Talking about interaction*

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Abstract
Recent research has exposed disagreements over the nature and usefulness of what may (or may not) be Human-Computer Interaction’s fundamental phenomenon: ‘interaction’. For some, HCI’s theorising about interaction has been deficient, impacting its capacity to inform decisions in design, suggesting the need either to perform first-principles definition work or broader administrative clarification and formalisation of the multitude of formulations of the concepts of interaction and their particular uses. For others, there remain open questions over the continued relevance of certain ‘versions’ of interaction as a useful concept in HCI at all. We pursue a different perspective in this paper, reviewing how HCI treats interaction through examining its ‘conceptual pragmatics’ within HCI’s discourse. We argue that articulations of the concepts of interaction can be a site of productive conflict for HCI that for many reasons may resist attempts of formalisation as well as attempts to dispense with them. The main contribution of this paper is in respecifying how we might go about talking of ‘interaction’ and its value as a promiscuous concept.
1. Introduction

Concepts of ‘interaction’ have been used in HCI as ways of talking about the myriad forms of relations that emerge amongst and between people living with and around digital devices and systems. Sometimes, the wide range of senses in which concepts of interaction are used in HCI is a source of confusion. There are many different and potentially incommensurate ways of constituting and schematising what we mean when we say ‘interaction’. For some in HCI, this has become problematic.

This paper does not address that issue. Instead we chart a different course by unpacking what ‘interaction’ lets HCI do. We do not think that this perspective has yet been articulated in response to HCI’s “current turbulence” (Kuutti and Bannon, 2014).

In order to head off confusions, we asterisk ‘interaction’\(^1\) to remind the reader (and ourselves) that we are interested not in addressing what ‘interaction’—its various versions included—might be in itself but rather bracketing the matter, i.e., considering *HCI’s conversations about the concept(s) of interaction*. This is what we mean when we say interaction*.

Recently, researchers have been taking stock of the import of interaction* for HCI’s disciplinary development. These positions can be construed as divergent. On the one hand, there is a case being made for the continued relevance of interaction* to HCI through better formal definition. On the other hand, there is frustration about the limitations of HCI’s renderings of interaction* and an implied conceptual dismissal of interaction* from the realm of the cutting edge. The broader tone of these debates thus splits in two divergent directions. The former rests on the implication that, although HCI’s research uses the conceptual language of interaction frequently, we do not know what it is that we mean when we say it,

\(^1\) To clarify, we are not addressing any versions of interaction directly, nor do we intend a specific sense of or perspective on what we mean by ‘interaction’. This, we feel, has been done far more comprehensively than we ever could in this article, and so we refer the reader to treatments by Hornbæk and Oulasvirta (2017), Janlert and Stolterman (2017), Dubberly et al. (2009), etc. To state this another way, interaction* is our way of bracketing ‘interaction’—‘the concepts of interaction’. We hope that this foregrounds some of the reasoning HCI researchers are employing so as to produce an objective stability to the concept in use (Garfinkel, 2002, pp. 30-33).
and, thus, there is a need for definitional work. The latter makes a case for new conceptual apparatus entirely.

Yet, this debate raises questions for us, which are perhaps even more fundamental: What are recent discussions about interaction* doing for HCI research communities? Where might they spring from? What could we mean when we talk about interaction* in HCI? How does HCI talk about interaction* and its associated or implied languages? How might we evaluate proposals to define or dismiss interaction*? Are there other ways we can think about interaction* and its role in HCI? In short, we need to talk about how HCI approaches debates about the concepts of interaction, just as much as some might feel interaction itself is a viable topic for HCI’s discourse.

In this essay, we offer an argument that proposes interaction* itself as a *promiscuous concept* that acts as a pragmatic—but not infallible or unbreakable—‘gravitational force’ that holds together the shifting sands of HCI’s disciplinary communities just enough so as to be useful. We begin by describing some motivating issues that illustrate why, we think, discussions of interaction* have taken hold in HCI in recent years. We then outline the broad shape of emerging interaction* debates that suggest different disciplinary pulls. Finally, we make some arguments for retaining interaction* by reframing it, and we propose ways for HCI to manage its interests through a therapeutic approach informed by ordinary language.

