

Affordances revisited: Articulating a Merleau-Pontian view

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Abstract This article takes a renewed look at the concept of ‘affordance’. It points out that the concept is being used within the CSCL community in ways which signify an underlying disagreement concerning the exact ontological nature and epistemological status of an ‘affordance’. Such disagreement, it is argued, is a problem for both design and empirical research. Since HCI discussions of the concept have informed CSCL, views presented within this discourse are discussed. A Merleau-Pontian account of affordances is developed, building on his view of the human being as always already being-in-the world in a non-thematized, pre-reflective correspondence of body and world in the concrete activity. A dynamic, agent-centred, cultural-, experience- and skill-relative, but perception-independent, ontology is proposed for affordances. Towards the end of the article, examples are given of how the Merleau-Pontian account of affordances may shift the focus of empirical research and of design processes within CSCL.

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Situating the article—why revisit affordances?

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Over the last decades the Gibsonian concept of “affordances” (Gibson 1986) has been widely used in research on human-computer interaction (HCI), in discussions of the design of information and communication technology (ICT) as well as of its use (Norman 1989; Gaver 1991; McGrenere and Ho 2000). The agent-centred focus of the concept and the

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interrelatedness of action and perception implied by it at both a theoretical and a practical level make it appropriate for the analysis of the role of artefacts in human practice (Norman 1989). Likewise, in recent articles, the concept has been acknowledged and interpreted within the context of computer-supported collaborative learning (CSCL) by a number of different authors for a variety of purposes and on the basis of rather diverse theoretical perspectives.

To illustrate this wide acknowledgement and the diversity of purposes and perspectives, a few notable examples should be mentioned: Kirschner, Martens, and Strijbos develop a six-stage model for “the design of efficient, effective and satisfying CSCL environments” (Kirschner et al. 2004, p. 17) based upon the distinction between three types of affordances, that is, technological, educational, and social affordances. Suthers argues for an integrating research agenda for the CSCL community, which is to consist of the study of technology affordances for intersubjective meaning making, and stresses that “understanding the affordances technology offers for intersubjective meaning making is as foundational to CSCL as understanding learning” (Suthers 2006, p. 324). In concrete realization of this claim, Dwyer and Suthers challenge conventional design wisdom through their empirical study of the functionally equivalent communicative practices which pairs of students enacted in collaborating on “wicked” problems (Rittel and Webber 1973) and specifically through their documentation of how the dyads in complex, contextually developed ways appropriated some of the affordances of the material environment, whilst ignoring others (Dwyer and Suthers 2006). Jones, Dirckinck-Holmfeldt, and Lindström argue for the importance of the concept of affordances in understanding that “designers have limited direct control over how their designs are enacted” and that design must, therefore, necessarily be *indirect*, that is, a design *for* learning as opposed to the belief that learning and learning environments can be designed directly (Jones et al. 2006, p. 51). In the context of presenting an argument for the necessity of conceptualizing the interrelations between macro-scripts¹ and the technological dimensions of their operationalization, Tchounikine, referring to the latter article, stresses the helpfulness of the “affordance notion...in understanding that the fact that designers have limited control over how their designs will be enacted is not a matter of ‘good’ or ‘bad’ design” and that, conversely, the view that “a computer-based system is [considered] appropriate for students on the premise that it has been designed with respect to the task to be achieved by these students is a rather technocentered view” (Tchounikine 2008, p. 206). Finally, Kaptelinin and Hedestig underline the analytical force of the concept in understanding empirical computer-mediated learning situations when they maintain, concerning their case study of a videoconference learning environment, that most of the breakdowns they observe can be explained as a mismatch between “perceived” and “actual” affordances in the environment (Kaptelinin and Hedestig 2008).

However, as evidenced, in effect, by the very variety of perspectives from which the concept is judged useful, and as advocated more explicitly by Jones et al. (2006), the rethinking and development of a theoretical coherent concept of affordance is an important issue for the CSCL community at the current stage of its research: Underneath the seeming common acceptance of the analytical force of the concept lies a disagreement as to the exact ontological nature and epistemological status of an “affordance.” Such disagreement is a

¹ For the distinction between macro- and micro-scripts cf. Dillenbourg and Tchounikine (2007). Macro-scripts denote “coarse-grained scripts” aimed at creating *learning situations* in which interactions between learners can take place. Micro-scripts, conversely, refer to “finer-grained scripts” which scaffold the *interaction process* itself by, for example, prompting specific conversational turns.

problem because divergent implicit ontological and epistemological understandings of the concept will inform both design processes and empirical analyses differently, potentially leading to tensions and misunderstandings in both areas at the practical as well as at the theoretical level.

A concrete example of the problem, that is, of the way divergent understandings result in theoretical tensions with implicated potential practical difficulties, is displayed in the relationship between the views of Tchounikine (2008), on the one hand, and Jones et al. (2006)—a text, which Tchounikine draws upon, but without commenting on the differences in outlook—on the other: Ontologically, Tchounikine equivocates between the essentialistic ascription of affordances to objects per se (“the affordance notion denotes the natural or design aspect of an object which suggests how the object should be used,” Tchounikine 2008, p. 206) and a more relational ascription of the concept to the situated activity of the students (“The characteristics of the technological setting [i.e., what was denoted ‘affordance’ in the first citation, NBD] will be picked up in different ways by students, who will appropriate them according to their purposes, and in context [this contextual appropriation in relation to current purposes being the reference of ‘affordances’ in the current citation, NBD]”, Tchounikine 2008). Epistemologically, the perception-action coupling for the agent is stressed on both ontological renderings; in the essentialist view through the tying of “affordances” to “suggested use” and in the more relational view through the implicit statement that something is only an affordance when perceived in context as such in relation to current purposes. These dualist, essentialist-cum-perception-dependent understandings of “affordances” are in direct opposition to the relational view advanced by Jones et al. (2006) who explicitly stress that their view is “non-essentialist, non-dualist and does not rely on a strong notion of perception,” because affordance is seen as “a property of the world in interaction,” a property which exists “in relationships between artifacts and active agents...whether or not the potential user of an affordance perceives the affordance.” (p. 42). Methodologically, Jones et al. seek to capture the ontology of affordances at an analytical “meso-level,” between the micro-level of local interaction and the macro-level of large-scale policy and institutional processes. This is in contrast to the individualistic and mentalistic approach of Tchounikine who understands the gap between design intentions and actual use as a gap between the *models* of the technological offerings held by the designers and the students, respectively. In terms of practical implications, the theoretical divergences between the views of Tchounikine and Jones et al. lead to different foci for both design and empirical research: Given the former view, design questions concern, for example, the degree to which “suggestions of use” should be unambiguous, facilitating an unproblematic perception, on the part of the students, of the model of the designers. This question is indeed discussed by Tchounikine as well as by Dillenbourg and Tchounikine (2007) in the context of considerations of how to balance between the potential merits of targeting learning experiences and the potential dangers of constraining them. Empirical analyses of actual learning situations correspondingly will focus, for example, on gaps between designer models and the models implicit or explicit in student perceptions of the technological offers. Design questions and empirical analyses of the approach of Jones et al., on the other hand, would have their focus on the meso-level, centering not on alleged “suggestions of use” in the artefacts themselves, but on relationships in interaction in the enactment of the design.

