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Abstract:

How is mindreading affected by social context? It is often implicitly assumed that there is one single way to understand others, whatever the situation or the identity of the person. In contrast, I emphasize the duality of functions of mindreading (social interaction and social observation), as well as the duality of social frames of reference (egocentric and allocentric). I argue in favour of a functional distinction between knowledge-oriented mindreading and interaction-oriented mindreading. They both aim at understanding other people's behaviour. But they do so using different strategies. However, to say that mindreading has two functions does not suffice to show that there are two kinds of mindreading. One and the same ability could accomplish different functions. Unfortunately, there has been almost no experimental data on a possible dissociation between two kinds of mindreading abilities. Nonetheless, I discuss a few results that point towards a dual ability.

What would be more relevant to Uta Frith's work and personality than to focus on the social dimension of cognition? I will not detail here how she has been able to create a real family atmosphere within her group and within the ICN, or how enjoyable it is to work with her. I will rather highlight some of the ideas that we had developed together in previous papers about social frames of reference (Frith and de Vignemont, 2005; de Vignemont and Frith, 2007). We suggested that there is more than one way to understand others and that it depends on the frame of reference of our social understanding. Here I will develop and refine the hypothesis of a dual mindreading ability.

**Social observation and social interaction**

The problem of other minds – or how I can understand others – has often been understood in such a way that there seems to be only one unique valid answer. The context should not matter, nor should the identity of the person one tries to understand. You could be conversing with someone, or seeing her converse with someone else; it could be your mother or a stranger in the street: the problem would stay the same, and the solution too. The literature in cognitive psychology for more than twenty years now has indeed provided a rather unilateral view of mindreading and social cognition. It is often assumed that there is one single way to understand the other, although people disagree on its nature. It is also often assumed that it is accomplished by a unique brain structure dedicated to the representation of mental states, like the temporo-parietal junction for instance (Saxe, 2006). Although Saxe agrees that social cognition involves more than that, she views mindreading *per se* as a unique ability realised by a unique brain structure. I will call this assumption the *Single Perspective view*.

We can contrast the Single Perspective view with what I will call the *Dual Perspective view*, which has been first defended by the philosopher Alfred Schütz, who founded phenomenological sociology in the thirties. In the *Phenomenology of the Social World* (1932), he made a distinction between two fundamental kinds of relationship with the other: social interaction and social observation. These two kinds of relationship are both oriented toward others. They both aim at understanding other people's behaviour. But they do so using different strategies. *Social interaction* is oriented toward persons that are considered as a 'Thou,' as another agent that cannot be treated as an object. The interaction can consist of affecting the other's behaviour and experiences. The face-to-face relationship is characterised by immediacy and flexibility. We can adjust to each other and I can test your reactions, to see how your assumed motives produce what you say. Furthermore, the environment can be guaranteed as a common one, shared in experience, which is useful in understanding the other. We can make unambiguous references to objects within our mutual reach, and check our guesses by questions. On the other hand, *social observation* is oriented toward persons located outside the nexus of intimacy. People are no longer perceived and reckoned with as unique individuals, but as instances of classes. For example, one expects policemen to act in certain ways, and thus we can relate to them in a prototypical way without ever knowing them as individuals. Such people are only relevant to us insofar as they correspond with our prototype. In social observation, I cannot modify your behaviour. Nonetheless, I can still guess your mental states based on inferences from the behaviour that I observe, on memories of similar past situations where I was involved, on general knowledge of prototypes of people based on assumptions of generalisability (e.g. policemen). I will validate my

understanding according to my experience of the social world and my knowledge of the character of the observed persons, actual or typical. However, no testing is possible, since we can make no reference to objects, and cannot ask questions to check observations.

In contrast to the Single Perspective view, Schütz distinguished two modes of relationship with the other based on phenomenological and epistemological differences between the two modes. His view is actually quite modern, although it was proposed more than 70 years ago. It goes in the same direction as some recent theories of the architecture of the mind that emphasise the possibility of multiple coding of the same category. One of the main proponents of such trend is Jackendoff (1996, p. 1): "The general idea is that the mind/brain encodes information in many distinct formats or 'languages of the mind'." We can provide a series of examples of this principle in various domains of cognition.