2. The problem with interaction*

Recently in HCI, interaction* has (re)surfaced as a focal topic in its own right. Broadly we detect two tendencies. 1. ‘Definers’: those seeking to formally arrange descriptions of a specific perspective on interaction* or schematise perspectives on interaction* with a view to establishing some measure of agreement in HCI. And 2. ‘Dispensers’: those tending to argue
that clear conceptual constraints within HCI’s interaction* discourse suggests the abandonment of interaction in some fashion or another.

**2.1 Defining interaction***

As Hornbæk and Oulasvirta—hereon, H&O—argue in their 2017 CHI paper, while “the term interaction” is often held to be “field-defining” and a “workhorse”, it is, in their view, “underdefined”. H&O’s paper is perhaps the most comprehensive of recent work attempting to address interaction* in HCI. In doing so it offers what we might call a catalogue approach to what H&O see as a problem of profound historic disinterest in articulating systematic claims about interaction* in HCI. By ‘catalogue approach’ we mean that H&O advance their argument by presenting a range of different “concepts of interaction” that they argue are largely inexplicit (“underdefined”) or submerged—but nevertheless drive different threads of HCI’s research. These are set in contrast with the ‘folk notions of interaction’ as presented in HCI textbooks wherein H&O argue that one might reasonably expect a “definition or high-level discussion of interaction” and yet fail to locate such a thing.

The purpose for HCI is thus to ‘move from a folk notion of interaction to a notion that really explains interaction’. This means locating causal reasoning that accounts for matters such as “intentions” for interaction (of a given formulation) and not just the interaction phenomenon itself. Overall, the absence of definition work in HCI seems to be a key motivating factor for H&O, and that practicing such definition work and developing fully causal explanations for interaction* will lead to an increase in HCI’s “problem-solving capacity” (Oulasvirta and Hornbæk, 2016).

Some of these concerns also emerge in contemporary work. Janlert and Stolterman (2017)—hereon, J&S—mirroring H&O’s complaint about “folk notions of interaction”, suggest that
HCI’s understandings of interaction* rely too much on “common intuitions” and that “interactivity”—their preferred cut through interaction*—needs to be approached “in a systematic and analytical fashion”. Although J&S hang their address of interaction* upon the question of “increasing interactivity”—that a key feature of designed systems is in providing different amounts of “interactivity”—ultimately, they return to the motivations of H&O by building up definitions and terms albeit in a way that does not clearly consist of a plurality of alternatives. In many ways, J&S present a particular but very explicitly stated attempt at a figuration of interaction* that could conceptually reside somewhere within H&O’s schema.

As noted by H&O, explicit attempts at core definitional work remain sparse. One exception we would point to is the cybernetic conception of interaction articulated by Dubberly et al. (2009). This is more consonant with the interaction design orientation of J&S yet probably falls within the ‘interaction as control’ concept covered by H&O even though it is not cited by them. Dubberly et al. directly approach what they mean by ‘interaction’, arguing that, in an interaction design sense, interaction is a “way of framing the relationship between people and objects designed for them—and thus a way of framing the activity of design” (p. 96). Like H&O and J&S, then, Dubberly et al. seek to firm up a particular sense of the ‘interaction’ component of ‘interaction design’ through greater conceptual definition.

Softer still than definitional work is the staking out of specific communities. This includes attempts to foreground something akin to agreement about what constitutes interaction* that sets of HCI scholars approach in a consistent way (i.e., either recognising or developing a common orientation towards what constitute ‘interaction phenomena’ for a community /

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2 This is similar to what Galle would call intuitive resonance (Galle, 2011, p. 82). In brief, people think that the term will be understood by their audience and so they do not offer a definition in an effort to preserve resources (e.g., page space) for other purposes.
3 It seems common to conflate (or at least not clearly distinguish) interaction design and human-computer interaction in discussions of interaction*; e.g., see Svanes’ chapter “Philosophy of Interaction” in https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/philosophy-of-interaction
perspective). Perhaps the clearest programmatic statement of this sort may be found in recent arguments for, or at least recognition of an extant “interaction science” / “science of interaction” in HCI. This has been pursued both by a Special Interest Group meeting and “Spotlight” at CHI 2014 (Howes et al., 2014), undergirded by the parallel commencement of a Journal of Interaction Science in 2013 (Bahr, 2013).

