Enactive Social Cognition

Tobias Schlicht (tobias.schlicht@cin.uni-tuebingen.de)
Centre for Integrative Neuroscience, Universität Tübingen
Paul-Ehrlich-Str. 15
72076 Tübingen, Germany

Abstract

In this talk, I extend the enactive approach to cognition to the social domain within a larger framework of varieties of intentionality and argue for a second-person approach to understanding others, emphasizing a difference in our understanding of others depending on whether we are directly engaged with them in interaction or merely observing them. The enactive account is especially persuasive in developmental respects, suggesting that sophisticated forms of cognitive intentionality (e.g. believing) are grounded in motor intentionality (e.g. perception and action): Our own sensorimotor skills are partly constitutive of cognition, and other people's expressions of their sensorimotor skills in turn modulate our cognition of objects and our social understanding. The enactive account explains how young infants acquire the capacities that allow them to move from dyadic to triadic intentional relations at around their first birthday, and it claims that our basic form of social understanding is neither based on theoretical inference nor a kind of simulation, but constituted by an embodied implicit know-how displayed in online interaction.

Keywords: social cognition; embodied cognitive science; enactive approach; intentionality; social neuroscience.

1. Varieties of Intentionality

Intentionality is a technical term referring to the capacity to be directed towards an object, where 'object' is broadly construed: artefacts, events, people, states of affairs in the world, abstract or fictitious entities and mental states of others and of oneself can be the goal of an intentional activity (Brentano 1874). Moreover, there are a multitude of intentional attitudes via which one may be so directed: sensorimotor, affective and cognitive ways of dealing with the world (Barresi & Moore 1996, Crane 2001). One can think about, hope or doubt that it might rain tomorrow and one can perceive or desire a glass of wine or just intentionally grasp it with their hands. At the same time, one can *be* intentionally directed at something without having a sophisticated *understanding* of such intentional directedness in oneself and in others.

Searle (1983) and Crane (2001) have provided thorough analyses of intentionality, but it is odd that (1) they largely ignore what we may call motor intentionality—a directedness towards an object manifested in grasping and manipulating it, and that (2) they do not even attempt to characterize the subject being intentionally directed at objects, although this is an essential element in the structure of intentionality. My first claim is that a proper integration of these two aspects motivates a thoroughly embodied and enactive account to cognition and intentionality:

The *subject* of intentional relations is best characterized as an embodied agent, possessing a number of skills and capacities, ranging from performing bodily actions, perceiving and grasping objects, to thinking and imagining complex and even counterfactual states of affairs. Conceptualizing the cognizing subject in this way provides a first motivation for understanding intentionality in a broader sense by integrating sensorimotor forms of directedness. *Motor intentionality* has received much attention in recent investigations of perception and social interaction and plays an important foundational role in the enactive approach, as will be elaborated below. This constitutes a radical shift of emphasis: Whereas analytic philosophers of mind have been concerned primarily with intentionality as a feature of mental states, it is better construed as a feature of whole organisms (Thompson 2007, Hutto 2008). A second motivation for considering sensorimotor forms of intentionality is based on recent developments in the cognitive neurosciences and a more general transformation of paradigmatic cognitive science. Regarding the latter, the traditional computational paradigm is currently being replaced by an embodied-embedded cognitive science that does not consider the computational brain in isolation but investigates mental phenomena in the broader context of an embodied agent being situated in her environment, which itself constraints the agent's cognitive projects. Regarding the former, data from animal studies suggest that perceptual capacities are grounded in motor capacities quite generally. More specifically, the discovery of mirror neurons has fostered an ongoing debate about the role of motor intentionality in the overall cognitive architecture of human agents (Sinigaglia 2008). Consequently, this leads to the following general structure of intentionality:

An embodied agent (or organism) is directed towards an object or content by way of one among several sensorimotor, affective, or cognitive attitudes.