The aim of the present article is to contribute to the theoretical explication of the concept of affordances as requested by Jones et al. (2006). Because the understanding of the concept within the CSCL community is, to a large extent, mediated by the discussion of the concept within the field of HCI, and especially by the view of Norman (1989 and 1999) (cf.

e.g., Kirschner et al. 2004; Suthers 2006; Tchounikine 2008; Kaptelinin and Hedestig 2008), the article starts with a consideration of the position of McGrenere and Ho (2000), based as it is on a comprehensive comparative review of the HCI discussion; and follows this up with a reflection on the problems inherent in Norman's view. On the basis of this, the author's own perspective is presented. Examples from everyday life involving the use of ICT and other artefacts are discussed as illustrations of the theoretical arguments. Toward the end of the article, the question of the implications which the presented view of affordances has for the design and empirical study of CSCL environments is taken up.

The view to be presented here follows the suggestion of McGrenere and Ho (2000) of returning to an understanding of the concept more in line with the original Gibsonian one. This understanding is expressed by McGrenere and Ho by the claim that affordances are "relative to the action capabilities of a particular actor" (McGrenere and Ho 2000, p. 1). It will be argued, however, *pace* McGrenere and Ho, that this understanding implies a dynamic, relational, cultural- and skill-relative interpretation of the concept as opposed to the culture-independent, essentialist conception proposed by them. To emphasize this non-dualist and ecological character, the term "interaction potential" will, therefore, be used instead of "action capabilities." Furthermore, it will be claimed that an adequate account of the "interaction potential" of someone cannot restrict itself to an analysis of "knowledge in the head or in the world" (cf. Norman 1989, chap. 3), but must consider the role of the body in determining both. In discussing this role, I shall draw on the phenomenology of Merleau-Ponty (1962), arguing that his concept of "body schema" is complementary to the concept of "affordance" and illuminative for the sense in which "an affordance is neither an objective property nor a subjective property; or it is both if you like" (Gibson 1986, p. 129). In relationship to the two views preliminarily discussed above in exemplifying the diversity of understandings within the field of CSCL, the view to be developed here agrees with Jones et al. (2006) in ascribing a relational, non-dualist, but perception-independent ontology to affordances. It does not, however, necessarily involve taking a meso-level approach to the study of affordances. Rather, in this respect, it agrees with Tchounikine in maintaining a focus on the individual agent. In the more concrete analysis of individual agency, though, models and representations are not understood to play as essential a role as they do for him.

Affordances as relative to "interaction potential"

Gibson introduces the term "affordance" in the following way: "The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill... [The word *affordance*] implies the complementarity of the animal and the environment." (Gibson 1986, p. 127). Confining ourselves to human beings, an affordance is an affordance *for* someone, that is, it only exists *as* an affordance *relative* to an agent. The fact of something being an affordance for someone is, however, according to Gibson, an objective matter, independent of the current needs of that someone and independent also of his/her ability in the concrete situation to perceive the affordance (Gibson 1986, p. 138f, p. 142f): A chair affords sitting for me regardless of whether I now want to sit or stand, and the computer mouse affords clicking for me regardless of the fact that for the moment it is hidden under the wealth of paper on my desk. The mouse would even afford clicking for me had it been designed to look like something else (e.g., a banana) so that I could not right away see that it *was* a computer mouse. On the other hand, it most definitely would *not* afford eating just because I perceived it as a banana.

Interpreting Gibson's emphasis on the perception- and need-independent existence of affordances, McGrenere and Ho propose two claims: 1) It is necessary to distinguish as independent the *existence* of an affordance and the *information* specifying it. 2) A person's ability to discriminate the information specifying a given affordance may depend on his/her experience and culture, but the existence of the affordance does not (McGrenere and Ho 2000, p. 2). In other words, on McGrenere and Ho's view, the action possibility exists as an objective feature of the environment irrespective of culture and learning, but it may be necessary to learn to see that it is there.

This view is highly problematic, especially when combined with a prior statement of the authors, according to which a fundamental property of an affordance is that it "exists relative to the action capabilities of a particular actor" (McGrenere and Ho 2000, p. 1). The implication is a very unclear notion of "action possibility for" and "action capability of" a given person; that is, a notion, in which the "possibilities" and "capabilities" of this person is without any reference to what he or she is actually able to do in any concrete situation. For what a person *is* actually able to do is definitely dependent on culture, prior experience, and learning. Instead, the "possibilities" and "capabilities" of someone seem to have to be defined in relation to some abstract point or logically possible world, in which the person possessed all the capabilities he or she could possibly be conceived to come to acquire in whatever settings necessary. Whatever that means, and however one were to determine what those capabilities would be. Defined in this way, "affordance" does not seem to be a particularly useful concept. In the context of design, it would seem to lead to designing only for "potential users" with a total neglect of the actual skills of actual users, predictably with many frustrations of the latter as a consequence.

The problem here is not the relating of "affordances" to the capabilities of a particular agent. Neither is the problem the emphasis on the distinction between affordances and perceptible information about affordances. Instead, the problem is the failure of McGrenere and Ho to acknowledge that not only do you often have to learn to *see* the use of something; you also, in most cases, have to actually *learn to use it* for it to present an "action possibility" for you. And that, therefore, the existence of an affordance *does* depend on culture and experience in the sense of the German *Erfahrung*, though it does *not* depend on actual perception here and now and, therefore, not on experience in the sense of the German *Erlebnis*. It should be noted that when Gibson speaks of affordances as experience-independent, it is in this latter sense of the word (Gibson 1986, pp. 137, 139–140). When above I emphasised that the chair for me afforded sitting and the computer mouse clicking, irrespective of my perception and current needs, the point was that *for me*, with my physiologically, personally, and culturally dependent skills, they provide such affordances. For the 3-month-old baby, the chair does not afford sitting, it affords falling-off-and-hurting-oneself, and the computer mouse does not afford clicking, it affords putting-in-the-mouth. This does not mean that the baby cannot accidentally click the mouse whilst putting it in the mouth, but it means that this accidental click is not an "action possibility" for the baby because it has not yet acquired the finger coordination skills necessary for making a click. Even if it had these coordination skills, it would still not have acquired the culturally dependent skills necessary for making use of the clicking in the further context of "using the computer." At most, the clicking would afford "making-a-certain-noise" for the baby. Likewise, a chair flung back into the days of Cro-Magnon would not afford him sitting; not because he would be physiologically unable to do so, but because culturally it would not present an "action possibility" for him.