2.2 Dispensing with interaction*?
H&O’s paper in particular sits quite clearly in response to prior work by Taylor (“After Interaction” (Taylor, 2015)), Verbeek (“Beyond Interaction” (Verbeek, 2015)), and Kuutti and Bannon (“The Turn to Practice in HCI” (Kuutti and Bannon, 2014))—hereon K&B. Collectively, they offer serious challenges to definers of interaction* in different ways. Taylor and Verbeek put forward a set of convincing arguments about the possible ways in which interaction* might limit, and in some cases repress, HCI’s potential and scope. K&B, on the other hand, argue for more for the recognition of a pre-existing “Practice paradigm” that can complement what they label as the existing “Interaction paradigm” in HCI.

Taylor argues that interaction* in HCI has been tied conceptually to the materiality of the user interface as well as the conceptual configurations of human-machine binaries, and that interaction*’s formulation in this way has led HCI to “concentrate […] attentions on the interface” to the exclusion of other things that HCI correspondingly lacks the conceptual apparatus to deal with, such as broader structural-societal issues. Verbeek argues that the concept of “mediation” may be more apposite for design, while Taylor suggests that design constructs complex entanglements between human and machine to constitute “worlds” rather than merely “discrete interaction[s]” of mainstream HCI. What kind of “worlds” HCI could or should be building is the main matter at issue, and the argument goes that interaction* in

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4 We note the distinction here for these are potentially two different programmes.
5 The discussion ensuing from Taylor’s article has been documented online (https://ast.io/back-to-interaction/), which itself initiated a subsequent workshop at Microsoft Research Cambridge in 2016 (see https://ast.io/promiscuity-of-interaction/ for a report).
HCI hinders deeper thinking on that matter. In short, both find HCI’s senses of interaction* to be insufficient and constraining. In many ways we concur.

One way of misreading the ‘interaction* is deficient’ view is by characterising it as an argument against what Taylor posits as the prevalence of Engelbartian conceptions of interaction—a reference to Engelbart’s famous “Mother of all Demos” which Taylor argues set the scene for HCI’s ‘default’ sense of interaction. Engelbartian interaction, suggests Taylor, “prefigures an interface, foregrounding a very particular set of relations between user and computer” that is naturally limited in its scope. H&O appear to take Taylor in the mode of rejecting Engelbartian interaction; suggesting that it must be done away with in order to correct HCI’s design role as “mediator” and focus on the enactment of “worlds” through design.

However, we think Taylor’s argument is more complex than that. Taylor argues that Engelbartian interaction is “taken for granted” in HCI and interaction design, but then appears to generalise this by noting that “as a concept, interaction hinges on an outmoded notion of technology in use” (emphasis added). On the one hand, this could be read as a challenge to an imagined status quo—a unitary sense of specific (Engelbartian) interaction—and, on the other, “outmoded notion” might apply to whatever other senses of interaction we have in mind, which, as H&O point out, is a broad set of possibilities. Hence, there is potential for a pejorative characterisation of HCI’s senses of interaction* and, indeed, this is moved upon by H&O.

Verbeek’s suggestion to go “Beyond Interaction” is similarly vexed. The provocative title is not matched by provocative content in the article. Verbeek is actually somewhat muted in that he argues both that “interaction might not always be the most helpful concept” for design and that considering deficiencies in HCI’s senses of interaction* via newer concepts of “technological mediation” is “shedding new light on the field of interaction design”. This
feels more pluralistic than the way H&O seem to take it. However, we can see why “Beyond Interaction” has the potential to be treated as a way of dispensing with interaction* entirely.

K&B on the other hand present the “turn to practice” within HCI as the gradual establishment of an alternate to the “Interaction paradigm” which has “tended to focus on momentary and ahistorical HCI situations”. While K&B underline the importance of the “Interaction paradigm” that is “brimming with unresolved problems”, and therefore distance themselves from a ‘dispensing’ view, they do present an argument that ‘shares DNA’ with Taylor’s and Verbeek’s. They point to the limitations of the “Interaction paradigm” and the need for a “decentering” of the “privileged position of interaction”, resulting in a focus on practices instead:

For the Practice paradigm, a whole practice is the unit of intervention; not only technology, but everything related and interwoven in the performance is under scrutiny and potentially changeable, depending on the goals of the intervention. Thus the changing technology is but one of the options. (Kuutti and Bannon, 2014)

While Taylor, Verbeek and K&B’s interventions are clearly productive for HCI, we are cautious about readings that adopt even a mild ‘dispensing’ view of any sense of interaction*. Even K&B’s respectful account of two “paradigms” in HCI tends to put them into a relationship that might be construed as antagonistic. Furthermore, while Engelbartian interaction may have “become a cornerstone for HCI and interaction design (IxD)” as Taylor writes, and though it seems reasonable to concur with Verbeek that developing new notions such as “technological mediation” seem fruitful, H&O’s response puts forward a comprehensive case that these are potentially impoverished and somewhat, probably unintentional, straw man views of the sheer diversity of interaction* present in HCI. Although, as we have made clear, this is nevertheless done by H&O under the auspices of
seeking further definitional and schematised clarity about interaction*, about which we also exercise caution.