Since this structure can be realized in various ways, the task of a comprehensive theory of intentionality is to provide an adequate account for the different varieties of intentionality, differing in complexity and sophistication (Barresi & Moore 1996, Schlicht 2008). In broad strokes, such a framework may look something like this:

1. The most basic and biologically primary forms of intentionality are *perception and action* (Searle 1983). They are essentially dyadic relations to single *existing* objects or agents and depend on being situated and embedded in an environmental context. We share these forms of intentionality with many animals. Ontogenetically, human infants first make use of sensorimotor skills in order to perceive,

grasp and manipulate objects in their vicinity. Only later are they capable of more sophisticated and detached forms like beliefs.

2. On a second level, in scenes of *joint attention*, intentional relations become triadic: either an additional subject enters the subject-object-relation or an object enters the relation between two subjects (mother and child, say). True *joint* attention is not coincidental, i.e. both agents have to be mutually aware of their coordination of different perspectives on the world and actively track and manipulate the attention of each other. Merely looking at the same object coincidentally does not suffice. Joint attention involves a *cognitive* aspect—being directed on the world—and a *social* aspect (being engaged in social interaction with another subject). Numerous studies show that infants are capable of such "triangulation" (Davidson 2001) only from around nine to twelve months of age (Carpenter et al. 1998). Even these complex intentional relations strongly depend on the existence and presence of the object and person one is directed at. All relata being agents constitutes a special case of triadic relations, e.g. two adults attending to the infants' actions. This not only seems to occur a few months earlier but also does not involve a proper external *object*.

3. A third level is marked by the partial use of the imagination in the second year of life, for example in pretend play, where functional properties are detached from one object, a telephone say, and assigned to another, a banana say (Leslie 1987). It has also been shown that pretend play mark the onset of truly *collective intentionality*, where two agents pursue a common goal and coordinate their actions accordingly. This also involves an understanding of norms (e.g. rules of a game), and two-year olds have been shown to reinforce these norms (Rakoczy 2006). But even then infants still partly depend on the existence and presence of objects in their immediate environment, although they are already capable of representing an object in its absence.

4. Finally, a fourth level is characterized by an explicit directedness towards mental states like beliefs, desires and intentions of others. At around 4 years, infants display an understanding of other people and have acquired the concept of belief, which is reflected in their passing false-belief-tasks (Wimmer & Perner 1983). That is, they can now explain other people's actions on the basis of what the other believes to be the case rather than in terms of what really is the case.

It may be necessary to modify this model by adding further levels or more fine-grained distinctions, so this first sketch of a theory of intentionality needs to be worked out in much greater detail (see Schlicht 2008). But the approach to intentionality recommended here can be contrasted on the one hand to traditional approaches pursued by many analytic philosophers of mind, who try to explain it from the top down by focusing on propositional attitudes presupposing language and concept possession (Dennett 1971, Fodor 1987, also Brandom 1994), and to reductionist approaches on the other hand, which attempt to reduce everything mental to a different level, e.g. neural processing. The present approach treats intentionality as a "moving target", taking on different forms and recommends to explain it neither from the top down nor from the bottom up, but following Gallagher (2005), developmentally from the beginning onward. By integrating insights from the neurosciences as well as adequate phenomenological descriptions and distinctions, this strategy promises to account for the 'developments' of the intentional attitude towards cognitive sophistication and of the target object from existing to fictitious and purely mental objects.

Because of its complexity, joint attention may be seen as a "primitive state of consciousness" (Campbell 2005, Eilan et al. 2005): One is at the same time directed at an object of interest and at another subject, with a cognitive and a social dimension. Thus, it is not only interesting with respect to our cognition of worldly objects but also with respect to our understanding of others. It has to be emphasized that joint attention as a complex form of intentionality does not come out of nowhere but has important precursors from the point of view of cognitive development, namely dyadic intentional relations. In the context of investigating the neural correlates of engaging in joint attention, Schilbach et al. (in press) developed an interactive paradigm in which participants' gaze behavior as measured by an eye-tracking device was used to contingently control the gaze behavior of a computer-animated character. Test persons interacted with the virtual other while undergoing fMRI. It was found that in contrast to merely following the other's gaze, actively establishing joint attention by directing the other's gaze was correlated with a differential increase of neural activity in the *ventral striatum*, known to be a part of *reward*-related neurocircuitry (Rolls, Grabenhorst, Parris, 2008). These findings may be interpreted as the neural correlates of an *intrinsic motivation* to engage in triadic intentional relations and of sharing experiences. But a natural question to ask is what allows infants to move forward to triadic forms of intentionality at the end of their first year of life, apart from this natural inclination to *share* something with someone. In the following, the aim is to outline central elements of an enactive approach to cognition and transfer them to the social domain, to show that it provides a plausible account of the capacities needed for this cognitive development. Along the way, additional empirical support from developmental psychology and the neurosciences will be integrated.

