**Fields of affordances and human-computer interaction**

Fields of affordances and HCI

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The *CHI 2021* workshop *Emergent Interaction: Complexity, Dynamics and Enaction in HCI* aims to harmonize theoretical positions between ecological-enactive cognitive science and embodied approaches to HCI. In this paper I will compare the concept of an enactive landscape with the concept of a field of affordances. Although the concepts are closely related, I will argue that fields of affordances are better suited to theorize two central topics of HCI: distraction and bad habits. I will close by presenting some open problems for future research.

**CCS CONCEPTS** • Human-centered computing - Human computer interaction (HCI) - HCI theory, concepts and models

**Additional Keywords and Phrases:** affordances, intentionality, enactive landscapes, technological mediation

1. Introduction

Recent research in embodied HCI has, by and large, developed in parallel from ecological and enactive cognitive science. One aim of the workshop is to “harmonise theoretical positions allowing HCI to draw upon and incorporate new results and methodologies” (Bennett et al., 2021, p. 4). My contribution should be seen in this light: I will develop a number of concepts central to the Skilled Intentionality Framework (Bruineberg & Rietveld, 2014), and sketch how they could be fruitfully applied in HCI. The aim is here indeed to harmonize theoretical positions and to offer new conceptual tools for HCI. If all goes well, however, it will also bring ecological-enactive cognitive science in a better position to deal with a world in which much of our everyday interactions are mediated by (digital) technologies.

It seems clear that interaction between me and my computer is not always going well. When I use my computer intentionally, say, to write a difficult e-mail, I am frequently drawn towards the other things my computer affords, such as scrolling through Twitter. When these other activities are not in line with my current goal, we call it distraction. It therefore seems that any philosophical account of an agent’s intentional relationship to computers should take into account the possibility to be distracted. In the first part of the position paper, I will discuss and compare two candidate concepts that might be able to do this: enactive landscapes and fields of affordances. I will argue that fields of affordances are better suited, but in order to make the concept applicable to digital distraction, some more changes are needed, which I will briefly outline in the second part of the paper.

1. Enactive landscapes

I will start my analysis by introducing a concept that has previously made its way from ecological-enactive cognitive science to HCI. In an influential paper, David Kirsh (2013) introduces the concept of an “enactive landscape”:

Let us introduce the idea of an enactive landscape as the structure that an agent cocreates with the world when he or she acts in a goal-oriented manner. An enactive landscape is meant to capture the goal- or activity-dependent nature of the perceptual world. It is the merger of a few ideas: task environment – the states and actions that are related to the achieving the goals and interests of the agent, the broader set of outside things or properties that can be acted on by that agent, and the full range of properties that agent can discriminate. (Kirsh, 2013, p. 3:10)

The enactive landscape consists of the things that an agent is able to discriminate, is able to act upon, and that are relevant in the current task. Importantly, what the current task is, is specified by the goals and interests of the agent. By making enactive landscapes task-relative and given that (modern) agents typically multitask, Kirsh suggests that “there must be a superposition of dozens of enactive landscapes […] rising and falling with our shifting interests”(Kirsh, 2013, p. 3:11).

Now, clearly Kirsh takes a number of lessons from ecological-enactive cognition at heart: perception is active, the perceptual fields is a co-creation between agent and environment, perception is skill-dependent etc. At the same time, there is a double determination by the agent: the current goals of the agent make specific parts of the landscape stand out as relevant, the current interests of the agent determine the waxing and waning of different enactive landscapes.

1. THE FIELD OF AFFORDANCES

Recent work in ecological-enactive cognitive science has developed a number of concepts that are closely akin to enactive landscapes, but that differ with respect to the primacy of goals and intentions. I will draw mainly on The Skilled Intentionality Framework (SIF) as developed by (Bruineberg & Rietveld, 2014; de Haan et al., 2013; Rietveld & Kiverstein, 2014).

The point of departure for the Skilled Intentionality Framework (SIF) is that an agent’s directedness at the world can be understood as coordinating with a field of relevant affordances. Affordances are the action possibilities the environment provides for an agent with particular skills. In each concrete situation (writing this paper), some affordances stand out as relevant (to drink my coffee) and some leave us cold (to read the adjacent pile of papers). Some relevant affordances are focal to the field (to type a sentence on the computer) and some at the horizon, (to go and refill my coffee), or temporally (to go out for lunch). This multiplicity of affordances can be characterized as a *field of affordances.* The affordances in this field that stand out *motivate* or *solicit* an agent to act, relevant affordances are therefore also called solicitations. *Skilled intentionality* is an agent’s coordination with this field of relevant affordances.

De Haan et al., (2013) highlight three dimensions of the field (Figure 1). The width of the field of affordances refers to the multiplicity of action possibilities. There is more than thing I can do here and now. The depth of the field of affordances refers to the temporal aspect, some affordances are available here and now, others are further on the horizon, only there as anticipated possibilities. Lastly, the height of the field of affordances refers to the relevance or soliciting character of an affordance. Some affordances will strongly demand action, while others are mere possibilities.



Figure 1: Dimension of the field of affordances (see text for explanation). Creative Commons license applies (de Haan et al., 2013).

