Beyond Cognition: Philosophical Issues in Autism

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Abstract

This dissertation explores philosophical issues in autism and defends a new version of the enactive approach to autism and social cognition. The discussion in this dissertation centres around the question "why do autistics encounter social interaction problems?", addressing this question in ways that raise broader philosophical issues. Within the philosophy of mind, these include the problem of other minds, the nature of emotions, and narratives and their role in understanding the self. Beyond cognition, such issues are intertwined with questions in metaphysics, philosophy of science, sociopolitical and moral philosophy, and disability studies.

In responding to the question "why do autistics encounter social interaction problems?", I argue that autistic social interaction problems result from the sensorimotor differences between autistics and non-autistics. This contrasts with the response to this question given by widely-endorsed views that emphasize instead the cognitive deficits that autistic people have. Such cognitivist views, such as the theory theory and simulation theory, are the focus of my first two critical chapters. I go on to offer a critique of two approaches that go beyond the focus on mindreading in appealing to sensorimotor problems as lying at the heart of the problem. These views, interaction theory and the original enactive approach, are the focus of the next two chapters. I then turn to defend a novel form of the enactive approach in the last part of the dissertation by emphasizing the role of emotions as the capacity for us to make sense of the world and to construct the sense of self from narratives.

My new approach shifts the explanatory focus from perception and motion to emotion. This maintains the advantage of the original enactive approach, while avoiding its

behaviouristically limited descriptions. My account thus expands the theory's capacity to describe and explain internal states important to self-understanding and self-expression. This allows one to approach autistic social difficulties by attending to the first-person perspective, cohering with my reliance on first-person autistic narratives as a major source of evidence that supplements traditional scientific research on autism.

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老爸、老媽、小屏、阿嬤

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Chapter 1

Autism: A Window to Other Minds

1 Philosophical Issues in Autism

Autism is a topic of significant philosophical interest, which consists of three main sets of philosophical issues that raise important implications for (i) metaphysics and philosophy of science, (ii) political philosophy, moral philosophy, and disability studies, and (iii) philosophy of mind. This dissertation focuses on the philosophy of mind issues in autism, which provide the foundation for further philosophical discussions on autism, as I shall argue in this chapter.

In this chapter, I shall give a more in-depth presentation of the above three main sets of philosophical issues through introducing autism. The discovery, causes, diagnosis, and characteristics of autism raise issues in the metaphysics and the philosophy of science of autism (Sections 2 and 3). Autistic self-advocacy and narratives are materials to be discussed in political philosophy, moral philosophy, and disability studies (Sections 4 and 5). The autistic mind is an important exemplar in the philosophy of mind, especially for the problems of other minds, narratives, emotions, and the self (Section 6).

2 The Discovery and Causes of Autism

The first set of philosophical issues in autism pertains to philosophy of science and metaphysics. In particular, the discovery and causes of autism have important implications in the long-standing debates between proponents of scientific realism and those of social constructivism (Grinker, 2007; Nadesan, 2005). In addition, there is an ongoing discourse

on whether autism can be reduced to single gene dysfunction or whether autism should be understood by a pluralist approach, since it might be impossible to pin down a single genetic cause of autism (Cushing, 2013; Waterhouse, 2013). Diverse theories proposed to explain autism also provoke discussions on modularity in evolution (Gerrans, 2002), causes (Sample, 2013), functions (Doan & Fenton, 2013), and explanations (Doan & Fenton, 2013) in the philosophy of science. Finally, the debate on the diagnostic criteria, characteristics, and categorization of autism leads to issues of the ontology and metaphysics of mental illness in general (Cushing, 2013). In what follows, I shall explicate these philosophical issues in autism.

Autism is a developmental disorder first discovered independently by Austrian pediatrician Hans Asperger and American psychiatrist and physician Leo Kanner. Asperger (1944/1991) characterized autism as a childhood personality disorder, in which a child "lack(s) contact from the start," involving "the shutting-off of relations between self and the outside world" (p. 39). Kanner (1943) understood autism as an affective disorder, more precisely, "autistic disturbances of affective contact" (p. 217). He described this disorder as follows,

> The outstanding "pathognomonic," fundamental disorder is the children's *inability to relate themselves* in the ordinary way to people and situations from the beginning of the life. … There is from the start an extreme autistic aloneness that, whenever possible, disregards, ignores, shuts out anything that comes to the child from the outside. (p. 242)

This and other descriptions of autistic children from Kanner and those from Asperger revolve around their difficulty to participate in social interactions. In particular, these two

authors emphasized the importance of family relationship in the development of children psychology and described each of their patients' family history despite both speculating that autism might have a biological origin and might be innate.[1] As Asperger (1944/1991) stated,

> It has been my aim to show that the fundamental disorder of autistic individuals is the limitation of their social relationships. The whole personality of these children is determined by this limitation. … Indeed, their behaviour in the social group is the clearest sign of their disorder and the source of conflicts from earliest childhood. These conflicts are especially pronounced in the smallest social unit, that is, the family. … The reason is simple: the family unit is based on the emotional bonds of the members to each other. The children in the family are influenced strongly by these feelings, by the interplay of feeling between parents and children. (p. 77)

Kanner (1943) noted especially the lack of warmth in autistic children's families,

> One other fact stands out prominently. In the whole group, there are very few really warmhearted fathers and mothers. For the most part, the parents, grandparents, and collaterals are persons strongly preoccupied with abstractions of a scientific, literary, or artistic nature, and limited in genuine interest in people. Even some of the happiest marriages are rather cold and

[1] For instance, Kanner (1943) hypothesized the innateness of autism right after he described the lack of warmth in autistic children's family: "We must, then, assume that these children have come into the world with innate inability to form the usual, biologically provided affective contact with people … For here we seem to have pure-culture examples of *inborn autistic disturbances of affective contact*" (p. 250).

> formal affairs. Three of the marriages were dismal failures. The question arises whether or to what extent this fact has contributed to the condition of the children. The children's aloneness from the beginning of life makes it difficult to attribute the whole picture exclusively to the type of the early parental relations with our patients. (p. 250)

This observation of Kanner's might be the reason why the "refrigerator mother" theory of autism is usually attributed to him. The refrigerator mother theory states that autism is caused by the lack of warmth from parents, especially mothers. In fact, it is the American child psychologist Bruno Bettelheim, a psychoanalyst, who first developed the refrigerator mother theory and popularized it in the 1950s and 1960s.[2]

It is not until 1964 when American psychologist Bernard Rimland published the book *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior* that the idea of biological origin of autism started to take over the refrigerator mother theory. After 1964, a number of different biological causes of autism have been proposed, such causes as vaccines, mercury, Thimerosal, genes, age of parents, mitochondrial dysfunction, infections, neural system imbalance, among others (Ratajczak, 2011). Nevertheless, the cause(s) of autism remain undetermined. In particular, the inability to isolate a single cause of autism continues to inform the debate between the pluralist and the reductionist approach to autism. While the former stresses a number of possible causes

[2] See Bettelheim's (1967) book, *The Empty Fortress: Infantile Autism and the Birth of the Self*, for his psychoanalysis theory of autism.

of autism, the latter aims to find a single cause, which is usually attributed to genetic factors (Cushing, 2013; Waterhouse, 2013).

In addition to biological theories of autism, many psychological theories of autism have been proposed as well. For instance, the "theory of mind" approach argues that people with autism[3] lack a theory of mind and thus have problems understanding other people (Baron-Cohen, 1995). Next, the "extreme male brain" theory suggests that autistic people's brain structures have stronger systemizing functioning and weaker empathizing functioning than average males (Baron-Cohen, 2003). Finally, the "weak central coherence" theory suggests that people with autism focus on details rather than the context or the big picture, due to their cognitive differences (Frith, 1989). These psychological theories inform the discussions on modularity in evolution (Gerrans, 2002), causes (Sample, 2013), functions (Doan & Fenton, 2013), and explanations (Doan & Fenton, 2013) in philosophy of science.

3 The Diagnosis and Characteristics of Autism

Next, the categorization and diagnostic criteria of autism are also the subjects of much recent discussion. The main diagnosis reference for autism, the *Diagnostic and*

[3] In this dissertation, I use "people with autism," "autistics," "autistic people," "autistic persons," and "autistic individuals" interchangeably. There are two main reasons for this decision. First of all, for most disabilities, "people with disabilities" is the usage preferred over "disabled people," since the "people-first" language considers being a person more central than having the disability. Nevertheless, in the case of autism, many people with autism view being autistic central to their existence and think themselves should not, cannot, and need not be separated or cured from autism. They thus choose the "identity-first" language and refer themselves as autistics and autistic persons/people/individuals. I respect and agree with both reasons and adopt both usages in this dissertation. See also Brown (2011) for the discussion on choosing between the identity-first language and the people-first language in the case of autism.