2. Enactive Cognition

As has been pointed out above, an embodied-embedded and enactive approach to cognition in general is recommended by a proper understanding of the subject being engaged in intentional relations as being an embodied agent. Such agents are in possession of a number of capacities that allow them to be intentionally directed towards objects of all kinds. It is claimed here that such an agent's cognitive intentional relations are grounded in her motor intentional activities. Motor intentionality is systematically, phylogenetically and ontogenetically prior to cognitive intentionality. What this claim amounts to can be illustrated by referring to essential sources that feed into the enactive account: Husserl and Heidegger. Both of them criticized Brentano for giving too much

prominence to the cognitive intentionality of beliefs and desires, and in general to the problem of how it is possible for our mental states to be about or directed to non-existent objects. In contrast, they claimed that "the manner in which things are given initially is not theoretically, disinterestedly, neutrally to our sight, as it were, rather things are given as items involved in our various tasks and practical engagements, our 'comportments'" (Moran 1996, p.58). That is, according to these phenomenologists, we are primarily directed towards existing objects in practical, embodied and sensorimotor ways.

Embodied sensorimotor skills. This central phenomenological idea has been revived in the so-called 'enactive' approach to cognition, according to which the whole embodied organism embedded in its environment is the fundamental subject of experience and intentionality (Thompson 2007, Hutto 2008). One central claim of enactive accounts is that cognition is not merely achieved by neural activity alone, but to some extent by bodily and environmental factors, which play not only a causal but constitutive role in cognition (Clark 1997; Noë 2004, 2009; Wheeler 2005; Thompson 2007). On this view, cognition is an activity, enabled by the exercise of skillful know-how in the agent's active exploration of and coupling with its environment.

The enactive approach to perception emphasizes the importance of sensorimotor skills exercised in the dyadic interaction with objects. This can be illustrated in an analysis of perception: Husserl already argued that a perceived object is never given in its full detail. Since we always perceive it from some point of view, we always only perceive some specific profile of it. We see the side facing us, while the other sides are hidden. Yet, although we do not directly see these other sides, phenomenologically speaking we have a distinctly perceptual sense of their presence in our actual experience of the side facing us (Hua 16, 176). For example, when you see a yellow lemon, a yellow round object is presented to you; and the correct description of your phenomenal content is not that of a flat two-dimensional screen, although you are only presented with exactly that from where you are standing. What you perceive is a round voluminous object. When you encounter this object for the first time and explore it, then you have to perform certain actions, e.g. eye- or head-movements, in order to make the hidden profiles visible. For example, in order to see the reverse side of the lemon, you must either go around it, or grasp it and turn it around. In this way, in comprehending an objects' complete profile you draw on your know-how, i.e. on a set of sensorimotor skills you are equipped with and which you can refine in your ongoing exploration of the world. Alva Noë (2009, 60) puts this central idea of the enactive approach to perception this way: "Seeing involves moving the eyes and head and body. ... Movements of your eyes or your head or your body actively produce changes in sensory stimulation to your eyes. Or, put differently, how things look, depends, in subtle and fine-grained ways, on what you do. Approach an object and it looms in your visual field. Now turn away: it leaves your field of view. Now shut your eyes: it is gone. Walk around the object and its profile changes. ... There are patterns of dependence between simple sensory stimulation on the one hand and your own bodily movement on the other. ... Seeing is a kind of skillful activity."