- Language: dual route of language understanding through the phonological pathway and the semantic pathway (Forster, 1979)

- Number: dual route of counting through subitising and serial counting (Dehaene and Sybesma, 1999)

- Body: dual representation of the body through the body schema dedicated to action and the body image dedicated to recognition (Paillard, 1999)

- Action: dual representations of action, either semantic or pragmatic (Jeannerod, 1997)

- Vision: dual representation of visual inputs through the dorsal pathway of sensorimotor transformation and through the ventral pathway of object

recognition (Milner and Goodale, 1995)

- Space: dual representation of the location of objects relative to other objects within an allocentric frame of reference and relative to the agent within an egocentric frame of reference (Pick and Lockman, 1981)

Interestingly, one criterion of distinction is present in several of these examples. For the body, for action and for vision, the duality of coding results from a difference in functional role. On the one hand, there is a representation dedicated to the recognition and identification of the input. This semantic representation constitutes the basis for judgments about the input and about its properties (e.g. I believe that the ball is red). On the other hand, there is a representation dedicated to actions. This pragmatic representation is used to plan and control movements performed toward the input (e.g. the ball is big so I make a large grip aperture to grasp it). This distinction is founded on an impressive amount of evidence coming from physiology, psychophysics, neuropsychology and neuroscience (for review, see Jacob and Jeannerod, 2003). It has been shown not only for vision, but also for other sensory modalities like audition (Belin & Zatorre, 2000) and proprioception (Dijkerman & de Haan, in press). It seems to be widespread in the cognitive architecture and one might even wonder whether we could not extend it further by applying it to social cognition.

Schütz's theory can indeed be reinterpreted in more cognitive terms using the Perception-Action model. If one takes seriously the parallel with the Perception-Action model, one would have first to describe the nature and the extent of the differences between social interaction and social observation. Putting it another way, one would have to show that social interaction and social observation rely on distinct cognitive

mechanisms. To be exhaustive, the Dual Perspective view would have to specify the properties of each of these mechanisms and to provide empirical evidence of this distinction based on neuropsychological dissociations and on developmental data. However, this paper will be more exploratory and does not pretend to reach such level of achievement. I will rather suggest a weaker version of the Dual Perspective view. I will show that it makes a difference whether I understand the other in the context of social interaction or social observation. This difference could be explained by assuming either that there are two distinct mindreading abilities (i.e. strong version of the Dual Perspective view) or that there is one single ability, used differently given the context. I will leave this latter question open, although I will try to provide some suggestions that might be worth investigating experimentally.

**Functions of mindreading**

Mindreading is often characterised as the ability to understand and predict someone else's behaviour. This definition gives us what mindreading does, not what mindreading is for. We are supposed constantly to try to guess what others feel or think, but why do we do that? Is it just out of curiosity by a kind of voyeurism? Or is there anything beyond, that would be essential to our survival in society? Can the Perception-Action distinction also be applied to mindreading?

Let us start with the false belief task, which is paradigmatic of the mindreading literature. The standard version presents the subject with a character, Sally, who puts a chocolate in her basket before leaving the room. In her absence, another character, Anne, removes the chocolate and places it in a box. Subjects are asked to predict, on Sally's

return to the room, where Sally will look for the object. Subjects have to make a judgment about what Sally believes. Mindreading here is considered as a strategy to form beliefs about someone else's mental states. It is what I will call *knowledge-oriented*. One uses mindreading in order to know what the other believes. Mindreading is a way to detect information about the other necessary to make judgments about mental properties. We can compare this function of mindreading with the function of the ventral pathway of vision, which is dedicated to the identification and recognition of the perceived object in order to make judgments about the properties of the object. In the same way that we have beliefs about the colour of the sofa for example, we have beliefs about other people's mental states, although in both cases the information is not directly relevant to us (e.g. we are not thinking of buying the sofa, nor do we intend to interact with the individuals to whom we ascribe mental states).

