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Embodied Intersubjective Understanding and Communication in Congenital Deafblindness

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Abstract

In all standard philosophical approaches to social cognition, both vision and audition play a central role; tactile and proprioceptive sensations, less central; and taste and olfaction, if they are ever mentioned in theories of social cognition, play a marginal role. This makes it difficult to think of how social cognition might work in the deafblind population. My intention is to outline three different views about social cognition, which attempt to explain intersubjective understanding and communication. I'll show how vision and audition play a central role in all of these accounts. I'll then ask what alternative resources might provide a clue to understanding social cognition in deafblindness, and finally, whether this is the right way to put the question.

Three theories of social cognition

Theory Theory

The standard and dominant approaches to social cognition in the philosophical and cognitive science literature include theory theory (TT) and simulation theory (ST). TT maintains that our understanding of others involves a process of mindreading. For TT, this means that on the basis of one's observations of another's behavior, one makes inferences about the other's mental states based on folk-psychological theory. To understand another person means to understand that person's reasons for acting or behaving the way they do. To understand another's reasons means to discern how their beliefs and desires shape their intentions and cause them to act the way they do. On most conceptions of TT, beliefs, desires, intentions, and mental states generally, are not themselves observable. This is sometimes referred to as the 'unobservability principle' (Krueger, 2012, p. 149). Leslie (1987, p. 164) provides a clear statement of this view: "Because the mental states of others (and indeed ourselves) are completely hidden from the senses, they can only ever be inferred". Many such statements of UP can be found in the theory of mind (ToM) literature. Karmiloff-Smith (1992, p. 138), for example, contends that social cognition "involves inferences based on unobservables (mental states, such as belief)..." Or again, Johnson (2000, p. 22): "Mental states, and the minds that possess them, are necessarily unobservable constructs that must be inferred by observers rather than perceived directly."

Precisely because mental states are unobservable, I have to depend on my observations of the other person's behavior, and my capacity to infer ("mindread") their mental states using the principles of folk psychology. Observation of the other's behavior in this context most often is explicated in visual terms, but can also include auditory information about vocal intonation. I see what the other is doing; I see the context, and on that basis I make inferences about their mental states. Mindreading, as inferential, requires the evidence provided by vision or audition to get started. In that case, even for the nativist who thinks of the inferences as subpersonal, vision plays a necessary and significant role in mindreading.

Three further points should be mentioned in regard to TT. First, there are debates among theory theorists about whether the rules of folk psychology are learned (e.g., Gopnik & Meltzoff 1997 – the empiricist view) or whether they are hardwired (genetically, or based on evolutionary processes) into specialized modules of the brain (Carruthers 2006 – the nativist view). Second, there are debates about whether we should think of the inferences as consciously constructed inferences – based on phenomenological considerations, this may happen in some, relatively rare instances – or as close to automatic non-conscious inferences. On the latter view, the inferences may be non-conscious just because they have become so habitual that we don't notice we're making them; or because the inferences themselves are subpersonal processes accomplished by neural activation, and in principle

not available to consciousness (Carruthers 2015). Third, TT usually appeals to the developmental science that has focused on false belief tests. To the extent that a young infant or child can pass a false belief test, they are said to have a theory of mind (ToM). The standard false belief test based on elicited (linguistic) responses from young children indicated that children on average gain the ability to infer mental states (and thereby gain ToM) at around 4 years. Three-year olds, and autistic children typically fail elicited false belief tests (Baron-Cohen 2000). More recent experiments with much younger children (13-18 mos) show that non-autistic children can pass spontaneous false-belief tasks, measured by looking time or anticipatory looking that indicates the correct answer (e.g., Baillargeon, Scott & Zijing 2010). This is more troubling for the empiricist theory theorist; not so troublesome for the nativist.

Simulation Theory (ST)

ST accepts many of the same assumptions made by TT. Mental states are unobservable. We require visual or auditory observation to initiate a mindreading process. Mindreading, however, for ST, is not based on theoretical inference or folk psychology; it's rather based on the observer's own experience. On the basis of my own experience, I run a simulation routine by putting myself in the other's place and simulating what I would do in that circumstance. I then project the results of that simulation, my simulated beliefs and desires, to the other person. Here is Goldman's description of this process.