Affordances. In all these activities necessary for perception, your body plays a constitutive role. For one thing, spatial objects can only be experienced by embodied subjects, which are situated and embedded in their environment. Moreover, your body constitutes the point of view from which you perceive objects in the environment, and thus functions as an egocentric principle of experience; and finally, as the analysis above has revealed, every perception of an object is mediated and made possible by the body. Your body is first and foremost not experienced as one object among others but with respect to its potential for action as an experiencing organ. Thus, the kinesthetic experience of your body is correlated with your object experience and, moreover, it presents objects as providing you with various possibilities for action. Thus, new emergent properties arise from the sensorimotor coupling with the environment: affordances (Gibson 1979). These are opportunities for perception and action offered by objects in the environment. A surface, say, may be horizontal and rigid such as to allow you to walk on it. That makes it 'walk-on-able'; it may also be 'sit-on-able' and 'stand-on-able' etc. At the same time, the features of the surface may prevent other actions and they may provide organisms of a different kind with yet other affordances. That is, such possibilities for action are not fixed properties, but vary as a function of the successful coupling between this specific agent and its environmental niche. They may differ for other organisms. Quite often, we even perform certain actions and use tools to change environmental structures in order for them to afford various other actions. In this respect, the coupling between agent and environment displays a certain dynamics.

Online intelligence. All this is especially plausible developmentally, since an infant's primary encounter with objects in the world is characterized by what they can do with objects rather than what these objects are exactly. Experiments by Sommerville and Woodward (2005) suggest that active experience also modulates an infants' *understanding* of simple actions. One of their studies shows that active experience using tools may enable infants to build motor representations of tool use events that subsequently guide action perception and support action understanding. Children can more easily detect and understand actions they have performed themselves than actions they have only observed being performed by someone else. Their understanding of the intentional actions of others may be facilitated by sensorimotor action representations that have been produced during their own performance of the same or similar actions. In this sense, Husserl was right to claim that in our dealings with the world, the practical *I can* is more fundamental than the cognitive *I know* (or the *I think*). And it is in this sense that one should understand the claim that cognitive intentionality is grounded in motor intentionality.

Another way to put this point is by emphasizing the important function of perceptual experience of enabling successful navigation in the environment. Wheeler (2005, p.12f) calls this *online intelligence*: "A creature displays online intelligence just when it produces a suite of fluid and flexible real-time adaptive responses to incoming sensory stimuli". Online intelligence is to be contrasted with *offline intelligence*, exhibited when pondering on a mathematical problem or deliberating about whether to move to another city. The present framework argues for the primacy of online intelligence over offline intelligence.

To sum up, the enactive account to cognition emphasizes the foundational and constitutional role of embodied *sensorimotor skills* for cognitive acts like perception. The corresponding kind of knowledge that is brought to bear in these situations is not propositional knowledge-that but rather a skillful *know-how* to cope with the environment in online cognition. Such know-how is implicit rather than explicit and can seldom be spelled out by those who possess it (Ryle 1949). A paradigm example is knowing-how to ride a bicycle. *Affordances*, the final notion that has been emphasized, are properties that emerge from the successful *coupling* of agent and environment and change in accordance with their *dynamic* relationship. In the next section, these ideas are applied to the social domain.

3. Enactive Social Cognition

Although it is easy to see how these ideas translate to the social domain, there is as yet no comprehensive account of enactive social cognition, apart from some noteworthy yet sketchy attempts (De Jaegher & DiPaolo 2007; Thompson 2007; Hutto 2008). Consider first the *primacy of embodied and sensorimotor skills*: Due to the dominance of theory-theory and simulation-theory, social cognition has often been interpreted in a very sophisticated way, based on the passing of false-belief tasks at around the age of four or five years. Everything that goes on before that age has (unjustifiably) been considered as a mere precursor to the real thing (cf. the modules distinguished by Baron-Cohen 1995, Ch. 4). According to the enactive approach, not only object perception is essentially embodied in the way specified. Social cognition is also fundamentally embodied and embedded, since the most intimate and basic encounter between two subjects is that in direct social interaction where gestures and facial expressions play a dominant role. Many critics have recently suggested that when we are actively and directly engaged with another, we do not need to draw theoretical inferences or engage in mental simulation. Instead, we have more basic and simple means for getting a grip on other minds: Once we drop the questionable separation between an inner (meaningful mental) and an outer (meaningless behavioral) realm and reject the premise that mental states are abstract entities hidden in someone's mind, there is room for the alternative view that we can often *directly perceive* other people's mental states, e.g. feelings and intentions, since mental states are not abstract theoretical entities, but essentially embodied and revealed to others in expressive behaviors like gestures and facial and other bodily expressions (Gallagher 2001, Ratcliffe 2007). Not only do we ourselves convey our feelings to others through facial expressions, we also use their bodily expressions as cues to what they feel and intend to communicate. Video-replay studies demonstrate that young infants have a good sense for appropriate bodily and facial responses from the caregiver to her own communicative signals since they respond when they are out of synchrony.

