Locating Theories of Embodiment Along Three Axes: 1st - 3d person, body-context, practice-cognition

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ABSTRACT

Embodiment is a multifaceted concept. We contribute to a clearer understanding of embodiment theories by suggesting three broad distinctions useful for comparing different approaches: whether they aim for experiential or objective accounts, focus on the body or the context, and whether emphasis lies on cognitive structure or practice.

Author Keywords

embodiment; theory; embodied cognition

INTRODUCTION

The concept of embodiment grows in prominence, ever since Dourish's book 'Where the Action Is' [6]. But there are various understandings of embodiment (cf. [33]). We here try to disentangle different notions of and perspectives on embodiment used in interaction design and HCI, and to structure this theoretical space.

Dourish proposed *embodied interaction* as a unifying concept for HCI, derived from phenomenology via ethnomethodology. He emphasizes that embodiment is about a state of engaged participation and situatedness of being-in-the-world. Other researchers build on Merleau-Ponty, and argue that a discussion of embodiment cannot ignore the body [12, 28, 31, 32], while Dourish acknowledges he is less interested in the role of the body: "Indeed the lessons I want to draw from the phenomenological perspective will be broader and less specific than those that primarily occupied Merleau-Ponty" [6]. While most theories of embodiment have a common root in the phenomenology of Heidegger, they have developed in different directions and within different disciplines. Embodiment is often characterized in opposition to traditional cognitive science. However, recent cognitive science work has rejected the Cartesian separation of body and mind, particularly the idea that cognition is achieved by manipulating amodal symbols in the brain without any reference to experiencing the world, and has begun to investigate phenomena that resonate with phenomenological approaches and concepts, i.e. that cognition is situated and grounded in bodily experience [2, 5].

THREE BROAD DISTINCTIONS

Embodiment refers to some aspect of our being living, feeling, bodily entities situated in a physical world. This is captured in the German word 'Leib', whereas 'Körper' refers to a merely physical entity. Thus 'embodiment' should not be confused with notions of 'representational artefacts that <embody> data in physical form'. For similar reasons, most of the emerging area of whole-body interaction, which explores the body as 'input device', and designs more of the body into human-product interaction, or the original TUI promise of enhancing the bandwidth of interaction by building on bodily skills [16], does not really address embodiment. These approaches tend to be fairly a-theoretical, using a simple notion of embodiment, and are driven by exploration and practical technical development.

Theories of embodiment focus on how our bodies and active experiences shape how we perceive, feel and think. This contrasts with a view of human cognition based on abstract information processing. However, rather than a single coherent theoretical perspective, there are a number of different traditions and emphases (cf. [20, 33, 36]). This often results in confusions and misunderstandings, especially for newcomers to this area of work. We feel that the diversity of the concept can be of benefit and propose three broad distinctions for comparing theories of embodiment. Each is characterized in terms of opposites.

The first distinction refers to whether the approach aims for experiential (1st person) or objective (3rd person) accounts; the second relates to whether the primary focus lies on body or context; and the third on whether there is an emphasis on accounts of practice or underlying cognitive structure.

a. 1st or 2nd person approaches	**b.** 3rd person accounts
1. focus on body	**2.** focus on context
x. practice descriptions	**y.** cognitive structure

Table 1. Three key distinctions of theories of embodiment

These distinctions are not dichotomous. While most approaches can be classified as either first- or third-person, classification in terms of body versus environment/context and structure versus practice is often a gradual difference and more a question of emphasis. While not always clear-cut, this classification can be helpful when comparing approaches/theories and identifying their utility regarding foci of research. We now briefly describe the three distinctions.

1st (and 2nd) Versus 3rd Person Approaches/Accounts

1st-person can be distinguished from 3rd-person approaches by their focus on personal experience, of 'what something is like' or on the perspective of the individual. Traditional science methods are characterized by the belief in an external, objective reality that can be scrutinized through observer-independent experiments. Nagel's paper 'what is it like to be a bat' [24] captures the dilemma of studying consciousness through 3rd person methodologies. In HCI, 3rd person embodied approaches to studying movement will focus on issues like the moving body's information capacity [26], its biomechanics, on tracking technologies, or on accurate notation, e.g. to document a choreography. 1st person approaches focus on questions such as how an individual experiences movement, for example, how it feels to perform different kinds of movements that may (or not) be tracked by technology [12, 13, 19]. This can then lead to investigations into how to enhance this experience and to improve bodily awareness.