A further problem of a more terminological nature concerns the phrasing of the relational character of affordances in terms of "action capabilities." Given an appropriate

ecological interpretation of the word “capability,” the phrasing seems suitable enough, but because such an interpretation is not the only (and perhaps not the most salient) one available, there is a risk of terminologically misleading readers to a dualist understanding of “action possibilities.” More specifically, the term does not quite capture the complementarity of agent and environment in that it might seem to point to a dichotomy between subjects who act and objects which are acted upon. Importantly, however, affordances are not only possibilities for action *by* the agent, they can also be possibilities of something acting upon him or her: An owl affords “being-eaten” for a mouse, an angry parent affords “being-scolded” for the child, and a webcam affords “being-seen-by-someone-somewhere-else” for the person in the room with the webcam. This kind of affordances could be termed “intransitive” affordances, implying that the action in question is not undertaken by the agent, but is happening to him/her. It should be noted, however, that “intransitive” affordances are also relative to the potential which the given agent has of interacting with the environment: In the case of the mouse, the owl’s affordance for it depends on the relative strengths and fighting capabilities of the two animals. Likewise, it is relative to the personal and social skills of the child that the loud wording of an angry parent can amount to being scolded. In order to more explicitly underline the complementarity of agent and environment, the term “interaction potential” has been chosen here in substitution of “action capabilities.”

On the face of it, the case of the webcam might seem to pose a difficulty for the claim that “intransitive” affordances are also relative to the “interaction potential” of the agent. This is so, because the transmission of pictures by the webcam does not rely on the skills of the being that is transmitted: A dog present in front of the webcam will be seen by the person receiving the signal, even though the dog has no computer skills. Actually, however, this alleged difficulty relies on a complete renouncement of a relational interpretation of affordances, that is, on the recurrence to an essentialist, non-agent-related understanding. In contrast, if one acknowledges (if only for the sake of the argument) the premise of returning to a Gibsonian relational view, consequently sustaining the relational focus on the agent, it becomes clear that one cannot reasonably say that the webcam “affords” “being-seen” for the dog at all, although it does afford “seeing-the-dog” for the person receiving the signal: It does not afford “being-seen” for the dog for the same reason that a computer game does not afford “playing” for the 3-month-old baby, even if the latter were accidentally to bite the click button of the mouse at exactly the rate needed to shoot down the monsters of the game: It simply does not make the necessary sense for the dog and the baby, respectively; and it could not make the necessary sense for them, given the interaction potential that they have.

What this boils down to, is the fact that affordance is necessarily tied to meaning, and that meaning is “meaning for someone.” This is what McGrenere and Ho do not take into account when they claim that the existence of affordance is culture-independent. Rather, they overlook that meaning is culture- and agent-dependent (though not “subjective” in the sense of “constructed by the individual”) and ascribe it an ahistorical, essentialist existence. Therefore, they end up with affirming an essentialist ontology of affordances; in point of fact not returning to a Gibsonian relational perspective, but to the very subject-object-dichotomy that Gibson was trying to transcend in the first place.

“Interaction potential” is a bodily potential

From the Gibsonian beginning, the concept of “affordances” was meant to elucidate an important aspect of the way an animal lives, perceives, and acts in its environment. Of

course, a very basic fact about animals, including humans, is that they have bodies and that they act by using their bodies. Interestingly, this fact has received relatively little attention in the discussion of the concept. Gibson himself had as his primary aim to give an alternative account of visual perception, starting from ecology rather than from the retinal image, and he stresses as essential that animals perceive as they *move around* in their environment, rather than from a still-life perspective (Gibson 1986, p. 72). In this way, perception is made sense of within the wider context of the behaviour of a bodily being. However, the implications of this wider context remain largely implicit, the focus being more on the information available in “the ambient light” than on the role of the body in structuring the information. The concept of “affordance” holds within it the incipience for an analysis of this role, by relating meaning to interaction potential, and by implying agency over and above mere moving around, but because this incipience has not been unfolded, it has been largely overlooked in the reception of the term, especially in the HCI community. An interesting exception is Bærentsen and Trettvik (2002), in which an activity theoretical perspective on affordance is developed. In line with the common activity theoretical trend, however, this paper, though discussing the importance of social practice, understands action as conscious, goal-directed behaviour and so tends to overrate the importance of consciousness and representation in sensemaking. The body is not viewed as in itself a resource of meaningful structuring of the environment, and, therefore, an essential aspect of agency is neglected in this paper as in others.

In striving to remedy this neglect, the fact must be taken seriously that we, as human beings, are bodily beings, and that “interaction potential,” whatever else it is, is a potential we have qua our body. Taking this fact seriously implies at least posing the questions to which degree the body itself can possess knowledge or “know how” and whether the body has any role to play in determining the meaning of its actions. Is the body just that “thing” which carries out the orders directed to it by the thinking human being? Is the “interaction potential” of an individual actually the capabilities of his or her mind, which, when practiced, are coupled with the more or less mechanical “executions” of these mental capabilities? This traditional Cartesian understanding of the relationship between mind and body seems to lie behind Norman’s original proposals for better design, building as they do on the proposition that knowledge can be “in the head and in the world” (Norman 1989, chap. 3) and that “knowing what to do” (Norman 1989, chap. 4) involves either constructing a “conceptual model” of the artefact to be used or “interpreting information in the world.” Although in a prior chapter Norman has distinguished two kinds of knowledge, *knowledge of* and *knowledge how*, and has discerned the latter to be “difficult or impossible to write down... and best learned through practice” (p. 57f), this does not lead him to question the necessity of mental models in “knowing what to do.” Quite to the contrary, “knowledge how” is declared to be largely subconscious (p. 58) and is not mentioned again in the book; and in discussing the skilled typist, Norman asserts that he or she gains speed and accuracy as the information on the keyboard is memorized in the head (p. 56), that is, as the information becomes “knowledge of” for the typist. “Knowledge of” is further asserted to include “knowledge of rules” (p. 57), which, it is later implied, is actually essential to skilful behaviour: “Those of us who study these things believe that guidelines for cultural behavior are represented in the mind by means of schemas, knowledge structures that contain the general rules and information necessary for interpreting situations and for guiding behavior” (p. 85f).

Passages such as these point readily to an understanding of skilful behaviour as primarily the mind’s work, carried out only secondarily by its mechanical transportation carriage, the body. Such an understanding is fully compatible with the view of affordances

advocated by Norman (both the original 1989—and the revised 1999—view) according to which affordances (or “perceived affordances” in the revised view) “result from the mental interpretation of things, based on our past knowledge and experience applied to our perception of the things about us.” (Norman 1989, p. 219). However, the question is whether this view of the relationship between knowledge and affordance is adequate. Norman himself acknowledges that his account is at variance with many Gibsonian psychologists (Norman 1989), including Gibson himself (Norman 1999, p. 39). As Dreyfus has argued extensively, it is disputable whether “those of us who study these things” really ought to (i.e., are justified if they) believe that skilful behaviour is rule governed (Dreyfus and Dreyfus 1986; Dreyfus 1992, 2001). From an empirical point of view, Norman’s claim is dubious, given the problems of cognitive computer scientists in handling the question of relevance and in constructing expert systems performing at the same level of skill as real experts (Dreyfus 1992; Copeland 1993; Clancey 1997). Philosophically, the claim is equally debatable, resting as it does on two problematic assumptions: (a) An ontological essentialist one according to which situations despite their seeming differences fall into disparate classes, each of which is characterized by fundamental features and/or structures. (b) An epistemological one to the effect that human knowledge of these fundamental features/structures and how to deal with them take the form of mental representations, for example, mental models and rule-following “scripts” (for a critique of these assumptions, cf. Wittgenstein 1984; Heidegger 1986; Merleau-Ponty 1962; Dreyfus 1992). From a common-sensical as well as a phenomenological point of view, Norman’s position simply seems to “miss a link” between world and head: However, is the information in the world to get into the head if not through the actions of the agent, a bodily being?

