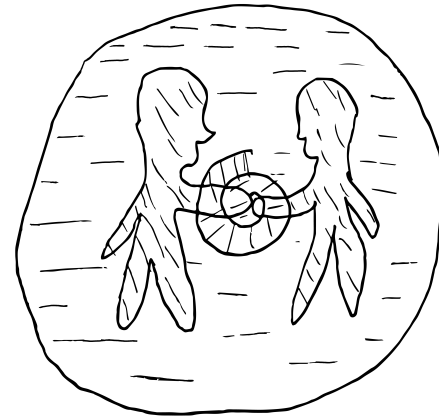
Merleau-Ponty's articulation of the experience of touch and notion of dual perception are helpful for understanding intercorporeality. Merleau-Ponty describes how one hand touching the other merges in a singular sensation of touch, where the subject-object distinction of touching and the touched gets blurred. This phenomenon extrapolates to the interpersonal interactions which are a co-experience of embodied subjects, where "*the single body's agency is subsumed by the production of a We*" [36, p. xvi]. Merleau-Ponty describes how this unified experience of his hand touching his other hand, then by extension allows him to understand the existence of another person through co-perception:

*If the existence of another is evident to me by squeezing his hand, it is because it takes the place of ... [my] left hand, because my body incorporates itself into that of the other [ ... ] he and I are like the organs of a single intercorporeality."*[34].

This notion explains intercorporeality as something emerging as bodies are coming together and mutually incorporating. Fush, summarizing Merleau-Ponty, refers to intercorporeality as a *bodily resonance*, that emerges in-between, but is experienced within each body, laying at the core of intersubjectivity [11]. This way, intercorporeality dissolves the boundary between self and other in their felt co-experience.

## 2.2 Intercorporeality in HCI

Intercorporeality applied to technologically mediated interactions offers a useful perspective for considering how these interactions enact our natural bodily processes situated within a mediated environment. Dolezal [6] applied intercorporeality as a lens to understand re-embodiment and inhabiting distant bodies or a distant environment during teleoperation and telepresence. Kim [29] applied intercorporeality to the understanding of '*digital-beings*' on



**Figure 3: Intercorporeal Design perspective on designing for social interaction. Intercorporeal Design holistically considers the feeling bodies, the interaction between them, and the environment they are situated in**

the Internet across time, calling for the need for integration of tangible and wearable technologies. This perspective, while stressing the value of richer sensory engagement through tangibles, still offers a way to consider intercorporeality as a process across digital bodies. Ekdahl and Ravn [9] described how intercorporeality can be enacted across seemingly disembodied web-based interactions like e-sports through a reciprocal bodily intentionality<sup>1</sup> among collaborating players in virtual worlds. Both Dolezal [6] and Kim [29] adapt and extend the notion of intercorporeality to the technological domains, offering a new kind of *intercorporeality* as a phenomenon distinct from but grounded in the intercorporeality described by Merleau-Ponty. For instance, a teleoperated body is embodied phenomenologically differently than our actual body, yet its engagement with the environment is enacted through similar action-perception processes. Similarly, our proposal of *Intercorporeal Design* is rooted in the original notion of intercorporeality, but it takes a new, more specified meaning in the context of design for dissolving self-other boundaries.

Beyond the lens for the analysis of our body-based engagement with technologies, *Intercorporeal Design* offers a framework for design. In this regard, this paper extends the exploration of intercorporeality in design by building on the strong concept of intercorporeal biofeedback for movement learning [52], and development of intercorporeal understanding with technology, e.g. drones, through embodied engagement practice [10, 30].

