Understanding Others

The Person Model Theory

Albert Newen

According to Interaction Theory (IT), neither Theory Theory (TT) nor Simulation Theory (ST) give an adequate account of how we understand others. Their shared defect, it is claimed, is that both focus on third-person observation of the other, and neglect the role of social interaction. While interaction theory is made to account for the latter, it has problems doing justice to explicit attributions of propositional attitudes, especially from an observational stance. The latter received a new explanation by the Narrative Practice Hypothesis (NPH) which focuses on story-based explanations and tends to underestimate the relevance of nonlinguistic intuitive understanding. In this paper, I first try to do justice to what is plausible about each of the four approaches by accepting that each account introduces one plausible epistemic strategy for understanding others, which leads us to a multiplicity view about the epistemic strategies for understanding others. But it will then be argued that an adequate theory of understanding others needs further adjustment and correction because we need to account for the fact that we usually understand others on the basis of specific background knowledge that becomes more enriched during our life; I thus propose Person Model Theory (PMT) as a fruitful alternative. On my account, understanding turns on developing "person models" of ourselves, of other individuals, and of groups. These person models are the basis on which we register and evaluate persons as having mental as well as physical properties. I argue that person models can be either implicitly represented or explicitly available. This is accounted for by describing two kinds of person model, corresponding to the two ways of understanding others; very early in life we develop implicit *person schemata*, where a person schema is an implicitly-represented unity of sensory-motor abilities and basic mental phenomena related to one human being (or a group of humans); and we also develop *person images*, where a person image is a unity of explicitly-registered mental and physical phenomena related to one human being (or a group). I argue that the person model theory has more explanatory power than the other candidates.

Keywords

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1 Introduction

A key question for social cognition is: Can we provide an adequate theoretical analysis of the process of understanding other human beings? For over twenty years, there have been only two possible answers to this question—that offered by "Theory Theory", and that of "Simulation Theory". The central claim of TT is that one's understanding of another essentially relies on a folk-psychological *theory*, where some take the position that the relevant folk psychology is inborn (e.g., Baron-Cohen 1995), while others claim that it is acquired (Gopnik 1993). In contrast, ST holds that we understand others by means of *simulation* (e.g., Goldman 2006), where simulation can take place at two levels, referred to as low-level and high-level simulation (Goldman 2006). In recent years, however, it has become clear that both positions have significant limitations. One central problem is claimed to be that both TT and ST take a

primarily observational stance towards the other when analysing understanding:[1] critics maintain that this observational stance is a nonstandard, intellectual perspective, and that in fact we are normally involved in *interaction* when we try to understand others. Developing this line of thought, Gallagher's interaction theory (2001) combines involvement in interaction with a direct perception thesis, such that we can directly perceive the mental states of others and do not have to infer them. Another alternative proposal is Hutto's *narrative* account of social understanding (2008), on which understanding others relies centrally on telling or understanding stories. These idealized positions are the bases for a wide range of mixed positions, with which I will engage shortly. Yet even if we consider only these idealized positions, a new central defect quickly becomes clear: namely, that these positions offer answers to rather different questions. Thus, in a first step, I aim to reorganize the field of the main positions and use this framework to situate my own view, which I refer to as the *person model theory* (Newen & Schlicht 2009; Newen & Vogeley 2011): this account is characterized by the claim that we understand others by essentially relying on person models of individuals, or of groups.

2 Reshaping the field of positions by distinguishing central questions

The question "How do we understand other human beings?" has to be divided into several subquestions, the first of which is: What epistemic strategy do we adopt to register or assess the other's cognitive states? To reach any kind of assessment of the other we need to obtain information within a concrete situation. The second question is: Once obtained, how is this prior information stored and organized? This

second aspect is important, because we always rely on prior background knowledge in our assessments of others. One main defect of the debate thus far has turns on the failure to distinguish these two questions. The debate between the two classic positions, ST and TT, can roughly be described as a misunderstanding stemming from their dealing with different questions: while ST insists that the use of simulation is the standard epistemic strategy, TT insists that the prior information we have about others is organized as a folk-psychological theory. Concerning their main claims, these accounts are not in opposition. The opposition only becomes visible if for each account we consider their favoured answer to both questions. The classic opposition between ST and TT can then be described as follows: TT claims that the epistemic strategy relies upon theory-based inferences, and that the prior information is organized as a folk-psychological theory; while ST claims that the strategy for information-processing involves simulation (to put oneself into the other person's shoes) which draws only on my own experience as the source of data for simulation, leaving it open as to whether these data form a theory.

Before turning to the question of which information-processing strategy we use to understand others, I first provide a brief survey of the field. Thus, in addition to TT and ST, we have Gallagher's IT, which focuses only on the strategy question; it claims that we understand others through social interaction and/or by direct perception, i.e., we can directly perceive mental phenomena; we also have Hutto's account, which is given in terms of story-telling. Their more elaborate joint account combines these claims (Gallagher & Hutto 2008), maintaining that we can distinguish three epistemic strategies for understanding others, depending on the stage of cognitive development in ontogeny: direct perception in very early childhood, followed by interactional understanding, and finally narrative understanding (Hutto 2008). In contrast, my aim will be to show that we actually use a multiplicity of information-processing strategies to understand others, depending on the context; the proposed account, then, is even

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1 This is a simplified view. A closer look into Gopnik & Meltzoff (1997) shows that their version of TT accounts for interaction as part of the development of an understanding of action and agency (Chap. 5). But interaction is not accounted for in the further dimensions of understanding others. From a bird's eye view this characterization is not inadequate, although it needs qualification. As the reader will see, my person model theory integrates this initial understanding of action and agency as elements of forming implicit person models that at the beginning may not be rich and abstract enough to warrant being called a theory (see n. 6 below).

richer than the three strategies proposed by the joint account of Hutto and Gallagher.

3 The epistemic strategy for understanding others

3.1 What about simulation?

According to Goldman's (2006) elaborate simulation account, we must distinguish between low-level and high-level mindreading. "Mindreading", in his view, comprises all cases of evaluating the mental state(s) of another person that normally lead to a language-based attribution of a mental state to a person. In the case of high-level mindreading, this is

> [...] mindreading with one or more of the following features: (a) it targets mental states of a relatively complex nature, such as propositional attitudes; (b) some components of the mindreading process are subject to voluntary control; and (c) the process has some degree of accessibility to consciousness. (Goldman 2006, p. 147)

The paradigmatic case of high-level mindreading is understanding another person's decision. Third-person attribution of a decision consists of:

- imagining propositional attitudes in a form of *enactment imagination;*
- using (the same) decision-making mechanisms (as in the first-person case);
- projecting the result of using that mechanism onto a third person by attributing a decision.

We can easily present cases in which these proposed essential steps are not involved. For (i), to understand a person suffering from a delusion of persecution, we are not able to deploy enactment imagination: Their case is just too different from our own experience. And the same may be true in cases of deep cultural difference. For (ii), if I have experience with the other person such that I know that he has idiosyncratic, non-rational decision-making habits

when making weekend plans, I can use this knowledge to model his decision and not my own decision-making apparatus, since I have experience that my own apparatus differs from his (at least concerning weekend plans). For (iii), grant for the sake of argument that we have a plausible candidate for the beliefs and desires of the other and we use this for enactment imagination as well as input for my own decision-making apparatus, thus reaching a decision to do action A. Then, according to Goldman, I should project this decision onto the other person. Yet there remains an essential gap, which is noted by Goldman but not adequately addressed by him: He observes the necessity of "quarantining" my idiosyncratic background beliefs if I want to come to an adequate projection of the decision to do action A. Suppose I am warranted in presupposing that the other wants an ice-cream, has money, and that there is a nearby cafeteria where he can get one: then the decision-making apparatus may come to the decision to buy an ice-cream. If, however, I am a person who is extremely parsimonious with money, then my own background desire to save money may prevent me from buying the ice-cream in the same situation, and so this intervenes and I do not attribute the decision to buy an ice-cream to the other. But it seems that the desire to save money is—often, at least—an idiosyncratic desire that I should not use in my projection. Yet how do I know which of my own beliefs and desires are idiosyncratic and do not relate to the person I aim to understand? To solve this problem, I must already possess some view about the attitudes of the other as compared to me; yet this was what we were aiming to understand. In general, then, Goldman's theory of high-level mindreading has difficulties even getting off the ground: It starts by making presuppositions about the beliefs and desires of the other person, where this is exactly what we were aiming to understand. The same problem appears again in the projection phase, as just illustrated. Thus, high-level mindreading is a very special case of simulating a decision of the other, specifically when I already know a lot about the other, which I can use as input. This leaves open the question of how we get this in-

formation at all. Goldman tries to account for problems of this kind by accepting the importance of inference-based strategies and the organization of the prior information in form of a theory. Thus he is no longer developing a pure simulation theory but rather a hybrid account. Nevertheless, the counterexamples are not rare but in fact quite typical, and thus they cast doubt on the typicality and pervasiveness of high-level simulation in mindreading decisions.