To some extent Verbeek’s argument also has a tendency to be parseable as constructing a straw man of interaction* in HCI simply by not giving a clear sense of what is meant when he uses “interaction”. The implication is probably a specific “interaction as dialogue” sense, but the reader is left wondering, unlike Taylor’s piece where the argument singles out HCI’s overreliance on defaulting to Engelbartian interaction which is fortunate enough to have a clear cultural reference for its own definition. Due to their ambiguity, Verbeek’s characterisations of interaction may then be criticised as insufficiently expressive. However, like J&S, once again topics of implicitness, agency, control, etc. all surface here as underlying driving concerns. So, there are points of common ground between the definers and dispensers.

Herein lies the tension: between what we have called the ‘interaction* defining’ and the ‘interaction* dispensing’ tendencies. We are not arguing that H&O, J&S, Taylor, Verbeek, or K&B are definitively motivated by this, intended the effect, or would necessarily agree with our characterisations. K&B, for instance, explicitly state they are not suggesting what they call the “interaction” paradigm should “disappear”. Rather, we detect implications about where the state of HCI’s interaction* discussion could lead, as perhaps any reader of their work might. And this is worth exploring and road-testing if they are to be adopted by other HCI researchers in the future. We also have tried to illustrate how the current discussions at times appear to suffer from cross-purposes and ambiguity about what might even be meant by ‘interaction’. We also suggest that the current discussion lacks a clear articulation of the position we present here: interaction* as a promiscuous concept—a ‘broker’ if you like—between a complex mix of interlocking communities that form CHI-oriented HCI.
We will next try to excavate the disciplinary milieu in the midst of which this discussion takes place and the ways it lends a framing to the debate about interaction*.

3. Why Interaction* Now?

So why this increased focus on interaction* now? We can frame a possible answer to this question by elaborating a cluster of interrelated concerns floating around HCI presently and historically. These include: multiplying sub/supra-communities, increasing intellectual differences, shifting senses of purpose, negotiating academia and industry, questioning disciplinarity, and doing away with old intellectual concepts and adopting new ones. Many of these are not exclusive to HCI but they are likely exacerbated by the peculiar makeup of its overlapping communities and particular confluence of inputs (cf. Grudin, 2017).

*Multiplying Sub/Supra-Communities. In recent years HCI research communities have been changing along various dimensions. Taking the ACM CHI conference as a bellwether, there has been significant community growth in terms of sheer participation rates rather than attendance. Materials submitted for CHI in the early 2000s hovered at ~400-500 items, whereas CHI 2018 has seen a rise to over 2500 items (see https://sigchi.org/conferences/conference-history/CHI/), in spite of present attendance (2010s onwards) being similar to or only slightly higher than those seen during the dotcom boom of the late 90s. This disparity of growth between participation and attendance plays into community divergence as new areas and interests come online to service smaller sub/supra-communities, which are then accommodated by a growing number of conference subcommittees.

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6 We fully accept that the use of CHI in this way is a limitation to this point in the argument given that it does not take into account other HCI communities of research.
Increasing Intellectual Differences. HCI’s research communities have become increasingly intellectually diverse over the past decade, including a range of new initiatives such as fabrication and making, postcolonial computing, AI and HCI, digital civics, and critical design, among others. As Rogers puts it, this has been a process of HCI “recasting its net ever wider” (Rogers 2012, p. 3). Such “recasting” has introduced new domains, approaches, agenda, research styles, and different contribution types. And with this comes an increase in the range of possible points of difference between members of HCI communities.