However, one might suggest a different function of mindreading, as suggested by Rutherford (2004, p. 92): "One of the functions of ToM reasoning is to assess another's knowledge, beliefs, intentions, etc. in order to manipulate their behaviour." Rutherford is interested in competitive situations. Fortunately, our social interactions are not limited to conflicts between individuals. As pointed out by Schütz (1937), there are different ways of affecting the behaviour of others. For instance, teaching involves being understood and remembered, and influencing the other's behaviour more positively. More generally, all situations of communication necessitate carrying a communicative intention in such a way that the other will understand it (Sperber and Wilson, 1986). Cooperation is another situation that involves mindreading. To cooperate, we must know that we have a shared intention (we both intend to do X). We are committed to mutual responsiveness and

mutual support (Bratman, 1992). Each agent must understand the other's intention to react accordingly. In all these distinct social situations, mindreading is what I will call *interaction-oriented*. One uses mindreading in order to be able to interact with others. The type of interaction can be very different. Yet, I would like to argue that all situations of interaction have something in common when mindreading is concerned. Mindreading is a way to detect information about other people's mental states to guide our behaviour with them. We can compare this function of mindreading with the function of the dorsal pathway of vision, which is dedicated to sensorimotor transformations to perform actions toward the perceived object. In the same way that we represent the width of a glass in order to adjust our grip aperture, we represent other people's mental states in order to adjust our own behaviour and to interact with them.

Consequently, there are two functions of mindreading. On the one hand, it can be knowledge-oriented. On the other hand, it can be interaction-oriented. But does it really make a difference?

**Social Frames of Reference**

Let us compare two everyday life situations illustrating the distinction between knowledge-oriented and interaction-oriented mindreading (see Figure 1).

(a) In the metro, I listen to two other travellers who have an argument together. Let us call them Peter and Mary.

(b) At one point they start to pay attention to me and Peter accuses me of spying on them. We have an argument together.

The first stage (a) corresponds to what Schütz calls social observation. I try to guess the background of their argument: Peter does not like that Mary came back too late last night and believes that she is cheating on him; she thinks that he is being unfair. The second stage (b) is a case of social interaction, a rather conflictive one. I am directly involved in the argument, and no longer an external witness. I try to understand why Peter is so angry with me in order to calm him down. At both stages, I ascribe mental states to Peter, although for different purposes. At the beginning, I just want to kill time and entertain myself; afterwards I just want to find a good way to react and to stop this argument. Do I use the same strategy in both situations? What are the differences between knowledge-oriented and interaction-oriented mindreading? I will consider two ways to understand the difference: scope of interest and frame of reference. Although none of these differences exhausts the distinction between social observation and social interaction, they will allow us to refine the contrast between the two kinds of mindreading.

**INSERT FIGURE 1 AROUND HERE**

At the core of the Perception-Action distinction, there is the idea that the visual system does not process the same type of information for action and for perception. For instance, if I want to grasp a glass, I need to encode the size of the glass to program my grip aperture. But its colour might not be relevant for my motor system. Similarly, in interaction-oriented mindreading, I am interested only in the pieces of information that are relevant for interacting. For instance, it is important for me to detect if Peter has the intention to hit me, but I do not need to know what he thinks of the government. More generally, understanding the intentions of others plays a key role for social interaction and constitutes 'a foundational skill', whether it is for communication, for competition or

for cooperation: 'these two dimensions of human expertise – reading intentions and interacting with others culturally – are intimately related' (Tomasello et al., 2005, p. 675). In contrast, the scope of knowledge-oriented mindreading is broader. It includes all the mental properties, as diverse as food-related desires, religious beliefs, emotional state, etc. However, based on this distinction, we cannot draw a sharp boundary between knowledge-oriented and interaction-oriented mindreading. What is relevant varies between each social interaction.

A different way to approach the distinction may be to look not at the information encoded, but at the way the information is encoded. In our example, at the beginning, Peter is considered from a third-person perspective. I refer to him with a 'he'. Later, while arguing with him, I refer to him with a 'you'. With Uta Frith, we have emphasised the importance of the distinction between the third-person (the other unrelated to the self), and the second-person (the other related to the self), this distinction between the latter two perspectives being often neglected (Frith and de Vignemont, 2005). Drawing further on the parallel with the Perception-Action distinction, we have suggested that one needs to take into account the frame of reference in which the other is encoded. We propose that it makes a difference to mindreading whether the other person is understood using an egocentric (''you'') or an allocentric (''he/ she/they'') stance.