Instead of postulating mental models and rule-governed scripts to account for action, a much simpler and yet phenomenologically more adequate explanation is provided by saying that, first and foremost, the body is itself acting in accordance with the requirements of the situation. An obvious rejoinder to Norman’s description of learning to type well is that acquiring this skill is not a question of getting “knowledge about the keyboard from the world into the head,” but into the fingers. A skilled typist will not necessarily be able to say where the keys are placed on the keyboard—until he or she is placed with the fingers on a keyboard (with or without the key labels showing). Once so placed, the typist will, however, be able to use the knowledge of the fingers moving around on the keyboard to reconstruct the arrangement of keys. Just like the rest of us can often only remember passwords and pin-codes when standing in front of the machines we need them for. Even then, we do not remember these codes “in the head,” but through the movements of our fingers.

The Merleau-Pontian notion of “body schema”

What precisely is involved in saying that “the knowledge is in the fingers”? A route to an answer is provided by Merleau-Ponty’s *Phenomenology of Perception*, in which one finds a non-representationalist view of knowledge and skills. For Merleau-Ponty, we are as bodily beings always already in the world in a pre-reflective, non-thematized (and, therefore, non-representational) correspondence of body and world in the concrete activity in which we are engaged “Our bodily experience of movement is not a particular case of knowledge; it provides us with a way of access to the world and the object, with a ‘praktognosia’, which has to be recognized as original and perhaps as primary. My body has its world, or

understands its world, without having to make use of my 'symbolic' or 'objectifying function'" (Merleau-Ponty 1962, p. 140f). The body is "polarised by its tasks," has "existence towards them," thereby "collecting [itself] together ... in the pursuit of its aims" (Merleau-Ponty 1962, p. 101). In explicating this pre-reflective correspondence of body and world, Merleau-Ponty introduces the concept *schema corporel*, which confusingly has been rendered "body image" in the English translation. As argued by Gallagher, the translation ought to be *body schema*, leaving the former term to refer to the conscious representation that a person may have of his or her body (Gallagher 1986).

The "body schema" is the way one has and knows one's body in action, through the demands and possibilities of the situation and the task one is undertaking in it. It is a focusing of the body on the concrete task, but, as a focusing is not a fixation, it is "open on to the world, and correlative to it" (Gallagher 1986, p. 143), that is, it leaves open the possibility of responding to and being polarized by other tasks (Gallagher 1986, p. 141). As a simple example of this "knowing oneself through the activity one is undertaking," Merleau-Ponty mentions the activity of smoking a pipe (Gallagher 1986, p. 100). In so doing, one knows where one's arm is, not in objective terms of coordinates and angles in relation to the trunk of one's body, but through knowing where *the pipe* is because one is enjoying it. The body itself is not thematized at all and, therefore, one knows it only through living it in the action. Similarly, this "knowing the body through living it" is the reason why one can be totally unaware of habitually performing a specific gesture, but, when told by others, nonetheless, one can recognize it as one's own action by performing it with awareness and feeling the familiarity of it.

At the same time, the body schema is the basis upon which space is structured for us, and we make intuitive sense of spatial relations between other objects. The body is "the unperceived term in the centre of the world *towards which all objects turn their face*," as Merleau-Ponty puts it (Gallagher 1986, p. 82, my italics, NBD). Spatial concepts such as "up," "down," "top," "bottom," "right," "left," "on," "under," "near" and "far" all have body-schematic meaning, that is, get their meaning from one's potential and realized bodily engagement in the world. Understanding relationships between *other* objects, on their side, involves an immediate, non-thematized projection of one's own bodily being into this relationship. Seeing the fly as "sitting on" the ceiling, for example, instead of the ceiling as "sitting on" the fly (though the latter is "under" the former), depends on a projection of one's bodily existence and body-schematic understanding of such phenomena as mobility, size, and support into the relation. Illustrating the point with an example from ICT-mediated settings, this basic body-schematic projection is an essential part of avatar-based activity in 3-D environments. Moving the avatar draws in a decisive way on the body-schematic understanding one has of lived space and of movements in it. This is the case, even when the avatar can move in ways which humans cannot (e.g., fly or walk through walls): Such movements present themselves as "strange," "fun," "different from real life" precisely because and as violations of the non-reflective expectations we have as bodily beings. For the same reason, they take some "getting used to" before one is able to utilize them smoothly in the actions of the avatar. Further, it should be noted, one is only able to make sense and use of such movements on the background of many body-schematic expectations which *are* fulfilled concerning the behavior of 3-D environment. The possibility of body-schematic projection, in sum, is a prerequisite for making three-dimensional interactive sense of the computer's two-dimensional screen.

On the other hand, for very experienced avatar users the avatar may become incorporated into the body schema, that is, become the phenomenal extension from which s/he acts: An important characteristic of the body schema is precisely that it is not

equivalent to the physical body. This lack of equivalence is the reason why a person can learn to use a prosthetic device as a substitute for an amputated limb, and, in general, why we can learn to use artefacts to probe and manipulate our surroundings. The blind person senses the world directly at the tip of his/her cane, not indirectly through an interpretation of the movements caused in the hand. Likewise, the sports fisherman senses the fish at the tip of his fishing rod, and experienced bicyclists or drivers sense the road through the wheels of their bike or car. In using an artefact, one is incorporating it into one's body schema and acting *from* it as part of the phenomenal body, not through it from the borders of the physical body. This phenomenon has been discussed extensively within phenomenology (Merleau-Ponty 1962; Gallagher 1986, 1995; Polanyi 1966; Leder 1990) and has recently also been pinpointed by Kaptelinin, who has given it an activity theoretical interpretation under the heading of "functional organs" (Kaptelinin 1996).