1st person approaches embrace subjectivity, including the subjectivity of the researcher. McCarthy and Wright [21] investigate '*felt life*', to analyze the multi-faceted nature of an experience: "We use the term felt life rather than just life, to help us keep our attention on the fact that lived experience is an embodied experience" (p13). 1st person methodologies are philosophically grounded in phenomenology and pragmatism, and include introspective psychology methods [34]. They value attention to self-experience and the senses (somatics) [13, 19, 29] and rely on methodological rigor in how attention is directed to experience and how it is described. Rather than for repeatability and objectivity, they aim for relevance and rich descriptions that other people resonate with. Phenomenological accounts aim to go beyond conscious experience, addressing pre-reflective experience. A challenge lies in going beyond superficial layers of experience. Related to 1st person methodologies are 2nd-person approaches [34], which attempt to gain an understanding of the phenomenology of someone else's experience. Examples of these approaches include interpretative interviews that focus on a person's experience [25, 27, 35] and dialogical methods described in [21]. Ethnomethodology may also be characterized as 2nd-person approach, as its focus is on the mechanisms through which actors maintain intersubjective understanding, although others may describe this as a 3rd-person view.

Body Versus Context

While theories of embodiment acknowledge that having a body shapes our experience and attitude towards the world, and moreover, our cognition, the role of the body differs within these approaches. Some focus on the body itself, others on human interaction with the world and social and physical context through the body – although this link to the body is sometimes implicit or underexplored [7]. This is a more gradual distinction, and some approaches attend to both body and context to some degree. Approaches to felt life might focus on how we experience a situation, including our sensory engagement with it [21] or focus on the 'felt body' and how to design for it [12, 13, 19, 29, 31].

Some embodied cognition approaches (also referred to as grounded cognition [2]) investigate how the body influences cognition, i.e. how sensorimotor experiences with the world shape abstract concepts (image schemas, such as inside-outside, up-down) [18, 14], or how physical changes to the body, such as adopting a different posture can induce changes in emotional or attitudinal states and social perceptions [1]. Other approaches focus on the situated nature of cognition, and interpret the environment as part of the cognitive system [15] or how cognition evolved to support action. But situational cues can also be shown to influence image-schematic metaphor interpretation, and (embodied) users' interpretation of common image schemas may be considered situated [14].

Approaches focussing on either body or context may have divergent origins, and theories from the same epistemological lineage may attend more to body or to situation. Phenomenological approaches may study experience of moving the body (or even of pain) via interviews and introspection. The role of the body for cognition can also be studied empirically using cognitive science methods and brain imagining, discovering e.g. the existence of mirror neurons or that the speed of mental rotation is related to the ease of doing the same movement in real [2]. It is fascinating that neurological and cognitive science studies in the new area of embodied cognition come to verify and explain the existence of phenomena that used to be the realm of first-person methodologies, e.g. mirror-neurons explaining empathy. Furthermore, concepts of the body may focus on very different aspects of the body (bodily knowledge, expressivity, skill, felt experience, social/cultural etc.) (see [20]).

Phenomenology [22] states that we, by having bodies, are necessarily situated in the world, and thus always engaged with and directed towards it. Human action is fundamentally concrete and embodied, situated and social [30]. Thus, body–context is not an exclusive distinction (cf. [33]), but emphasis may be on one or the other. Heath and Luff's work [10] combines both foci, focusing on the role of embodied conduct in situated action. Heideggerian followers tend to emphasize human social and cultural situatedness, engagement with the world and interactive sensemaking, whereas in the branch of phenomenology started by Merleau-Ponty, the body takes a central role. The former was adapted in HCI by [6, 21, 30] and others, while [8, 12, 28, 33] are proponents of body-focused embodiment in HCI.

Practice Versus Cognitive Structure

McCarthy and Wright [21, cf. 9] describe a 'turn to practice' in HCI, which is sensitive to the circumstances of use, and based on empirical (often ethnographic) analysis of technology in use. Work in this tradition emphasizes how human action is practically carried out by people in every-

day life [9] and tends to provide descriptive, thick descriptions. Ethnographic approaches attempt to understand practices from 'the inside', that is how they make sense to participants, while ethnomethodology attempts to identify the mechanisms through which social order is maintained. The practice-turn is strongly related to focus on context. While practice theories are interested in intersubjectivity, they tend to emphasize situatedness and social nature of action, to marginalize the individual and thereby ignore 'felt life' [21], but they may have more of a social or body focus [6, 9, 10, 28, 30].

The majority of work on embodied cognition, for example work on image schemas [18, 14], falls into the 'cognitive structure' side, focusing on understanding the underlying structures governing human cognition and in HCI, attempting to understand how existing cognitive structures might influence interaction with technology. Other work in cognitive science attempts to understand the cognitive work carried out by the body, for example by gestures [17].