The distinction between egocentric and allocentric representations was first made in spatial cognition. A frame of reference was first defined as 'a locus or set of loci with respect to which spatial position is defined' (Pick and Lockman, 1981, p. 40). The spatial location of an object can be encoded either in its perceptual relation to the agent (e.g. the apple is in front of me) or in terms of its surroundings independently of the agent (e.g. the

apple is on the table). The former frame of reference is egocentric, centred on the agent, whether the agent is me, you or a third person. The latter frame of reference is allocentric, which does not depend on the presence of the agent, or on her location. Similarly, we have suggested that one can adopt either an egocentric or an allocentric stance toward the other. When one takes an egocentric stance, one understands the other person relative to oneself. When one takes an allocentric stance, one represents the other in her relationship with other individuals independently of oneself.

However, the notion of social frames of reference may seem obscure. In the case of spatial cognition, the relationship is spatial. But what is the nature of the relationship in social cognition? There are at least two components. The first component is external. It is the relationship between the individuals in the society (e.g. a relative, a colleague, a friend, etc.). Interestingly, Piaget pointed out that young children can easily understand the relationship between themselves and their mother but have more difficulties in understanding that their mother is also their father's wife. They understand the egocentric relationship with their mother, but not the allocentric relationship between their mother and their father. The second component is internal and concerns the content of the target's mental states. People have thoughts directed towards other people. The egocentric stance is interested in thoughts directed towards me. The allocentric stance is interested in thoughts directed towards others. Let us go back to Peter and Mary. At the beginning, I understand Peter and Mary in an allocentric frame of reference independently of myself: I understand that Mary is Peter's girlfriend (i.e. allocentric social relationship) and I mindread that Peter thinks that Mary is cheating on him (i.e. allocentric reference). Later, I understand Peter and Mary in an egocentric frame of

reference centred on myself: I understand that Peter is a stranger that I will never meet again (i.e. egocentric social relationship) and I mindread that Peter is angry with me (i.e. egocentric reference).

I would like to argue that the egocentric frame of reference is necessary to interact with others. In spatial cognition, the egocentric representation of the location of the perceived object is directly linked to the actions that the agent can perform toward the object: it is only if I know where the apple is relative to my body that I can reach it. Similarly, in social cognition, one needs to understand the other relative to oneself if one wants to cooperate, compete or communicate. For example, to react properly to Peter, I need to know that it is with me and not with anybody else, that he is angry. I also need to take into account the fact that I will never see him again, so I do not care too much if he leaves upset. Both egocentric types of information – self-reference and egocentric social relationship – are thus necessary for interacting with Peter. The situation is the same for cooperation. It relies on the mutual knowledge that we both have 'the intention that we do X' (Bratman, 1992). To be able to form such an intention, I need to relate the other to myself, creating the first-person plural (e.g. I + you = we). I need to understand that the other intends to do the work with *me*, and not with anybody else. And when the other holds a paintbrush in my direction, I need to understand that it is to *me* that the other gives the paintbrush so that we paint the house together. In communication too, I need to understand that your communicative intentions are addressed to *me*. It is easy to see what happens when we fail to understand the egocentric reference. For instance, as long as you do not understand that the chairman of a conference is pointing at *you*, you cannot ask your question. Conversely, you might start speaking while it was not your turn. It is thus

important to understand self-reference. Interestingly, it has been shown that for the same level of syntactical complexity, children understand more easily sentences that are referring to themselves than those referring to others and than impersonal sentences (Mood, 1979). Putting it another way, in the same way that one cannot reach a glass if one does not know where the glass is relative to oneself, one cannot talk and work with others if one does not know what the other thinks of oneself.

What is then the relationship between the egocentric stance and the classical notion of egocentrism, which has a long history in psychology? Egocentrism actually covers several distinct concepts. It can be tracked down to Piaget and the Three-Mountains problem (Piaget & Inhelder, 1948/1956). A child is egocentric if he is unable to distinguish his own spatial perspective and someone else's perspective on the world. Egocentrism is characterised by the saliency of one's own perspective, leading to an inability to disregard one's own experiences and to imagine other people's experiences. The child therefore assumes that all people will react like him. A second type of egocentrism arises during adolescence. It is characterised by two main personality features: the imaginary audience and the personal fable (Elkind, 1967). First, adolescents believe that other people's thoughts centre on them. In this respect, they play to an imaginary audience perceiving that others share their own self concerns. Second, adolescents convince themselves that their emotions and experiences are entirely unique. Egocentrism in adolescence can be thus defined by self-concern with no concern for others. It is related to what is considered as egocentric speech, characterised by monologue, repetition, muttering, self-answered question and frequent self-reference (Garvey and Hogan, 1973). For instance, children's discourse often mentions the other's

behaviour toward themselves, their own behaviour or affective attitude toward the other, or they compare themselves to others (Honess, 1980). Another aspect of egocentrism is imposing one's will. For instance, individuals with Asperger syndrome want other people to behave exactly as they want and get very frustrated if they are not obeyed (Moore, 2004). In summary, egocentrism can be defined according to three different axes: (i) lack of understanding of the other; (ii) lack of interest towards the other; and (iii) lack of respect for the other's will.