On the basis of this Merleau-Pontian notion of "body schema," the sense in which the skilled typist has "knowledge in the fingers" can be identified, as can, in general, the sense in which the "interaction potential" of the agent is rooted in the body: In typing, the keyboard is incorporated into the body scheme of the typist and, therefore, he/she is meeting the demands of the situation by acting from the keyboard as part of the phenomenal body. As Merleau-Ponty says, actually also discussing typewriting: "To know how to type is not, then, to know the place of each letter among the keys [*pace* Norman, NBD], nor even to have acquired a conditioned reflex for each one, which is set in motion by the letter as it comes before our eye... It is knowledge in the hands, which is forthcoming only when bodily effort is made, and cannot be formulated in detachment from that effort... When I sit at my typewriter, a motor space opens up beneath my hands, in which I am about to 'play' what I have read." (Kaptelinin 1996, p. 144). More generally, the interaction potential of the agent consists neither of capabilities of a Cartesian mind, nor of those of a Cartesian pure mechanical body (which is why a skill is not a conditioned reflex). Rather, the Cartesian mind-body-dichotomy must be transcended by a concept of agency as the acting of a bodily being; an acting to which concepts can be ascribed like "intentionality," "meaning," and "knowledge," traditionally viewed as purely "mental." Equivalently, "knowledge and meanings in the head" on this view depend greatly on "knowledge and meanings of the body." "Being a body" involves "having a world" and an "interaction potential" is the potential of an agent as a bodily being.

Before proceeding, a comment should be made relating the Merleau-Pontian view of affordances to be developed here to other similar approaches which stress the potential mutual clarification between Merleau-Pontian and Gibsonian ideas, for example, Sanders (1993) and Gallagher (2005). The analysis presented here differs from such approaches, partly through its (even) stronger focus on agency, partly, of course, by the very fact that it develops the concept of "body schema" to make it applicable to computer-mediated contexts. Other approaches relating Merleau-Ponty and Gibson solely discuss the physical world. As regards the first difference, in contrast to the focus on agency in this article, Sanders' primary concern is *perception*. To be sure, his point is that perception is an activity, but like Gibson he focuses on the implications of this point for perception. Probably as a consequence, he does not discuss the concept of "body schema" but instead concentrates on the "materiality of meaning" which he finds most developed in Merleau-Ponty's later works with their concepts of "flesh," "chiasm," and "reversibility" (Sanders 1993; Merleau-Ponty 1968). Gallagher, on the other hand, does focus on the "body schema," but ends up to some extent renouncing the importance of agency as reciprocity between body and world by claiming the innateness of the body schema (in a primitive form).

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Returning to the concept of “affordances” with the Merleau-Pontian notion of “body schema,” the two concepts emerge as complementary ways of referring to the fact that concrete situations are, *objectively* seen, meaningfully structured *relative* to the actual skills of a particular agent. Thus, “affordance” signifies that meaning is in the world, *not* in the head, and “body schema” signifies that the world is meaningful because of what we can *do* in it. Together, they reciprocally signify that we as human beings live in a world not of our own mentalistic making, the meaning of which nonetheless, transforms in accordance with what we learn to do. Even more importantly, the complementarity of the two concepts implies an interdependency of body and world, which is experientially and epistemologically primary, and, in respect of meaning at least, ontologically primary as well. Finally, the dual notions of “body schema” and “affordance” suggest an understanding of agency as an immediate “doing of what the situation calls for,” that is, an “attuning of the body to the demands and possibilities of the situation” that does not rely on representation of these demands and possibilities. In the following two subsections, I shall draw on this basic reciprocity in giving a Merleau-Pontian account of affordances, focusing on the ontological nature and epistemological status of the latter.

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Perceiving affordances—the epistemological question

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Fundamental to the Merleau-Pontian understanding of perception is its interwovenness and dependency on agency. Though, of course, we sometimes represent and consciously think about what we perceive, perception of something does not imply representing it. Instead, it implies that the situation presents itself to us as bodily agents with a certain figure to-be-acted-upon. Perception is first and foremost *presentation-in-action* to the agent (not solely to the mind) of meaning in the world, not a *representation* in the head of this meaning. Accordingly, perceiving the affordances of a given situation does not necessarily mean being consciously or subconsciously representationally aware of them; rather it means body-schematically acting upon them in an attuning to the possibilities that they pose. When a standing conversation becomes tiring for the legs, one can respond to the affordance of a chair by sitting down without necessarily being representationally aware neither of the act, nor of the chair itself, focused as one is on the conversation held. Likewise, when the long-sought-for words for a passage in a research paper finally come to mind, the mouse may be grabbed, pushed, and clicked, and the keys of the keyboard struck, without any representation of these operations having to be involved, awareness being fully absorbed “out there” in the words presenting themselves on the screen of the computer.

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Importantly, perception always has a figure-background structure. This point is often illustrated with “gestalt-switch pictures,” that is, pictures which can be seen in two different ways, as non-simultaneously representing two gestalts, where the background of one gestalt is the gestalt of the other and vice versa. An example is Rubin’s famous Peter-Paul Goblet (Dreyfus 1992). However, the point is more general than the discussion of such rather special pictures might seem to imply: Quite generally, the background of a picture determines its figure as much as the figure itself, both banally in establishing the outline of the figure, and more significantly in deciding its meaning. A smiling face means something very different when portrayed on the background of a flowery meadow and on the background of starving children. Of course, the meaning of the picture is perceived by the observer on the background of his or her knowledge and experience (in the sense of the

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German *Erfahrung*); part of which will be representational and part of which will be bodily incorporated as ways the world make actionable meaning.

These observations about the perception of pictures apply similarly to the question of perceiving affordances. Concrete situations present themselves with the figure of action possibilities relative to the task currently undertaken by the agent. Given the openness of the body schema to being polarized by other tasks, the current one does not preclude noticing affordances unrelated to it, but, depending on one's degree of immersion in the given activity, one may very well actually fail to take regard of other affordances, unless these are in other ways very important. When fully engrossed in writing a paper, the chilliness of the room may not be noticed, though it does afford being cold. Typically, in such a situation, one's first reactions to the non-task-related affordance are body-schematic and non-representational, for example, one may without thinking about it shuffle one's feet, rub one's legs, or maybe even get up and close the window. Only if the chilliness persists does one become aware of it and of being cold. Again, the perception of this affordance takes place on the background of the knowledge and experience of the agent. Though feeling cold is to a large degree independent of experience and culture, what one does in acting upon the feeling is not. A 3-month-old will cry, an adult Viking anno 1000 might have put on an extra garment or lit a fire, a grown-up European of today probably adds a sweater, closes the window, or turns up the central heating. Importantly, the affordance of the chilliness presents itself "with a handle on it"; not just as a state of affairs to be contemplated, but directly as demanding certain actions in response. Our bodily existence, with the physiological, personal, cultural needs and skills each of us has incorporated, is the background upon which we perceive and act in the situations we come into.

In regard to the epistemological status of affordances, a Merleau-Pontian account therefore holds: First, we do not always perceive all the affordances of the environment; quite the contrary, we first and foremost perceive the ones relevant for the task we are undertaking. Second, perceiving affordances is not primarily a question of representations and mental models; rather, in perception, situations present themselves directly as body-schematically to-be-acted-upon. Third, we are body-schematically able to take account of or attune to affordances of the situation without being representationally aware of doing so. Fourth, the meaning a situation has for us and specifically the affordances it offers us stand out as a figure on a background, where the latter has a decisive role to play in determining the former. Fifth, the figure-background structure of the situation is perceived on the background of our physiologically and culturally dependent bodily existence, with the skills, experience, and knowledge incorporated herein.