## 2.3 Social Interaction Design

HCI field has been exploring how to design for social interactions. While the dominant approach traditionally stems from information-processing view of the mind and consequently a sender-receiver model of communication [43], there have been several notable proposals influenced by phenomenological approaches. These proposals shift how technology for social interaction is developed from

<sup>1</sup>Note, here the term 'intentionality' is used in its phenomenological sense of 'aboutness' of an experience'

an individual to a more integrated perspective. The phenomenological notion of *intersubjectivity* has been relevant in the CSCW (Computer-Supported Cooperative Work) community. While the early discussions of intersubjectivity were focused on understanding of others' minds within a single mind, more recent works shifted to a more social view, exploring group cognition that forms between collaborating people [46]. In a different subcommunity, postphenomenologists highlight how there is no clear separation between subject and object in an experience, and rather they are two sides of one coin [24, 26]. Applying this to an interpersonal interaction helps us see how two interacting partners have to be considered in unison, rather than one being an object of other's subjects' perception.

Most similarly to Intercorporeal Design, Hummels and van Dijk [23, 54] ground their approach in situated and distributed cognition that acknowledges an integral role of context in any cognitive processes, where sense-making is distributed across the objects and people involved in an activity. More importantly, Hummels and van Dijk propose to adopt the framework of participatory sense-making in design. While they don't discuss intercorporeality, the theory of participatory sense-making is highly relevant. *Participatory sense-making* developed by Hanna De Jaegher [3] extending Varela's work [55], argues for a holistic view of social interaction as situated actors in a shared sense-making process. Participatory sense-making outlines *social coupling* formed between interacting subjects akin to a coupling a musician forms with their instrument. Referring to De Jaegher's theory, Hummels and van Dijk propose to insert the design in-between the people in their shared environment [23] and craft scaffolds to help sustain the coupling [54]. Similarly to how somatic turn extended the embodied interaction by bringing in the dimension of the feeling body, the Intercorporeal Design specifies the felt aspects of the coupling within the participatory sense-making process and the bodily resonance between them.

### 3 Proposal of Intercorporeal Design

We propose a design stance of an Intercorporeal Design. This stance offers an analogous move to the one achieved through Dourish's Embodied Interaction [7], which evolved our understanding of interaction beyond mind-body dualism. With Intercorporeal Design, we can dissolve not only the mind-body dualism but also the self-other dualism. This way we will design not for the individual mind or body but for a dynamic co-experience of all the interactors within a shared environment. Intercorporeal Design offers an analytical lens through which we can unpack mediated interactions as understood from the position of intercorporeality. It also offers a pragmatic design approach outlining how Intercorporeal Design can be enacted in design artifacts. Intercorporeal Design is in its developing stage, where its scope and articulations are being refined as we see it being applied across diverse projects. Here we outline a provisional set of pillars of an Intercorporeal Design: closing the action-perception loop, designing for the felt experience, and considering human bodies as design material. While we consider these pillars conducive for realization of intercorporeal design, they are not sufficient. Successful Intercorporeal Design has to achieve the coming together of all the elements into a single unified experience, dissolving self-other dualism.

#### 3.1 Closing the action-perception

Intercorporeality describes the interaction as inescapably reciprocal. Social interaction happens in-between bodies coming together in a dynamic interplay. This way, considering only one side of the interaction by itself, without exploring its coming together with the other side, becomes meaningless. The metaphor of touch again is useful here. Touch only happens when one hand comes in-contact with the other, and we can't consider touch from just the perspective of one hand touching or the other hand being touched. Touch happens only in between and within the two surfaces, merging together in the unified experience of touch. Therefore, when designing through the lens of intercorporeality, we need to design for the whole system and for the coming together of all elements instead of the individual perspectives of the actor or perceiver in the action-perception loop. For example, this allows us to reconsider how the dominant majority of mediated touch systems are designed. Most touch-over-distance technology is following the sender-receiver model of the interaction. Thus, such systems are designed to send tactile 'messages' over a network representing hugs, touches, or kisses, that then can be received on the other end [22]. In this standard implementation, the action-perception loop is disjoint, as the messages are being sent and received in a subsequent order rather than being simultaneously co-experienced. Some systems even only allow for one-directional message, e.g. from a sender glove to a receiver glove in Flex-and-Feel [45].

