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Editorial: Inbodied interaction

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Editorial on the Research Topic
Inbodied interaction

Inbodied interaction takes as its starting point that the body is the locus of constant adaptation to context. It proposed therefore that by aligning our designs with that awesome complexity that is our physiological, chemical, electrical, biological selves, we then have done our best to support our aspirations for our health, wellbeing, engagement in the world. Such support, as we see in this Research Topic's paper *Discomfort: a new material for interaction design* is not always comfortable, but it is natural, essential for building skills, for thriving, for being our *better* selves and societies (schraefel and Jones).

Indeed each of the papers in this Research Topic on *Inbodied Interaction* are part of an invitation to explore the following questions:

> *What happens to our interactive technology when we align our designs with the internal complexity of the human body's interconnected, physical, and biological networks first? When we design to align with our inbodied selves?*

That is, can we design technology beyond the interaction component to leverage the body's internal complexity as a design resource? These questions are drivers in what we have called the "Inbodied Interaction" approach to design and engineer interactive systems.

In inbodied interaction we have offered three models in particular to support that internal, bio-physio-electro-chemical working: **these include the Inbodied 5 (In5), Circumbodied 4 (C4), as well as Tuning**, they are outlined in the IX Special Topic on Inbodied Interaction. They are also detailed in our inbodied interaction online primers. We particularly encouraged authors to engage with these Inbodied Interaction **framings** as design approaches and provocations for their papers.

Our goal in this Frontiers Research Topic has been to foreground such examples of how an Inbodied Interaction approach can help us fundamentally re-imagine the interactive technology of work, workplaces, home, education, and play. In particular, we challenge ourselves to ask: where we focus on the effects of *aligning* our approach with the *inbodied first*, from individual to infrastructure, how does this orientation make it easier for us all to build both the environments and the knowledge, skills, and practice we need to be healthy, effective, creative and resilient, not least in harmony with, sustainably with, our planet.

As an example of aligning with the orienting principle of Inbodied Interaction of *the body is site of constant adaptation*, Tabor et al. present *Comparing heart rate variability biofeedback and simple paced breathing to inform the design of guided breathing technologies*, In this

paper, the group considers the benefits of helping people slow their breathing to achieve a variety of physiological and associated psychological benefits. In most design cases, we use sensors to monitor phyiological/biomechanical processes, whether that's walking, heart rate and so on. For breathing support, sensors—often connected to tracking systems—are common. But are they necessary in this case? The design question explored is: to what degree do sensor devices differ in effect (specifically achieving "coherence") differ from far simpler external guides. In this case, there is no effect benefit. The results open related inbodied interaction questions around design continua like *outsourcing to insourcing*. Sensor-based designs typically support perpetual *outsourcing* of our status to devices to tell us how we are doing; might lighter weight guides help *insource* and own better inbodied awareness to guide ourselves, over time?

A further reflection on the experience of adaptation is explored in the discomfort work (schraefel and Jones), noted above. Here, the physiology of discomfort is explored as a *necessary* inbodied experience to support positive adaptation. The authors also offer examples and challenges for HCI design to embrace discomfort, and especially to help participants prepare for discomfort by aligning it with the paths for adaptation. Making discomfort explicit, the authors propose, can help prevent people abandoning practices that would be beneficial for them—across physical, emotional, social and cognitive practices that each affect our inbodied responses.

Inbodied Interaction's two interacting models of the Inbodied 5 (Move Engage Eat Cogitate Sleep) and the Circumbodied 4 (Gravity Air Microbiome Light) come together in *Human factors affecting ventilation in Australian classrooms during the COVID-19 pandemic: Toward insourcing occupants' proficiency in ventilation management* (Snow et al.). The paper focuses on the impact of Air Quality (from the C5) on the ability to Cogitate (from the In5) in class room environments. It uses Inbodied Interaction approaches, such as *Tuning*—to explore building personal knowledge skills and practice to help *insource* both inbodied self-awareness and practices around elevated CO_2, and to build responses individuals/groups can take to address these effects.

The orienting concept of inbodied interaction is that *the body is the site of constant adaptation to context*. The focus in this approach is to align our designs to support optimal adaptation of our inbodied, complex, dynamic systems. *Adaptive human bodies and adaptive built environments for enriching futures* considers how this approach may be specifically applied to technologically augmented built environments to better support sustainable, healthful interactions for human performance (Andres).

A quest embodied within inbodied interaction, as foregrounded in the above papers, is to help people use devices like sensors, guides and so on, either minimally or temporarily to help people enhance and *tune* their internal sensing and associated practices. The inbodied 5 themselves are what we call "semi-volitional" and "non-invasive" ways to interact in a fundamental way with the body. In *Socio-technical context for insertable devices* the authors consider particularly the largely averse response to invasive devices, framed as "insertables" (Heffernan et al.). This adverse reaction seems to create substantial opposition to the use insertable devices, hindering the full realization of the whatever impact they may eventually have on inbodied interaction. The paper explores responses to these devices, offering a perspective for future inbodied interaction considerations of how these devices may disrupt or align with the "align the design" ethos of inbodied interaction.

We hope you find these papers inspiring, useful, positively challenging, and invite you to engage with Inbodied interaction as an emerging perspective, approach and methodology in HCI that fosters a deeper bodily literacy to align technology with the internal complexity of the human body's interconnected, physical, biological and planetary networks. Our hope is that these papers help illuminate how considering, exploring and applying inbodied understandings to *align our designs* is *vital* in the very literal sense of life-fostering, in our aspirations to design minimal dose technologies that support our performance, wellbeing, quality of life. Thank you for reading.

Author contributions

ms: Conceptualization, Methodology, Project administration, Writing—original draft, Writing—review and editing. MJ: Investigation, Project administration, Supervision, Writing—original draft, Writing—review and editing. JA: Investigation, Project administration, Writing—original draft, Writing—review and editing. EM: Project administration, Writing—review and editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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