Shifting Sense of Shared Purpose. Perhaps in response to developments such as the above two points, concerns have been raised by some HCI researchers about a lack (or loss, depending upon one’s point of view) of coherent shared purpose in HCI research (Beck & Stolterman, 2017). Specifically, Liu et al. (2014) and Kostakos (2015) make the case for HCI having an absence of what they call “motor themes”—jointly oriented-to endeavours within HCI that establish HCI as a ‘normal science’⁷. The perceived absence of coherence reflects discontiguities in researchers’ orientations about what kind of thing HCI is as a disciplinary object (Blackwell 2015). In other words, coherence and shared purpose debates seek to resolve broad, perceived conceptual problems for HCI, of which we argue interaction* is but the latest iteration of. H&O make just this connection in their 2017 CHI paper, identifying Liu et al.’s work as a motivating factor in their topicalisation of interaction*.

Academia and Industry. Related to the shifting senses of HCI’s purpose is also a complex set of challenges based around the political relations of HCI’s members and their research agenda. It has not been unusual to hear members of HCI communities historically expressing desires to positively effect change in ‘the world’ through HCI’s design practices. Initially

⁷ The Interaction Science Spotlight (Howes et al., 2014) provides an interesting contrast to this call for coherence; for “Interaction Science”, it is researchers’ existing sense of alignment and agreement that is being brought to prominence rather than the perceived need for alignment and agreement itself doing the driving (as in the case of (Liu et al., 2014; Kostakos, 2015)).
narrowly focussed on improving usability, expansion towards “grand challenges” such as development goals has ensued (Shneiderman et al., 2016). However, widespread adoption and the structural-societal (economic, social, political) embedding of HCI-relevant technologies has continued apace, touching almost every part of everyday life, albeit driven largely by technology corporations (as opposed to, e.g., government or hybrid partnerships as in Scandinavian participatory design traditions). Most notably, social media, but also other network technologies have played a role in this, backed by the massive accrual of personal data to private entities, and most recently, increased application of Machine Learning-based systems to classify and sort the human subjects of such systems. The corporations representing many of the drivers of these changes are represented in HCI as ‘industry’. This creates further frictions in the configurations of relationships between HCI community members’ orientations as to what constitutes ‘good’ interaction*.

Questioning Disciplinarity. As digital technologies—products and services and systems—have become widespread, so naturally the interests of other fields and disciplines towards investigating HCI-relevant matters has increased. Calls for interdisciplinarity frequently drive research funding structures. Conceptualising HCI as a discipline (as has been argued against) can lead to a sense of stakes (or perhaps rights) to some particular intellectual territory by HCI communities which is increasingly ‘trespassed’ by ‘others’. This point is as much about how HCI draws its own boundaries as how communities operating within them in some capacity notice such matters.

Doing Away with Older Concepts. The historicisation of HCI has offered various accounts of progress and change. These could be “waves” (Bødker, 2006), “turns” (Rogers, 2012) or “paradigms” (Harrison et al., 2007). But it is perhaps primarily the use of “paradigm” with respect to HCI—with its allusions to Kuhn’s well-known description of scientific revolutions
(Kuhn, 1970)—that suggests most clearly a connection with ideas of doing away with or superseding HCI concepts that are no longer of use, such as interaction*.

In sum, this cluster represents significant concerns: about the model(s) HCI researchers express a desire to operate along the lines of, about what HCI’s shared values are along which researchers jointly travel, about how members of HCI communities relate to one another and upon what basis those relations are conducted, about how HCI ‘stays together’ as sets of communities with conflicting pulls over interaction*, and, finally, about how HCI might even tell a ‘coherent’ and agreed-upon story of its history when there are multiple ways of squaring what the role of interaction* is in that.

If HCI communities cannot tell a coherent story of their history or find ways of living together around shared concepts and connected subcommunities, then interaction* poses problems. For other disciplines that have grappled with similar issues, the stakes are threefold: (1) coherence, (2) status, and (3) progress (Beck and Stolterman, 2017). While it makes sense that mulling over matters of formal definition, or ‘ironing things out’, acts as a salve for these concerns, it is also possible to lose things when we do this. This is akin to proposing a set of guiding or ‘big’ questions for a discipline. Doing so may create the appearance of having achieved greater intellectual cohesion, yet, at the same time, it also thwarts creative efforts to take a field in new directions. If we agree on formal definitions, could this somehow be construed as self-imposing intellectual constraints and undermining the potential for more innovative or creative construals of interaction*? We want to avoid such ‘ironing work’ and instead focus on examining the sea we swim in.
4. For interaction*