Goldman may, however, appeal to his strategy of low-level mindreading, which is characterized as an activity that is "comparatively simple, primitive, automatic, and largely below the level of consciousness" (2006, p. 113). Goldman uses as a paradigmatic case face-based recognition of emotion, and he makes an additional appeal to "mirror neurons", proposing that mirror neurons are not only relevant in the case of understanding motor activities (in both observing and doing them) but also for recognizing mental phenomena like pain and disgust. The most elaborate case relevant to this area of discussion concerns the study of disgust: It has been shown that experiencing disgust and observing disgust are dependent on certain mirror neurons that are activated in both cases (Wicker et al. 2003). Yet what exactly can we learn from this observation? I develop a critical position on the explanatory potential of mirror neurons in two steps. First, I argue that if mirror neurons could provide us with the whole story of how we understand others, this story would not be given as a case of simulation. Second, I cite evidence that mirror neurons do not provide the core part of the story of understanding others in cases of understanding emotions. Let us start with criticism of the claim that low-level mindreading is a case of simulation. Here I mainly rely on lines of criticism worked out by Gallagher (2007), who claims that "simulation is a personal-level concept that cannot be legitimately applied to subpersonal processes" (p. 363). Even if we do not accept Gallagher's claim, the two core features of simulation would be lacking in the case of resonance processes implemented by mirror neurons: There is neither a first-person perspective involved nor

a type of pretence that includes a projection from a first-person perspective to a third-person perspective: "Thus, according to ST, simulation involves the instrumental use of a first-person model to form a third-person 'as if' or a 'pretend' mental state. For subpersonal processes, however, both of these characterizations fail" (Gallagher 2007, p. 360). Why are mirror neurons not an essential part of understanding others? They represent a type of action or emotion that is independent from a first- or third-person perspective; but the distinction between self and other is an essential part of understanding others. Thus a simulation process cannot be fully captured in its essential aspects by the mirror-neuron processes (see Vogeley & Newen 2002).

This criticism of high-level and low-level mindreading does not imply that simulation processes never take place: rather, it suggests that it is only so-called high-level simulation that we can characterize as simulation, and also that it is implausible that simulation is the standard strategy for everyday understanding of others. The latter claim is also based on the observation that we often rely on automatic, intuitive understanding of others without any conscious considerations.

3.2 What about theory-based inferences?

The same general line of criticism can be developed with respect to theory-based inferences. Such inferences may sometimes be relevant, but are not always so; neither are they the standard strategy for understanding others. Theory-based inferences are important when we are confronted with cases that we find strange or surprising, i.e., situations where we meet another person suffering from a mental disease which we know nothing about, or where the person belongs to a culture that is radically different from ours. In such scenarios, we consciously build hypotheses about the relevant mental phenomena, as well as about the best behavioural strategy to adopt. But most everyday scenarios in which we understand others are not of this type; quite the contrary, we are generally in-

volved in well-known situations with individuals or types of persons with whom we are familiar. There is an effortless application of our know-how regarding dealing with other humans, without any need to rationalize through theory-based inferences. The reply of the advocate of TT would be: Even if the relevant knowledge-how does not involve an explicit theory-based inference, it is only applicable because we rely on *implicit theory-based inferences*. The criticism of this line of thought is twofold: The status of *implicit inferences* is very unclear, because inferences are defined as relations between propositions; and there is evidence that implicit information processes are often non-propositional in nature. For example, in the case of experts, very often the epistemic strategy in their field is complex visual pattern-matching without any inferences; with their superior organization of knowledge, for instance, a chess expert can rapidly perceive a promising move, or a medical expert can quickly notice an inconsistency in a suggested diagnosis. The process of smoothly using this information mainly relies on fine-grained pattern-discrimination and pattern-matching (Gobet 1997) in the relevant situation, rather than on drawing inferences (which only becomes the case if the expert has to consider problematic situations). This is supported by observations of the way people recall chess positions: When seeing a chess board that contains a real, meaningful arrangement, chess experts excel as compared to novices in recalling positions, but perform no better for scrambled, impossible positions (Gobet & Simon 1996). This indicates that they are able to "see" meaningful patterns that a novice cannot see. They may use this ability in addition to making inferences, but inferences are not so much their basic access strategy as an additional one.[2] If neither the strategy of simulation nor the strategy of theory-based inferences is the standard strategy upon which our smooth, everyday understand-

ing of others is based, what form does epistemic access to others' mental states take?

3.3 What about direct perception?

In recent years Gallagher (2008) has argued that our epistemic access to others' mental phenomena is essentially based on direct perception. The mental states of others are not hidden, and need not be inferred on the basis of perceiving others' behaviour; rather, behaviour is an expression of the mental phenomena that, in seeing the behaviour, is also seen directly. What does the claim of direct perception involve? Gallagher explains his main idea with an analogy: I can directly see my car. It would be inadequate to claim that I only directly see the colour, the shape, and the material, and then have to infer that it is my car. This is also supported by the fact that, when seeing the car, I at the same time see its drivability. This view does not deny that object-perception involves complex and partially hierarchically-organized brain processes, but it introduces the notion of "smart" perception: If I have learned the concept CAR and I am used to driving cars, I can see a car directly; and in seeing my car I may also see concomitant affordances such as its drivability. The same is true in the case of understanding others: according to Gallagher, by seeing their face and body posture in a specific situation, I can directly see that someone fears an aggressive dog. This can be realized by visual pattern-matching without inferences (see footnote 3 and Newen et al. forthcoming). This is a convincing comparison, especially as regards its potential to give a unified account of both basic perception and what Gallagher calls "smart" perception. The latter are cases in which it appears plausible to accept that perception can be modulated by conceptual information, these usually being described as cases of cognitive penetration (see Macpherson 2012; Vetter & Newen 2014).

Let us illustrate both the basic and the smart perception of an emotion. Basic perception of an emotion takes place when we see fear, joy, anger, or sadness in the face of a person while relying mainly on a single feature, or

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2 It is important to note that I leave it open whether we have to rely on a package of knowledge we are warranted in calling a theory, since I only discuss the strategy of information processing, not the organization of prior knowledge in experts.

small group of features, connected with facial expression (Ekman et al. 1972).[3] This can be done through a bottom-up perceptual process that involves almost no top-down influences, especially if the facial expression is very characteristic of an emotion pattern. In the case of smart perception, the perception of the emotion is modulated by higher-order cognitive processes. To show this, we need a case in which the same facial input leads to a different perception of an emotion as a result of conceptual input. Such cases have indeed been discovered: If we first hear a story describing a very unjust situation that makes us expect the person we are going to see to be angry, we have a strong tendency to see a typical "Ekman" fearful face as an angry face: for example, if I am told that the relevant person made a reservation at the restaurant, waited for an hour while many other people who had come in later were served first, and that after a further hour was informed that she would have to wait for at least another hour, then I have a strong expectation of seeing anger. This has been shown to make us see a typical fearful face as an angry face (Carroll & Russell 1996). *Smart* perception of an emotion is a cognitively-penetrated perception of an emotion, and it is also important for seeing more complex emotions that do not have the typical Ekman facial expressions: if I know that John is jealous of Peter, because he told me so, and I have seen several episodes of Peter behaving intimately towards John's wife Anne, and the next day I see another episode of John flirting with Anne while Peter observes them, I can directly see the jealousy in Peter's face. There is no need for inference-based evaluations. This is parallel to Gallagher's case of seeing one's car:

3 Although our basic perception mainly relies on certain central cues—e.g., wide-open eyes for fear—the fearful face is not recognized only in one central feature of the face. It requires the integration of several facial features, and not static ones alone. The perceiver also benefits from noticing dynamic visual features like gaze direction: If the gaze is directed away from the perceiver instead of towards her, then this makes the recognition of fear occur faster (see Adams & Kleck 2003; Sander et al. 2006). Together with colleagues I have argued elsewhere that emotion recognition is essentially a process of pattern recognition (Newen et al. forthcoming). This is true for these basic perceptions of emotions. The face is integrated with body posture, since facial expressions are categorized as expressing a specific emotion most rapidly when they are paired with emotionally congruent body postures (Meeren et al. 2005; van den Stock et al. 2007).

we may describe both cases as cases *of seeing as*: seeing my car as a car (by knowing which affordances come with it) and seeing John's face as evincing jealousy. I illustrated these cases of direct perception because I think Gallagher makes an important point when he claims that the main source of understanding others is direct perception (whether basic or smart). Nevertheless, there are clear limits to direct perception as a form of epistemic access.

Although Gallagher has in the past shown a tendency to overgeneralize the importance of the role of direct perception (2008), he is well aware that there remain cases that cannot be accounted for without going beyond direct perception. This is the case especially concerning our understanding of propositional attitudes—e.g., someone's desire to take a summer holiday with his elder brother in western Turkey. Propositional attitudes are normally radically underdetermined by expressive elements such as facial expressions, gestures, body postures, etc., in a given situation. In general, therefore, complex human cognitive phenomena of this underdetermined type are communicated by linguistic exchange, or else have to be inferred or simply guessed on the basis of available information. The latter often happens in situations of non-transparent communication due to norms in social situations, or due to the fact that at least one person wants to hide her beliefs and intentions. Since these situations are also part of our everyday life, inferential processes remain part of our everyday understanding of others. Thus, although direct perception is a very important epistemic strategy that we may use in cases of face-based perception of emotion, even "smart" direct perception is not the basic strategy employed to understand complex beliefs, desires, and intentions of others. The latter require inferential processes as well. Thus, we are left with three strategies (simulation, theory-based inferences, direct perception), where none is a clearly dominant standard strategy relevant to all mental phenomena.