Statistical Manual of Mental Disorders (DSM), has changed both the categorization and diagnostic criteria over the years. In the first edition of DSM (*DSM-I*; American Psychiatric Association, 1952) as well as the second edition of DSM (*DSM-II*; American Psychiatric Association, 1968), autism is categorized as childhood schizophrenia. From the third edition of DSM (*DSM-III*; American Psychiatric Association, 1980), autism began to be identified as a separate disorder. Specifically, it has come to be identified with "pervasive developmental disorders" (PDD), which include three subtypes: infantile autism, atypical autism, and childhood onset PDD. PDD are also called "autism spectrum disorders" (ASD). In the fourth edition of DSM (*DSM-IV*; American Psychiatric Association, 1994), autism spectrum disorders include five subcategories: autism disorder, pervasive developmental disorders, not otherwise specified (PDD-NOS), Rett's disorder, child disintegrative disorder, and Asperger syndrome. In spite of that, the latest DSM (5th ed.; *DSM-V*; American Psychiatric Association, 2013) includes only autism but not the other four syndromes and identifies autism, PDD-NOS, and Asperger syndrome as different syndromes. In addition to the categorization of autism, the diagnostic criteria of autism also have changed across different editions of DSMs. For instance, the diagnostic criteria for infantile autism in *DSM-III* include: "pervasive lack of responsiveness to other people", "gross deficits in language development", "if speech is present, peculiar speech patterns such as immediate and delayed echolalia, metaphorical language, pronominal reversal", "bizarre responses to various aspects of the environment, e.g., resistance to change, peculiar interest in or attachments to animate or inanimate objects", "absence of delusions, hallucinations, loosening of associations, and incoherence as in Schizophrenia" (p. 89-90). However, in *DSM-IV*, the diagnostic criteria of autism disorder change to three main categories:

"qualitative impairment in social interaction", "qualitative impairment in communication", and "restricted, repetitive, and stereotyped patterns of behavior, interests, and activities" (p. 70-71). Similarly, *DSM-V* identifies autism based on the above traits, while integrates the first two categories in *DSM-IV*: "persistent deficits in social communication and social interaction across multiple contexts" and "restricted, repetitive patterns of behavior, interests, or activities" (p. 50-59). Given these above changes of categorization and diagnostic criteria in DSMs, DSMs are continued to be used as the main references for psychiatric practices. Nevertheless, it is not without debates and disagreements for each of these changes (Grinker, 2007; Mandy, Charman, Gilmour, & Skuse, 2011).[4] Indeed, this fluidity of autism's categorization and diagnosis continues to fuel the idea of social constructivism of autism, according to which autism is a socially constructed, rather than a natural phenomenon, as scientific realists would argue (Nadesan, 2005).[5]

Another potential problem with the diagnostic criteria of autism in DSMs is that they are behavioural.[6] This is a potential problem because of two reasons. First, autism usually accompanies other conditions that also have behavioural manifestations, such as epilepsy and intellectual disabilities. Second, autism is a spectrum and each individual on the spectrum is different. Thus, even though autism has behavioural manifestations, selecting

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[4] See also McPartland, Reichow and, Volkmar (2012) and Worley and Matson (2012).

[5] In this dissertation, I use autism in the broader definition as per *DSM-IV*, despite the change in *DSM-V*. There are two main reasons for this decision. First, most scientific research uses the broader definition of autism as the criterion for the selection of experimental subjects. Second, a majority of first-person narratives of autism are from Asperger subjects who identify themselves as autistics.

[6] See Falkmer, Anderson, Falkmer, and Horlin (2013) for a review of autism diagnostic procedures.

certain behavioural traits as the diagnostic criteria is potentially problematic. The underlying question of this problem is whether autism as a mental disorder can be reduced to physical traits, such as behaviours or other lower-level biological factors, such as genes.

4 Autistic Self-Advocacy

Next, in Sections 4 and 5, I shall introduce the self-advocacy and narratives of autism, which bear upon the second set of philosophical issues in autism: political philosophy, moral philosophy, and disability studies.

Autistic self-advocacy is one major contributor to the neurodiversity movement, which promotes rights for people with cognitive disabilities. More specifically, neurodiversity is the idea that cognitive disabilities are neurological conditions that belong to human variation, just like different genders, sexualities, as opposed to being diseases that need to be cured (Fenton & Krahn, 2007; Jaarsma & Welin, 2012; Nicolaidis, 2012). Following this idea, the neurodiversity movement advocates support and services for people with cognitive disabilities to have a self-sufficient life. In particular, the neurodiversity movement impacts the debate on whether people with cognitive disabilities should have equal political rights and moral personhood.[7] In addition, the idea of neurodiversity informs the discussion between the scientific realists and the social constructivists of autism (Nadesan, 2005). Even though it is not necessary for the neurodiversity movement to endorse the social construction of autism, the latter does lean toward the idea of neurodiversity. These issues also intertwine with the cause of autism,

[7] See also Kittay and Carlson (2010) for the moral and political philosophy of cognitive disabilities.

which would inform both the neurodiversity movement and the debate between scientific realism and social constructivism about autism.

5 Autistic Narratives

During recent years, autistic narratives—such as autistic autobiographies, memoirs by parents of autistic children, movies and novels with autistic characters, and the coverage on autism research and autistic individuals in the mass media—have boomed with the increase in number of autism diagnoses. These narratives create a certain image of autistic people (Hacking, 2009a, 2009b, 2009c) that influences how we think about the experiences, moral status, and political rights of autistic individuals.

In addition, narratives from parents with autistic children also contribute to the neurodiversity movement by providing different opinions about the movement. For instance, Kit Weintraub (2004), a mother with an autistic daughter and an autistic son, disagrees strongly with the neurodiversity movement and states that it is about "self-proclaimed 'high-functioning autistics'". For Weintraub, autism is a disorder that requires medical treatments and behavioral interventions. According to Weintraub, her daughter's serious self-injury behaviors are one of many difficulties and unhappiness autism brings her family. It is medication that relieves both her daughter and her family from the pain. On the contrary, another mother, Christina Nicolaidis (2012), who is a pediatrician and has an autistic son, strongly supports the neurodiversity movement because the movement brings humanity back to autism studies, instead of separating the person from autism. Nicolaidis also argues that "neurodiversity, support, services, and therapies are not mutually exclusive", which addresses some parents' concerns that once autism is considered as part

of the normal, autistic children will lose medical resources they now have, such as those of Weintraub's. Furthermore, Nicolaidis proposes to abandon the distinction between high-functioning and low-functioning autism, because it is a potentially harmful categorization of people. Usually people think Asperger syndrome is part of the high-functioning autism and low-functioning autism usually accompanies intellectual disabilities and low IQ. However, as Nicolaidis (2012) argues, such a distinction between high-functioning and low-functioning autism is "inaccurate, demeaning and potentially harmful" (Nicolaidis, 2012, p. 507)[8]. As she explains,

> Many of my autistic colleagues have been categorized as both high- and low-functioning, with both categorizations working to take away their power or voice. As health care professionals… We risk unnecessarily depriving patients categorized as "low-functioning" of their self-determination and opportunities to reach their potential. Similarly, we often deprive our patients categorized as "high-functioning" of necessary supports and services, or we make dangerously false assumptions about their ability to understand what we say or carry out our recommendations. (p. 507)

I agree with Nicolaidis's suggestion of abandoning the distinction between high-functioning and low-functioning autism. However, because many scientific researchers still use this distinction, I shall rely on it when the scientific researchers I refer to use it. I also agree with Nicolaidis's argument for the neurodiversity movement and think it provides an excellent response to the worries some parents have about the movement. Nevertheless, I

[8] See also Savarese and Savarese (2010) and Murray (2010).

respect many parents' disagreement with the neurodiversity movement and understand the difficulties both they and their autistic children face every day. The love and efforts those parents have for their autistic children should not be ignored or belittled. Silverman (2012) provides an excellent monograph on the crucial role of parental love in the history of autism.

Narratives of people with autism and parents of autistic children contribute to the understanding of autism from the first-person perspective, complementing (and sometimes countering) the third-person perspective provided by scientific studies. In particular, a number of autistic autobiographies suggest that autism is a sensorimotor dysfunction, rather than a cognitive disability assumed by much of the scientific literature (Grandin, 2006; Pentzell, 2013; Tammet, 2007; Willey, 1999). In particular, first-person narratives from autistics contribute to the neurodiversity movement by providing rich materials on what autism really is like. According to many autistics, sensory overload is the most important problem they experience due to being autistic. Sensory overload influences not only whether an autistic can receive sensory information properly from the environment, but also whether an autistic child can learn language by picking up the proper range of auditory signals and whether an autistic can function well in social interactions by picking up enough information from the conversations and from other people's facial expressions. The emphasis on sensory overload from autistic narratives not only pushes research on autism from its past focus on cognitive disabilities to sensorimotor

dysfunction,[9] but also fuels the neurodiversity movement by replacing an emphasis on cognitive differences between people with and without autism with sensorimotor differences. This change—from cognitive disability to sensorimotor dysfunction—also parallels the introduction of non-mindreading accounts that provide an alternative to the mindreading accounts that have come to dominate discussions in the philosophy of mind. These competing accounts of autism and other minds will be discussed in Chapters 2 to 6. In addition, in Chapter 7, I shall propose a different understanding of autistic social interaction problems motivated by first-person autistic perspective, as a justification for my evaluation of all of the accounts discussed in the dissertation.

Thus, in this dissertation I shall employ many first-person autistic narratives as evidence to support my arguments and analysis, in addition to my reliance on scientific studies. By employing these narratives, this dissertation also aims to show that first-person autistic narratives not only provide evidence of comparable epistemic value as do scientific studies, but also present a different, crucial aspect to our understanding of autism.

Since a majority of the first-person autistic narratives available and employed in this dissertation are from "high-functioning" autistics or from those with Asperger's, one question is whether a discussion based on these narratives can be applied to all other people on the autism spectrum. In response to this question, I argue that it is justifiable to apply the discussion in this dissertation to autistics who are not high-functioning or having Asperger's. There are two reasons to support this answer. First, as discussed above, many of those on the autism spectrum and many researchers of autism, such as Nicolaidis (2012),

[9] See Hirstein, Iversen, and Ramachandran (2001) and Ramachandran and Oberman (2006).

have provided reasons why such a distinction between high-functioning and low-functioning autism is not helpful for understanding autism. Second, the distinction between high-functioning and low-functioning autism is based on cognitive differences, while many autistic first-person narratives, from both high-functioning autistics (such as Temple Grandin (2006)) and low-functioning autistics (such as Amanda Baggs (2007)), have suggested that the more fundamental issue of autism turns on sensorimotor problems, which stem from shared traits of autistics across the autism spectrum. The first-person autistic narratives used in this dissertation focus on sensorimotor problems, rather than cognitive deficits, and can thus be understood as representative of autistics across the spectrum.