In our view, in light of the contrasting attitudes in HCI towards interaction*, a reframing is in order. Although typically configured as problems of coherence, status, and progress, we argue that it is not necessary for HCI to see these things as problems. Instead, we want to make an argument for an orientation to interaction* that trades on its value as a conceptual broker and ‘promiscuous’ concept. This orientation charts a third way that disposes of ‘interaction* definition’ and ‘interaction* dispensing’. We believe that rethinking the framing of the perceived problems with interaction* might help HCI communities’ cohesion and help channel further debates on HCI’s chosen concepts of interaction. Towards this end, we pose two questions: (1) what jobs has interaction* done, and what jobs is it currently doing, for HCI researchers, and (2) what might be meant when HCI researchers talk about interaction*?

Our first question is about what ‘jobs’ interaction* has done (and is doing) for us as a matter not only of HCI communities’ academic discourse as found in the research record but also interaction*’s embeddedness within domains of reasoning in the different species and varieties of HCI that is practiced within various institutions, labs, research groups, and so on. Firstly, and contra H&O, we suggest that interaction* has been usefully underdefined.

It is clear from H&O’s instructive account that when HCI researchers talk about interaction* it be used to say a great many things that may nevertheless be incompatible ways of talking about interaction*. We argue that this is generally not problematic. One might reasonably say—perhaps in a research paper—that someone tapping a touch screen is ‘interacting’. Just as we can say that posting on social media is ‘interaction’. Or that someone being physically tracked is ‘interacting’ with a geolocation system. Or we might say that ‘interactions’ are taking place with, around, or through technologies embedded in the social life of the home. Or, perhaps, we might even say someone using an urban public bicycle hire scheme is
'interacting’ with a network of systems and data and other people and even things like political and ethical “worlds”.

It seems unlikely to us that such formulations would cause a researcher reading a paper to squint and shake their head, as though using ‘interaction’ to describe these different activities is in some way deeply incomprehensible to them; indeed, the unique characteristics of use might be “intuitively resonant” (Galle, 2011, p. 82) with readers. We do not deny that confusions may occasionally result. However, we argue that this is not ultimately resolvable through further definition (which sets up intellectual straightjackets for future work) or through starting to abandon interaction* (which may work against the value of retaining one of the few shared interests that features in HCI’s complex cross-cutting communities). Further, interaction* always appears in context. Even when left undefined, contextual details—such as the broader topic of the paper, the author(s), their home discipline, institutional affiliation, etc.—shape the way we might imbue interaction* with a particular meaning. When we ask for greater specificity—if we ask for greater specificity—are we trying to narrow the gap between authorial intent and reader interpretation?

A different way of framing interaction* is as a conceptual broker: as helping to manage these complex relationships between increasingly diverse research communities and influences that associate themselves in some way with HCI (primarily under the banner of conferences like CHI)8.

We also want to elaborate somewhat on our notion of interaction* as promiscuous. H&O refer to a "vocabulary and [...] reasoning apparatus" of interaction, but we want to build this

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8 We are hesitant to use Star and Griesemer’s (1989) much over-used notion of a “boundary object” as it pertained (originally) to collaborating (scientific) communities centred around identifiable shared projects. We are cautious of stretching the notion (as others might have done) to describe the circumstances of broader community relations that we are speaking of.
argument to consider how it is not just a matter of words but the ways in which language makes its connection to local rationality, mundane practical reasoning, and scientific practice (see Lynch, 1993; Pollner, 1987). For instance, psychologists and sociologists of different persuasions have added their own alternative, and sometimes incommensurate, ways of practicing interaction* in HCI, some outcomes of which seem to surface in H&O’s catalogue. These then become ways of talking about interaction* into which practical reasoning about method and technologies become entwined when they surface within the HCI community.

We might consider, for example, how the practicing interaction* can be a way of speaking of a model of stimulation and response between people, which we might contrast with speaking of it as an interpretive process performed by members of social groupings. There are of course many more examples like these, which are documented by H&O. The broader point is that there are many ways of talking about interaction*, which can be ‘at play’ at any time in no distinctly differentiated way in HCI discourse. We might also say that interaction* has been treated in HCI is as a promiscuous concept. It offers opportunities for new associations or affiliations, and it has, thus far, been subject to little policing, which could account for the general sense of it being “underdefined”.