But there is at least one further candidate we should take into account, namely *understanding though primary interaction* (Gallagher & Hutto 2008). All the epistemic strategies dis-

cussed so far can apply to situations in which I am simply observing the other without being involved in any interaction. As we have already mentioned, Gallagher views this as a radical defect of such accounts; intuitive understanding of others is part of our everyday life, and this is especially the case if I am not in a purely observational situation but am directly involved in some kind of interaction. Intuitive understanding may then be characterized just by the fact that I notice a social act being directed towards me and so start to interact, such that a standard social interaction is realized, which may be non-linguistic but may also involve linguistic communication—e.g., friendly greetings exchanged while arranging ourselves in line at the office coffee machine. Such a strategy of understanding can only be dominant if the interaction is situated within many conventions, such that smooth understanding can take place without theoretical considerations about the others' beliefs and intentions (de Bruin et al. 2012). But is understanding though primary interaction, as it already takes place in neonate imitation (Meltzoff & Moore 1977, 1994), really the main or the standard strategy for understanding others? Again, even if we grant that this is an important strategy in basic understanding of others, even in adults—e.g., in minimal understanding deployed by smoothly interacting with a stranger who is taking the same bus—we need more advanced strategies to frame estimations about the ramifications of the situation—e.g., whether taking this bus in an unknown city, by night, and with such people on board, is a reasonable risk to take.

3.4 The multiplicity view

To summarize thus far. We use at least four epistemic strategies to understand others, and we learn to use these strategies on the basis of evidence of successful application in the past in relevantly similar situations. We prefer to use simulation strategies where we have evidence that the other is similar to us in respect of many features that are relevant to the situation of evaluation. We typically use theory-based inferences if we need to account for complex mental phenomena or if an intuitive understanding is, for whatever reason, not available. We use understanding by primary interaction in cases in which we are involved in interaction with the other and only need to understand her or him to a limited degree, such that acting according to conventions is sufficient for a smooth interaction. Finally, we normally rely on direct perception of mental phenomena when we are in an observational stance towards the other and have a rich, well-organized body of experience that allows us to recognize mental phenomena as patterns. This is rather easy in cases of emotion recognition, more complex in recognizing intentions, and almost impossible in understanding complex propositional attitudes of others. Only the combination of all four strategies, in full sensitivity to the context and applied on the basis of our experience in successfully using the strategies, makes us experts in understanding others. Thus, we have reached a first main conclusion concerning strategies of understanding, this being what I call the multiplicity view:

> The multiplicity view $=_{Df}$ There is no standard default strategy of understanding others, but in everyday cases of understanding others we rely on a multiplicity of strategies that we vary depending on the context and on our prior experiences (and which are eventually also triggered by explicit training).[4]

This thesis is also supported by a closer look at mental disorder such as Asperger's syndrome, which is a variant of autism (Fiebich & Coltheart under review). People with Asperger's syndrome lack an intuitive understanding of others. They are unable to directly perceive emotions on the basis of facial expressions, and they tend to avoid social interaction (Vogeley 2012). Thus intuitive understanding by primary interaction or direct perception is not available for them. Since they also tend to experience themselves as being different (Vogeley 2012), they do not use simulation as a strategy: so

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[4] This view was worked out in parallel by Anika Fiebich in her PhD thesis, under my supervision. She applied the thesis in discussing the case of autism (defended January 2013).

they are left principally with theory-based inferences (Kuzmanovic et al. 2011). And this is what we can observe: persons who are autistic try to understand others by asking for theoretical guidance; thus they might ask how long one is allowed to look into the eyes of another person (Kai Vogeley, personal communication; his expertise is based on regular treatment of more than 300 patients). They also learn what people think in typical situations, but become lost in new situations. Since we have to deal with new situations almost every day, autistic people notice their tendency to get lost and many of them avoid social encounters. This special situation is explained by the fact that in contrast to the usual multiplicity of strategies of understanding, they are left with theory-based inferences alone. People with Down's syndrome are in a contrary kind of situation: they have a good intuitive understanding of others' emotions, but, due to typically very constrained cognitive abilities, they lack any theory-based inferences. In the early years of childhood—where cognitive skills are not so important as in kindergarten or school—their social life is very similar to the social life of children without Down's syndrome; but in later life the interdependence of social interaction with cognitive abilities leads to more problems in building an inclusive social life (Buckley et al. 2002). Thus, the normal multiplicity of strategies may be strongly constrained in some conditions of mental disorders. Furthermore, we can roughly cluster direct perception and interaction as the main epistemic access for *an intuitive understanding* of others, while *inference-based understanding* is based mainly either on a (high-level) simulation strategy or theory-based inferences (including inferences from narratives, see below). Since in our everyday life most of what is going on is intuitive understanding of others, it is especially important to highlight the relevance of social perception. In what follows, I will argue that the most important unit of clustering information about others is neither a facial unit nor an emotion type (or some other sub-personal unit), but the *whole person*—and thus a primary aspect of epistemic access is our ability to perceive persons. We *perceive persons* and

their mental settings mainly by directly perceiving them, and/or interacting with them. In addition, we can come to *judgments regarding persons* by simulating them and/or through inference-based understanding.

4 The organization of relevant background knowledge about others

We can now address the second independent question concerning understanding others: How do we organize the information about other people that we already have? This question presupposes that in standard cases of understanding others we are not in a situation in which we are bereft of relevant background knowledge. Quite the contrary: most of the time, we interact with people about whom we have a lot of background knowledge—family members, colleagues, friends, etc. Furthermore, we have background knowledge about the general needs of human beings, the special needs of students, homeless people, etc. It seems clear that we are relying on this type of knowledge in an essential way when we understand others. There may be very short period as a newborn baby when we start from scratch, armed only with certain inborn minimal mechanisms such as neonate imitation. Even the social smile developed with two months is dependent on external stimulation and learning processes, and babies very quickly start to react selectively towards familiar and foreign individuals. They also expect a typical behavioural interactive pattern from the caregiver. If a mother stops reacting intuitively through normal facial expressions and gestures, and instead reacts with a "still face", then the baby quickly starts to cry (Bertin & Striano 2006; Nagy 2008). The baby is irritated by the unexpected pattern of reaction. How, then, are all these different types of background information about the other organized and used in social understanding?

4.1 Are we organizing our prior knowledge in folk-psychological theories?

The question of whether we are organizing our knowledge according to folk-psychological theor-

ies has received a number of different answers. According to TT, this is exactly what happens. In understanding others we rely on folk-psychological rules such as: "If she desires an ice-cream and she believes that she can get one with her money at the cafeteria, then she will go to the cafeteria". No doubt folk-psychological rules, organized according to a belief–desire psychology, are an important instrument for understanding others; but they are by no means the only one. Often it is sufficient to know the conventions in a society to understand what someone is doing and will do next, e.g., if someone is in Japan and he enters a restaurant, he will first take off his shoes, then take a seat, and then will be asked to order. So, seeing someone entering a restaurant who looks like a guest (and not a waiter) allows us to expect a specific conventionally-regulated sequence of behaviour. If one has a liberal notion of folk-psychological theory, then we may add such behavioural conventions into that theory. But even then the question remains whether our understanding of others always relies on knowledge organized as a folk-psychological theory. A counterexample can be proposed by reference to cases of basic intuitive understanding: e.g., the still-face reaction by the caregiver, instead of a typical smiling facial expression and gestural response, makes the baby start to cry (as we saw above). There is thus an intuitive recognition of basic emotions like fear, anger, happiness, or sadness. This may rely on inborn emotion recognition mechanisms, or mechanisms learned very early, which may be evolutionarily anchored, since recognizing such basic emotions is essential for survival (Griffiths 1997; Panksepp 2005). There are two ways in which the counterexample might be blocked: (i) It could be maintained that some folk-psychological theories are inborn (Baron-Cohen 1995) and that intuitive understanding such as face-based recognition of emotion already involves a theoretical package. The problem with this line of reasoning is that the notion of theory, stretched that far, starts to look very implausible. A theory is constituted by a minimal package of systematically interconnected beliefs; and even if a belief is understood in a liberal way such that it does not presuppose linguistic rep-

resentations, it remains highly questionable whether basic cases of faced-based recognition can be characterized as a systematically interconnected set of beliefs. The standard descriptions of face-based recognition of emotion (e.g., Goldman 2006) on a neural level highlight the relevance of mirror neuron mechanisms and characterize the underlying mechanism as a rather basic and partially independent pattern-recognition process, and thus as not forming a theory. A defect in recognizing disgust does not automatically lead to a defect in recognizing other basic emotions like happiness or sadness (Calder et al. 2000). (ii) A more promising move is to claim that the folk-psychological theory is learned (Gopnik 1993). This view is compatible with some basic processes of understanding which do not yet form a theory, but are developed into one as they are integrated step by step into a systematically-organized body of knowledge. This is a plausible and to some extent empirically grounded view (Gopnik & Meltzoff 1997; Newen & Vogeley 2003).[5] One shortcoming of this view, however, is that its proponents tend to appeal to examples that have a strong focus on general folk-psychological rules, such as: "All humans need to drink, thus if someone picks up a glass in the kitchen, he intends to pour into it some liquid to drink". This neglects a very important phenomenon, namely that we mostly interact not with complete strangers but with persons we know at least partly and often very well. For example, if Michael observes his son in the kitchen grasping a glass he does not appeal to the folk-psychological rule at all, since he knows that his son—despite his education—still only drinks from a bottle when at home, and that if he takes up a

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5 Gopnik and Meltzoff insist that the basic registration of objects—e.g., their being sensitive to object permanence, as well as the basic registration of agents rooted in their being able to distinguish inanimate objects and living beings—which babies develop very early on, shows that they already have an *initial theory* of objects and agents. They argue that the already innate "structures are rich enough and abstract enough to merit the name of theories themselves" (Gopnik & Meltzoff 1997, p. 82). But it is questionable whether the notion of theory really has any fruitful role here, because, for example, explanations and predictions of the behaviour of a baby when seeing an object are extremely constrained. The developmental story told by Gopnik and Meltzoff is of course very plausible and at some point turns into a theory, because the transformation of the representation in the context of new cognitive abilities comes with a rich and systematic package of explanations and predictions.

glass it is just because he wants to use it for practising magic tricks. This indicates that all the theories canvassed thus far have a blind spot: so far it seems simply to have been neglected that we rely extensively on knowledge of properties of individuals, which is organized as belonging to one specific individual (the son, the partner etc.) or to a group (students, managers, etc.). The general worry concerning the organization of this knowledge, according to TT, can also be expressed as follows: How are we able to apply a general theory of typically human features in a *specific social* situation? If we want to integrate our prior background knowledge of persons as individuals or as belonging to a group, e.g., to a profession, then we can characterize the organization of this knowledge as *person models*. Person models of individuals and groups are by far the most important source of understanding others, I will argue, and since they involve specific knowledge, they are the natural candidate for enabling adequate deployment of more general knowledge of human psychology in concrete everyday situations. It remains to be discussed, then, whether person models have the status of a folk-psychological theory or not. To adumbrate my line of argument: no doubt some elaborate person models are systematically-interconnected sets of beliefs, but not all of them have to be, because some person models only involve very sparse and basic properties that are not highly interconnected.