In all these cases, the egocentric frame of reference is pushed to its limits, so much that it becomes an obstacle to social interaction. Defining the other by her relationship to the self is not denying the other. Egocentrism results when the social world is not only centred on the self but is reduced to the self. We suggested, with Uta Frith, that egocentrism results from a lack of interaction between egocentric and allocentric representations of others (Frith and de Vignemont, 2005). In normal adults, the egocentric and allocentric stances interact constantly with each other. Allocentric and egocentric representations are complementary. In spatial cognition, an allocentric representation of an object allows one to link this object to other objects, independently of the agent. Objects have to be perceived in their mutual relationship in allocentric coordinates to be perceived in their own right. Similarly, the allocentric representation of others is detached from possible interactions with them. It secures the existence of the other person independently of the relationship one may have with her. A second role played by the allocentric frame of reference is that it allows one to understand the social world. By observing others and understanding their mutual relationships, one can learn about the social rules and the social structure. This knowledge can be later used during

social interactions. Therefore, one needs both egocentric and allocentric representations of others to achieve satisfying interactions with others.

However, some people may doubt the possibility of non-egocentric frame of reference. They may argue that egocentrism is not something that happens only to young children or adolescents. It would be more pervasive than that. For example, social psychology has studied extensively what has been called the 'contrast effect' (Dunning and Hayes, 1996). Contrast effects occur when people judge the behaviour and attitudes of others relative to their own. They use their own particular behaviours as norms when evaluating the performances of others. For instance, if you go swimming every day, you will judge that the person that goes swimming only once a week is not very sporty. Conversely, if you never go swimming, you will consider the weekly swimmer as sporty. The other is judged in a frame of reference centred on the self. Another well-known example is the 'curse of knowledge'. Even adults have difficulties in inhibiting what they themselves know to predict someone else's behaviour. For instance, well-informed subjects had to predict what others less-informed people would forecast for the earning of a company. Despite the fact that they knew that they were less-informed, still they predicted that they would say what they themselves forecasted (Camerer, Loewenstein, Weber, 1989). Such egocentric biases happen not only for knowledge but also for values and feelings (for review, see Goldman, 2006). Does it mean that egocentric reference always invades mindreading? Can we really get rid of the self in understanding others?

My reply to this is twofold. First, although egocentric biases are indeed more frequent than one might think, fortunately they are not always the rule. Most of the time, we are able to 'quarantine' our own feelings and beliefs from our understanding of others

(Goldman, 2006). Mindreading is not necessarily contaminated by egocentric biases. The second point that I want to make is more theoretical. The fact that we use egocentric reference when making judgments about other people in situations of social observation is not self-contradictory. The egocentric/allocentric distinction is not equivalent to the distinction between interaction-oriented and knowledge-oriented mindreading. This is true of spatial cognition too. The fact that the glass is in front of me is necessary for action, but it can also constitute the content of a conscious perceptual belief. Egocentric representations can be used by both visual systems. The distinction between the two frames of reference does not perfectly overlap with the distinction between the two functions of mindreading. All I want to claim is that the egocentric frame of reference is necessary for social interaction, while it is not necessary for social observation. In this sense, it constitutes a difference between the two types of mindreading.

However, we have not yet provided any conclusive evidence that knowledge-oriented and interaction-oriented mindreading rely on two different abilities. This paper is prospective and exploratory. It does not pretend to provide a definite reply to this question. Nonetheless, as a conclusion I would like to review a few results that point towards a dual ability.

**One or two?**

At the beginning, I described the Single Perspective view, according to which there is one single ability to understand others, independent of the context. I have then emphasised the duality of functions of mindreading, as well as the duality of social frames of reference. However, to say that mindreading has two functions does not suffice

to show that there are two kinds of mindreading. One and the same ability could accomplish different functions. According to a principle of cognitive economy, it would be even more parsimonious to defend the Single Perspective view. To be able to argue in favour of the strong version of the Dual perspective view, one needs to leave armchair speculations and philosophical ruminations for experimental evidence. Unfortunately, this has not been really studied and there is almost no data on the existence of a dissociation between two mindreading abilities.