Through an intercorporeal lens, we will design for the whole system and emerging co-experience. We would aim to support a dynamic interplay between all the elements and their coming together in a harmonious resonance. This goes beyond ensuring the responsiveness of the system, such as the button reacting to the user touching it. To support intercorporeality, it's key to consider that action and perception happen simultaneously in a single unified experience experienced within both bodies. As when one hand touching the other, each is inescapably simultaneously touching and being touched. This shifts the design focus from supporting a message-exchange to holding spaces for co-experience to emerge.

#### 3.2 Designing for the felt experience

As discussed above, intercorporeality stresses how we perceive others through a *feeling* in our bodies. Intercorporeality is fundamentally centred in the sensuous experience at the core of our experience of this world and each other. Intercorporeality is experienced pre-reflexively below the conscious level of our awareness, but it consists of a felt visceral dynamic experience. Therefore, Intercorporeal Design should prioritize the felt experience over quantifiable metrics as a core value in the design. The somatic turn in HCI [32] exemplified, for instance, in the growing adoption of the soma design method, centres the design process in the felt experience of designers. Such designs aim to cultivate a sensuous experience in the users of the created artifacts, such as the support of their attention to their body in a Feldenkrais practice [48], or help them overcome their fear of water by noticing the nuance of their felt experience [37]. Intercorporeal Design adds a social dimension to soma-design inviting us to consider how we can design for the felt presence and engagement of another person as distributed across multiple bodies. Taking a somatic approach such



Figure 4: Corsetto performance [27]

as soma design may be fruitful for exploring the felt qualities of intercorporeality.

### 3.3 Human bodies as design material

Following the somatic [32] and the material [8] turns in HCI, we propose to consider the intersection of these two approaches and treat human bodies and the somatic experiences embedded in it as the design material in itself. Intercorporeality is realized through the interplay and the resonance between our bodies, and it is experienced as a feeling within our bodies. This way, if we design for intercorporeality, we need to design with the bodies. The focus should be shifted from the design of technology to the design of the interbodily interaction and sensuous experience emerging in it, as can be augmented through technology.

We propose regarding the body as more than the medium through which we experience technology, but as a material that can itself be central to the design. There is a strong history within body-centric design approaches to refer to the body as a resource to draw design insights from [18, 20, 50]. Treating the body as the design material, involves not only rooting design process in bodily sensations as design knowledge, but also using bodies as central actuators of interaction [40]. This way we merge the 1st and 3rd person perspective on the body, by both actuating bodies, as for instance considered in Mueller et al. [39] view on body as Play, but also drawing from the internal bodily experiences typical for soma-design [20]. For instance, this can be realized by augmenting interpersonal interaction by stimulating touch between users as in Touchomatic [33], Body RemiXer [5], or Music Embrace [38], where participants' own bodies become the primary interface as they are enticed to touch other participants' bodies to activate the interaction.

### 3.4 Examples of intercorporeal design

Redstrom discusses how a research program comprises of prototypical and atypical designs that embody the principles of such program [41]. To this end, we now review a selection of designed mediated experiences that illustrate the provisionary pillars of Intercorporeal Design. We have selected two examples of haptic interaction designs, and two virtual reality experiences to exemplify how intercorporeal design can be realized through a range of technologies, from haptic to purely audio-visual.

The first example is a shape-changing corset – **Corsetto** [27] (Figure 4), which was created as a haptic component of a modern opera performance. Corsetto is constituted of omni fibres [28], which are pneumatic fibres that allow for a nuanced change in