Illustrative of these points is the phenomenological consideration of the introduction of a webcam into a synchronous oral or written ICT-learning situation. Participants in such situations often claim that after a while they neglect the webcam and concentrate on the words said or written; a claim which is backed by the fact that they actually seem only rarely to look at it.² However, though it may be that the participants do not make direct positive use of the affordance of the webcam in their communication, its affordance plays a large role in the structuring of the meaning of the situation, changing the figure of it to one in which participants "can be seen." Though they may not be representationally aware of

² The empirical claims presented for illustrative purposes in this paragraph draw on experiences from 7 years of computer-supported distance teaching and learning, on personal communication with the students and teachers involved herein, and on personal communication with representatives of two global companies, in which a large fraction of meetings and training activities are conducted on a synchronous audiovisual platform.

the webcam at all, it is part of the background of the situation, posing demands for and setting restrictions on appropriate action in the situation. These demands and restrictions are taken into account in the participants' body-schematic non-representational attuning to the situation. In consequence, participants change their behaviour as compared to ICT-learning situations without webcams, though they may not be aware that they do. Without a webcam, participants may (and many say they do) fetch coffee, skim through a letter, or talk with other people in the room (if sound is not automatically transmitted). Such actions will not, in general, be undertaken with a webcam, and when they are, they will normally be preceded by an apology for the interruption.

As the last point, it must be emphasized that we, of course, sometimes fail to perceive something or misperceive it for what it is not. For this reason we sometimes fail to act on an affordance which it might have been advantageous to have taken into account, or alternatively act as if the environment offered an affordance for us which it does not. The webcam may be hidden to us, or we may misperceive it for an audio recorder or a beamer and so not act appropriately. This possibility of erroneous perception leads on to the next section, which treats the ontological question of the nature of affordance and more specifically asks, to which degree affordances are agent-dependent.

The existence of affordances—the ontological question

The ontological nature of affordances is a dynamic, relational, cultural-, experience- and skill-relative one. Affordances are the actionable meanings of objects for a particular agent and as such their existence must be determined relative to the body-schematic space of possible interactions for that agent. As this body-schematic space of possible interactions changes over time as the agent incorporates new experience, knowledge, and/or skills into his body schema—or, more negatively, as he or she forgets/loses skills and so forth formerly possessed—what an object affords a specific person is in most cases transformed more than once throughout his or her life.

Claiming that the existence of affordances is to be seen as relative to the body schematic space of possible interactions of a particular agent, however, is not equivalent to postulating a relativistic, subjectivist ontology of affordances. The objects in the environment exist independently of the agent, and they have actionable meaning for the agent, independently of his or her current needs and actual perception. As Gibson maintained, meaning is objectively there in the world, only, as it has already been emphasized, meaning is necessarily meaning for someone. *Not* in the sense that this “someone” must necessarily be *aware* of the meaning here and now, but in the sense that it has meaning *in relation to* what he/she is body-schematically able to do. From a Merleau-Pontian point of view, it is in this fundamental relating of meaning-in-the-world to bodily doing-in-the-world that the Gibsonian transcendence of the subject-object-dichotomy consists.

Clarifying this relational, yet not relativistic, ontological nature of affordances further, not only does an object's affordance for someone not depend on his/her perception thereof; neither does it depend on whether anyone ever perceives *this particular* object to have this affordance for him or her. It makes sense to say that the computer mouse hidden under the paper heaps on my bookshelf affords clicking for me and my colleagues, though it in point of fact never has been clicked (because I misplaced it there right after I got it) and never will be clicked, because it eventually will be thrown out by mistake together with the unsorted paper heaps. However, it *only* makes sense to say this, because my colleagues and I are able to use that *kind* of device. And “are able to,” it should be noted, means that we in point of fact exercise this ability with *other* computer mice in concrete situations.

Affordance is, therefore, relative to interaction potential understood as body-schematic possibilities of interactions, (i.e., interactions actually sometimes taking place) with or in relation to objects qualitatively identical or at least sufficiently similar to the one in question, but not necessarily numerically identical with this *particular exemplar*.

An objection might here conceivably be that it is not possible to give a precise account of the notion of “an object being sufficiently similar, qualitatively speaking.” The answer to the objection is that such an account is not necessary either: As McGrenere and Ho note (McGrenere and Ho 2000) referring to (Warren 1995), “affordance” is not a binary concept, though it has often been used as if it were. Chairs afford sitting for modern agents above a certain age, but, relative to a particular one of these agents, some chairs afford the activity better than others. Most (but not all) chairs for 3-year-old children afford sitting on for grown-ups, too, but not nearly as well as (most) chairs designed for grown-ups. An object “to some non-precisely specified extent qualitatively similar” to a chair will afford sitting “to some non-precisely specified degree.” The important ontological point to be made is a) that the (probably not precisely specifiable) degree of affordance of an object for a given person is relative to his/her body-schematic space of possible interactions. b) That this space is determined by the person’s physiology and the experience, knowledge, and skill which he/she has acquired in the sociocultural settings in which he/she has partaken.

Implications for design and empirical analysis within CSCL

It is time to return to the questions of how the Merleau-Pontian rendering of “affordances” developed in the preceding sections can inform design processes and empirical analyses within the field of CSCL, and especially if it can do so in more appropriate ways than other understandings of the concept represented within the field. These questions will be addressed in this section, through, first, an overall comment on the importance of entertaining a theoretical consistent understanding of the concept and, secondly, a discussion of how the Merleau-Pontian understanding developed here results in some displacement of focus for design and empirical research. In the course of this discussion, concrete statements and findings of specific CSCL articles will be reinterpreted on the basis of the Merleau-Pontian view. The reinterpretation, it should be noted, is tentative and intended for illustrative purposes only, because the author of this article has not had access to the primary data of the research discussed. The discussion will be supplemented with considerations of the phenomenological significance of certain ICT-mediated learning episodes which have taken place in the computer-supported distance teaching and learning, in which the author has been involved over the last 7 years.

First of all, a coherent understanding of the concept of “affordance” is central to both design and empirical analysis: The fundamental ecological focus of the concept on meaning as an aspect of the interaction of agent and environment can elucidate notions of use, usefulness, utility, and usability theoretically, and can guide the design for and empirical investigation of these notions practically. Because the force of the concept lies in its ability to transcend the subject-object-dichotomy, it is, however, essential to be clear about ontological and epistemological issues. Otherwise, chances are that the implicit understanding of the concept will unwittingly draw on precisely this dichotomy, leading to the well-known philosophical positions of essentialism (e.g., McGrenere and Ho 2000) and phenomenism (e.g., Norman 1989), respectively, only clothed in a new wording. The consequence for design and empirical analysis are very unhelpful concepts: As noted, the essentialist interpretation of “affordances” as related to “action capabilities” understood

without reference to experience, knowledge, and culture, would lead one to design for mysterious “potential users” instead of actual ones. On the other hand, the phenomenalist position that affordances exist exactly as they are perceived makes misperception and mistakes inexplicable and ultimately denies the possibility of bad design. Correspondingly, empirical analysis will lack concepts to interpret the complexity of interaction between agents and environments in successful ICT-based learning as well as the “breakdowns” of such learning situations in terms of gaps between the intentions of indirect design and the reality of actual enactments of the design in interaction. More concretely, the claim is that a relational, dynamic, agent-centred, and skill-relative conception of affordances is necessary if one wishes to design real learning environments for and empirically understand the interactions of real users because the possibilities that these users have, change with skill and experience. Further, one has to understand perception as interwoven with body-schematic being-in-the-world to be able to focus one’s design process on creating the best possible design: the one that does not break the primary correspondence of body and world by making reflection necessary. Designing should not primarily be about making mental representations easy to construct, as Norman has it (Norman 1989); it should be about making representation unnecessary.