Let me start first with a slightly different domain than mindreading, that is, action observation. It has been shown that brain activation differs relative to the aim of the observation of the action (Decety et al., 1997). If you observe the action in order to be able to recognise it later, you activate structures dedicated to memory encoding. In contrast, if you observe the action in order to be able to imitate it later, you activate the regions involved in the planning and in the generation of actions. Put it another way, action observation differs whether it is knowledge-oriented or interaction-oriented. It shows that observation of other people can be affected by the role played by the observation.

Similarly, one might suggest comparing two versions of the false belief task. I described the false belief task as a typical example of knowledge-oriented mindreading. However, we could suggest a slightly modified version of the standard task to test interaction-oriented mindreading. Rather than being the external witness of a story involving two remote characters, the child could be directly involved in the story (Gallagher, 2005). For instance, the child in presence of two examiners puts a chocolate in a basket. One of the examiners leaves and the other suggests to the child to put the

chocolate somewhere else. The child removes the chocolate and puts it in a box. Then the examiner who has left comes back. In contrast to the standard version, the child would be directly in interaction with the target to whom he ascribes a belief about the location of the chocolate. He is the one who has tricked the target. Intentional deceptive behaviour involves the intention to induce a false belief in the other. Interestingly, it has been shown that children spontaneously deceive other children as early as 3-years-old (Carlson et al., 1998). However, they are able to understand deception only at 4-years-old (Perner, 1991). Therefore, I would suggest that children would have greater ability in this task than in the standard false belief task. If we could show that interaction-oriented mindreading has a different developmental story than knowledge-oriented mindreading, then it would be a good starting point to argue for the Dual Perspective view.

As far as I know, a systematic comparison between the two versions of the false belief task has never been done and the literature about deceptive behaviour in children is not always consistent. Furthermore, even if we could show an improvement with the interactive false belief task, it could be argued that the difference between the two versions is just a question of difficulty. The classical version of the false belief task is indeed highly difficult and demanding (Bloom and German, 2000). When the task is made simpler by using more specific or more pragmatic questions or by giving memory aid, even three-years-old children succeed (Lewis & Osborne, 1990; Siegal & Beattie, 1991; Freeman & Lacohée, 1995; Surian & Leslie, 1999). Similarly, the interactive task would just make the task simpler. The false belief task requires more than just mindreading, and the additional processing capacities could be responsible for the failure in the classical version. Consequently, it will not be easy to provide conclusive evidence

of a dual way of understanding others.

There are however some preliminary results that show the role of social relationships for mindreading. It was noticed in the 1950s that people coming from an ethnic minority had a deeper understanding of the 'white mentality' than vice-versa (Dollard, 1957). The underlying assumption is that people in a weaker position need to know more about the others to be able to get what they want and to compensate for their lower social status:

> Whereas a more powerful person might be able to manipulate another's behaviour using brute force alone, a less powerful person would not be able to change another's behaviour without tracking mental states. A person of average or below-average status is especially dependent on ToM [Theory of Mind] reasoning to control their social situations through negotiations, bargaining, threatening, appeasing, etc. (Rutherford, 2004, p. 92)

Putting it another way, you have better be aware of the feelings and thoughts of your boss if you want to gain his favour. But your boss does not care what you feel. Interestingly, when one is given the role of subordinate in an experimental situation, one becomes better in assessing the feeling of others, and conversely, when the same person is attributed the role of leader, one becomes less good (Snodgrass, 1985). Rutherford (2004) used the classical false belief task to evaluate whether social status can indeed affect mindreading. Subjects first participated in a general quiz game, but unbeknownst to them some received an easy version and the others, a difficult version, leading to two groups, the Winners and the Losers. In order to introduce a hierarchy between them even more, the Losers were later taught and evaluated by the Winners. They all then took a false belief task. The results showed that the Losers had a better performance than the

Winners (i.e. less errors and shorter reaction time). Rutherford concluded that people with a lower social status allocate more resources to mindreading. One might regret that the author used a classical false belief task based on story telling. It would have been even more interesting if the Losers had to judge the Winners' false belief and vice-versa. Furthermore, one may also suggest a slightly different interpretation of the results. The Losers felt in competition with the others. They wanted to win at least at this task. In contrast, the Winners had nothing to prove. They did not feel in competition with the others. They might not even pay attention to the others. Putting it another way, some took into account their social relationship with the others and felt themselves to be in a social situation of competition, while the others simply did the task as required. The difference in performance could then reflect a difference between interaction-oriented and knowledge-oriented mindreading. However, once again it does not tell us whether both rely on the same ability or not. It might be just a question of motivation and resource allocation.