First, the attributor creates in herself pretend states intended to match those of the target. In other words, the attributor attempts to put herself in the target's 'mental shoes'. The second step is to feed these initial pretend states [e.g., beliefs] into some mechanism of the attributor's own psychology ... and allow that mechanism to operate on the pretend states so as to generate one or more new states [e.g., decisions]. Third, the attributor assigns the output state to the target..." [e.g., we infer or project the decision to the other's mind]. (Goldman 2005, 80-81.)

Again, like TT, there are debates about whether the simulation process is a matter of consciously imagining myself in the other's place (Goldman 2006 often describes it in this way), or whether simulation is non-conscious. The recent discovery of mirror neurons (MNs) has supported the concept of a subpersonal neural process that is equated with a non-conscious simulation process (e.g., Ferrari & Gallese 2007). Gallese and others often equate simulational mindreading with a form of basic empathy that happens automatically and non-consciously whenever I see someone else engaged in intentional action. Debates between nativists and empiricists generally focus on the question of whether MNs are functional at birth (e.g., Ferrari & Gallese 2007), or take time to get attuned to the observed action of others (e.g., Heyes 2010). Finally, simulationist accounts focus primarily on visual and auditory input. MNs respond to both visual and auditory stimuli, and more generally,

simulation depends on visual and auditory observations of other's actions. Even the kind of imagination that is appealed to in ST is about visualizing the situation of others.

Interaction Theory (IT)

A more recent approach to social cognition is understood as an alternative to the dominant standard approaches of TT and ST. Interaction theory (IT) disagrees with a number of the basic assumptions made by TT and ST (Gallagher 2001a). IT takes mental states to be embodied and not hidden away or unobservable. For that reason, one does not need a specialized type of inference or simulation to get to the minds of others; in many cases one can simply perceive their intentions, emotions, and some other mental states. IT also disagrees with the emphasis on observation as our primary way of understanding others; instead IT emphasizes interaction. The idea is that we are primarily engaged in actively responding to others, and they to us, so that social cognition is much more dialogical. In this respect there is much less need for mindreading (although in some instances when the other person is acting in a puzzling manner, or in specialized activities, such as in psychotherapy, one might require inference or simulation).

IT finds its evidence in developmental studies that distinguish between primary intersubjectivity and secondary intersubjectivity (Trevarthen 1979; Trevarthen and Hubley 1978). Primary intersubjectivity is operative from the very beginning of life and is nicely exemplified in neonate imitation (Meltzoff and Moore 1977). There are debates surrounding the status of neonate imitation – whether it is a proto-form of interpersonal communication (Meltzoff and Moore 1997), or perceptual priming or contagion, or arousal (see Keven & Aikins, in press; Vincini et al., in press) – but for IT, whatever neonate imitation is, it strikingly pulls the infant into a primitive form of interaction with the other person – interaction that develops and becomes much more sophisticated. Primary intersubjectivity includes our embodied sensory-motor capacities to perceive and to respond to others' bodily postures, movements, gestures, facial expressions, expressive movements, vocal intonations, etc. These capacities are present at birth, or shortly thereafter, and continue to develop throughout the life span.

Primary intersubjectivity includes the ability to perceive the other person's emotions and intentions. IT argues for a direct enactive perception. Direct means that no additional cognitive inference or simulation needs to be added; enactive means that perception is action-oriented: we perceive others in terms of how we can respond to them or how we can interact with them. Others present us with affordances for action and interaction (social affordances), and these are things that we can perceive in their actions and emotional expressions.

Evidence for direct perception includes studies of the perception of motor intentions, where we are able to distinguish intention-related kinematic aspects of reaching and grasping actions. For example, simply by perceiving another person reaching and grasping an apple, we can anticipate whether they are going to eat the apple, offer it to someone else, or throw it (Becchio et al. 2010). We can do this without context, simply viewing an agent wearing point-light displays on arm and wrist in darkness (at above 70% accuracy). When we add context it is even easier to see what they intend to do. This capacity for the direct perception of intentions develops early, so that even 2 year olds are able to distinguish between a playful gesture (of withdrawing a feeding bottle) versus an honest action (offering the bottle for feeding) (Legerstee 2005; Reddy 2008).