While for ‘interaction* definers’, conceptual promiscuity is seen as a problem that is resolvable via ever greater caveats and formal distinctions in the language of interaction*. In contrast, for ‘interaction* dispensers’, these features become an opportunity for (potentially straw man) arguments against interaction* given the sense of irresolvable constraints the concept is seen to place on future HCI research.

Our second question is about what might be meant when we talk about interaction*. The
ways in which interaction* is leveraged rests on a range of metaphorical features and entanglements in categorisations, acts, and so on. Interaction* as metaphor is doing some potentially interesting, but confusing, things for HCI by blurring the social and the technical. When we say technologies, systems, devices are ‘interactive’, we necessarily embed them within mundane social order—i.e., the (accomplished) stability of reality as the social world (Pollner, 1987). In other words, we leverage ordinary understandings of interaction* to talk about what people do with and around computational technologies at the selfsame time as we might ordinarily speak of what people do with other people. This socio-technical blurring of interaction*—this drawing of interaction from our ordinary language—suggests a relevant repertoire of ‘interaction words’ like ‘response’, ‘react’, ‘alert’, ‘remind’, and ‘interrupt’. We talk about what machines “do” in these terms, but we have to keep in mind that these are ways also ways of talking about people individually, and jointly, using and living with machines. These ways of talking about machines are grounded in practical and everyday experiences of language in use, which means they borrow from the everyday sense but acquire certain technical senses in HCI.

We can extend this argument. As implied by H&O’s catalogue of interaction*, different ways of talking about interaction* bring with them particular bodies of language, their associations, implications and insinuations. These different genres further imply more particular families of ‘interaction words’ (often also borrowing from an everyday sense). Consider “interaction as dialogue”, which uses a language of turns, feedback, goals and subgoals. Or “interaction as transmission” which speaks of noise, throughput, capacity, etc. “Interaction as tool use” brings with it senses of what one might do with tools and toolic connections–tools break, tools amplify, etc. Considering “interaction as optimal behaviour”, we then enter the language of behaviour including rewards and costs, rational and irrational behaviour. “Interaction as embodiment” speaks of intentions, context, situation, coupling, etc., while
“interaction as experience” leverages a host of normative reasonings about ‘feeling words’: emotions, surprise, stimulation, and also aesthetics, expectation, etc.

5. Therapies
We are not so interested in discussing if there is ‘progress’ in HCI’s view of what interaction* ‘really is’ because to do so would miss the point. We think that attempts at resolutions in this way are in error. Interaction* in heterodox HCI is probably not a resolvable matter—and it need not be so. ‘Forward’ may not be the best way to characterise how HCI ought to be moving in order to remedy anything. Indeed, ‘remedy’ might itself be a less-than-useful way of framing things. If we agree that we need to hone in on a dominant understanding then maybe ‘forward’ would make sense. But if instead we value multiple understandings (promiscuity), and if we focus less on agreed upon definition(s) and more so on embracing the possibility of misunderstandings, then we can begin to construct an argument not for interaction* moving forward but instead for its outward expansion.

We believe it is perfectly reasonable to hold multiple, potentially contradictory senses of interaction*, get along with each other, and be critically productive as HCI-affiliated communities. But we probably need something like therapies to help us live with our frictions rather than finding ways to eliminate them—even though deriving therapies is not our primary goal. Additionally, proposing an embrace of interaction*’s promiscuity might also mean doing away with normative discourses of scientific progress (i.e., replicability, cumulation, forward motion, etc.; Reeves, 2015).

Our inspiration for the therapeutic reframing of interaction* is as thinking of it in terms of being a problem of language in use (within research communities), previously addressed by Wittgenstein, Ryle or Austin (amongst others; see Wittgenstein, 2009; Ryle, 1949; Austin, 1962). To begin, we can reread a portion of Wittgenstein’s Philosophical Investigations
As talking about how formalised versions of interaction* may play out in HCI’s discourse (“a game”) and what to do about it:

*Here the fundamental fact is that we lay down rules, a technique, for playing a game, and that then, when we follow the rules, things don’t turn out as we had assumed. So we are, as it were, entangled in our own rules.*

*This entanglement in our own rules is what we want to understand: that is, to survey.*

(Wittgenstein, 2009, §125)