Figure 5: Participant interacting with a performer in Mediated Body [17]. Still from a video by Mads Hoby ©2011

the shape of the corset. Corsetto was worn by the audience of the performance as they listened to three voices join in a resonating composition. The movement of the corset was composed of the music sheet of the opera and the soma reflections on the complex muscle engagement involved in the formation of one's voice. Corsetto performed a fourth, haptic voice, coming into resonance with the three vocal voices. Corsetto, this way, amplified our intercorporeal somatic experience of listening to an opera as the vibrations of the sound waves perpetuate through our bodies. The experience of wearing Corsetto elicited a dynamic evolution of coming in contact with it, negotiating space as it pushed on participants' bodies as they pushed back at it with their breathing, and it also offered occasional moments of perceptually dissolving the sense of boundary between one's body and the corset. Occasionally, some audiences experienced all the elements of the performance coming together in a singular experience of "wearing the full performance." Here, Corsetto augmented the existing intercorporeality of an opera performance felt in our bodies by actuating a haptic voice, harmonized with the rest of the composition through a shape-changing technology. Corsetto illustrates how intercorporeality is enacted in the interplay between boundaries as the audience negotiated the space between their bodily movements and the corset, occasionally harmonizing in the sense of elements coming together and this boundary dissolving. Corsetto was designed through a soma design process as an art project, prioritizing the felt experience and leaving space for observing novel experiences.

**Mediated body** [17] (Figure 5) provides another compelling example of intercorporeal design. This art installation invites participants to play on the performer's body like a theremin. The system consists of an ensemble of a Suit, a Performer and a Participant. Participants are invited to put on the headphones and to explore touching the performer. The bare-skin touch between the Performer and the Participant plays a generated sound and changes light. The use of headphones created an immersive intimate bubble that strengthened the intimate quality of the interaction, as the sound was only heard by the performer and the participant. The

Performer, through the experience, learned how to support a playful and prolonged interaction. He would prime participants at the beginning by offering to play, use variant touch to keep the mapping ambiguous, and tell stories about auras and energies to stimulate imaginative sense-making. Mediated body is a great example of using bodies as a design material, where the body of the performer and the participant become the central material through which the interaction is realized, which is then augmented by the sound and lights. Both participants and the performer dynamically adapt to each other to negotiate the interaction and produce a pleasurable experience in terms of the touch and generated soundscape.

**ETC** or Embodied Telepresent Connection [4] (Figure 6) is a VR experience designed to support the feeling of interpersonal touch and embodied social connection telepresently. It employs pseudohaptics to elicit the illusionary tactile sensation. By using audio-visual input and embodied metaphors, ETC creates illusions of social touch between two networked avatars. Pseudohaptic interactions included, for example, warmth elicited through colour change, and resistance elicited through physics simulation. Participants are represented as abstract light particle-based auras with a glowing orb in their chest representing their heart. Participants can reach towards the heart of the other person to listen to its beating, using their hand as a stethoscope. Participants reported feeling faint touch-like sensations of pressure, warmth, tingling, texture, or even their hands sweating. The heart interaction was the most profound and intimate. Design of ETC illustrates the prioritization of the felt experience of touch at the centre of the augmented social interaction. The system is designed to support a telepresent social interaction reducing it to movement and felt touch, thus attuning participants to these sensations and the social meaning-making that may emerge from it. Participants can note how the other's heartbeat may change as they reach their hands towards it, peaking into their internal somatic processes. ETC illustrates the closing of the action-perception loop as the interaction happens in-between the two telepresent bodies coming together.

**Isness** [15] (Figure 7) is a multi-user VR experience that connects 4 people in a physics simulation, where they take the place of light energy sources interacting with energy-matter. It's created by a team of physicists and chemists on the basis of a realistic molecular simulation originally developed for educational purposes. The experience is accompanied by a narration rooted in contemplative practices, while also being informed by psychedelic experiences characterized by ego-dissolution and the sense of global interconnectedness. Participants find themselves and others represented as light sources emitting from their hands and hearts. Participants can walk and interact in a shared virtual space as these abstract forms of human essence. They can increase the intensity of light they are emitting by forming a mudra shape with their hands. The emitted light joins others, forming a molecule stretched out between all users. Study participants experienced a sense of interconnectedness comparable to a psychedelic experience [14]. While Isness only provides minimal and abstract bodily representations, the openness of the experience allows for a fluid and playful exploration that guides attention to what happens in-between the bodies, in the virtual world, and as a representation of the invisible physics of the molecular energy fields in our real-world. This way, Isness experience manifests the intercorporeal notion of coming together

and the interplay between our bodies that encompasses us and the space between us.