4.2 Do we organize our prior knowledge in narratives?

As we saw earlier, one recent account of understanding others, proposed by Dan Hutto (2008), holds that understanding others mainly relies on telling stories and using this knowledge to understand individuals. The core claim of his NPH (Narrative Practice Hypothesis) is

> [...] that direct encounters with stories about persons who act for reasons—those supplied in interactive contexts by responsive caregivers—is the normal route through which children become familiar

with both (1) the basic structure of folk psychology and (2) the norm-governed possibilities for wielding it in practice, thus learning both how and when to use it. (Hutto 2008, preface, p. x)

One focus of his theory is not so much how the prior background knowledge of others is organized, but rather how children are able to acquire it. His developmental claim is that the central route for learning relevant background knowledge is listening to stories about persons. I grant that this is an important additional route of epistemic access to relevant knowledge about others; but it is already an advanced method, not normally used before the second year of life. Furthermore, in such cases the focus is not epistemic access to knowledge used to understand the other in the situation (i.e., when listening to the storyteller), but rather to gain new background knowledge with an eye to future understanding of others. In a follow-up paper written together with Gallagher (Gallagher & Hutto 2008), Hutto and Gallagher enrich their views about epistemic access through appeal to direct perception and interaction (see above) in addition to learning by narratives. It is important to note the difference between epistemic access to information that allows me to understand the other in the actual situation (see section 3) and epistemic access to background knowledge relevant for future usage. Thus, by granting that narratives are an additional instrument for learning about important properties of persons, I can enrich my multiplicity claim as characterized above. In integrating this idea, one should also generalize it: we not only learn important background information that helps us to understand others by listening to stories told by a caregiver, but also by reading stories, especially novels.

Let us now briefly discuss the NPH considered as a claim about the organization of our background knowledge. If I have elaborate and explicit knowledge of a person, I may have acquired it by listening to or reading a story, and I may tell a story if someone asks me about this person. But, as the interaction view highlights, sometimes my knowledge may be anchored in

the interaction, yet still be non-linguistically represented, and only activated in similar interactive situations. Our rich non-linguistic knowledge about other human beings, which we acquire when directly perceiving them (tone of voice, what they look like) or interacting with them, or when realizing a joint action, etc., are often not linguistically coded and thus not memorized as a linguistic story. If we widen the notion of a story such that it includes any sequence of memorized events, we lose track of any interesting notion of "story". In fact, we are instead going in the direction that I propose, i.e., that we organize our prior knowledge about others through unifying it in person models. Some such models may include properties of a person that are connected as or with stories, but the core of a person model is a unity of features of a person that are grouped together as belonging to one individual or to a group, where the features may be as primitive as the tone of voice of a person, and have no connection to any story, even in a wide sense.

Although our prior knowledge about others is the main component of our understanding of others in a specific situation, most of the theories canvassed above did not present any clear view on how this knowledge is organized.[6] We found only two suggestions: relevant prior knowledge is organized either as a folk-psychological theory or as a narrative. Neither proposal covers all relevant cases: neither accounts for the innate or very-early-learned (nontheoretical) basic background knowledge that enables us to effect smooth interaction and allows us to rely on a basic intuitive understanding of others. And, furthermore, as I argue in the following, there is an alternative view, the person model theory, which is able to integrate the plausible aspects of these two suggestions, and additionally allows us to explain a variety of phenomena that the alternative views did not or cannot take into account—especially the integration of features of

other human beings that allow us to realize an intuitive understanding of them.

5 The person model theory

Before expounding the new account, let me highlight two main criteria of adequacy for any plausible candidate theory and some open questions. (i) The theory should account for two levels of understanding others from a phenomenological perspective, namely intuitive understanding and inference-based understanding. This was first clearly discussed by Gallagher (2001), while Goldman (2006) described it in his distinction between low-level and high-level mindreading. What, we may then ask, would be an adequate way of establishing this distinction? (ii) We learned from Gallagher (2005) that we should distinguish understanding others by observation from understanding by interaction.

There are also a number of open research questions that can potentially be answered in developing the alternative account: (a) What is the relation between understanding oneself and understanding others? Here the ST claims that understanding oneself is the basis for all understanding of others, while TT is neutral; Carruthers, for example, has famously argued that understanding others is the source of our self-understanding (2009). (b) What is the relation between understanding persons and understanding objects or situations? (c) How can we best account for the difference between understanding a well-known person, on the one hand, and a complete stranger, on the other?

The new alternative theory, which promises to deal with these open questions, is the person model theory. The central claim of this theory is that we organize our prior knowledge that is used to understand others into something we can call person models, and that accounting for our way of using person models is the most informative factor when analyzing our everyday understanding of others. A person model[7] is a unity of properties or features that

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6 This includes, e.g., the ST, which mainly offers a claim about how we use our knowledge to understand others, and that the main source of this knowledge—in addition to situational input—is one's own experience. But a representative of ST can easily grant that relevant prior knowledge is organized in a folk-psychological theory. She only insists that the strategy of application of this knowledge in a situation is a simulation process.

7 An important question which I cannot discuss in this paper is the question of the development of person model and the limits of application. Some very sketchy remarks may be of help here for urgent

Table 1: Varieties of person models

Person models	Self	Other: Individuals	Other: Groups
Person schema	Self schema	Individual person schema	Group person schema
Person image	Self image	Individual person image	Group person image

we represent in memory as belonging to one person or a group (resp. type) of persons. To account for the difference between two types of understanding others (intuitive versus inference-based understanding), I suggest that there are two types of person models in use: implicit person models,[8] which we shall call person schemata; and explicit person models, which we shall call person images. Very early in life we develop *person schemata*: a person schema is an implicit person model and can typically be described as a unity of sensory-motor abilities and basic mental phenomena[9] realized by basic representations and associated with one human being (or a group of humans), where the schema typically functions without any explicit considerations and is activated when directly seeing or interacting with another person. A person

schema is thus the unity of implicitly-available information about a person that is thus not easily accessible in terms of being reportable but is nevertheless used in a specific situation. In other words, a person schema is the basic unit that enables a practical knowledge (a *knowledge how*) for dealing with another human being while this ability relies mainly upon social perception and interaction. Person schemata can be developed step by step into *person images*. A person image is a unity of explicitly represented and typically consciously available mental and physical phenomena related to a human being (or a group of people). Thus, a person image is the unity of rather easily and explicitly available information about a person, including the person's mental setting. Both person schemata and person images can be developed for an individual, e.g., one's mother, brother, best friend, etc., as well as for groups of people, e.g., medical doctors, homeless people, managers, etc. Furthermore, person models are created for other people but also for oneself.[10] In the case of modelling oneself we can speak of a self-model that we develop implicitly as a self-schema and explicitly as a self-image. Thus, we have the following varieties of person models (see Table 1).

Person models are characterized here as memorized units of person features, ignoring the difference between long-term or short-term memorization.[11] Person models are distinguished

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questions: Concerning the development I suggest that person model enfolds gradually from an early model of living agents which is based on sensitivity for clusters of features indicating animacy and agency. This "agent models" enfold into person models which are systematically enriched by the features I describe as belonging to person schemata and person images. Furthermore, a creation of a person model (which is a unity of information clustered together) does not presuppose a concept of a person. Person models are developed in fact if some typical features of adult healthy human beings are clustered to model an individual or a group of entities which are relevantly similar to adult healthy human beings. Typical core features are e.g., 1. being an agent, 2. being a sentient being, 3. having some minimal control of action. We use person models to understand babies and pets since we usually perceive them as having a minimal amount of core features.

8 I am only presupposing a minimal consensus on using the distinction of implicit versus explicit. It indicates a (gradual) difference in epistemic access such that paradigmatic cases of explicit contents are easily accessible (by the subject's experience, memory, thinking, imagining etc.) while paradigmatic cases of implicit contents are very difficult to access by the subject while they nevertheless influence the subject's cognition and behaviour. Intuitively, explicit content are correlated with our intuitive understanding of *conscious accessibility*, but since the latter is scientifically pretty unclear, I do not want to ground the implicit/explicit distinction on the difference between being or not being consciously accessible.

9 Mental phenomena have different ontological types: states, events, processes, and dispositions. So not only are stable mental phenomena included but so are situational experiences (like tokens of perceptions, emotions, attitudes, etc.).

10 The distinction between *person schema* and *person image* is based on Shaun Gallagher's distinction between *body schema* and *body image*. Establishing a *person schema* of my own body amounts to Gallagher's *body schema*, while a *person image* of my own body is similar to what he introduces as *body image* (2005, p. 24).