Secondary intersubjectivity begins around 9 months of age, and again continues through adult life. It's signaled by the development of joint attention to worldly contexts and the capacity for forming joint intentions for joint actions. The infant starts to take pragmatic and intersubjective (social) contexts into consideration when attempting to understand another's actions. Understanding the situation in which an agent acts helps the infant to understand the action. The infant begins to learn about the world through attending and acting with others. Children begin to understand social roles and start to understand others in terms of their roles.

In addition to primary and secondary intersubjectivity, the development of competency in communicative and narrative practices, starting at 2-3 years of age, provides further resources for understanding others, without the necessity of mindreading. If we can ask others what they intend or what they believe, we don't need to infer about mental states. And if we have the ability to situate their behavior and actions in a narrative framework, this will provide a rich context for understanding them.

Further evidence for IT can be found in empirical work on the situated pragmatics of conversation. For example, Charles Goodwin shows that meaning emerges at the intersection of social, cultural, material and sequential structures of the environment, where action and interaction occur – including vocalization, gesture, postural orientation, etc. Meaning is accomplished, not just via speech (which has been the traditional focus) but, by drawing on "different kinds of semiotic resources" available in the environment and in whole body pragmatics (Goodwin 2000).

Goodwin provides a detailed analysis of a dispute between two young girls over a game of hopscotch. There is an interactive organization of various phenomena that have to be considered to understand the full encounter. "For example, spoken language builds signs within the stream of speech, gestures uses the body in a particular way, while posture and orientation use the body in another, etc." (Goodwin 2000, p.). Goodwin emphasizes the "visible, public deployment of multiple semiotic fields that mutually elaborate each other" (2000). The temporal flow/rhythm of high vs. low, hard vs. soft vocal intonation of the

speech – some of which has a deontic rather than descriptive force; a set of instituted norms (i.e., the rules of the game of hopscotch); reference to a completed action (throwing a marker on one of the squares), etc. One girl intentionally moves to stand in the way of the other girl, interrupting the game. The bodily orientations of the two girls allows for eye contact and joint attention toward the hopscotch pattern on the ground – but also for temporal modifications in those postures. In addition, hand gestures integrate with the speech, but also with the body positions of both girls.

Carla has to use her body in a quite precise way while taking into account the visible body of her co-participant. She is faced with the task of using not only her talk, but also her body, to structure the local environment such that her gestures can themselves count as forms of social action…. Unlike talk, gestures can't be heard. [This means] Carla actively works to position her hand gestures so that they will be perceived by Diana…. Carla's hand is explicitly positioned in Diana's line of sight….thrusting the gesturing hand toward Diana's face twists Carla's body into a configuration in which her hand, arm and the upper part of her torso are actually leaning toward Diana. (Goodwin 2000, p.)

How close is the gesture to the other girl's face? – that proximity has meaning. If it were not a gesture, but a touch, how hard or soft, and where the touch occurred would also have meaning. The gesture is meant to be attention grabbing, forcing the other to orient to the point being made in the speech, or to a point of joint attention on something in the environment – a grab could do the same thing. This is not one-sided – the other girl is standing on one foot, attempting to finish her jump through the hopscotch squares – attempting to ignore the other girl, and the accusation of cheating. Joint attention is broken when one girl looks away – the accomplishment of meaning involves two-way interaction and is not under the control of just one individual. Moreover, the interaction, the conversation is not confined to vocalization and gesture – reference is made to the physical environment, with glances to the hopscotch squares under discussion. This is a distributed form of communication that builds on the material aspects of the environment.

In another moment, Carla stomps her foot in a gesture that hits three semiotic points: Where Diana is looking; on the hopscotch square in question; on what she is iterating in speech.

The nature of interaction is important for IT. Embodied interaction with the other person in most cases facilitates social understanding, and in some cases even constitutes a basic social cognition. In interaction, agents enter into dynamical relations that constitute a system that extends beyond what each individual agent brings to the process (De Jaegher et al. 2010). Communicative practices, e.g., the timing of gesture in relation to speech, the practice of turn taking, operate on the same principles of dynamical interaction. Social affordances (like any affordances) are relational and depend on the possibilities opened up by interaction. In contrast to TT and ST, which look to processes within the individual or the individual brain (ToM modules, or MNs), IT suggests that the processes of social cognition

go beyond the individual and are to be found in the dynamics of interactions. Participatory sense making (De Jaegher and Di Paolo 2007) involves the creation of meaning that would not be possible without agents interacting, and, at least in part, it is this extra-individual meaning that figures into social cognition. Merleau-Ponty refers to this as a process of 'intercorporeity'.