## 4 Discussion and Conclusion

Rooting in intercorporeality could guide our design process to create spaces where intercorporeality may emerge. We can distinguish intercorporeal design as a design approach, intercorporeality as an analytical lens to understand any human interaction, and an ultimate intercorporeality or an intercorporeal connection as an experiential outcome of a harmonious experience, i.e. of elements coming together in a harmonious interplay unified in a co-experience. Intercorporeal Design thus can contribute to designing for a genuine connection [47] by staging intercorporeal connection. By designing for coming together of the boundaries, we will treat the experience holistically, encompassing all interacting actors and the space between them.

Compelling experiences often offer an open-space for exploration, where participants are enticed to engage with each other in an intercorporeal exchange, such as in *Mediated Body*, *ETC*, and *Isness*, where a unifying sense of intercorporeality may emerge. However, the interaction is not prescribed by the design, allowing participants to dynamically negotiate the boundaries between them. Intercorporeal interaction happens between participants' bodies, with technology enticing engagement and extending interbodily connection through other senses. For instance, *ETC* and *Mediated Body* provide audio and visual augmentation of the physical proximity and touch between users' bodies. In *Isness* the creators highlight the indispensable exchange between the energy fields of our material bodies by visualizing it in VR. And *Corsetto* amplified the experience of feeling opera music waves through our bodies by actuating a worn corset performing a haptic score. Among the reviewed examples, *Corsetto* is the only one with a prescribed interaction, as it was performing a pre-recorded score. This might have impeded its potential for frequent experiences of fusing of boundaries, as *Corsetto* didn't respond to the audience's breathing, limiting the space for open exploration. This way, Intercorporeal Design creates spaces where intercorporeal experiences may be invited, and augments the intercorporeality naturally existing between our bodies with technological mediation spotlighting it. This aligns with van Dijk's discussion of scaffolding of participatory sense-making [54] but extends it specifically to the unifying experience of intercorporeal connection when the sense of self-other boundaries dissolves.

Intercorporeal Design doesn't necessarily promise a pleasurable experience. However, it can allow us to better navigate a range of experiences, including uncomfortable ones. We can return to Merleau-Ponty's example of perception of other's anger [35]. An intercorporeal experience allows this seamless co-experience of a conflict, with both parties embodying the experience, which allows them to navigate and resolve it. If technology comes in the middle, that may break the intercorporeal co-experience isolating individual users from each other. For instance, when communicating through texting, the experience of such exchange can more easily become disjoint, with two separate experiences on each end of this communication, and lead to confusion and frustration. With Intercorporeal Designs, such as in *Mediated Body* or *ETC*, even when participants