6 Other Minds: The Central Philosophical Issue in Autism

The third set of philosophical issues pertaining to autism bears upon philosophy of mind, specifically, the problem of other minds, emotions, narratives, and the self. Indeed, the issues of philosophy of mind in autism are the basis of other philosophical issues regarding autism, since understanding autism requires understanding the autistic mind. That is, because autism is a mental condition, referring to autistic mental aspects is inevitable when discussing autism. In addition, a coherent account on other minds, emotions, narratives, and the self of autism can provide a more substantial foundation for further philosophical discussion on autism, such as issues that arise in metaphysics, philosophy of science, and sociopolitical and moral philosophy. I shall return to elaborate on this point in my concluding chapter, Chapter 7.

So this dissertation focuses on the philosophy of mind issues regarding autism. In particular, Chapters 2 to 4 of this dissertation are dedicated to the problem of other minds and Chapters 5 to 6 are dedicated to the issue of emotions. The connections between the above two issues and the other two related issues in philosophy of mind, narratives and the self, will be discussed further in Chapter 7.

Traditionally, the problem of other minds consists of two questions: (i) whether other minds exist and (ii) whether the mental states of others are similar to my own (Hyslop, 2014). The first question is a question of solipsism: am I the only conscious existence in this world, since there is no obvious evidence that other minds exist? Other human beings might just be philosophical zombies, who behave like they have minds but in fact lack them. After the 1960s, the second question was transformed into the question of how we understand other minds and became the focus of recent literature. Functionalism and physicalism, two dominant views in philosophy of mind, both assume positive answers to the second question. In this dissertation, I shall focus on the question of how we understand other minds and use "the problem of other minds" to refer to this question.

Basically, the current literature on this problem of other minds is dominated by the debate between the theory theory and simulation theory. The theory theory suggests that we understand other people through theorizing about their mental states and behaviours, just like the way we apply scientific theories to understand physical objects (Churchland, 1979; Dennett, 1978; Fodor, 1981, 1987; Morton, 1980; Sellars, 1956).[10] On the contrary,

[10] See also Baron-Cohen (1995), Carruthers (1996b), Gopnik and Meltzoff (1997), Gopnik and Wellman (1992), Ravenscroft (2010), and Wellman (1990).

simulation theory argues that we understand other minds through simulating their mental states with our own (Gallese & Goldman, 1998; Goldman, 1992).[11] Both the theory theory and simulation theory are mindreading approaches. They both assume that in order to understand other people, we need to *read their minds*, or to attribute mental states to them, since we cannot directly access other people's mental states but only their behaviours.

Recently, a number of non-mindreading accounts have been proposed as alternatives to the theory theory and simulation theory. As their name suggests, non-mindreading approaches abandon the idea of mindreading. In particular, non-mindreading approaches argue that we understand other people not necessarily through mindreading, that is, mental state attribution, since other minds are not as inaccessible as mindreading accounts assume. In Chapters 2 to 4 I shall examine mindreading and non-mindreading approaches to the problem of other minds and to autism and argue that newer non-mindreading approaches provide better responses to the problem of other minds and autism than do their more entrenched mindreading counterparts.

In addition, I suggest that the question of autistic social difficulties, "Why do autistics encounter social interaction problems or have troubles understanding other people?", and the problem of other minds, "How do we understand other minds?", are like two sides of the same coin, since a theory of how we understand other people should also answer why autistics have problems in social understanding.

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[11] See also Gordon (1986, 1992, 1995, 1996, 2000, 2009), Currie (1996), Currie and Ravenscroft (2002), Harris (1992), and Heal (1995, 1996, 1998a, 1998b, 2000).

There is an additional reason why this dissertation starts with autistic social interaction problems and the problem of other minds: Social interaction problems are central to the definition of autism. When first characterizing autism, both Asperger (1944/1991) and Kanner (1943) stressed the social interaction problems of autism and suggested that these problems are central to autism. Asperger's (1944/1991) and Kanner's (1943) characterization of autism will be further investigated in Chapter 5.

7 Chapter Summaries

In responding to the question "why do autistics encounter social interaction problems?", I argue that autistic social interaction problems result from the sensorimotor differences between autistics and non-autistics. This contrasts with the response to this question given by widely-endorsed views that emphasize instead the cognitive deficits that autistic people have, such as the theory theory and simulation theory.

In Chapter 2, I present counterexamples from both scientific studies and first-person autistic narratives to argue against the theory theory's account of autism, according to which autistic people encounter social interaction problems because they lack a theory of mind or are 'mindblind'. Specifically, I draw the results from the new false belief test, whose original version was viewed as evidence that people with autism lack a theory of mind, and show that autistics fail the original false belief test not because of the lack of a theory of mind but because of the problems in the experimental design. In addition, I present evidence from autistic first-person narratives to show that people with autism in fact use a theory of mind to understand other people, and this use of theory of mind in autism is a compensatory mechanism for autistics' lack of social intuitions.

In Chapter 3, I continue my critique of mindreading accounts and focus on simulation theory. I first elaborate on two dominant simulationist views of autism: (i) autistic social interaction problems result from their problems in simulation capacity or imagination capacity, and (ii) autistic social interaction problems are caused by the dysfunction of mirror neurons, which underlie the capacity to simulate. I then present evidence from both scientific studies and autistic first-person narratives to debunk these two simulationist views, and show that autistics are capable of simulating other people. For this reason, the simulationist account that lacking the simulation capacity causes autistic social interaction problems cannot be true.

I go on to offer a critique of two approaches that go beyond the focus on mindreading in appealing to sensorimotor problems as lying at the heart of the problem. These views, interaction theory and the original enactive approach, are the focus of Chapter 4. Both the theory-theory and simulationist approaches to autism are individualist and disembodied in their view of cognition. While interaction theory and the original enactive view represent some shift from such views, they do not go far enough here. In particular, though emphasizing the sensorimotor problems in autism, interaction theory still assumes an individualistic understanding of autistic social interaction problems and attributes the cause of these problems to autistic sensorimotor deficits. And while the original enactive approach correctly understands autistic social interaction problems as a result of the sensorimotor *differences* between autistics and non-autistics, it faces the problem of being methodologically behavioristic because it ascribes too much explanatory work to physical coordination in social interactions; in addition, its explanations focus primarily on

perception and motion. This explanatory focus limits the capacity of the view to describe and explain the rich phenomenology and conscious experiences in social interactions.

I then turn to defend a novel version of the enactive approach in Chapter 5 by emphasizing the role of emotions as the capacity for us to make sense of the world and to construct the sense of self from narratives. My new enactive approach shifts the explanatory focus from perception and motion to emotion and suggests an understanding of emotion as the sense we make of things and events in the physical and social world. By doing so this view is able to maintain the advantage of the original enactive approach, including social interactions as part of the explanation while avoiding its behaviouristic bias. Another advantage of this explanatory shift to incorporate emotion is that it greatly expands the theory's capacity to describe and explain internal states important to self-understanding and self-expression. This allows one to approach the question "why do autistics encounter social interaction problems?" by attending to the first-person perspective, cohering with my reliance on first-person autistic narratives as a major source of evidence, supplementing traditional scientific research.

In Chapter 6, I turn to the scientific studies on autistic emotions. I use these studies to test the enactive approach I propose in Chapter 5. At the same time, I also extend my arguments against mindreading accounts and interaction theory through providing counterexamples to their accounts of autistic emotions.

In Chapter 7, I first present an analysis of autistic social interaction problems from the first-person perspective in order to justify my evaluation of the above mindreading and non-mindreading accounts of autism. I next use the distinction between individualism and non-individualism to map the views of social cognition and autism discussed in this

dissertation. In the end, I discuss the philosophical implications of my enactive approach, including the issue of narratives and the self in the philosophy of mind, the issues on metaphysics, philosophy of science, political philosophy, moral philosophy, and disability studies, which were first introduced earlier in this chapter.

Chapter 2

The Theory Theory Account of Autism: Mindblindness

Autism has been invoked by proponents of a range of views that hold that we possess a theory of mind. I argue here that not only does autism fail to provide support for this claim, but that more fully considering autism highlights the inadequacy of the "theory theory" conception of folk psychology in the case of autism and more generally. Crucially, both recent autistic autobiographies and new false belief studies on autism suggest that people with autism possess a theory of mind yet still face social interaction problems because of limits to the social intuitions they possess. Instead of being the primary way in which we understand other people, the theory of mind is something that autistic people and others draw on only when the primary means of doing so are unavailable or function in restricted ways. Hence, the case of autism is a counterexample to, rather than an exemplar of, the theory of mind approach.

1 Introduction

Autism, a developmental disorder associated with deficits in communication and social interactions (*DSM-V*; American Psychiatric Association, 2013), is an important case for philosophical issues concerning other minds: if a solution to the problem of other minds successfully explains how we understand other people, then it should also be able to explain why anyone, including people with autism, might have problems understanding other people. In response to the problem of other minds, the theory theory suggests that having a theory of mind enables one to understand other people and engage in social

interactions smoothly. Consequently, people with autism have social interaction problems because they have theory of mind deficits, or lack a theory of mind altogether.