Turning now to the more concrete question of the ways in which the Merleau-Pontian understanding shifts the focus of design processes and empirical analyses in comparison with other renderings of “affordances,” two principal areas can be identified: One is the background body-schematic structuring of the meaning of the environment; the other is the dependency of affordances on the experience, skill, and culture of the agent.

Concerning the first, the implication of the Merleau-Pontian view is not so much a *different* focus than the one held by other views, as it is a *widening* of this focus, as well as a reinterpretation of focus areas as “figures” on backgrounds. The design framework based on affordances proposed by Kirschner et al. (2004), for example, presents a six-stage model as a general approach for designing CSCL settings. This model centres on “what learners actually do and want to do” and how designers can support the actions of the learners. Here, the Merleau-Pontian view would widen the focus and ask “On which body-schematic structuring of the situation do these actions emerge? That is, on what background are these actions figures?” “Can we hypothesize different body-schematic structurings if we were to make available other affordances?” Methodologically, important questions to ask in trying to uncover the background structuring is “What don’t the learners do [that we might have thought they would]—and why not? Are they making ‘background’ use of affordances in this ‘not-doing’? How might changing the affordances for the learners change possible background body-schematic structuring of the situation?” Now, the model presented by Kirschner et al. does include a stage which concerns the determination of technological, educational, and social constraints and conventions at play for the learners. However, the focus in this determination is still the tip of the iceberg consisting of actions which are undertaken or that students and teachers want to be able to undertake: Constraints and conventions already at play are to be identified with the aim of ensuring that they do not interfere with the support which the designer aims to give the learners. Again, the example of the webcam is illustrative: Using the model presented by Kirschner et al., focus will be on the actual communicative actions of the learners, presumably leading to the conclusion that “the web-cam is not being used.” Analysis of technological, educational, and social constraints and conventions may supply *reasons* for this nonuse (e.g., “students find the pixels distracting”; “web-cams are not used in the kinds of mediated communication with which students are familiar such as telephone calls and e-mail conversations”), but will not lead to a questioning of the *fact* of nonuse. Whereas the Merleau-Pontian analysis, with its

awareness of the background structuring on which the actions are figures, as already indicated, will do precisely that.

A similar objection must, from the Merleau-Pontian point of view developed here, be put to the assertion of Tchounikine: "Coming back to the affordance notion, the platform specification specifies the *actual properties* of the platform, as an artifact that can be unambiguously described. Defining these properties is the prerequisite step of an iterative and experience-based process that must also take *perceived properties* and *effective usages* into account" (Tchounikine 2008, p. 216, italics in original). Here, again, from a Merleau-Pontian perspective, too much emphasis is placed on the figure—the alleged "actual properties," "perceived properties," and "effective usages"—whilst the background on which the figure stands out is neglected. In contrast, to aim at an adequate design, it is necessary, not only to investigate which properties are perceived and used, but also to analyse the body-schematic structuring, on the background of which these properties and usages become salient for the users.

This focus is no less significant if one considers adaptive learning environments designed to be sensitive to the knowledge and previous experience of the learners. An obvious problem here, from the Merleau-Pontian perspective, would be how to design for adaptation beyond the learner's *articulated* knowledge and *actual* actions. An analysis of the background is paramount for this and especially for deciding whether options which would be dynamically eliminated on the basis of actual articulations and doings should nonetheless, be retained and if so in what way. With a simple and, therefore, too banal example: A script encompassing, as part of initiating collaboration, the question "Which country are you from?" would on the face of it seem to require a different adaptation in response to the answers "Bosnia," "Denmark," "Europe," and "USA," given that experiences and language competence may be expected to be different for the persons in question. On the other hand, these answers might well be true of one and the same person, for example, a Bosnian refugee who had lived most of his life in Denmark and was currently studying in America. In this case, the answer he actually chose to give would say quite a lot about his background understanding of his situation—as well as position him rather differently vis-à-vis the other learners. Here, therefore, the learning environment would probably be better if it adapted, not directly to the actual response of the person, but to the background structuring of the situation which led him to finding this response the relevant one. In practice, of course, this will be very far from easy.

Quite analogous to the widening of focus implicated for design, the view argued for here leads to an expansion of the issues which appear relevant for empirical analysis. The study of Dwyer and Suthers (2006) makes a convincing case for the thesis that the students partaking in the experiment were able to develop and enact functionally equivalent communicative practices utilizing affordances of rather different material environments. Again, however, the focus is fully and flatly on what the students *do*. With Merleau-Ponty, it seems reasonable at least to ask to which extent these actions of the students are figures on a background body-schematic structuring of the situation as a "constructed learning situation for the purpose of research, not for the purpose of my learning or of actually finding a solution to the task problem"—and how such a possible background structuring might in effect have ruled out actions (and even coming to think of them) that might otherwise have been undertaken. Conceivable examples of such "ruled out actions" being: seeking other sources of information or representational media than the ones present; deciding to split the task in two and work relatively uncoordinated in parallel on different aspects; or postponing the task. Or getting so exasperated with one's teammate as to get up and walk out of the room (given the communication patterns reported by Dwyer and

Suthers for dyad 5, this would seem to have been a highly probable action for one of the students under other circumstances). The point here is not so much to question the results of the study per se, as it is to highlight that a Merleau-Pontian analysis raises further questions of the contextual boundedness versus the generalizability of the results than other perspectives do. This can be illustrated by the fact that if a teacher wanted to facilitate a similar situation of students “developing functionally equivalent communicative practices,” he/she would, following Merleau-Ponty, have to consider which affordances the students in the study were making background-structuring use of and how he/she could provide similar affordances in his/her educational setting.

