

available at [www.sciencedirect.com](http://www.sciencedirect.com)[www.elsevier.com/locate/brainres](http://www.elsevier.com/locate/brainres)**BRAIN  
RESEARCH****Research Report****Intentional attunement: A neurophysiological perspective on social cognition and its disruption in autism****Vittorio Gallese**

Dipartimento di Neuroscienze, Università di Parma, Via Volturmo 39, 43100 Parma, Italy

## ARTICLE INFO

## Article history:

Accepted 11 January 2006

Available online 28 February 2006

## Keywords:

Autism

Embodied simulation

Intentional attunement

Mirror neuron

Shared manifold

Social cognition

## ABSTRACT

A direct form of experiential understanding of others, “intentional attunement”, is achieved by modeling their behavior as intentional experiences on the basis of the activation of shared neural systems underpinning what the others do and feel and what we do and feel. This modeling mechanism is embodied simulation. In parallel with the detached sensory description of the observed social stimuli, internal representations of the body states associated with actions, emotions, and sensations are evoked in the observer, as if he/she would be doing a similar action or experiencing a similar emotion or sensation. Mirror neuron systems are likely the neural correlate of this mechanism. By means of a shared neural state realized in two different bodies, the “objectual other” becomes “another self”. A defective intentional attunement caused by a lack of embodied simulation might cause some of the social impairments of autistic individuals.

© 2006 Elsevier B.V. All rights reserved.

**1. Introduction**

In primates species, the relationship between social complexity and cognition is well established. [Humphrey \(1976\)](#) originally suggested that the intelligence of primates primarily evolved to solve social problems. This view is supported by empirical data. Several studies revealed the unique capacity of non-human primates of understanding the quality of the relationships within their social group, not only in terms of kin, but also in terms of coalitions, friendship, and alliances. The capacity to understand conspecifics' behaviors as goal-related provides considerable benefits to individuals, as they can predict others' actions. The advantage of such a cognitive skill would allow individuals also to influence and manipulate the behavior of conspecifics (see the Machiavellian Intelligence hypothesis [Whiten and Byrne, 1997](#)) or to achieve better social cooperation within a group.

As pointed out by [Tomasello and Call \(1997\)](#), primates can categorize and understand third-party social relationships.

The evolution of this cognitive trait seems to be related to the necessity to deal with social complexities that arose when group-living individuals had to compete for scarce and patchily distributed resources. [Dunbar \(1992\)](#) posited a relationship between primates' group size and the degree of expansion of the neocortex. The increase of social group complexity exerted a powerful pressure for the development of more sophisticated cognitive skills.

The problem of intentionality in primates was almost simultaneously and independently raised by [Humphrey \(1978, 1980\)](#) and [Premack and Woodruff \(1978\)](#). The traditional view in the cognitive sciences holds that human beings are able to understand the behavior of others in terms of their mental states by exploiting what is commonly designated as “Folk Psychology”. The capacity for attributing mental states—intentions, beliefs, and desires—to others has been defined Theory of Mind (ToM, [Premack and Woodruff, 1978](#)). The attributes of “Folk Psychology” have been thus basically identified with the notion of Theory of Mind ([Carruthers and](#)

E-mail address: [vittorio.gallese@unipr.it](mailto:vittorio.gallese@unipr.it).

Smith, 1996). A common trend on this issue has been to emphasize that non-human primates, apes included, do not rely on mentally based accounts for others' behavior (Hayes, 1998; Povinelli et al., 2000). According to this perspective, social cognition becomes almost synonymous of mind reading abilities.

The dichotomous account of primate social cognition based on a sharp evolutionary discontinuity between species of behavior readers (non-human primates) and one species of mind readers (humans) appears though over simplistic.

As recently pointed out by Barrett and Henzi (2005, p. 1866), this traditional approach is "...heavily oriented toward a particular model of cognition that focuses solely on internal mental representations, whereas recent work in cognitive science and neurobiology argues for a more distributed and embodied approach".

In the present paper, I propose a different approach. I submit that social cognition is not only "social metacognition", that is, explicitly thinking about the contents of someone else's mind by means of abstract representations. There is also an experiential dimension of interpersonal relationships, which enables a direct grasping of the *sense* of the actions performed by others, and of the emotions, and sensations they experience. This dimension of social cognition is embodied in that it mediates between the multimodal experiential knowledge we hold of our lived body and the experience we make of others.