The theory of mind is a capacity proposed by the theory theory and is claimed to enable us to understand, explain, and predict other people's mental states and behaviours. Specifically, some theory theorists suggest that the theory of mind is a cognitive module (Baron-Cohen, 1995; Carruthers, 1996a).[12] This branch of the theory theory is called the theory of mind approach. The theory of mind approach and the theory theory in general are supported by the false belief test, a psychological experiment designed to test the functioning of a person's theory of mind. Several false belief studies showed that most autistic children, around 70-75%, are unable to separate other people's false beliefs from their true beliefs about reality (Baron-Cohen, Leslie, & Frith, 1985, 1986; Perner, Frith, Leslie, & Leekam, 1989). To explain these studies, theory theorists suggest that autistic children's poor performance in false belief studies results from their deficits in, or lack of, a theory of mind. Specifically, theory theorist Simon Baron-Cohen (1995), who proposes that the theory of mind is a module, suggests that autistic children perform poorly in false belief tests because these children fail to attribute false beliefs to other people due to the deficits in their theory of mind module. In particular, Baron-Cohen (1995) coined the term "*mindblindness*" to capture autistic children's problems of understanding other minds.

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[12] Nevertheless, there is a disagreement amongst theory theorists about whether a theory of mind is innate (Simon Baron-Cohen, Peter Carruthers, Alan Leslie) or is acquired after birth (Alison Gopnik, Andrew Meltzoff, Henry Wellman). The former argues that a theory of mind is modularized and hardwired (Baron-Cohen, 1995), while the latter proposes that experiences after birth are necessary for acquiring a theory of mind (Gopnik, 1996).

Nevertheless, in this chapter, I shall argue against the above theses from the theory theory and the theory of mind approach. I first demonstrate that there is evidence showing that people with autism have social interaction problems because of the lack of social intuitions, instead of deficits in theory of mind. Indeed, theory of mind is a compensatory mechanism we use to understand other people when our social intuitions are not working. Next, I present an alternative interpretation to the deficits-in-theory-of-mind account in order to explain autistics' poor performance in false belief tests. New studies on autistic false beliefs show that the theory of mind deficits are not the main reason why people with autism fail false belief tests. Instead, autistics fail false belief tests because of the experimental designs: newer versions of the false belief task employing varied experimental design have greatly increased autistics' success rate in these tests. Furthermore, autistic first-person narratives suggest that sensory oversensitivity is a more fundamental reason why people with autism do not perform well in standard false belief tests.

In what follows, I elaborate on the theory theory's thesis—an alleged lack of theory of mind in the case of autism—and the support for this thesis from false belief tests, in Sections 2 to 6 respectively. Next, in Section 7, based on autistic autobiographical narratives, I argue that people with autism do not lack a theory of mind as the theory theory suggests. Finally, in Section 8 I argue that false belief tests do not provide the support the theory theory needs.

2 The Theory of Mind: Philosophical Background

Theory theory is one of the two main solutions proposed to the problem of other minds. The problem of other minds is a problem about how we understand other people's mental states. How we understand other people's mental states is a problem because we can only observe other people's behaviours. As it is sometimes put, we do not have "direct access" to other people's mental states. Despite the inaccessibility of other minds, we do not seem to have problems interacting with and understanding other people on a daily basis. This is the reason that *how* we understand other people is a problem of philosophical interests. In particular, both the theory theory and simulation theory agree that we seem to understand other people through the knowledge we have about other people: the behaviours people would have under certain situations and the feelings and emotions they might experience toward certain cases. This knowledge we have about other people's mental states and behaviours is called *folk psychology* or commonsense psychology. It is called commonsense psychology or folk psychology in contrast to the scientific knowledge of human psychology established through formal experimental procedures.

Both the theory theory and simulation theory argue that based on folk psychology, we attribute mental states to other people, or *read their minds*, in order to explain and understand them. In particular, the theory theory and simulation theory interpret this mental state attributing in terms of the activities, respectively, of theorizing and simulating. Specifically, the theory theory suggests that folk psychology has many of the same properties as scientific theories. In particular, we apply folk psychology to explain the behaviours of other people in the way in which we employ scientific theories to account for the behaviour of physical objects. This explains why the theory theory understands folk

psychology as a 'theory' of other minds: in order to understand other minds and to explain others' behaviours, we employ "theoretical terms," such as mental states.

Most literature traces this idea of theory of mind back to "Empiricism and the Philosophy of Mind," Wilfrid Sellars' (1956) seminal paper. In this paper, Sellars discusses a thought experiment according to which at some point in human history, human beings start to explain and predict each other's behaviours in mentalistic terms. The mentalistic terms take the form of scientific theories and can be verified by scientific methods and empiricist principles, Sellars suggests.[13] Sellars' motivation for this suggestion is to propose an alternative to Cartesian dualism and logical or philosophical behaviourism. Sellars rejects Cartesian dualism because it has problems explaining the interactions between the mental and the physical substances. Sellars also rejects logical behaviourism, which was the dominant view in psychology and philosophy of mind from the 1930s until the 1960s. According to logical behaviourism, all descriptions of human psychology should be identified with or reduced to observable behaviours of human beings. In particular, this is a relatively restrictive view because it allows only behavioural terms to describe human psychology, as Sellars suggests. Alternatively, Sellars proposes methodological behaviourism, according to which behaviours are used to verify mental states, while there is no need to reduce mental states to behaviours, as logical behaviourism suggests, and there is no need to assume mental states as a separate substance, as Cartesian dualism suggests. In this way, methodological behaviourism incorporates both mental terms and behavioural terms and thus has a larger vocabulary to describe human psychology. Since

[13] See Sellars (1956), especially p. 181-183, for characteristics of theories.

having a complete description of human psychology is the priority, whether these mental terms should be reduced to other theoretical terms, such as behaviours, is a further issue, Sellars notes.

Despite the fact that Sellars' paper was published in 1950s, it was only in the 1970s that Sellars' view overthrew the then-dominant logical behaviourism in philosophy of mind and psychology. This shift is called the cognitive revolution, and philosophers who helped to bring it about included Paul Churchland, Daniel Dennett, Jerry Fodor, and Adam Morton, all accepting Sellars' view of mental terms as constituting a scientific theory. These philosophers' motivation was, following Sellars, to further motivate a scientific view of mind as an alternative to Cartesianism and logical behaviourism: to employ folk psychology as the basic understanding of mental states.

As Churchland (1979) mentions, the folk psychological understanding of human beings touches upon the philosophical question of other minds: how we understand other people. The answer provided by Churchland, Dennett, Fodor, Morton, and Sellars is that we understand other people by a theory of mind, a scientific theory-like understanding of other people. We use this "theory" to explain and predict other people's mental states and behaviours, like the way we use scientific theories to explain and predict scientific phenomena. This explaining and predicting activity is called *mindreading* by some philosophers and scientists because it enables us to understand other people's minds or *read their minds*. In particular, Morton (1980) coined the term "theory theory," since the "theory" of mind that actually resembles the form of a scientific theory. In addition, we apply this theory of mental descriptions to explain and predict other people like applying a scientific theory to account for other natural phenomena. Further, Morton suggests that

because the rules in theory of mind are interconnected, we do not learn the rules in the theory of mind one by one and we do not use only one rule at a time. Instead, we learn and use the theory of mind as a set of interconnected rules. These rules about mental states correlate with behaviours into a larger network, which can be developed and modified like a scientific theory.

3 The Theory of Mind: Operational Definition and Functions

The standard definition of theory of mind in scientific research came from David Premack and Guy Woodruff (1978). In 1978, Premack and Woodruff published the first tests on what they referred to as chimpanzees' theory of mind. Two impacts of this publication should be mentioned here. First, the theory of mind tests in this paper generated a series of discussions that helped develop the false belief test, the standard test of theory of mind nowadays. This development of the false belief test is discussed in Section 5. Second, Premack and Woodruff's definition of theory of mind became a standard definition among psychologists and primatologists. There they defined the theory of mind as follows:

> In saying that an individual has a theory of mind, we mean that the individual imputes mental states to himself and to others (either to conspecifics or to other species as well). A system of inferences of this kind is properly viewed as a theory, first, because such states are not directly observable, and second, because the system can be used to make predictions, especially about the behaviour of other organisms. (p. 515)

This definition of theory of mind is a version of the theory theory, which is derived directly or indirectly from Sellars (1956).

The major functions of mental state attribution are explaining and predicting other people's behaviours. These functions are illustrated in an example from Baron-Cohen (1995). The example starts with John's walking into a room.

> John walked into the bedroom, walked around, and walked out. (p. 1)

Baron-Cohen suggests that naturally, a person with the theory of mind capacity would explain John's behaviours by John's mental states. For instance,

> Maybe John was **looking** for something he **wanted** to find, and he **thought** it was in the bedroom.
>
> Maybe John **heard** something in the bedroom, and **wanted to know** what had made the noise.
>
> Maybe John **forgot** where he was going: maybe he really **intended** to go downstairs. (p. 1)

These mental terms connect John's actions with causal explanations. This is how mental state attribution *explains* human behaviours. Next, an example from philosopher Jerry Fodor exemplifies the *predicting* function of mental state imputation.

> Someone I don't know phones me at my office in New York from—as it might be—Arizona. 'Would you like to lecture here next Tuesday?' are the words he utters. 'Yes thank you. I'll be at your airport on the 3 p.m. flight' are the words that I reply. That's all that happens, but it's more than enough; the rest of the burden of predicting behavior—of bridging the gap between utterances and actions—is routinely taken up by the theory. And the theory works so well

> that several days later (or weeks later, or months later, or years later; you can vary the example to taste) and several thousand miles away, there I am at the airport and there he is to meet me. (Fodor, 1987, p. 3)

Here mental state attribution helps predicting actions by bridging the gap between what a person says now and what that person will act in the future. Indeed, Fodor (1987) suggests that the explanatory power of mental states comes together with its causal power. The theory of mind has its explanatory and predictive power because the relation between mental states and behaviours in the theory of mind resembles the causal relation between mental states and behaviours in reality.