1. COMPARISON

One marked difference between a field of affordances and an enactive landscape is that there is only one field of affordances. When my phone rings and I see a friend calls, this does not raise a new field, but reorganizes the fields of affordances.

So what are the relative advantages of those two (closely related) constructs? It seems to me that enactive landscapes are somewhat easier to operationalize. If an interface designer can assume an agent with particular goals and interests (i.e. being in on-line contact with their friends), they can optimize the cocreation between agent and world for the process to unfold as smooth as possible. They do not need to worry about what happens when the goals and interests of the user changes (they simply move to a different enactive landscape), or whether spending lots of time in that enactive landscape changes the user’s goals and interests.

The primacy of goals and interests have lately come under scrutiny. In their workshop paper, Bennett et al. (2021) approvingly cite Hornbaek and Oulasvirta (2017):

HCI, via its concepts, has had an overwhelming tendency to understand interaction as one-sided—as channeling and realization of *human* intentions through a computer, furthermore assuming that these intentions are outside the realm of interaction itself. (p.5047)

By taking goals and interests as a primitive of the theory, I see Kirsh’s *enactive landscapes* concept as an illustration of this tendency. This one-sided view of interaction brings with it a particular division of labor between agent and environment. The agent has its goals and interests, the (digital) environment is a means for obtaining these goals. The task description of HCI then is to design an interface that facilitates obtaining these goals.

This one-sided view is not just a philosophical or theoretical issue, but one with very real consequences. For example, it makes it difficult to theorize distraction, bad habits, excessive task-switching and similar problems that we encounter in everyday situations. (see (Wu, 2017) Chapter 11 for an entertaining example).

The question is whether the concept of a field of affordances can fare better. If not goals and intentions, then what shapes the field of relevant affordances? There is no simple answer here. De Haan et al., (2013) state that the field of affordances is tied to a concrete situation, and also relative to an “individual’s abilities and concerns” (p.7). Bruineberg and Rietveld (2014) start to articulate the reorganization of the field of affordances using the tools of dynamical systems theory and self-organization. Crucially, in both works, goals and intentions are not mentioned as organizers for the field of affordances. The reason is what Dreyfus calls “the direct perception of significance” (Dreyfus, 2007, p. 258). The field of affordances is the result of the agent’s previous experience and directly resonates to the affordances of the environment. We *find* ourselves solicited in a particular way.

Of course it might very well be that an agent has a goal. But importantly, goals are not pre-existing states of minds that determine openness to affordances. I might have the goal to write an e-mail, but am still solicited by a social media feed. This mismatch between what we want (eating healthy) and what we are attracted to (the bag of chips) is a given, our theoretical apparatus should reflect this possibility.

1. Open problems for fields of affordances in HCI

In closing this paper, I want to articulate two conceptual problems that stand in the way of harmonizing theoretical positions. These might be relevant for further discussion during the workshop.

* 1. Skill, habit and the dogma of harmony

Bruineberg and Rietveld (2014) limit their account to “skilled intentionality”. By focusing on skilled actions, they excluded a discussion of how skills are acquired and fine-tuned. At the same time, this reflects a rather optimistic view of human intentionality: we are continuously moved to improve to refine our skills. The prototypical expert is someone who is directly solicited by that what is relevant in the given situation. Although this might be a nice ideal, it not clear whether this is characteristic of everyday intentionality.

A more general issue with 4E cognition (most prominently in relation to technology) is what Jesper Aagaard (Aagaard, 2020) calls “the dogma of harmony”: a tendency in 4E cognition to focus on cases of cooperation between humans and technology and a deemphasizing of conflict. This harmony is not an a priori given, and, when it comes to engagement with digital technologies, hardly empirically defensible.

One option might be to tease apart skilled and habitual intentionality. While skilled intentionality is the kind of pinnacle of human cognition (i.e. someone who is completely attuned to the demands of the situation), the more realistic scenario is one of habitual intentionality. This might still be characterized by a field of affordances, but now the things that are relevant will not always be in line with my concerns. Twitter’s solicitation when writing my e-mail needs to be actively resisted. The relationship between skills and habits is an intricate one (Romdenh-Romluc, 2013).

* 1. Digital affordances

The last issue I want to raise pertains to technological mediation. Tools have played an important part of phenomenology. The paradigmatic examples is Heidegger’s analysis of the hammer. When all is going well, the hammer becomes phenomenologically transparent, we see the world through the hammer as affording hammering. Similar analyses can be made for the blind person’s cane or for sensory substitution devices (Wheeler, 2019). Through the cane, the skilled blind person experiences their world. In such cases, the field of affordances is mediated by the tool, the tool itself is transparent.

At first sight, something similar holds as well for digital technologies. The agent’s computer might become phenomenologically transparent. But whereas the cane extends the spatial reach of tactile perception, the computer has a different kind of transformative effect. We see with these devices into a new, highly designed, space in which action possibilities are structured in a radically new way: games, social media, news articles and work e-mails are all available with the virtually effortless swipe of a finger. One challenge here is that I am not talking about a *virtual reality* in which an agent is immersed, but about a hybrid niche in which an agent can easily switch between engaging with digital and non-digital affordances. The question is how to conceive of, and operationalize such a hybrid niche.

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