Moreover, my own eye- and head-movements are not only crucial for my own perceptual states. They also play an important role as cues for another subject to find out where I am looking and/or to establish joint attention with me. Consequently, Corkum and Moore (1995) found that it was easier for infants to locate a target if this was activated on the same side as an adult model's head turn than when it was activated on the side opposite to the adult's head turn. They also investigated the origins of the gaze-following response necessary for joint attention and found that head orientation information is more important for infants below twelve months than eye orientation information. Only at eighteen months gaze following is reliably produced when eye movement is the only cue. Thus, it seems that such bodily cues are important to different degrees in the course of development.

Earliest forms of social understanding are proto-conversations and dyadic emotional engagements between infant and caregiver. They are clearly based on embodied practices, which the infant can engage in from the very beginning. In numerous studies, Meltzoff & Moore (1977) as well as Kugiumutzakis (1998) have established that neonates can imitate simple facial expressions. This has been interpreted as demonstrating an intimate connection between proprioception of one's own bodily actions and one's perception of the bodily actions of others, mediated by an innate body schema (Gallagher & Meltzoff 1996). But it also demonstrates an early form of social coupling, i.e. the fact that adult and infant can form a conversational unit from the beginning.

Partly, the spectacular finding of mirror neurons may also be interpreted in support of the claim that we can detect intentional states with a kind of immediacy, since perceiving other's actions activates one's own motor program responsible for that particular action (Rizzolatti & Sinigaglia 2008). Mirror neurons also fire differentially depending on which action chain a bodily movement is embedded in. Interestingly, they fail to be activated for observed actions that are not part of the observer's own motor repertoire (Buccino et al. 2004). I take it that these sensorimotor neurons support and enable the perceptual understanding of intentional action, and that the activation of one's own motor system reflects the foundational role of motor intentionality for cognitive intentionality. This interpretation is anticipated in Merleau-Ponty's phenomenological claim that one can *see* one's own possible bodily actions *in* the actions of the other (Merleau-Ponty 1964, p.117).

That infants take pleasure in directing the attention of the caregiver to oneself or to one's actions can be seen in the

still-face procedure: Between two and three months they already actively seek to re-engage a parent's attention when it has been disrupted (Murray & Trevarthen, 1985). Reddy (2003) argues that infants acquire an understanding of attention already in the first few months of life, primarily on the basis of the caregiver's attention towards some aspects or actions performed by the infant or the infant as a person. That is, the infant is first confronted with attention to the self and then to some aspect of the self or the self's actions. She argues that in scenes of *dyadic* mutual attention infants already demonstrate a *capacity for* and an interest in dealing with other's attention and that this provides the infant with the experience required for *further developing* her intentional repertoire. In the context of joint attention, attention is best characterized as an *act* of attending rather than an information-bearing mental state that arises passively. Focal attention is a continuous process *executed* by *the human agent*. The infant's alternation of attention on the object and the other subject (which is constitutive for joint attention) is essentially active and embodied since it involves head and eye movements, and possibly pointing gestures as communicative signals to direct the others' attention.