Theory of mind is most often understood as "belief-desire psychology" because of its heavy reliance on beliefs and desires in accounting human behaviours. In particular, beliefs are states of the mind with the knowledge about the world and desires are the motivations that lead to actions. Similarly, developmental psychologist Henry Wellman (1990) suggests that beliefs and desires are important elements that connect other mental states and actions.[14]

4 The Theory of Mind Module and Autism

In Baron-Cohen's (1995) version of theory theory, the theory of mind is thought of as implemented by a module independent of other cognitive capacities; it is the module

[14] Wilson (2004) suggests that belief-desire psychology is *bare-bones* folk psychology, as opposed to *full-blown* folk psychology, "that includes the full range of psychological states, such as emotions (anger, elation, fear), moods (restless, horny, inattentive), and sensations (pain, experiencing red, tickling)" (p. 207).

that is, in part, responsible for human social interactions. The mechanism proposed for this theory of mind module is called the Theory of Mind Mechanism (ToMM). According to Baron-Cohen (1995), ToMM is "a system for inferring the full range of mental states from behaviours - that is, for employing a 'theory of mind'" (p. 51). In particular, ToMM has two main functions. First, ToMM represents epistemic mental states, such as "pretending, thinking, knowing, believing, imagining, dreaming, guessing, and deceiving" (p. 51). Second, ToMM uses the information from itself and three other mindreading mechanisms, the Intentionality Detector (ID), the Eye Direction Detector (EDD), and the Shared Attention Mechanism (SAM), to form a theory of how mental states and actions are related in other people (see Figure 2.1). ID, EDD, and SAM develop earlier than ToMM, and together with ToMM, they constitute the full mindreading capacity in adults. These three mindreading mechanisms' specific functions are as follows. ID distinguishes volitional behaviours, which have desires and goals, from non-volitional ones. EDD detects other people's perceptual mental states: their eye directions and visual targets. SAM is joint attention and its function is "to verify that different people can be experiencing these particular mental states about the same object or event" (p. 51).

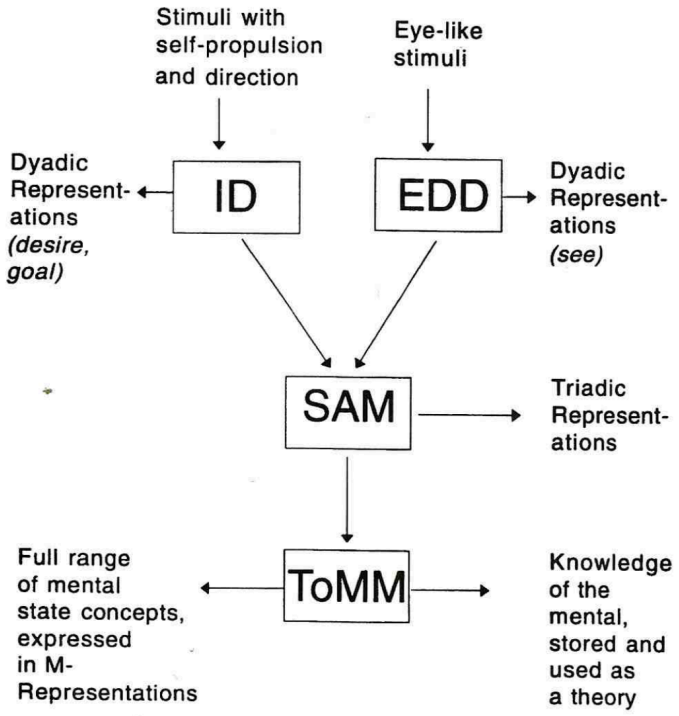

Figure 2.1. The mindreading system. Adapted from "Chapter 4: Developing Mindreading: The Four Steps," by S. Baron-Cohen, 1995, *Mindblindness: An Essay on Autism and Theory of Mind*, p. 62.

According to Baron-Cohen (1995), the four mindreading modules operate through three different developmental phases. During Phase One, roughly from birth to 9 months, infants have ID and EDD. This stage is also called "primary intersubjectivity". During Phase Two, from around 9 to 18 months, SAM emerges and links with ID and EDD. This stage is called "secondary intersubjectivity"[15]. During Phase Three, from about 18 to 48 months, "ToMM is triggered in development by taking triadic representations from SAM and converting them into M[ental]-Representations" (p. 55). In particular, as Baron-Cohen says,

[15] Baron-Cohen (1995) borrows these two terms, "primary intersubjectivity" and "secondary intersubjectivity," from Trevarthen (1979). This latter research will be further discussed in Chapter 4.

in “its strongest and clearest form, my claim is that without SAM ToMM cannot get started” (p. 55).

According to Baron-Cohen (1995), ToMM is the most crucial mechanism for mindreading and its defect in autistic children is the reason why autistic children fail false belief tests and have social interaction problems. In addition, Baron-Cohen suggests that the case of autism proves that ToMM is an independent module: some autistic children have ToMM deficits but not problems in ID, EDD, and SAM, even though most autistic children have problems in both SAM and ToMM since SAM is crucial for the initiation of ToMM (Baron-Cohen, 1995). The functionalities of ID and EDD in autistic children were confirmed by their capabilities to describe people’s actions with intentional words and to interpret eye directions as “seeing,” respectively (Baron-Cohen, 1995; Baron-Cohen et al., 1986). Even though many autistic children have deficits in both ToMM and SAM because SAM is crucial for the development of ToMM, some autistic children have only ToMM deficits but not SAM deficits (Baron-Cohen, 1995). The above studies confirm the specificity of autistic children’s ToMM deficits. In addition, the theory of mind deficits in autism result specifically from ToMM deficits, rather than from other general cognitive problems, such as those concerning language, memory, or intellectual capacities (Baron-Cohen, 1995; Baron-Cohen et al., 1985, 1986). Autistic children’s ToMM deficits were manifested in false belief tests, whose control studies also confirm the integrity of autistic children’s general cognitive functions (Baron-Cohen et al., 1985, 1986; Perner et al., 1989). These false belief studies are reviewed in Section 6 below.

According to Baron-Cohen (1995), autistic children have problems in social interactions because of their deficits in theory of mind, the ability to attribute mental states

to oneself and other people. Failing to attribute mental states results in a series of social interaction problems, such as "the abnormalities in social development, in communication development, and in pretend play" (Baron-Cohen, 1995, p. 63), and more specifically,

> … lack of normal eye contact, lack of normal social awareness or appropriate social behaviour, "aloneness," one-sidedness in interaction, and inability to join a social group. (Baron-Cohen, 1995, p. 62)

These autistic traits are fleshed out in an example discussed by Baron-Cohen (1995):

> ... he never really seemed to look at anyone directly. Rather, he would look at them only fleetingly or else not at all. Despite this, John seemed to notice everything in minute detail. He could ride his bicycle along the most crowded pavements without knocking anyone over, and he spotted car number plates with a figure four in them long before anyone else had noticed. He would also do things his parents found embarrassing, like grabbing and eating sandwiches from a stranger's plate at restaurants. (quoted in Baron-Cohen, 1995, p. 62)

In particular, Baron-Cohen suggests that these autistic social abnormalities result from the theory of mind deficits, and he describes autistic children as *mindblind*, due to their inability to attribute mental states, or to *read other people's minds*. This claim is also called the *mindblindness thesis*, which is the main thesis of the theory of mind account of autism. Another theory theorist, Peter Carruthers (1996a), extends Baron-Cohen's mindblindness thesis by arguing that autistic people have insufficient capacity to attribute mental states to other people and themselves and lack the second-order awareness of their own beliefs and desires.

Before introducing the evidence presented by the theory of mind account of autism, I shall first summarize the preceding discussion. According to the theory theory, we understand other people by explaining and predicting their mental states and behaviours. In particular, Baron-Cohen's version of theor theory, the theory of mind account, suggests that explaining and predicting other people's mental states and behaviours are the functions of a module called theory of mind. This theory of mind module is missing or defective in autism, and this is why autistics have problems understanding other people and passing the false belief test, as Baron-Cohen suggests.

5 The False Belief Test and Theory of Mind in Young Children

False belief tests, the standard test of a theory of mind, were mainly developed from studies in developmental psychology and primate research. This is especially because theory of mind in young children and non-human animals is a research topic that draws the attention of many researchers (see Wellman (2011) and Andrews (2012a, 2012b)). In particular, it is a challenge to test a theory of mind in young children or non-human animals since these subjects do not have the verbal capacity of human adults. Thus, a good test of theory of mind would allow us to know whether non-human animals possess a theory of mind like human beings and when and how the theory of mind develops in young children.

In 1978, Premack and Woodruff published the first tests on chimpanzees' theory of mind. In these studies, Premack and Woodruff showed a chimpanzee, Sarah, a few 30-second videos about certain real-life situations, as well as some photos choices amongst which contain alternative solutions for Sarah to choose from for these real-life situations. For instance, in one video, there is a human locked in a cage trying to escape, and the

solution photo is a key (see Figure 2.2). Indeed, Sarah was able to correctly select the solution photos for most problems. Based on these results, Premack and Woodruff suggest that Sarah understood the problems faced by the human actor in the videos, and this implies that Sarah was able to attribute mental states to the actor and thus had a theory of mind.