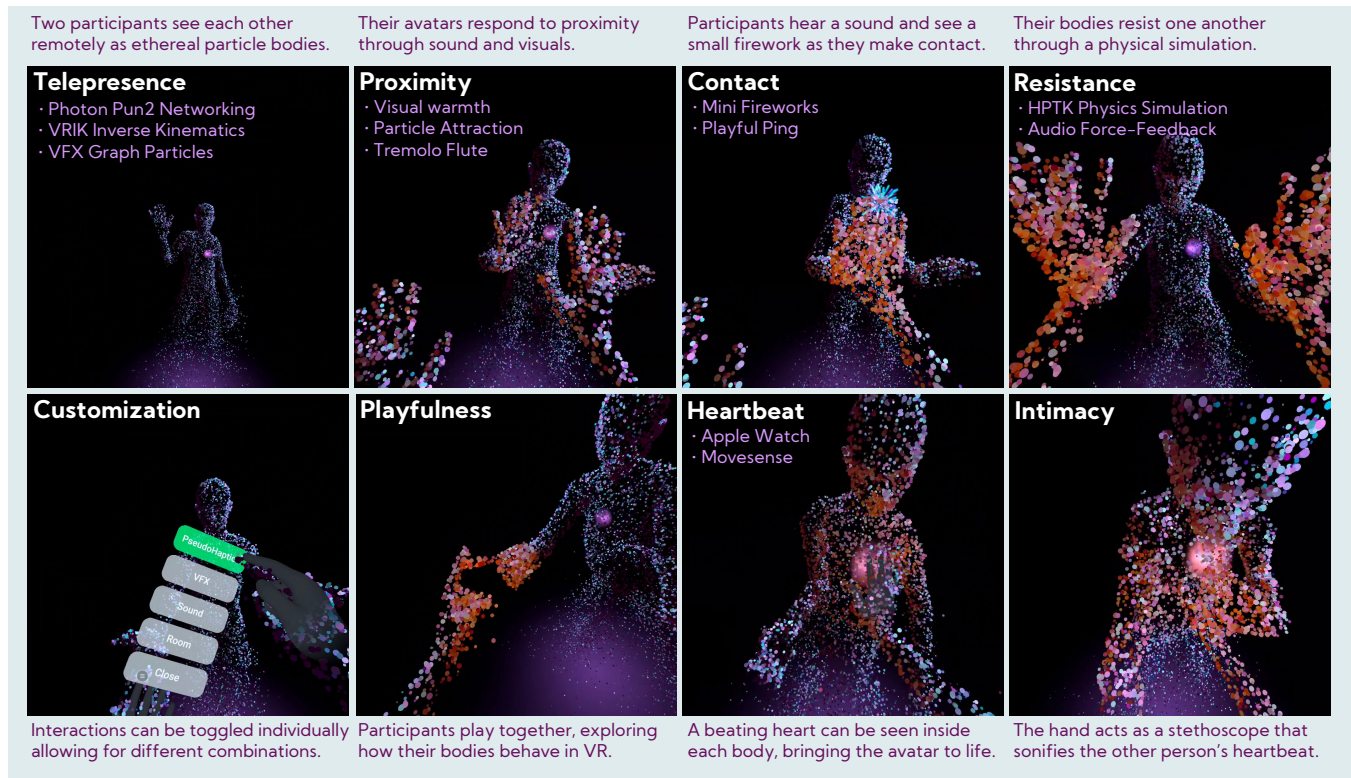


Figure 6: Pseudohaptic interactions in ETC [4]



Figure 7: Participants experiencing a co-present version of Isness. Isness D allows participants to connect over distance. Glowacki et al [15] Creative Commons BY-SA 4.0

may not always be aligned on their initial intentions to engage, they still co-experience their interaction that allows for this lack of alignment to become apparent, as one can directly perceive the full interaction and whether it feels harmonious or not, stimulating adjustments from both sides.

Merleau-Ponty describes intercorporeality as an extrapolation of the experience of touch [34]. This allows us to use touch as a metaphor for interaction in intercorporeal design. From a phenomenological perspective, our bodies are central to all lived experiences. From self-consciousness to perceiving our relation to the world we share and those we share it with, the interaction between

our bodies is at the core of all we know [13]. Specifically, touch is fundamental to our connection with others due to its key role in the developmental process [2, 12]. Even non-tactile experiences of social interaction can be understood as an extrapolation of early experiences of tactile social engagement with others [34, 36]. This rooting of our social interactions in the experiences of touch inspires us to consider how bodies themselves can constitute a *tactile material* we can design interaction for, as exemplified by *Mediated Body*. We can then extend interaction design to other domains to create touch-like interactions, even in absence of co-presence of material bodies, such as a pseudohaptic touch implemented in *ETC*. Thinking of interactions we design for as touch-like, even without an actual touch, could be a fruitful direction for closing action-perception loop and exploring intercorporeal designs.