The best way to argue for a conceptual distinction is to provide a case of double dissociation. If an individual is impaired in A and not in B, and if another individual is impaired in B and not in A, then we are entitled to conclude that A and B are two distinct abilities. The problem here is that we do not have such double dissociation. However, as a starting point, we might be interested in Asperger syndrome. Although people with Asperger syndrome sometimes succeed in the false belief task, they still show strong social impairments characterised by the inability to interact with peers and a lack of desire to do so, a poor appreciation of social cues, and socially and emotionally inappropriate responses. I have argued with Uta Frith that their impairment can be

explained in part by a disconnection between egocentric and allocentric representations of others (Frith and de Vignemont, 2005; de Vignemont and Frith, 2007). While we know – with some exceptions – when to use an egocentric or an allocentric frame of reference, they are unable to switch appropriately from one to the other. In social interaction, they display an extreme egocentrism, leading them to ignore that the others have their own existence independent of themselves. As for social observation, either they are not interested or they use a very abstract and detached view of the social world, completely disconnected from what they themselves would feel in such situations. However, there is no experimental data to support our hypothesis, merely autobiographical cues. It would be interesting to investigate in further detail mindreading abilities in Asperger syndrome.

This leads us to the core question. What could be the experiment to test the Dual Perspective view? We would need to compare two situations: the subject in presence of two persons interacting with each other and the subject interacting with one of the two. The type of interaction should be the same. In both conditions, the subject would be required to judge the mental state of the same person. One would have to make sure that in both conditions, the subject pays as much attention and is as motivated. If we could show differences of performance, then we would have an argument for the strong version of the Dual Perspective view. This would be even stronger if we could find distinct neural networks activated in the two conditions. We could also expect the differences in performance to vary relative to the age. In addition, people with Asperger syndrome might display a different pattern of performance. However, as long as we do not have such type of evidence, we are limited to emphasise the importance of the conceptual distinction between knowledge-oriented and interaction-oriented mindreading. It makes a

difference whether mindreading is used for social interaction or for social observation.

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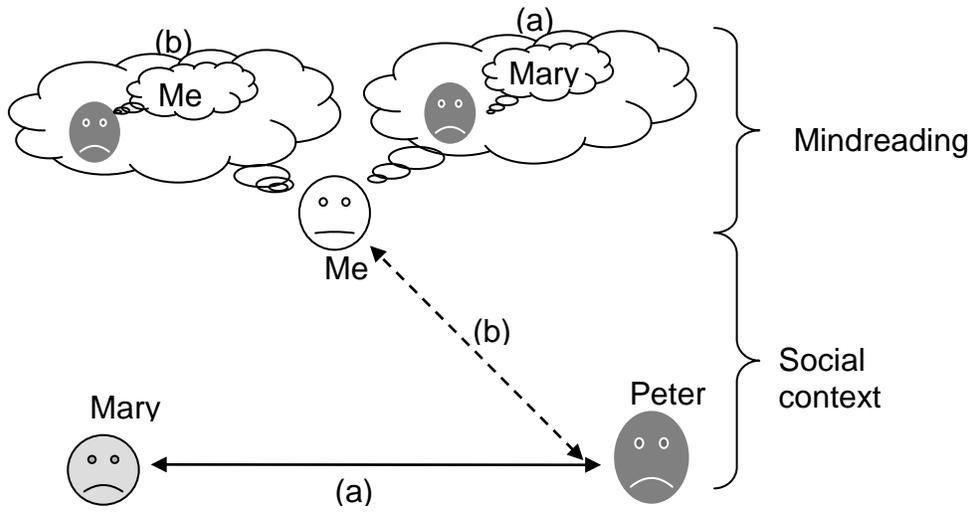
Figure 1. Social frames of reference