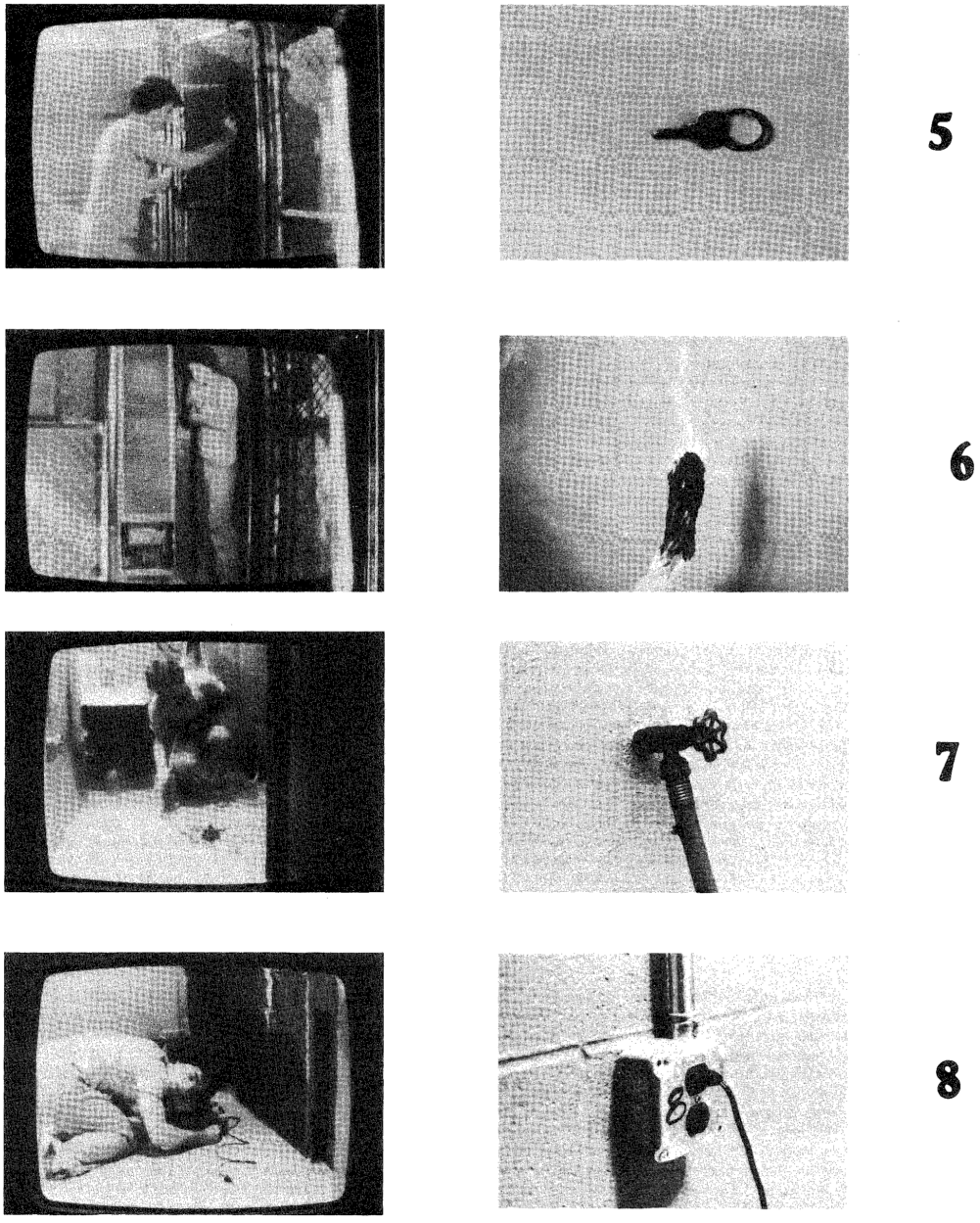

Figure 2.2. The theory of mind test for chimpanzees. "Photographic reproductions from the last 5 sec. of each of the 30-sec videotaped problem scenes in Test 1 appear in the left column. In the right column are the still photographs of the correct solutions. For example, in Problem 5, the human action struggles to escape from a locked cage, alternately grasping the bars of the cage and the padlock on the door, and Solution 5 shows a key." (p. 519) Adapted from "Does the Chimpanzee Have a Theory of Mind?," by D. Premack and G. Woodruff, 1978, *Behavioral and Brain Sciences, 1*(4), p. 519.

Premack and Woodruff's study generated a number of replies, some of which proposed a better version of the test of theory of mind. For instance, Daniel Dennett (1978) argued that Premack and Woodruff's study did not convince him that chimpanzees have a theory of mind, thus suggests that instead of employing more control studies to strengthen the claim on chimpanzee's theory of mind, Premack and Woodruff should adopt a better test of theory of mind. In fact, as Premack and Woodruff (1978) noted in their paper, it is possible to explain Sarah's performance with associations:[16] Sarah learned about the contingent relations between things in the lab setting and this enables her to choose correct answers in the experiments. Given this possibility, Dennett suggests, in order to test, for example, if a child has a theory of mind, we need to know if this child can act according to his or her understanding of other people's beliefs. If others' beliefs will lead to unwanted results for the child and the child can act differently to prevent these unwanted results or to create the wanted results, we can then be sure that the child understands other people's beliefs and has a theory of mind. However, as Dennett notes, even if a chimpanzee passes such a test, we still cannot conclude that a chimpanzee does develop a

[16] Premack and Woodruff (1978) discuss three possible interpretations of Sarah's problem solving capacity: associationism, theory of mind, and empathy (see p. 516-518). They acknowledge that these three interpretations are not necessarily exclusive, though they favor theory of mind as the better interpretation.

theory of mind in its natural environment. We can only conclude with a less exciting claim: a chimpanzee can develop a theory of mind according to the need to survive in the lab setting. Next, Jonathan Bennett (1978) also proposed an improved version of the test of theory of mind. He suggested that a better test of a chimpanzee's theory of mind is to study if a chimpanzee can use her understanding of other's beliefs to coordinate her behaviours in order to achieve her goals. Finally, Gilbert Harman (1978) suggested a version of the false belief test:[17] a chimpanzee can understand others' false beliefs only if this chimpanzee can understand that after a banana is moved to a different place while another chimpanzee is not aware of the moving, the second chimpanzee's belief about the location of this banana becomes false.

These suggestions from Dennett, Bennett, and Harman were adopted by Wimmer and Josef Perner (1983), who developed a series of experiments to test young children's theory of mind. In particular, Wimmer and Perner designed a story in which a boy named Maxi first puts chocolate in a cupboard x. Then after Maxi leaves, his mother moves the chocolate to another cupboard y. When Maxi comes back, he is looking for the chocolate. The child is asked where will Maxi look for the chocolate. Wimmer and Perner's study results show that only children older than the age 4-6 can answer that Maxi will look for the chocolate in cupboard x, the location where Maxi put the chocolate, while children

[17] This suggestion of the false belief test was quickly developed into an actual test for human children, as the following paragraph will discuss. However, it took nearly forty years for a study to be published actually confirming the requisite capacity in great apes (see Krupenye, Kano, Hirata, Call, & Tomasello, 2016).

younger than this age answer cupboard y, the actual location of the chocolate.[18] This result shows that children start to understand other people's false beliefs between the ages of 4 and 6, as Wimmer and Perner suggest.

Next, Wimmer and Perner (1983) also designed a competitive version and a cooperative version of the experiment, in order to test children's capacity to understand deception and to construct deceptive scenarios and link these results to their hypotheses of theory of mind development. In the competitive version, Maxi's older brother asks Maxi about the location of the chocolate. In order to keep the chocolate to himself without sharing with his brother, Maxi is supposed to tell his brother the wrong location of the chocolate based on his belief. In the cooperative version, Maxi needs the help of his grandfather to get the chocolate for him and thus needs to tell his grandfather the correct location of the chocolate based on his belief. The result of this study showed that 4-5-year old children understand the notion of deception only 28% of the time, while 5-6-year olds do so 94% of the time. Based on this result, Wimmer and Perner (1983) conclude that children start to understand the concept of deception between the ages of 4 and 6, the same period when they start to appreciate other people's false beliefs. In addition, this result reinforces the conclusion of the above study that normal children start to develop the theory of mind at this time, as Wimmer and Perner suggest. Wimmer and Perner's (1983) study is also compatible with Baron-Cohen's (1995) suggestion that ToMM usually develops around the age of four.

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[18] More specifically, "None of the 3-4-year old, 57% of 4-6-year old, and 86% of 6-9-year old children pointed correctly, to location x in both sketches" (Wimmer and Perner, 1983, p. 103-104).

6 Autistic Children's False Belief Studies

Baron-Cohen's (1995) mindblindness thesis of autism receives it primary support from three classic false belief studies on autism. In the first of these studies, Baron-Cohen, Alan Leslie, and Uta Frith (1985) adapted the methodology of Wimmer and Perner (1983) and designed a test called the Sally-Ann test. In this test, the child first watches a doll named Sally put a marble into a basket. After this, Sally leaves the room. Ann, the other doll in this room, then moves Sally's marble from the basket to a box. After Ann transfers the marble, Sally comes back. The experimenter then asks the child: "Where will Sally look for her marble?" After Ann transfers the marble to the box, the true belief about the marble is that it is in the box. However, the child is supposed to answer "Basket" since Sally does not know about the transfer because she was not in the room during the transfer. If the child can correctly report Sally's belief, even though Sally's belief now becomes false, then we can be sure that the child has the capacity to understand other people's false beliefs.

The results of the Sally-Ann test in autistic children suggest the deficits of a theory of mind in these children. In particular, in this study, 85% of normal children around four years-old and 86% of Down syndrome children with lower verbal and non-verbal mental age than autistic children, whose mean verbal mental age is around five years-old, correctly answered the question about false beliefs. By contrast, 80% of autistic children in this test failed to answer questions about false beliefs correctly. Autistic children all answered that Sally will look for the marble in the actual location, the box. This result indicates that children with autism have problems attributing false beliefs to Sally and thus have a deficit in their theory of mind.