11 In a more detailed explication of the theory, it would indeed be useful to distinguish short-term person models (only stored in working memory) and long-term person models (stored in a long-term memory). In addition, other established distinctions in memory can be used to characterize the content of person models, such as procedural and declarative contents as well as episodic and semantic contents. I will, however, ignore these distinctions in this paper.

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from the result of understanding in a situation, which may be either a person impression that mainly relies on person schemata, or a person judgment that mainly relies on person images. Let me illustrate one clear virtue of adopting the distinction between person schema and person image by reference to the fact that it can account for the difference between intuitive understanding and inference-based understanding of others.

5.1 Person schemata

In detail, then, what are person schemata? A *person schema* is an intuitively formed, implicit model of a person; it is a memorized unity of characteristic features of a person including facial features and expression, voice, moving pattern, body posture, gestures, and other perceivable features of a person. The function of clustering these features is to allow us to evaluate a person very quickly in a situation according to evolutionarily-important aspects: is a person familiar, dangerous, aggressive, helpful, or attractive? The evaluation is either expressed in a type of interaction, or it can simply be memorized in an implicit unitary structure for future retrieval, including recognizing the person and activating the former evaluation (Reddy 2008). Our main access to others in everyday life is through perceiving a person and forming an impression (see the review published as a book chapter by Macrae & Quadflieg 2010). To form a person impression, (i) we typically pick up these basic features by means of a quick visual evaluation, even when seeing a person for the first time, where (ii) most features are directly associated with socially-relevant information, and (iii) they are clustered at the level of perceiving the whole person. Let me offer some support for all three characteristics of the process of forming a person impression in a situation that is memorized as a person schema:

(i) *Quick evaluation even with parsimonious information*: Evaluations of threat (which is of strong evolutionary relevance) can be made on the basis of exposure to an unfamiliar face lasting as little as 39 milliseconds (Bar et al. 2006). If the exposure to the unfamiliar face

lasts about 100 milliseconds, we are able to evaluate likeability, trustworthiness, competence, and aggressiveness with subjective reliability levels that are similar to those generated under longer viewing times (Willis & Todorov 2006).[12]

(ii) *Most features are associated with socially relevant information*: looking into the face is a very rich source of information about a person. Between 3 and 7 months of age, infants learn to recognize the face of the mother and to distinguish it from the faces of strangers, and they start to categorize people according to emotional expression and sex (Nelson 2001). One important source of information that children use from 4 months onwards is the gaze-direction of a person, it having been shown that they can distinguish a direct from an averted gaze (Vecera & Johnson 1995). From 9 months onwards, infants learn to register the joint attention of the infant and an adult as directed towards an object (Cleveland & Striano 2007). Thus, on the basis of gaze-interaction they evaluate whether joint attention towards an object has been established or not, and learn to direct the attention of the other if necessary (Tomasello 1999). Between the ages of 9 and 18 months, children start to use gaze-information to register the *goal* of the action of the other human: they attend immediately to the eyes when the intentions of an actor are ambiguous (Phillips et al. 1992).

Let me now pick out some results based on studies of adults that illustrate the informational value of single cues. To start with facial expression: in emotion recognition, highly in-

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12 The time course can be observed in ERP studies. These studies all support claims about the early information processing of faces, although there is an ongoing debate about how best to interpret the results. The main observations are enhanced responsiveness to faces relative to a variety of other objects with peaks at approximately 100 milliseconds (Herrmann et al. 2005; Liu et al. 2002; Pegna et al. 2004), 170 milliseconds (Bentin et al. 1996; Eimer & McCarthy 1999; Itier & Taylor 2004), and 250 milliseconds (Bentin & Deouell 2000; Schweinberger et al. 2004) after stimulus onset. (For review see Macrae & Quadflieg 2010). Whole bodies (without faces) are evaluated with a delay of 20 milliseconds compared to the evaluation of faces (Gliga & Dehaene-Lambertz 2005). Concerning faces with emotional expressions, the following rather stable result is reported: there is a frontocentral positivity as early as 120 milliseconds after stimulus onset and a later more broadly distributed positivity beyond 250 milliseconds; both are modulated by emotional facial expressions (Eimer & Holmes 2002; Holmes et al. 2003; Vuilleumier & Pourtois 2007; Williams et al. 2006).

formative features include knitted eyebrows for sadness, a smile for happiness, and a frown for anger (Ekman 1972, 1999). To prevent this remark giving the wrong impression, I here highlight some individual features and will argue in the next step that they are part of an integrated view at the level of persons. Salient biological visual markers allow us to easily identify the "big three" categories in person perception (Brewer 1988; Fiske & Neuberg 1990), i.e., sex, race, and age. In the same way, we can illustrate highly informative single features such as body posture: if the other is bending her head in a communicative context, this is unconsciously registered as signalling sympathy (Frey 1999).[13] One important data source here is biological motion-detection as investigated by point light studies. If a person has lights on her hands, feet, and ankles, and some other significant parts of her body, we can videotape her bodily movement in the dark. Such artificial pure biological movement information allows us to register social features, e.g., we can recognize emotions (Ambady & Rosenthal 1992) and attribute personality features (Heberlein et al. 2004) on the basis of seeing dynamic movements alone. Furthermore, there is evidence that social information can be taken from the combination of gesture and body posture alone. In an intercultural study (Bente et al. 2010), an interaction between an employer and an employee (played by two students of one type of culture) was filmed for a short period. Then the film was edited to show only gesture and body posture. This was realized by showing idealized wooden puppets, representing the real interaction while abstracting from facial information, speech, clothing etc. The question to be addressed was, what we can read from seeing the body postures and gestures. The interactions were filmed with students from UAE (United Arabic Emirates), Germany, and the United States; and the test subjects were also drawn from all three countries. With this film, people could determine whether the people in the scene were nervous or not, as well as the dominance relation, i.e., they could see who was the boss. This is an interculturally-shared social understanding of otherwise culturally variable cues of body posture and gesture (the US students moved a lot while the UAE students moved rarely). They furthermore could perceive the level of friendliness in the interaction, although the study showed that we are good at this only in assessing our own culture.[14] Furthermore, there are many more complex culturally-dependent visual features that (according to other studies) we use for evaluating the other—e.g., physical attractiveness, where attractive people are evaluated as possessing more desirable characteristics than their less attractive counterparts, a phenomenon that has been labelled the *beauty-is-good stereotype* (Dion et al. 1972; Eagly et al. 1991). These kinds of stereotypes are especially connected with racial classifications: African–Americans are stereotypically assumed to be lazy, criminal, and uneducated, but also musical and athletic (Devine & Elliot 1995), whereas Asian–Americans are considered to be intelligent, industrious, conservative, and shy (Lin et al. 2005). Most observers in our culture assume that people with stylish hair and extravagant clothing are highly extrovert (Borkenau & Liebler 1992). We live with a lot of these deeply culturally-anchored stereotypes, and they are often applied without the perceivers' intention or conscious awareness (Macrae & Bodenhausen 2000). This last point relates to the third aspect of person schemata. Person schemata are unities of characteristic features integrated at the level of persons. All these singular features are integrated into person models that enable us to develop detailed and extensive expectations of behaviour.

(iii) *Integration of characteristic features at the level of perceiving the whole person*: Although I have presented evidence that some single features are very salient for transferring social information, there is also much evidence that these features are normally combined with a variety of others to form an integrated impres-

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13 We leave the question open as to what extent person schemata are constituted by innate or by learned dispositions. The examples mentioned above indicate that they involve properties of both kinds.

14 Interestingly, Germans could perceive the friendliness of students from the US and UAE partially (as well as the other way around), while students from UAE and USA could not read the level of friendliness from the other culture at all (Bente et al. 2010).

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sion of a person that I call a person schema. We have seen evidence for the key role of gaze detection in registering another person's direction of attention (see ii). But there is further evidence that gaze alone is not the critical source of information; we actually seem to rely on an integrated evaluation on the basis of perceiving gaze, head, and body position (Frischen et al. 2007). The same holds for evaluation of the basic features sex, race, and age. Although isolated facial features are often sufficient to determine a person's sex, research has indicated that sex categorization is based on the integration of several features (Baudoin & Humphreys 2006; Bruce et al. 1993; Brown & Perrett 1993; Roberts & Bruce 1988; Schyns et al. 2002). Concerning face, the best available theory of face recognition seems to be Haxby's account (Haxby et al. 2000), according to which there are two distinguishable processes, one leading to face identification by focussing more on invariant core features, and the other leading to registering facial expression by relying on varying features. Furthermore, there is evidence that there are two different neural circuits for face perception and body perception (see the review by Macrae & Quadflieg 2010), both playing a core role in registering face or body identity, and playing an extended role in registering face or body expression in a given situation. And the integration processes are not limited to this level (Martin & Macrae 2007). Since we know that information about facial and bodily features is integrated, e.g., in the evaluation of emotional expression, we can therefore characterize a sequence of integration processes as leading finally to a person impression in a situation, which may be stored as a person schema in memory.

5.2 A model of forming a person schema

How can we best describe this process of forming a person schema? In general terms, the same complex process takes place in the case of perceiving a person and forming a person impression in a given situation as takes place when we perceive an object. I describe the process according to the model of object

perception developed by Ernst & Bülthoff (2004), and I have already shown in detail that it can do justice to our recognition of emotions (Newen et al. forthcoming). The overall process comprises bottom-up processes starting with basic visual features that are modulated either by feature combination (if two features provide complementary information), or by feature integration. The latter can be modelled as a Bayesian weighting process that leads to the most probable intermediate estimate given the input. Further integration processes then lead from the most probable estimate to a stable percept of an object in the case of object perception, and to a stable person impression in the case of person perception. This model explicitly accounts not only for bottom-up but also for top-down processes, in the form of so-called cognitive penetration. I have sketched a plausible but in no way complete model of the formation of a person impression (see figure below). According to the evidence I have presented so far, it is plausible to suggest that at the level of intermediate estimates in the process of forming an impression of a person, we find (a) an estimation of a core person identity, (b) an estimate of situational emotions, intentions, and actions, as well as (c) an estimation of social status, person abilities, and individual personality traits. An important step in the model is the association of visual features with socially-anchored stereotypes (see above) which allows us to develop rich intermediate estimates, e.g., of the other's emotional situation, social status, etc.