DISCUSSION

Despite differences in foci (1st or 2nd vs. 3rd person, body-context, practice-structure), many approaches in the literature have a shared lineage from phenomenology (Husserl, Heidegger) with a focus on the life-world. Our suggestion of three distinctions does not cover all potential differences between approaches. For example, we might distinguish between the aim to *increase awareness* of the felt body (somatics and somaesthetics) and to *decrease awareness* of interaction by using subconscious body-based knowledge (image-schema metaphors), or between 'real-time' effects of the body on cognition and its 'offline' residue in cognitive structures. But the proposed distinctions can help to differentiate a wide range of approaches, and may be useful as thinking tool to highlight differences and similarities in focus despite possibly diverse origins and methodologies. In the following, we sketch the space created from the permutations of the distinctions, giving non-exhaustive examples of the kind of work that fits in the space.

1st or 2nd Person – Body – Practice (a.1.x):
The clearest candidates for this section all investigate the 'felt body' using somatic approaches or attempt to increase bodily awareness [12, 13, 19, 29], respectively to design for somatic aesthetics [31]. Depending on where we place ethnomethodology regarding 2nd or 3rd person approach, work in this tradition, for example on the role of the body in social interactions with medical equipment from the actors' perspective [11], may also fall into this section.

1st or 2nd Person – Context – Practice (a.2.x):
1st person approaches that focus on felt life and how situations are experienced fall into this section. This includes McCarthy and Wrights' [21] dialogical methods and the kinds of interpretative interviews that elicit a 2nd-person phenomenology of someone's else's experience [27, 35], although these might also be employed to inquire about the felt body. It thus depends on the focus of a study (rather than its methodology), where exactly to position it.

1st or 2nd Person – Body/Context – Cognitive Structure (a.y):
Given that 1st person methodologies focus on individual experience and embrace subjectivity while a focus on structure implies generalization, little work exists in this area so far. A candidate for the body-focus is [25], who extract a vocabulary for tactile perception from phenomenological explication interviews for a set of defined stimuli. Work on perceptual supplementation or extension (e.g., [4]) that explores the malleability of the experienced body schema could also be included in this category, although it can also be studied using 3rd-person approaches [23].

3rd Person - Body – Practice (b.1.x):
Here we locate approaches and theories based on observation (thus 3rd person) of bodily practices. This includes so-called practice-based theories based on anthropological descriptions of practice which focus on embodied conduct, the ways people use their bodies in the unfolding organisation of social action. Notational systems for describing body movement, which are grounded in practice and support it (e.g. choreography), such as Laban notation (see [19, 29]) also fit in here.

3rd Person - Context – Practice (b.2.x):
Practice-based theories are characterized by emphasis on how human action is practically carried out by people in real life situations. Theoretical approaches with a focus on situated action [6, 30] fit in here, as do ethnographical approaches that straddle the body-context distinction (e.g. [10]. Moreover, distributed cognition, e.g. Hutchins' work [15] emphasizes the situated nature of action.

3rd Person - Body – Cognitive Structure (b.1.y):
Many studies in grounded cognition [2] or on sensory substation and extension [23] fall into this category. It has been shown that physical changes to the body, such as adopting a different posture, can induce changes in affective or attitudinal states and social perceptions [2]. Increasing levels of bodily involvement can enhance user engagement in gameplay [3]. As mentioned, work on image schemata [18, 14] investigates how past sensorimotor bodily experiences shape cognitive structure. Image schemas develop through early experience in the world and this experience is constrained by the body's sensorimotor capabilities, but also by situational constraints. Acquisition of image schemas thus falls into the body side of the distinction, whereas the triggers are often situational.

3rd Person - Context - Cognitive Structure (b.2.y):
Once developed, image schemas are triggered not only by bodily postures but also by experiencing situations. Cognition about dominance can be cued by assuming a straight posture. Work on the practical usage of image schemas in HCI [14] tends to emphasize the situation, which can be designed. The treatment of the environment as part of the cognitive system by distributed cognition theorists is also

included in this category [15]. However, where the links are considered so fundamental that the features of the external world can be considered part of the body schema as, discussed above, in work on perceptual extension or supplementation, we prefer to think of this as either 3rd person – body – structure or 1st person – body – structure.

A BRIEF CONCLUSION

Instead of a single view on embodiment there are diverse approaches and theories. We believe this variety is fruitful and can inspire. Here we have attempted to provide some structure to this diversity, to assist in comparing approaches. As we saw, a number of approaches blur the distinction between body and situation or focus equally on both. This might call for a refinement of our set of distinctions, but nevertheless shows that the exercise of trying to locate approaches yields clearer insight into their different foci.