By contrast, in the control study of this experiment, all these autistic children correctly answered questions about the dolls' names, the actual location of the marble, and a memory question about the location of the marble at the beginning of the test. This suggests that autistic children's other cognitive functions are intact and their deficit in theory of mind is specific. The comparison study with Down syndrome children further supports the conclusion that autistic children's theory of mind deficit is independent of IQ and general intellectual capacities, since Down syndrome children can pass the false belief tests despite their lower IQ and deficits in general intelligence.

In the second study, Baron-Cohen, Leslie, and Frith (1986) adopted another false belief test based on sorting pictures according to causal sequences and describing these pictures. They compared autistic children's understanding of physical and social events by examining autistic children's uses of mechanical, behavioural, and intentional descriptions in the test. In the experiments, the child is asked to sort four pictures in accordance with their causal sequence and then describe what happened in these pictures. These pictures are about the characters' false beliefs, desires and goals, or causal actions toward inanimate objects. For instance, in the pictures about false beliefs (see Figure 2.3(c)), a girl puts a toy bear on the ground and turns around to pick up a flower. When she is picking the flower, a boy takes away the toy bear. After that, the girl turns around and finds her toy bear missing. In this task, the experiment subject is expected to identify the fact that the girl's belief about the toy bear becomes a false belief after the boy takes the toy bear away. In another example, which is about goals and desires (see Figure 2.3(b)), a girl desires a boy's ice cream, takes away that ice cream, and makes the boy cry. In this task, the experiment subject is expected to identify the girl's intentions in the pictures. Next, in a task about

causal actions (see Figure 2.3(a)), a boy kicks a stone from the top of a hill next to water. The stone then falls down the hill into the water. In this example, the experiment subject's task is to describe that the boy's action leads to the stone's falling.

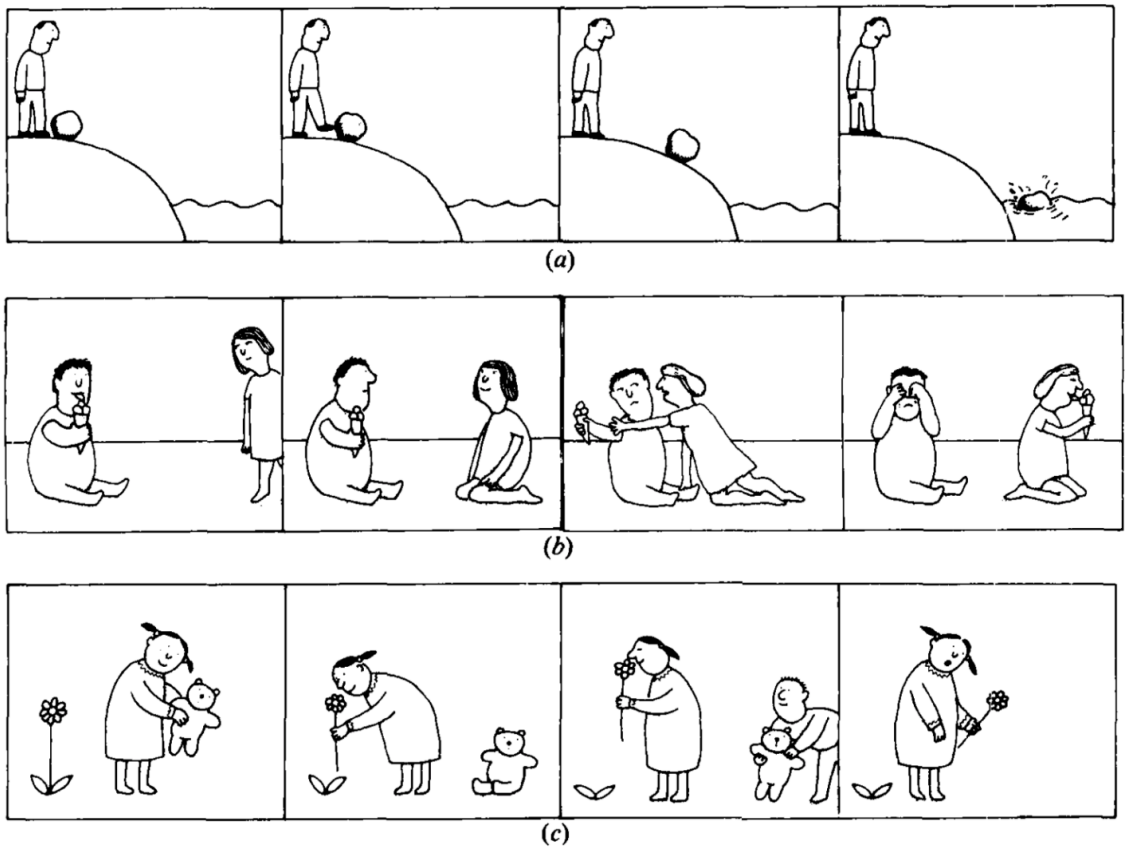

Figure 2.3. A task of causal sequences. Examples of picture sequences: (a) 'mechanical' (person and object); (b) 'behavioural' (person-to-person); (c) 'intentional'. Adapted from "Mechanical, Behavioural and Intentional Understanding of Picture Stories in Autistic Children," by S. Baron-Cohen, A. M. Leslie, and U. Frith, 1986, *British Journal of Developmental Psychology, 4*(2), p. 116.

The results of this study also suggest the specificity of autistic children's theory of mind deficits. In particular, they indicate that autistic children are better than normal children and Down syndrome children at ordering pictures when they are about causal actions. On the contrary, normal children and Down syndrome children are better than autistic children in using intentional terms to describe pictures. Indeed, autistic children

rarely use intentional terms to describe the pictures, while use behavioural and mechanical terms to describe more often, even when describing pictures that require intentional descriptions. The following are some of these descriptions from autistic children,

> The sweet is in the box, and the boy goes out, and the sweet's missing, and Mummy eats the sweet. (Baron-Cohen et al., 1986, p. 122)
>
> The boy puts his chocolate in the box, then his mother eats it, then he comes back, and the box … (Baron-Cohen et al., 1986, p. 122)

Based on these results, Baron-Cohen et al. (1986) concluded that autistic children lack the ability to attribute mental states but retain other cognitive abilities, since autistic children can perform tasks that require behavioural and mechanical descriptions well but not those requiring intentional descriptions.

Next, in the third study, Perner, Frith, Leslie, and Susan Leekam (1989) employed the "Smarties test" as a response to Perner, Leekam, and Wimmer's (1987) objection to Baron-Cohen et al.'s (1985, 1986) conclusion about autistic children's theory of mind deficits. According to this objection, it is possible that autistic children might not have theory of mind deficits, but just different expectations about what people would think in those studies. In addition, Perner et al. (1989) excluded language development problems as the factor of autistic children's performance through using specific language impairment (SLI) children with similar verbal mental age as a control group.

In this study, the child is shown a Smarties candy box and asked "What is in here?". Both SLI and autistic children answer "Smarties". The experimenter then shows the child that there is a pencil rather than Smarties candies inside the Smarties box. After that, the child is asked "What will the other child say when I ask her what is in the box?" Even

though there is in fact a pencil in this box, the child should answer "Smarties," since the other child does not yet know the real content of the box. However, most children with autism answered "Pencil" instead of "Smarties" when being asked this question. This shows that autistic children actually have problems attributing false beliefs ("There are Smarties in the Smarties box") to other people and can only attribute true beliefs to others ("There is a pencil in the Smarties box"). This result also implies that when autistic children fail false belief tests they are attributing true beliefs to other people, rather than having different expectations about what people would think. On the contrary, SLI children correctly answered the questions about false beliefs in the above Smarties test despite their language deficit. This suggests that autistic children's theory of mind deficit is independent of language deficits.

Based on the above three classic false belief studies on autism, Baron-Cohen consolidated the theory of mind account of autism: autistic children encounter social difficulties because they have deficits in their theory of mind module, rather than other general cognitive problems, such as intelligence, memory, and language. Autistic children's poor performance in the false belief test, together with the performance of control groups that exclude other factors such as intelligence, memory, and language, provide evidence for Baron-Cohen's view.

Nevertheless, I argue against Baron-Cohen's theory of mind account of autism. In particular, I shall show that recent false belief test with improved experimental design undermines the significance of these traditional false belief tests. These new false belief studies will be discussed in Section 8. Before that, I shall present counterexamples from autistic autobiographies to argue against a more general claim on autistic theory of mind.

This more general claim is a more generalized version of the theory of mind account of autism. Like the theory of mind account of autism, it suggests that autistic social difficulties result from the theory of mind deficits. While unlike the theory of mind account, this general account does not specify the theory of mind as a module. I shall call this more general account the theory theory account of autism and will consider the theory of mind account of autism as its more specific version.

7 The Argument Against the Theory Theory From Autistic Autobiographies

Autistic autobiographies are a rich source of counter-examples to the claim that people with autism have problems understanding other people because of deficits in their theory of mind. In particular, examples from several autistic autobiographies suggest that people with autism can explain and predict other people's mental states and behaviours using a theory of mind. Nevertheless, autistics still have problems understanding others. For this reason, the theory theory account of autism cannot be true.

Indeed, autistic autobiographies suggest that far from being central to understanding other people, a theory of mind is a compensatory rather than the primary mechanism for understanding other people. Most of the time, we do not use a theory of mind to understand others. In short, we use a theory of mind only when the normal process we rely on to understand other people does not work. In fact, autism is such a case: autistic people have problems with the normal process of understanding other people, and thus using a theory of mind as an alternative way to gain such understanding.