There is, between … [my] phenomenal body, and the other person's phenomenal body such as I see it from the outside, an internal relation that makes the other person appear as the completion of the system (2012, 368).

Intercorporeity is the "presumptive domain of the visible and the tangible, which extends further than the things I touch and see at present" (Merleau-Ponty 1968, 142–143).

Although one can find in Merleau-Ponty some emphasis on the importance of the tactile sense, and likewise in developmental studies of primary intersubjectivity, the importance of touch between infant and caregiver (consider breast feeding, the predominance of holding and carrying the infant), the primary sense modalities for interaction are still visual and auditory. Imitation, joint attention and joint action are all highly dependent on visual and/or auditory cues from the other agent, and this continues into adulthood. IT argues that even more developed capacities, not only communicative and narrative abilities, but also the use of theoretical inference and simulation in the rare cases where we have to put them to use, already presumes grounding in interaction and reliance on visual and auditory modalities. But Goodwin adds an important qualification: "this is by no means a fixed array of fields [or resources]. Thus on many occasions, such as phone calls, or when participants are dispersed in a large visually inaccessible environment (e.g., a hunting party, or a workgroup interacting through computers), visual co-orientation may not be present" (2000, p.)

Deafblindness as a Complete Form of Existence

For me, this section can only be brief, and likely I'll only be able to say things that those who work with individuals who are deafblind already know, and know better than I do. Moreover, I want to keep in mind that, as McInnes and Treffry indicate, "there is no one formula which will be applicable to all deaf-blind children" (1993, xiii).

For people with residual sight and/or hearing, *intensive interaction* – specifically focused on the kind of interaction found in primary intersubjectivity – may form the basis of building some degree of social cognition. Lacking vision and audition this likely involves dynamics different from typical interactions. Should we then ask what other resources are available to the deafblind individual?

To the extent that deafblind children can incorporate the haptic aspects of interaction, might this provide a base for further development? Building on the tactile/haptic aspects of

interaction, one can gain a tactile sense of the other's emotions. Consider, for example, the way the deafblind person is touched or held from infancy onward. He or she may be able to develop a sense of the emotional state of the other from such tactile interactions. Likewise, of course, many alternative forms of communication – haptic communication, tactile signs and fingerspelling, the use of a braille communicator— involve tactile/haptic processes and likely a different dynamics from those involved in typical development. This means that the deafblind individual may not only gain informational content from such haptic communicative practices, but also a sense of the other's affective or emotional attitude, much as non-deafblind individuals gain that sense from vocal intonation.

Furthermore, through the use of such communicative methods deafblind individuals may gain narrative competency, which, according to some theorists, can facilitate simulation methods (Stueber 2012). One problem with ST in this regard, however, is what I've called the diversity problem (Gallagher 2012). The diversity problem is the problem of attempting to understand others solely on the basis of one's own experience. Gilbert Ryle indicated the problem:

> *The observed appearances and actions of people differ very markedly, so the imputation to them of inner processes closely matching [one's own or] one another would be actually contrary to the evidence.* (Ryle 1949, p. 54)

Even if it were possible for deafblind individuals to be exposed to a large number of narratives, which could remedy the diversity problem, their own experiences may remain so different from those of others that their simulations would fall short of their target.

Recent research suggests that autistic individuals (across the autistic spectrum) have problems processing proprioceptive information (Brincker & Torres 2013; Cook, Blakemore & Press 2013; Hilton et al., 2012; Torres 2013; Torres et al. 2013; Whyatt and Craig 2013; see Gallagher and Varga 2015 for review), and also deficits with regard to MN activation (Gallagher 2001b; Oberman 2005; Rizzolatti & Fabbri-Destro 2010). On one interpretation this means that they have problems that would interfere with primary intersubjectivity and with simulation. Accordingly, in high-functioning autistic individuals, conscious and relatively slow theoretical inference may be the only way they have of understanding others, and they have to gain competence in this approach without the insight offered by direct perception. Deafblind individuals may be in a similar situation. Sight, for example, is not divorced from motor control, and is usually integrated with vestibular and proprioceptive processes, so the lack of vision may introduce modulations into these other sense modalities.