Intercorporeal Design is an extension of Embodied Interaction and Soma Design. It bridges the action-perception perspective of Embodied Interaction with the appreciation of the felt bodily experiences of Soma Design, and applies this to the social context of interpersonal interaction. While intercorporeality has been discussed in HCI context [19, 31, 53], we propose Intercorporeal Design as a design stance that can dissolve self-other dualism and invite harmonious interactions. The notion of *intimate correspondence* (based on Ingold's *correspondence* [25] in sociology) within Soma Design [20] resonates with Intercorporeal Design, as it emphasizes the reciprocal nature between user's bodies and technology, providing immediate feedback in turn influencing bodily processes. However, the previous discussions within Soma Design more often than not focused on either a single user or on an individual perspective within a social context, rather than the whole intertwined

system. Intercorporeal design stresses the fusion of the experiences into a single co-experience emerging between and within the users, like how *Corsetto* allowed some audience to have moments of experiencing wearing the whole performance. We argue that starting from the notion of intercorporeality in our conceptualization of interaction design could be a useful stance for overcoming self-other dualism and designing for more inherently connective and harmonious experiences rooted in our felt bodily processes.

Considering Intercorporeal Design provokes several reflective questions we encourage the community to engage with at the Halfway to The Future Symposium and beyond:

- Can Intercorporeal Design help explain and mitigate the negative psychological effects (e.g. loneliness, echo chambers, depression) of dominant social technologies, such as social media?
- Can Intercorporeal Design help address ethical concerns emerging in online interactions on the web and in social VR, such as harassment, hate-speech, and prevalence of angry sentiment?
- Is Intercorporeal Design a *drift* [41] of Soma Design or a standalone novel research program building on Embodied Interaction and Soma Design?
- What does it mean precisely to treat human bodies as design material? Can we go beyond bodies as a resource to draw from, but integrate them in the design process in-line with non-human materials we craft with? How would this shift between 1st, 2nd, and 3rd perspectives on our bodies affect our design practice and outcomes?
- While embodiment and enactivism perspectives have entered HCI field decades ago [7], design is still overwhelmingly dominated by the focus on the “mind” of the user. Why do we experience a resistance to this change? Is it a problem? And how can we as a community better promote this paradigmatic shift towards dissolving dualisms?
- Is dissolving self-other dualism always desirable? What positive and negative outcomes could it lead to?

## 5 Conclusion

We offered an evolving early proposal of the design stance of Intercorporeal Design with its provisionary design pillars. The proposed stance will inevitably develop further along with new technologies and designs emerging. Adopting intercorporeal design would allow us not only to design for more authentically embodied intercorporeal interactions but would also feed back into cognitive science and psychology theory, providing a model for understanding our social interactions. This way, intercorporeal design offers a new way of knowing that dissolves self-other dualism and adopts a broader holistic view, encompassing all actors intertwined in a co-experience of bodily resonance.

With *Intercorporeal Design*, we would consider the whole intercorporeal processes emerging between interacting bodies holistically (Figure 3) rather than two agents sending and receiving messages (as in Shannon and Weaver’s sender-receiver communication model Figure 1). Accordingly, the interaction is a *co-experience of a dynamic interplay in a simultaneous engagement of feeling bodies within a shared environment*. Intercorporeality doesn’t happen

within the body or mind of one user, but rather, it is situated within the full interaction between users and technology. Through *Intercorporeal Design*, we will start by designing for this space in-between, within, and encompassing all users and technology in one holistic view. Intercorporeality goes beyond mirroring or information exchange, which retain individual boundaries, but instead fusing them together, focusing on the resonance occurring in between. In the same way as touch doesn’t exist on each individual surfaces, but rather emerges as two surfaces come together forming touch in-between and with both of the surfaces. This way, if we design for intercorporeality we will design for the coming together and dissolution of the boundaries instead of the individual perspectives of users and the back-and-forth between them. This shift in focus towards the intercorporeal coming together could offer designs that invite more harmonious and connective experiences and in turn extend our understanding of the human experience and cognition.

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