> Numerous lines of research (Albright, Kenny, & Malloy, 1988; Ambady & Rosenthal, 1992; Behling & Williams, 1991; Borkenau & Liebler, 1992; Kenny, Horner, Kashy, & Chu, 1992; Norman & Goldberg, 1966; Secord, Dukes, & Bevan, 1954) have provided compelling evidence that trait evaluations are readily drawn from a person's physiognomy (i.e., facial features), outer appearance (i.e., clothing), or demeanor (i.e., posture, walking, style). (Macrae & Quadflieg 2010, p. 433)
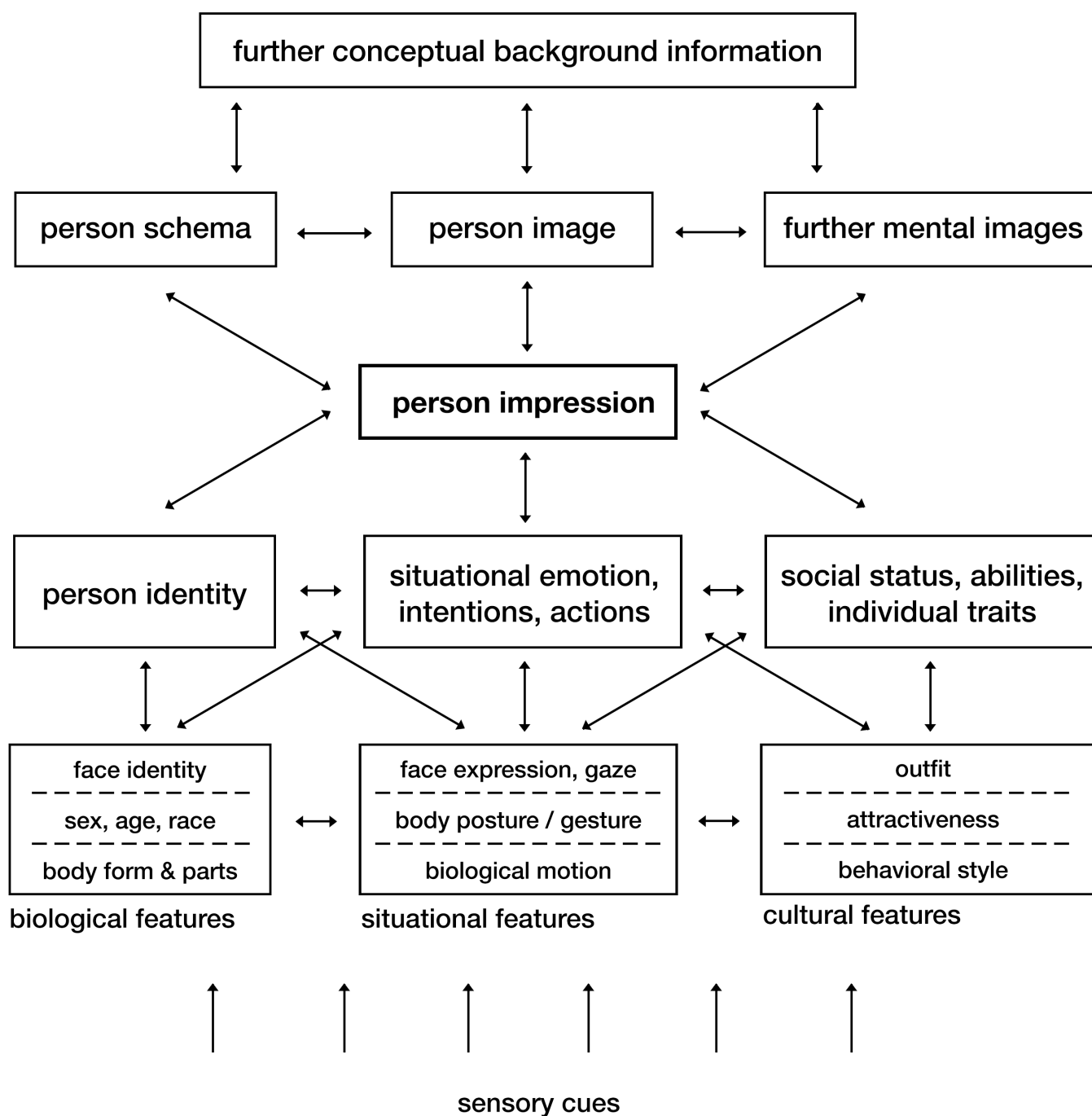
Figure 1: A model of the dynamics of bottom-up and top-down processes leading to a stable person impression by relying on person images and/or person schemata

Finally, I highlight that the top-down processes are able to interfere in this process of combination and integration very early in the visual information processes: for example, it has been shown that the activation of a race concept on the basis of the form of a face (African versus European face format) changes the perception of colour in the face, while colour is known to be represented in V4 as part of early visual brain processes. The same hue of colour is seen as more dark in the African face than in the European face (Levin & Banaji 2006). Thus we have to admit that the process of feature-combination and integration is highly dynamic, involving simultaneous activation of features rooted in bottom-up and top-down processes, finally reaching the most probable and usually stable person impression. The dynamic is de-

scribed in detail for the case of object perception in Vetter & Newen (2014); it is postulated for person categorization in Macrae & Martin (2007), and analysed according to the levels of processing that lead to person construal in Freeman & Ambady (2011). Figure 1 is a sketch of the formation of a person impression according to my account.

A person schema emerges as the result of direct perception of a person, where this may be either basic or relatively smart perception; yet it usually remains implicit, and is not amenable to linguistic description. A typical example of person schema based on basic perception is the everyday experience of seeing a person only briefly in a single situation, whereupon it is difficult for us to describe the person—particularly her face. While we can often easily recognize the person, it may take hours with a professional to end up with an adequate "identikit" picture such as those produced at police stations. A person schema based on smart perception might be, for instance, a person schema that includes a lot of top-down activation—for example, while on campus, perhaps I see a person of typical student age dressed like a law student, and thus activate the "rich person" schema that is the basis for my everyday smooth interaction with law students, and which differs (despite overlaps) from my person schema for students in natural sciences. If we not only develop implicit practical knowledge regarding our use of the person impression (independent from its richness), but also develop explicit *knowledge* pertaining to the relevant person information, or at least develop easy explicit access to it, then we go beyond a person schema. We can characterize this new unified information as a person image.

5.3 Person images

In detail, then, what is a person image? A person image is a unity of relatively easily and explicitly available information about a person, including her mind-set. On the basis of typically implicit person schemata, young children learn to develop explicit *person images*. These are models of individual subjects or groups. In the case of individual subjects, they may include names, descriptions, stories, whole biographies, and visual images highlighting both mental and physical dispositions as well as episodes. Person images are essentially developed not only by observation but also by telling, exchanging, and creating stories (or "narratives").[15] Person images presuppose the capacity to explicitly distinguish the representation of my own mental and physical phenomena from the representation of someone else's mental and physical phenomena. This ability develops gradually, reaching a major and important stage when children acquire the so-called explicit theory-of-mind ability (operationalized by the false-belief task, see Wimmer & Perner 1983).[16] Then they are able to construct explicit person images by characterizing a person such that they attribute a biography to an individual. There is strong folk-psychological evidence that we have explicit person models of the people we deal with extensively, e.g., family members, and people about whom we tend to have a lot of explicit knowledge. The same is true for relevant groups of persons we deal with often. Even in professional contexts this leads to judgments that can be inadequate: the apparent association between wearing revealing clothes and immodesty and promiscuity has been shown to cause not only laypeople but also police officers and judges to hold victims of rape to be responsible for their having been assaulted (Lennon et al. 1999). An essential part of becoming an adult is learning to interact socially with other humans, by developing sophisticated and explicit person images of the groups of professions we have to come to any sort of arrangement with. We often have explicit beliefs about medical doctors, managers, secretaries, craftspeople, etc., and we try to deploy these beliefs to deal with these people in a smooth and efficient way. When we

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15 This is the aspect of the narrative approach to understanding other minds, mentioned above (e.g., Hutto 2008). But narratives are only one method of establishing a person model. Representatives of a pure narrative approach underestimate the importance of other sources, such as perceptions, feelings, interactions, etc., which often do not involve narratives.