Moving on to the other area in which a Merleau-Pontian understanding shifts the focus of design and empirical analysis, namely, the dependency of affordances on the experience, skill, and culture of the agent, the study of Dwyer and Suthers provides the basis for a simple, if somewhat speculative, example. The authors note—apparently with some surprise—that “Despite the availability of a wide variety of materials, every pair constrained themselves to a very *limited subset of the materials*. Even when the widest variety of materials was made available, all pairs tended to use only one or two material types almost exclusively.” (Dwyer and Suthers 2006, p. 494). The point to be made here is that though the authors are probably justified in assuming a high degree of familiarity with each kind of material on the part of the students, because these materials consisted of office supplies like index cards (two sizes), post-its, and paper sheets of different sizes, it cannot, with the same certitude, be assumed that the students are experienced in working with these different materials at once and utilizing their affordances in synthesis. That is, though each of the types of materials provided affordances for the students, emergent ways in which task aspects and communicative purposes can in principle be distributively organized, utilizing the different specific features of the materials (such as the flexibility of location of post-its versus permanent proximity of sight of words written on the tabletop paper) might not previously have been experienced by the students. In this sense, the conjunction of materials might not have the affordances, which Dwyer and Suthers seemingly expected, in relation to these specific students.

A further simple example is supplied by returning once again to the example of the non-focal use of the webcam in many ICT-mediated settings: Though the webcam definitely affords “being-seen” for the students, it might not provide more sophisticated communicative affordances for them because of their lack of experience and skill in utilizing it for communicative purposes. This might well be the quite straightforward reason for its non-focal use: The affordances which the other available orally and/or textually based media have relative to the given agents might support their need for complex communication better because the simple “being-seen”-affordance has not (yet) been transformed for these agents by the acquisition of “web-cam communication skills.” Anecdotal support for this interpretation is provided by an analogous empirical example concerning a synchronous oral ICT-mediated learning session: In a course, which was primarily conducted in physical settings, but which included some virtual lessons, one student was very active and talkative in both face-to-face-classes and written synchronous and asynchronous ICT-settings, but refused to communicate directly through a microphone in a synchronous, orally based ICT-mediated class. Instead, he communicated with the others in the small group of students with whom he was physically colocated and let them report his views via the computer to the teacher and the rest of the class who were placed in other physical locations. Analogously to the affordance of “being-seen” versus the need for more sophisticated communicative affordances, the microphone+computer setup only afforded “being heard” for this student, which was not sophisticated enough for the conversation he wished to have.

Much firmer support for the proposed interpretation of the non-focal use of the webcam is provided by the case study reported by Kaptelinin and Hedestig (2008). Though the technology involved in this case study is a videoconferencing system, not a webcam, the overall issue is very similar: Students and teachers alike do not make as efficient use of the communication features of the videoconference technology as might have been expected. Teachers who had technicians to manage the technology for them during the sessions tended to disregard the videocameras by on the one hand neglecting to look at the incoming pictures of the students and on the other focusing on the whiteboard on which they were writing, thus neglecting the question of what exactly the outgoing picture would be transmitting. Students, on their part, tended to lay back and regard the videoconference presentation of the teacher as on a par with a TV show without making use of the possibility of interacting more actively themselves. The interpretation presented by Kaptelinin and Hedestig is that the traditional coordination mechanisms and structures known from face-to-face settings (eye contact, voluntary gestures, involuntary body movements, etc.) fail in this new learning environment and that the parties have not yet developed appropriate new coordination mechanisms and structures. Here, again, corresponding to the webcam example, it would seem that the videoconference system did not provide the necessary sophisticated communicative affordances for the students and teachers (though it did afford “being-seen”), because they lacked the required experience and skill.

As a last, somewhat disconcerting, example, the study of Weinberger et al. (2005) may be mentioned: In an investigation of the cognitive support of social and epistemic micro-scripts (structuring the interaction process and the knowledge building process, respectively), Weinberger et al. are forced to conclude that the epistemic scripts did not have the intended positive influence on knowledge construction in either of their two studies. For one study, the epistemic script actually was detrimental to the individual knowledge construction. Weinberger et al. comment that “The epistemic script might not have fostered the *internalization* of concepts. The epistemic script may have limited processes of reflective thinking about the cases in functioning like a checklist.” (p. 18, italics in original). The Merleau-Pontian phenomenological explanation of this finding would be, one level deeper, that the affordance of the epistemic script for the students was so intuitively clear, given their previous experience and skills in copying with educational question-and-answer-scripted settings, that they responded immediately to it. That is, that they did not have to think about the import of the question, which, of course, in *this* situation was an *undesirable* transparency of the artefact, because the purpose of the script was to facilitate cognitive representational knowledge construction.

The preceding paragraphs concentrate on the shift in focus for empirical analysis which one gets with a Merleau-Pontian understanding of the dependency of affordances on the experience, skill, and culture of the agent. The corresponding implications for design for learning are obvious and have already been touched upon: For neither the technology designer nor the educational one does it suffice to consider opportunities offered by technology or learning settings in abstraction from the persons who are actually going to enact them. Quite the contrary, the experience, skills, and culture of the learner must be taken into consideration, if the office supplies are not to be left unused, the videoconferencing system to be utilized as bad TV broadcasting, and the scripts to hinder learning. More generally, the Merleau-Pontian relational view of affordances stresses that if it is not possible to design for skills already possessed by the user because the situation will inevitably be new for him/her, *this* fact must be taken into account at a deeper level. This is done by designing room—temporally and spatially—for the incorporation of the skill into the body-schematic space of possible interactions for him/her.

In conclusion

The aim of this article has been to give a theoretical elaboration of the ontological nature and epistemological status of the concept of “affordances,” based on a Merleau-Pontian understanding of human beings as always already in the world in a non-thematized, pre-reflective correspondence of body and world in the concrete activity. The argument has been that the Gibsonian concept of “affordances” and the Merleau-Pontian notion of “body schema” are two complementary ways of referring to the fact that concrete situations are meaningfully structured for each agent relative to the knowledge, skills, and experience (in the sense of the German *Erfahrung*), which s/he has physiologically, personally, and socioculturally been able to attain. Importantly, this meaningful structuring is an objective fact, independent of actual perception here and now by the agent (the German *Erlebnis*). That is why the concept of affordance cuts across the subjective-objective distinction, as Gibson claimed. Or better: which is why it is the basis upon which such a distinction can be drawn at all, as Merleau-Ponty would say.

The motivation for providing such an elaboration in the context of CSCL has been the discernment of ambiguities and inherent tensions in the ways in which the concept of “affordance” is used within the field, combined with a consideration of the influence which this lack of clarity has on concrete empirical analyses and design suggestions. A further reflection has been that the role which the body plays in meaningfully structuring situations seems to have been largely overlooked in the discourse on affordances. Because the lack of clarity has been inherited to a high degree from the discourse within the field of HCI, space has been spent on discussing views of the concept presented within this discourse, most notably those of Norman and of McGrenere and Ho. Toward the end of the article, a section has been devoted to exemplifying how the Merleau-Pontian account of affordances developed here may shift the focus of empirical research, of interpretation of findings, and of design processes within the domain of computer-supported collaborative learning. Examples have here been drawn primarily from the CSCL literature and have been supplemented with phenomenological considerations of episodes from the author’s experience with computer-supported teaching and learning. The central thesis of this section—as indeed of the article as a whole—has been that only given a relational, dynamic, agent-centred, and skill-relative conception of affordances can one design real learning environments for—and empirically understand the interactions of—real users whose skills develop and possibilities increase as their experience gains.

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