Moreover, there is evidence of deficits in the MN system in congenitally deaf or blind individuals.

Although largely unexpected, congenitally blind or deaf subjects displayed substantially lower resonant motor facilitation upon action perception compared to seeing/hearing control subjects. Moreover, muscle-specific changes in cortico-motor excitability within M1 appeared to be absent in individuals with profound blindness or deafness. [This suggests] that action perception in blind and deaf subjects engages a mode of action processing that is different from the human action recognition system recruited in typically developed subjects. (Alaerts, Swinnen & Wenderoth 2011, 1080).

One implication of these limitations is that deafblind individuals may do well in a limited set of interpersonal associations. We may, by these various methods, become familiar with specific persons, learning their specific interaction patterns – Newen and Schlicht (2009) call this the "person model" of social cognition. When we know a particular person well, we learn what actions are consistent with her character or personality, and therefore what to expect from her. This familiarity gives us a more intensive understanding of specific others, and in those particular cases less of a reliance on general folk psychology or simulation routines.

Studies of autism and of Moebius Syndrome suggest that the non-social or socially limited behavior of individuals with autism or Moebius Syndrome may in part be due to the way that others treat them (McGeer 2001; Cole 1999a&b; 2009; Krueger & Michael 2012), and this would also seem to be the case in regard to deafblind children. Rönnberg and Borg (2001, 7) note: "a common complaint is that other people do not greet the deaf-blind individual or inform about their presence." In typical development, caregivers are often initiators of interactions, but interaction develops into a reciprocal arrangement. Indications for intensive interaction methods suggest that the other person, e.g., the caregiver, is in the position of initiating interaction. At the same time the method suggests that the interaction should be tuned to the dynamics of the deafblind person, allowing that person to take the lead. McInnes and Treffry refer to this as setting up a 'reactive environment', and as they indicate, this is likely a difficult thing to learn, but also an important thing to master – especially for caregivers and teachers who are inclined to 'do for' the child, rather than to 'do with'.

One might think, then, that the conclusion should be as follows: although deafblind individuals have more limited resources available – specifically less sight- and audition-based interaction – their intersubjective interactions may still be significant, with more tactile/haptic-based processes, and processes that lead to alternative forms of communication. *All other things being equal*, these may further lead them to the more subtle and sophisticated capacities for theory-based mindreading and the fostering of a limited set of associations where they can gain more intense familiarity with individual persons.

Consider, for example, drawing on Goodwin's (2000) analysis, the wealth of resources at their disposal given alternative ways of accessing them for deafblind individuals:

- The temporal flow/rhythm of interaction
- The "intonation" of touch – hard, soft, quick, slow
- Instituted norms
- Knowledge of completed actions
- Bodily movement/posture/proximity to other bodies
- The material environment
- The other person
- The attention of others – the means to grab it for joint attention
- Theoretical inference, narratives, imagination

It's not clear, however, that this is exactly the right way to put it. All of this, and especially the 'all other things being equal' clause, should be qualified, because what I'm calling resources are not additive components. Although it may be that if there is deficit in one or more sense modalities, other sense modalities gain in strength, that doesn't mean they provide what's not there to begin with. This relates to the fact that blindness is not experienced by the congenitally blind person as missing sight; nor is congenital deafness experienced as the missing of some positive sense – with all other aspects of existence remaining equal. As Merleau-Ponty indicated, such congenital conditions determine a "complete forms of existence" (2012, 107). Being deafblind is not equivalent to having an *incomplete* form of experience; it is rather a *different* form of experience that holds together in a holistic fashion. Interventions in that form of existence will not be equivalent to interventions in a typically developing form of existence that is simply missing several components. In this respect, adding alternative resources, such as alternative forms of communication may be beneficial, but they will be incorporated into the individual's own form of existence, with its own differences in social cognition and interaction.

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