REFERENCES

1. Barsalou, et al. (2003) Social embodiment. In Ross (Ed), *The Psychology of Learning and Motivation*, 43, 43-92.

2. Barsalou, L.W. Grounded cognition. *Annual Review of Psychology, 59* (2008). 617-645.

3. Bianchi-Berthouze, N., Kim, W., Patel, D. Does body movement engage you more in digital game play? And Why? *Proc. of ACII'07.* Springer 2007, 102-113

4. Bird, J., Marshall, P., Rogers, Y. Low-Fi Skin Vision: A Case Study in Rapid Prototyping a Sensory Substitution System. *Proc. of HCI'09* (2009), 55-64.

5. Clark, A. *Being there: putting brain, body and world together again.* Cambridge, Mass.: MIT Press 1997

6. Dourish, P. *Where the Action Is: The Foundations of Embodied Interaction.* Cambridge: MIT Press 2001

7. Dourish, P. Epilogue: Where the action was, wasn't, should have been, and might yet be. *ACM ToCHI 20, 1*, 2013

8. Fallmän, D. *In romance with the materials of mobile interaction: a phenomenological approach.* Doctoral thesis, Umea University, Sweden 2003

9. Fernaeus, Y., Tholander, J., Jonsson, M. Towards a new set of ideals: consequences of the practice turn in tangible interaction. *Proc of TEI '08.* ACM 2008, 223-230.

10. Heath, C., Luff P. *Technology in Action.* Cambridge: Cambridge University Press 2000

11. Hindmarsh, J. and Pilnick, A. Knowing bodies at work: Embodiment and ephemeral teamwork in anaesthesia, *Organization Studies, 28 (9)* (2007): 1395-1416.

12. Höök, K. Transferring qualities from horseback riding to design. *Proc. of NordiCHI '10.* ACM 2010, 226-235.

13. Höök, K. et al, (2015) *Somaesthetic Design.* Interactions, 22 (4). pp. 26-33.

14. Hurtienne, J. *Image schemas and design for intuitive use.* PhD thesis, TU Berlin 2011

15. Hutchins, E. *Cognition in the Wild.* MIT Press 1995

16. Ishii H., Ullmer, B. Tangible bits. *Proc of CHI '97.* ACM 1997, 234-241.

17. Iverson, J.M., Goldin-Meadow, S. Why people gesture when they speak. *Nature vol 396*, 1998, 228

18. Lakoff, G., Johnson, M. *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought.* New York: Basic Books 1999

19. Larssen, AT. *How it Feels Not Just How it Looks.* PhD theses, University of Technology Sydney, 2010

20. Loke, L., Robertson, T. The Lived Body in Design: Mapping the Terrain. Proc. of OzCHI'11. ACM 2011, 181-184

21. McCarthy, J., Wright, P. *Technology as Experience.* MIT Press 2004

22. Merleau-Ponty, M. *The Phenomenology of Perception.* London: Routledge & Kegan 1962.

23. Nagel, S.K, et al. Beyond sensory substitution—learning the sixth sense. *J. Neural Engineering* 2(4):13–26, 2005.

24. Nagel, T. What Is It Like to Be a Bat? *The Philosophical Review Vol. 83, No. 4.* (1974), S. 435-450

25. Obrist, M., Seah, S.A. Subramanian, S. Talking about tactile experiences. *Proc. of CHI '13.* ACM, 1659-1668

26. Oulasvirta et al. Information capacity of full-body movements. *Proc. of CHI '13.* ACM, 2013, 1289-1298

27. Petitmengin, C. Describing one's subjective experience in the second person. An interview method for the science of consciousness. In press at *Phenomenology and the Cognitive Sciences*

28. Robertson, T. The Public Availability of Actions and Artefacts, *CSCW, v.11 n.3* (2002), 299-316,

29. Schiphorst, T. *The Varieties of User Experience: Bridging Methodologies from Somatics and Performance to HCI.* PhD theses University of Plymouth, UK 2008

30. Suchman, L. *Plans and Situated Actions.* Cambridge: Cambridge University Press (1987)

31. Sundström, P. et al. Experiential artifacts as a design method for somaesthetic service development. *Proc. of RDURP '11.* ACM, NY, 33-36.

32. Svanæs, D. Kinaesthetic thinking: The tacit dimension of interaction design. *Computers in Human Behavior vol. 13, Iss. 4* (1997), 443–463

33. van Dijk, J., van der Lugt, R., Hummels, C. Beyond Distributed Representation: Embodied Cognition Design Supporting Socio-Sensorimotor Couplings. Proc. of TEI'14. ACM 2014, 181-188

34. Varela, F., Shear, J. Introduction. In. Varela, Shaer (eds). *The View from Within. First person approaches to the study of consciousness.* Imprint Academic 1999

35. Vermersch P. *L'entretien d'explication.* ESF, 1994

36. Wilson, M. Six views of embodied cognition. *Psychonomic Bulletin and Review, 9(4)* 2002. 625–-636.