16 There is a long and not fully understood process of development from implicit false belief sensitivity to explicit false belief understanding (de Bruin & Newen 2012a; 2012b). Person images actually presuppose an explicit representation of false beliefs.

have stored a person image in memory, and are placed in a new situation in which we see and recognize the person, there is evidence that we immediately activate the biographical knowledge we have available. For example, when test persons were asked to judge the traits of target individuals from photographs, the test persons' responses continue to be influenced by what they have explicitly learned about the people in question (Uleman et al. 2005). A recent neuroimaging study (Hassabis et al. 2013) indicated that when test persons were asked to predict the behaviour of persons, they essentially relied on prior knowledge of personality traits, which in this particular study were implemented in two ways, namely as agreeableness (the tendency toward altruism, cooperation, and the valuing of harmony in interpersonal relationships as opposed to antisocial and exploitative behaviours) and as extroversion (in contrast to introversion). The test person became acquainted with four types of personalities that had been constructed from combinations of high and low versions of agreeableness, on the one hand, and high and low versions of extroversion, on the other. In the test situation they had to predict the behaviour of four specific persons who were exemplars of the four personality types. The authors report that the predictions of behaviour were mainly based on personality traits and that the latter also had rather clear neural correlates: by using functional magnetic resonance imaging (fMRI) the authors showed that there is a neural correlate for recognizing (and imagining) high agreeableness (in contrast to low), namely in the left LTC (lateral temporal cortex) and dorsal mPFC (medial prefrontal cortex), as well as for recognizing (and imagining) high extroversion (in contrast to low), namely in the pCC (posterior cingulate cortex); in addition the recognition (and imagination) of one of the four personality types was correlated with four distinctive patterns in the anterior medial prefrontal cortex (mPFC). In line with my proposal, the authors of the fMRI study write: "Different patterns of activation in the anterior mPFC could reliably distinguish between the different people whose behavior was being imagined. It is hypothesized that this

region is responsible for assembling and updating personality models" (Hassabis et al. 2013). Since the study was based on explicit evaluation of personality features or types, I take this to support the existence of person images. Yet even if the reader accepts the idea of person models, she may be sceptical about whether we need to distinguish person *schemata* and person *images*.

5.4 Why should we distinguish person schemata and person images?

A very convincing case that forces us to make a distinction between person schemata and person images comes from taking a closer look at a typical patient suffering from Capgras syndrome, a misidentification syndrome. Sufferers have the delusional belief that one of their closest relatives, e.g., their wife, has been replaced by an impostor. Such a patient typically says things like "this person looks exactly like my wife, she even speaks and behaves like my wife and she expresses her typical desires but she is not my wife" (Davies et al. 2001); thus, one aspect of this mental disorder is the observation that all the features explicitly believed to be possessed by the wife are correctly attributed. We can account for this by asserting that the patient has an intact person image of his wife. Nevertheless, the usual person identification has gone wrong. According to a standard analysis, what is lacking in the case of the Capgras patient is a feeling of familiarity that normally comes with perceiving a well-known person. How can we account for this in the new framework? When perceiving his wife, the subject intuitively develops and activates a person schema. One aspect of the person schema is the person's identity.[17] As the Capgras case nicely illustrates, the registration of a person's identity is a result of an integration process that relies not only on visual features but also on an implicit emotional evaluation, and that these together trigger an explicit judgment. While the

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17 The involvement of identity already at the level of implicit schemata is supported by Haxby's model of face perception according to which we have to distinguish a core cognitive system involving the recognition of face identity and an extended cognitive system which is enabling the recognition of facial expression (Haxby et al. 2000).

visual recognition fits, here the emotional evaluation is inadequate and the feeling of familiarity is lacking; and in the case of this disorder, the Bayesian integration process for these features leads to an implausible result, since the emotional mistake overrides the visual adequateness. Thus, the Capgras patient has an adequate person image of his wife but an incorrect person schema, and the tension between the two is solved by developing the (implausible) hypothesis that she is an imposter. This analysis is in line with two-factor theories of the Capgras disorder, according to which two distinct factors cause the phenomenon[18]: first, the lack of familiarity, and, second, a local breakdown of rationality that enables the irrational belief-formation on the basis of a severely disturbed person schema (Davies et al. 2001).[19] Several other cases seem to be accounted for if we accept the evidence for a two-factor theory of person modelling—namely a first level of intuitive and implicit person impression and a second level of explicit person evaluation, which are described respectively as intuitive person schemata and explicit person images.

A contrast case to Capgras syndrome is the Fregoli syndrome, wherein a patient has the delusional belief that one and the same person, usually a persecutor, is following her, who is able to radically change his outer appearance. The sufferer then connects people with rather different outer appearances and treats them as the same persecutor. One explanation, still in need of testing, is that this time the feeling of familiarity is developed too often, probably by top-down initiation due to the delusional belief

that the subject is being persecuted. The delusional belief, together with an inadequate feeling of familiarity, may explain the syndrome.[20] But again we need to distinguish the two factors: a level of implicit feeling or impression, and a level of explicit judgment. This time the delusion produces a breakdown of rational judgment formation, i.e., the person model of the other is strongly influenced by the delusion: the person schema formation may be largely intact but has a local defect due to being dominated by the delusional belief. In general, monothematic delusions (delusions about a single belief content) seem to rely on two factors (Coltheart et al. 2007): "[o]ne factor has to explain the strange experiences patients claim to have, while the other factor has to explain the misattribution of actions and thoughts" (Vosgerau & Newen 2007, p. 40).

Are there nonpathological everyday cases that support the distinction between person schema and person image? One illustration can be drawn from Mark Twain's "Huckleberry Finn." At first Huck helps the slave Jim to escape from slavery; but then he rethinks his support in the light of the law, and forms the judgment that he should turn him in to the slave-hunters. But when he has the opportunity to do so, Huck actually ends up protecting Jim. Why does he do this? Huck has a person schema of Jim that is constituted by a person impression according to personal interactions that are dominated by empathy; thus he has a positive impression of Jim and there exists between them a growing friendship. On the other hand, he has a person image of Jim that is dominated by the fact that he is a slave, such that he has to accept his role in society, to do the hard work, to live without freedom, and thus that it is forbidden to aid his escape. Cases of tension between an intuitive person impression (being helpful, being peaceful) and a person image dominated by the knowledge that the same person is a pathological murderer are often reported by judges and policemen. A less dramatic tension seems to be part of our everyday experience of "false" friends (we may still think of someone as

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18 In the literature there are discussed one-factor accounts to explain mental disorders, e.g., in the case of schizophrenia (Gallagher 2004): a top-down approach argues that disturbances of higher-order cognition is the only source for thought insertion (Stephens & Graham 2000) while a bottom-up approach argues that thought insertation is a product of disturbances of neural or basic cognitive processes (like perception). Most of the recent accounts are hybrid account which we call two-factor theories.

19 The fact that person identity as a component of person schema formation is not only based on visual but also on an emotional evaluation is supported by the case of prosopagnosia, i.e., the inability to recognize the face of the person one is seeing, even though one is able to see and perceive the rest of the person adequately. Despite the fact that a person suffering from prosopagnosia is not able to see the familiarity of the face, we can measure increased skin conductance for familiar but not unfamiliar faces, thereby demonstrating intact (albeit covert) emotional recognition of known others (de Haan et al. 1992; Tranel & Damasio 1985).

20 For a discussion of delusional phenomena, see Coltheart et al. (2007) and Hirstein (2005).

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a friend while implicitly already noticing signs of unfair treatment), though of course the tension can also exist the other way around. As illustrated above, the visual features of a person are often loaded with social information, and often involve the activation of negative prejudices which, after a more careful investigation of the person, can be opposed by a positive person image. The general functional role of person models is to simplify the structuring and evaluation of social situations, to enable a quick evaluation of the person in a given situation, and to initiate adequate behaviour. An additional special functional role of person models consists in stabilizing my self-estimation, since there is a strong tendency to have positive stereotypes of one's own in-group members and negative stereotypes of the out-groups' (see Volz 2008, p. 19). These examples illustrate not only that we need to distinguish the person schema and person image, but also that we have a tendency towards harmonizing both. Thus, if one of them is disturbed we tend to adjust the other, which may result not only in wrong judgments about persons, but in extreme cases may become an aspect of a mental disorder, as described above. Finally, to distinguish them is compatible with the claim that a person image may often gradually evolve on the basis of a person schema such that partially the same information about a person changes the status of accessibility from implicit to explicit. But we also have to distinguish both kinds of person models because often an implicit representation of a person as unfriendly exists simultaneously with an explicit evaluation of the same person as friendly.

5.5 Person model theory (PMT) and its relation to other main theories

The central claim of PMT is that we organize information about others by forming person models. We account for a multiplicity of epistemic access strategies, while direct perception and interaction are the main source for person schema formation. Person image formation is based on all the epistemic strategies we have examined, including theory-based inferences and (high-level) simulation strategies. Why, then, is