Ryle and Austin’s careful considerations of what it actually means to be “entangled in our own rules” in the course of language in use offers us some practical points. Where Wittgenstein is therapeutic, Ryle adds a layer of the methodical (as does Austin), promoting an approach that takes words and their senses seriously by rolling them around enough to shake out both their meanings in use as well as their potential for philosophical conceptual confusions. Although primarily concentrating on conflicts between the philosophical and ‘everyday’ modes in which ‘the mental’ and ‘thinking words’ feature\(^9\), Ryle has a broader concern: “not how to apply [concepts], but how to classify them, or in what categories to put them”. Austin, in turn, considers how *doings* with words (e.g., promising, marrying, or betting) lead to a complex and potentially highly varied set of different *senses* in which things are said, and thus what concretely being done, despite identical formulations of such statements. Statements of ‘interaction’ seem particularly vulnerable to this problem unless carefully unpacked. This is not definitional work. Rather it entails teasing apart vernacular from technical and distinguishing differences between the variety of senses interaction*

\(^9\) Arguing against Descartes (the “official doctrine”), Ryle pointedly illustrates that while philosophers generate “theory of the mind”, ‘anyone’ can engage successfully in “describing the minds of others and in prescribing for them” (Ryle, 1949).
takes. It is in the broad genre of this therapeutic approach that we might think about interaction*.

In this approach, HCI’s language of interaction* acts as a provocation to facilitate the work of its promiscuity. Doing so can, we think, foreground and support the exploration of potential conceptual confusions, surface the troubles of categorisation, remind us of the play of metaphor, foreground the prevalent leverage of mundane senses of terms which might then be played with ‘fast and loose’ by HCI research. By doing this we can promote more generative discussions and greater depth of understanding in HCI. Returning to our family of affiliated ‘interaction words’ (‘response’, ‘react’, ‘alert’, ‘remind’, ‘interrupt’, etc.) let us consider ‘interrupt’ as an example of a core part of some senses of concepts of interaction. What does it mean specifically and what might the different senses be for an app, an agent, a personal device, an Internet of Things / device ‘ecosystem’, a social network recommendation, a friend’s message, or an organisation’s call-to-action to ‘interrupt’ us?

There are many senses in which we might take interrupt as eminently meaningful in each of these simple instances and it’s likely that you, the reader, are already constructing scenarios in which to place the particular sense in which ‘interrupt’ could be made sense of. Does it make sense to treat a device interrupting us as in the same category as an IoT ecosystem interrupting? Is that the same sense of the word? Or that of an organisation’s emailed notification? We can say a social network interrupts us to deliver a recommendation of some kind, but is this sense of interruption similar to that produced by a message from a friend? When we say an agent interrupts a person is this in the same sense of interruption as someone being interrupted in the street by another? Something could be classed as an interruption by an app but treated as anything but by the ‘receiver’ of that interruption. What are the practical implications of such categorizations? Should we even try (or not) to describe all these differences?
Overall, we wonder what it means for us to use interaction* as a frame within which to talk about interruptions as interactions that are generated or mediated by different kinds of technologies in different circumstances—things which ordinarily take much of their sense from mundane sociality? When we examine the literature on interruption as part of a particular sense or concept of interaction, it is often unclear what corresponding sense of interruption might be meant. To pick just one paper, see a recent Special Issue from Janssen et al. (2015), in which something called “self-interruption” is subsumed into a general sense of interruption, a concept itself that is also left undifferentiated or textured.

In summary, we call for a much stronger focus on the language of interaction* in HCI research. More sensitivity and care towards language and its use, in talking to particular communities and in particular ways, and the different senses in which they may be made sense of, becomes a key challenge for HCI research as it manages the ongoing diversification, expansion and changes to community participation, constituency, and types of contributions that constitute HCI-relevant.

6. Conclusions
A multifaceted discourse composed of interaction*, and its attendant concepts, prevails as a concern in HCI. Sometimes this is explicit, but mostly it is implied. As a set of concepts, interaction* is about research practices as much as it is about the words HCI researchers use when they generate talk and texts. Interaction* acts as a common recognisable interest, and it is perhaps the only thing identifiably bridging gaps between increasingly disparate HCI communities. We think there might be value in rediscovering the concepts of interaction* for their sense of intellectual promiscuity. Perhaps HCI might be better off being more cognisant of the multiplicity of ways in which interaction*—admittedly confusing at times—lets us talk about what is a massively varied focal interest. It is probably worth pausing for thought
before we either seek to tighten its useful lack of definition or dispense with it in view of new conceptual frontiers.

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