Gaze and Engagement with other agents. Direct interaction with another agent in joint attention also modulates our own processing of that object. Becchio et al. (2008) found that objects under the gaze of others "acquire properties that they would not display if not looked at", namely the gaze "enriches that object of motor, affective and status properties that go beyond its chemical or physical structure" (2008, 254). The authors call this "intentional imposition". – Other studies have shown that by twelve to fourteen months of age infants can use the gaze of others to predict a person's subsequent actions (Phillips, Wellman, Spelke 2002), can interpret a person's emotional expressions as being about the object at which she gazes (Repacholi 1998), and can interpret the words a person utters as naming the object at which she directs referential behaviors (Woodward 2003). Finally, Moll et al. (2007) demonstrated that one-year olds can attribute knowledge and ignorance to others but that such knowledge-ignorance understanding strongly depends on the joint engagement between infant and adult. Such knowledge could not be demonstrated independently of such engagement. These data support the interplay between object perception and social interaction. They also support the notion that embodied practices and active engagement with another agent plays a crucial role for (social) cognition.

Reciprocity and social affordances. Primary intersubjectivity in direct face-to-face social interaction between infant and caregiver displays an important dynamics and reciprocity that is crucial for *online* social cognition quite generally. Understanding others is typically not a unidirectional process: My own efforts to engage with the other prompt reactions feeding into a communication 'loop' characterized by *reciprocity* (Frith 2007, p.175). The importance of this is underestimated by theory-theory and simulation theory: Since they presuppose a detached observational stance towards the other (*offline* social cognition) instead of a more engaged interaction, they fail to account for this reciprocity. Basic social understanding is based on a sensitivity to "expressions of intentional and affective attitudes, as revealed in another's gaze, gesture, facial comportment" etc. (Hutto 2008, p.117). But in addition, perceiving the *meaning* of another's bodily expression requires processing the *social affordances* (Costall 1995) provided by them, analogous to the affordances provided by objects we perceive. The coupling between two agents in direct interaction is even more complex than the coupling between agent and environmental object. Due to the general flexibility and unpredictability of others in social interaction and a higher degree of uncertainty, social affordances are richer and more complex than affordances provided by objects. But they can prompt appropriate actions and reactions in a conversational context, culminating in the maintenance and extension of reciprocal relations. And healthy human beings can distinguish and pick up deliberate as well as inadvertently emitted communicative signals and to intuitively grasp the communicative context in which to make sense of another's behaviour (Senju & Csibra 2008). The studies mentioned earlier suggest that infants already possess this skill.

Autism. All this is crucial for the interpretation of autism as a social cognitive impairment. The enactive approach offers an interpretation of autism different from the traditional diagnosis as a lack of theory of mind based on a failure in false-belief tasks (Baron-Cohen 1995). It has recently been demonstrated that autistic patients can indeed pass such tasks when prompted to do so explicitly. Yet, this does not improve their social skills in direct interaction. As Senju et al. (2009) conclude from their study, patients with Asperger's are impaired in the "automatic online computation of others' mental states". They are not impaired in mindreading generally, but lack the more basic social skill to spontaneously encode socially relevant information and understand gestures and facial expressions *as* expressions of emotions (see Lee, Meyer, Hobson 1997). Thus, if autism is seen as a more general deficit in the sensorimotor, embodied and implicit *know-how to deal with other people*, this account can also explain other peculiarities significant for autism that have nothing to do with social cognition, e.g. the problems in lying, righting, sitting, crawling, and walking (Gallagher 2001).

4. Conclusion

In accordance with the enactive approach, it has been argued that cognition is based on sensorimotor skills executed by the organism as a whole in its exploration of objects in the immediate environment. It has been shown how central ideas from enactive cognition can be transferred to the social domain. The *primacy of embodied sensorimotor skills* is obvious in online social cognition when two agents are directly engaged in social interaction. *Social affordances* emerge from the *coupling* between two agents. Picking them up can prompt appropriate reactions, which in turn culminate in the *dynamics and reciprocity* characteristic of online social cognition. Displaying and perceiving bodily expressions of feelings, intentions etc. allows for a *skillful know-how* to deal

with other people, a spontaneous social understanding below and before mindreading which is impaired in autistic subjects. Direct engagement in online interaction also modulates object cognition. In this sense, it has been demonstrated that motor intentionality is more basic than cognitive intentionality both for object cognition and social cognition. Thus, if this foundational role can be spelled in more detail, then it promises to lead to a comprehensive account of intentionality.

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