PMT not a version of TT? Person models are more general and allow for a unification of rather parsimonious information about a person, which does not warrant being called a theory since it does not form even a minimal package of systematically-interconnected beliefs. As we learn more and more about the same person, our person model may develop into a theory. Thus, this is not to deny that we often have rich person models that are theories; and thus I can account for the empirical evidence that supporters of TT tend to rely on. A further question concerns how PMT is related to ST. Simulation is one epistemic strategy in which person models are used to understand others: if I have evidence that another person is similar to me in relevant respects, then I may use my self-model, either the self-schema or the self-image, to produce an explanation or a prediction of the other's behaviour. But I also often have clear knowledge that the other is different from me in relevant respects, especially when there are great differences in the three main categories— sex, age, and race—or in cultural background. In such cases simulation is not used. Although simulation is a worthy epistemic strategy, it is only of limited and constrained use in everyday understanding. How is PMT related to interaction theory and direct perception theories? It explicitly accepts the important role of both as epistemic strategies, but insists that in addition to understanding others in situations of direct interaction there is also often an understanding of others just by observation. The use of these two strategies seems to depend heavily on the personality traits of the person who aims to understand another: while extroverts mainly rely on interaction, introverts (who avoid social contact) mainly rely on observation. Furthermore, these theories do not offer an answer to the main question addressed in this article, namely how we organize the information about other people that we already have. The narrative account offers one answer here, and again we can account for the role of narratives that in the case of rather rich person models may be sources for creating or enriching the models further, or they may also concern the way a person model is memorized. But the narrative account
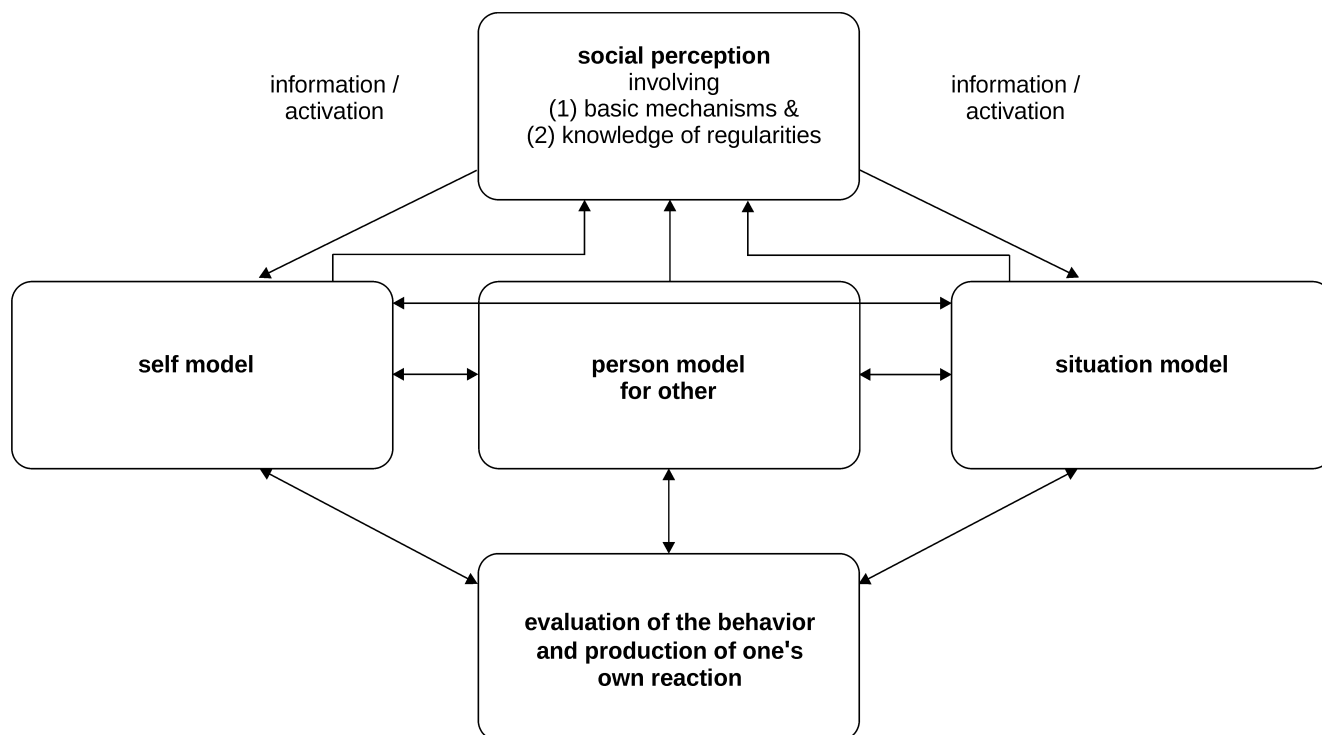
person model theory

Figure 2: Interaction of person models with situation models in understanding others

alone ignores the strong relevance of our intuitive understanding of others as it is anchored in person schemata. This short overview, then, indicates that all of the evidence that representatives of other theories put forward can be integrated into this view, while there is further evidence for my theory, e.g., rich evidence that there is an integration of information into person models by person perception. Notably, PMT allows us to account for certain mental disorders, and I have cited evidence from a very recent fMRI study that is further supportive of the organization of information according to person models.

5.6 Widening PMT: Person models, situation models and culture

Does PMT give us the complete story about understanding others? What about my understanding of a person whom I only see from behind, when queuing at a self-service restaurant? Here it seems sufficient to predict her behaviour just by expecting her to act according to the so-

cial conventions of a self-service restaurant. Understanding the situation alone seems to be sufficient for an understanding of and interaction with the other.[21] This is an important observation that suggests a widening of my theory: we do not only create person models, but also situation models, and our understanding of others uses both types of model as input and selects the most helpful model for evaluating the other person. If I have no person model of this individual, if seeing someone from the back gives me only very parsimonious information, and if I am only interested in getting my lunch, then the situation model may be dominant in dealing with persons in this context. As soon as minimal enrichment of person information is available we naturally tend to rely on person models. The fact that situation models are used at all is supported by successful artificial intelligence (AI) studies working with scripts and

21 These types of cases are considered in Gallagher & Hutto (2008), in the section "Pragmatic Intersubjectivity". Their view is close to a multiplicity view. A minor criticism is that we have to account for such cases independently from being in interaction with someone. They may also involve only observing the other.

frames that can account for human behaviour (Schank & Abelson 1977). Furthermore, in Asian cultures the understanding of other people seems to rely much more on social conventions, since people are strongly expected to behave according to these conventions. In general, situation models are more important for understanding others in "collectivistic" cultures than in individualistic cultures where explanations and predictions of behaviour are usually more reliant on individual belief–desire explanations. Such observations as these require us to give an account of situation models. This can be easily done by widening the theory of understanding others such that it includes situation models, as well as the interdependence of personal models and situation models. It can also include a dynamic, involving bottom-up and top-down processes that lead to an activation or construction of the most plausible person model for interacting with, explaining, or predicting the behaviour of the other person.[22] Here is a rough outline of the process leading to understanding others in the rich sense of interacting, such as in observing, explaining, or predicting (see Figure 2).

In general, we should note the important role of culture in shaping our way of modelling persons (Vogeley & Roepstorff 2009). As we have seen, culture modulates the relevance of person models in relation to situation models. But it also influences our formation of person models, for example by shaping our person perception. To illustrate: Japanese individuals are encouraged to be sociable and cooperative (Moskowitz et al. 1994), to be affiliative rather than competitive (Yamaguchi et al. 1995), and to show obligation to others (Oyserman et al. 1998). Concerning dominance and subordination, Japanese people learn to be rewarded for subordinate behaviour, while Americans learn to be rewarded for dominant behaviour. This

also shapes the perception of dominance and subordination in others. Typical neurological activations of the mesolimbic reward system can be shown to be shaped by the respective culture: Americans show a higher activation of this system when doing and seeing dominant behaviour (in contrast to subordinate behaviour) while with Japanese people we can observe the opposite: they show a higher activation of exactly the same system when doing and seeing subordinate behaviour (Freeman et al. 2009). Thus, the perception of dominant and subordinate behaviour is connected with opposite evaluations (Americans highly esteem dominance while Japanese people highly esteem subordinate behaviour) and a different set of personality traits. Cultural influences on the psychological and neural level are also reported for self-models: on the psychological level, the difference between an Asian interdependent self and a Western independent self was reported by Markus & Kitayama (1991), while a respective difference in neural correlates was also recently discovered (Sui & Han 2007).

6 Conclusion

Our understanding of other minds is based epistemically on a multiplicity of strategies, the core strategies being direct perception, interaction, simulation, and theory-based inferences (including learning from narratives). The most important aspect of understanding others is the activation of prior knowledge of individuals or groups of persons. This is organized into person models. The main claim of PMT is that we rely on *person models* to understand others. These person models form the basis for perceiving and evaluating persons, their social behaviour, and their mind-set. We develop person models for ourselves, for other individuals, and for groups of persons (group models). Furthermore, all types of person models can be realized on two levels: (implicit) person schemata and (explicit) person images. A *person schema* is a bundle of information including information about sensory-motor abilities, voice, face, basic mental dispositions, etc., and such schemata are intuitively used, implicitly developed, and not usually

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[22] There is already one dynamic model of person construal available in the literature that also supports my dynamic theory of understanding others with person models, i.e., the model of Freeman & Ambady (2011). Despite its merits in describing social perception in more detail as regards the interrelation of bottom-up and top-down processes, the authors neither account for the claim that our rich prior information is mainly organized on the level of persons (not faces or subpersonal features), nor do they account for the interaction between person models and situation models.

easily accessible for linguistic report. A *person image* is a unity of explicitly-registered mental and physical dispositions as well as situational features (like perceptions, emotions, attitudes, etc.) that is usually easily accessible for linguistic report (albeit sometimes with the help of gesture, drawings, etc.). The PMT has several advantages over existing accounts of social understanding (e.g., TT, ST, and interaction theory), since it can account for all of the following criteria:

1. It explains specific and more general social understanding of particular individuals in terms of individual person models and group person models. (Not accounted for in ST.)
2. It accounts for the difference, for which evidence is presented, between implicit, intuitive forms of social understanding and explicit deliberative ones by appealing to the role of person schemata and person images respectively. (Not accounted for in interaction theory.)
3. It does justice to folk-psychological evidence that we understand very familiar persons much better than unfamiliar ones: We have rich person images of individuals with whom we are very familiar. (Deficit of all former theories.)
4. It marks adequately in what ways our understanding of others and our self-understanding are interdependent, e.g., in special cases of simulation, understanding the other relies on self-models. (Generally not accounted for in TT.)
5. It offers an adequate framework that is in line with the best explanations of some mental diseases in understanding others, such as the Capgras and Fregoli syndromes. (Deficit of ST.)
6. It can account for cultural differences in social understanding: Future research will show how person models vary with culture, and we have already illustrated that it varies in the case of self-models between Asian and Western cultures. (Not accounted for in any former theory.)

Thus, PMT is at least a serious alternative account, and certainly a candidate for future investigation.

Acknowledgements

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