I proposed that our capacity to share experiences with others rests on the constitution of a shared meaningful interpersonal space. This "shared manifold" (Gallese, 2001, 2003, 2005a) can be characterized at the functional level as embodied simulation (Gallese, 2005a), a specific mechanism by means of which our brain/body system models its interactions with the world (for a similar account of the mechanisms at the basis of empathy, see Preston and De Waal, 2002). I submit that embodied simulation constitutes a crucial functional mechanism in social cognition.

The self/other distinction in my opinion is not the most difficult problem in social cognition, neither from a theoretical, nor from an empirical point of view. The "hard problem" in social cognition is to understand how the epistemic gulf separating single individuals can be overcome. The solipsistic attitude, inspired by Folk Psychology and purported by the approach of classic cognitive science, leaves this hard problem unsolved. Recent neuroscientific evidence suggests alternative answers. Here, I discuss this evidence and provide a theoretical framework for its interpretation. Before doing so, I want to briefly discuss the problem of social cognition from an ontogenetic point of view.

## 2. The ontogenesis of social cognition

The notion of "social cognition" sounds almost as a pleonasm, since from an ontogenetic point of view, the relationship between cognition and the social dimension is intrinsically tight.

At the very onset of our life, interpersonal relations are established when a full-blown self-conscious subject of

experience is not yet constituted. However, the absence of a subject does not preclude the presence of a primitive "we-centric space". The infant shares this space with others. Few hours after birth, neonates display facial imitation (Meltzoff and Brooks, 2001). Furthermore, empirical research has shown that mothers and infants systematically engage in mutually coordinated activities during which their movements, facial expressions, and voice intonation synchronize in time (Reddy et al., 1997). From 4 months of age onwards, infants and mothers show proto-dialogic behaviors in which they time their behavior in a bidirectional coordinated way (Trevarthen, 1979). Approximately at the same age, infants become sensitive to social contingencies (Striano et al., 2005). According to Daniel Stern (1985/2000), this evidence suggests that such proto-dialogic behaviors enable mother and infant to establish an affective attunement by means of which inner feeling states can be shared.

According to my hypothesis, the shared we-centric space enables the social bootstrapping of cognitive and affective development because it provides a powerful tool to detect and incorporate coherence, regularity, and predictability in the course of the interactions of the individual with the environment. The we-centric space is likely paralleled by the development of perspectival spaces defined by the establishment of the capacity to distinguish self from other, as long as self-control develops. Within each of these newly acquired perspectival spaces, information can be better segregated in discrete channels (visual, somatosensory, etc.) making the perception of the world more finely grained. The concurrent development of language possibly contributes to further segregate single characters or modalities of experience from the original multimodal perceptive world. Yet, the more mature capacity to segregate the modes of interaction, together with the capacity of carving out the subject and the object of the interaction, does not annihilate the shared we-centric space.

In fact, the establishment of a self-centered perspective is paralleled by the creation of an epistemic gap between self and others. The gulf separating self from non-self poses a challenge to any account of intersubjectivity and social cognition. I posit that the intersubjective we-centric space may provide the individual with a powerful tool to help overcome such epistemic gap. If my hypothesis is correct, social identity, the "selfness" we readily attribute to others, the inner feeling of "being-like-you" triggered by our encounter with others, are the result of a preserved shared we-centric space.

The proposition that self-other physical and epistemic interactions are shaped and conditioned by the same type of body and environmental constraints sounds almost as a truism. Less trivial in my opinion is the fact that this common relational character of intersubjectivity is underpinned, at the level of the brain, by shared neural networks, the mirror neuron systems, compressing the "who-done-it", "who-is-it" specifications into a narrower content state. This content specifies what kinds of interaction or state are at stake. A concise overview of the evidence supporting the existence of such shared neural mechanisms will be the focus of the next sections.

Download English Version:

<https://daneshyari.com/en/article/4333172>

Download Persian Version:

<https://daneshyari.com/article/4333172>

[Daneshyari.com](https://daneshyari.com)