There are two main features of the social situations that autistic people find themselves in. The first one is the lack of sensibility in social interactions. A number of

autistic autobiographers mention that they lack the intuition of what to say and what to do in most social situations. They also lack the intuition to understand other people and to read between the lines. Specifically, they fail to detect people's feelings and thoughts through subtle signals such as eye directions and tones of voice. This deficit also makes them unable to understand other people emotionally.

The second characterization of autistic social interactions is over-intellectualization. Several autistic autobiographers demonstrate that they can understand other people intellectually and logically. In particular, they learn social rules like learning a foreign language or a school subject, instead of learning it unintentionally and subconsciously like most people.

The following examples are from three widely read autistic autobiographies: Temple Grandin's (2006) *Thinking in Pictures: My Life with Autism*, Liane Willey's (1999) *Pretending to be Normal: Living with Asperger's Syndrome*, and Daniel Tammet's (2007) *Born on a Blue Day: Inside the Extraordinary Mind of an Autistic Savant*. They provide vivid portraits of these two traits of autistic social interactions.

> I was always observing, trying to work out the best way to behave, but I never fit in. I had to think about every social interaction. … I was a scientist trying to figure out the ways of the natives. I wanted to participate, but I did not know how. … Even today, personal relationships are something I don't really understand. (Grandin, 2006, p. 153)

> … people with autism lack the basic instincts that make communication a natural process. Autistic children have to learn social skills systematically,

the same way they learn their school lessons. Jim Sinclair summed it up when he said, “Social interactions involve things that most people know without having to learn them.” He himself had to ask many detailed questions about experiences other people were having to figure out how to respond appropriately. He describes how he had to work out a “separate translation code” for every new person. Similarly, Tony W. has an intellectual awareness of how people felt, but he did not experience those feelings himself. (Grandin, 2006, p. 155-156)

I do not read subtle emotional cues. I have had to learn by trial and error what certain gestures and facial expressions mean. … Other people with autism have also found that becoming friends with somebody on the phones is easier than building a face-to-face relationship, because there are fewer social cues to deal with. (Grandin, 2006, p. 156)

I found it almost impossible to “read between the lines.” … Just as difficult for me is to know when to respond to statements that are not phrased explicitly as questions. I tend just to accept what is said to me as information, which means that I find it hard to use language socially as most people do. … Knowing when someone expects you to reply to a statement is just not intuitive for me, and my ability to do things like converse socially has only emerged as the result of lots of practice. (Tammet, 2007, p. 76-77)

> My friend brought me to the party … I could see their formula but I could not bring myself to follow it. … I remember feeling like a scientist who was curious to see who made it and who did not, but only after my friend came back to check on me, did I realize that I was standing completely alone, virtually twenty feet or more from the small circles and large groups of chatting and laughing people. Only then did I realize that I had been tossed aside. (Willey, 1999, p. 55)[19]

These narratives from autistic autobiographies indicate that autistics indeed use a theorizing process to understand other people, while lacking an intuitive process that does not involve cognition and explicit reasoning.[20] These two main features of autistic social interactions suggest a very different picture from the theory theory of how we understand other people.

First of all, the above autistic narratives refute the theory theory's claim that people with autism have a theory of mind deficit. In fact, autistics develop theorizing process—that is, a theory of mind—to compensate their lack of intuitions to understand other people. We can learn how autistics develop their autistic theory of mind in Grandin's (2006) autobiography. In this autobiography, Grandin explains that she learns social rules

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[19] See also Grandin (2006, p. 158), Tammet (2007, p. 74-75, 85), and Willey (1999, p. 51, 53, 56-57) for more examples.

[20] Further support on this point from Grandin (2006): "Hans Asperger stated that normal children acquire social skills without being consciously aware because they learn by instinct. In people with autism, 'Social adaptation has to proceed via intellect.' Jim, the twenty-seven-year-old autistic graduate student I have mentioned in previous chapters, made a similar observation. He stated that people with autism lack the basic instincts that make communication a natural process." (p. 155)

from a huge collection of movies, books, magazines, and newspaper articles by memorizing what and how people usually respond under different situations. She uses what she learns as a guide to decide what she should do and say under different situations. Moreover, Grandin published what she learnt about social interactions and social rules in a book, *Unwritten Rules of Social Relationships: Decoding Social Mysteries Through the Unique Perspective of Autism*, with a journalist Sean Barron, who also has autism. This book aims to provide helpful social information that people with autism should know and learn but cannot pick up naturally. It is obvious that autistic people like Grandin consciously attribute mental states to other people in order to explain and predict others' behaviours. That is, people with autism are using the theory of mind in the way Baron-Cohen (1995) and Fodor (1987) suggest. In this way, people with autism clearly depend on a theory of mind to understand other people. An excerpt from Grandin's (2006) autobiography further supports this proposal:

> Some researchers don't believe autistics are capable of deception. They subscribe to Uta Frith's conception of autism, wherein people with the syndrome lack a "theory of mind." According to Frith, many people with autism are not able to figure out what another person may be thinking. It is true that autistics with severe cognitive deficits are unable to look at situations from the vintage point of another person. But I always used visualization and logic to solve problems and work out how people will react, and I have always understood deception. (p. 156-157)

Indeed, the capacity to understand deception involves not only the ability to understand other people's beliefs but also other people's false beliefs. Realizing that what other people

are saying is not true means representing other people's beliefs in a way that is different from what they say. This capacity obviously involves theorizing about other people's mental states or a theory of mind. It is thus clear that the theory theory is wrong that autistic people's social interaction problems are caused by theory of mind deficits.[21] If people with autism face social interaction problems despite having a theory of mind, then it is apparent that having a theory of mind is not sufficient for understanding other people and having smooth social interactions.

Next, autistic autobiographies suggest that what is essential to understand other people is the intuition to detect other people's mental states. What really bothers autistics in social interactions is that they lack intuitions to understand other people without reflections. For instance, autistic people find it difficult to detect other people's mental states through facial expressions and eye movements. This characterization of autistic social interactions is compatible with Baron-Cohen's characterization of autism and the "language of eyes." In Baron-Cohen's (1995) discussion of Grandin, he mentions that despite the fact that Grandin can pass false belief tests, she still cannot get the language of eyes. Grandin (2006) mentions the same point in her autobiography,

> I was in my early '50s when I first learned about small eye signals. I did not understand why eye contact with [sic] so important. There was a whole secret world of eye movements that were unknown to me until I read Simon Baron-Cohen's book *Mind Blindness*. (p. 165)

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[21] Gallagher (2004) and Shanker (2004) both suggest that people with autism not only do not lack a theory of mind, but use *only* a theory of mind to understand others.

Indeed, it seems that people with autism are mindblind not because of ToMM deficits, but because of the lack of certain social intuitions, which include the ability to read the language of eyes. In particular, this first-person observation from autistics shows that people with autism do not lack a theory of mind as theory theorists suggest. Furthermore, having a theory of mind is not sufficient to understand other people. Social intuitions might be more essential to understand other people.

In fact, autistic author John Elder Robison's (2007) autobiography provides further support for the two main features of autistic social interactions described here. Robison (2007) mentions that his sole dependence on logic and rationality did not to produce satisfactory responses in ordinary conversation. Most of the time, he finds himself clueless when choosing the right response from more than one possible response in a conversation. As he says,

> I'm a very logical guy. Psychologists say that that's an Asperger trait. This can lead to trouble in common social situations, because ordinary conversation doesn't always proceed logically. In an effort to improve my own interpersonal skills, I have studied computer programs that engage in conversation with people. The best programs follow logical pathways to arrive at suitable responses. The results, however, don't always sound natural, and I am not sure that I do much better than the machines. (p. 189)

In this way, Robison's experience confirms my suggestion that the social intuitions that autistics lack seem to explain why autistics have troubles in social understanding.

In this section, I have introduced counterexamples from autistic autobiographies to argue against the theory theory account of autism: despite having the capacity of a theory

of mind, several autistic autobiographers still have problems understanding other people. This shows that the capacity of a theory of mind is not sufficient for understanding other people. However, one might argue that the fact that these adult autistic autobiographers have developed a theory of mind does not prove that autistic children also have a theory of mind, and the latter is what the original theory of mind account of autism targets. In response to this potential objection, I shall present studies from new false belief tests with autistic children that show that they do not lack a theory of mind, as the theory of mind account of autism suggests.

8 The Argument Against the Theory of Mind Account From New False Belief Studies

Recent scientific studies on autistic false beliefs confirm autistics' reports about their theory of mind capacity. These studies suggest that autistics fail false belief tests not because of theory of mind deficits but because of the design of the experiment. After changing the experimental design, autistic children can pass the false belief test like normally developed children. Moreover, an autistic author Nick Pentzell (2013) suggests that sensory overload, rather than theory of mind deficits, is the real reason why autistic children fail false belief tests.

First, a recent study found that most autistic children are able to trace other people's false beliefs when they are motivated to do so in the experiments (Peterson, Slaughter, Peterson, & Premack, 2013). Peterson et al. (2013) employed a new experimental design, the Dot-Midge test, to show that autistic children can trace others' (false) beliefs in games. The Dot-Midge test was proposed to deal with the problem of the standard inferential false belief tests: they are motivationally barren. In the Dot-Midge test,

the child is asked to choose a toy he or she wants as the reward of the game. Two adults, Dot and Midge, express strong interest in winning the same toy the child chooses. The child, Dot, and Midge then watch the experimenter hide the toy in container A. After that, Dot leaves the room. After Dot leaves the room, the child and Midge watch the experimenter move the toy to container B. Midge leaves the room after the moving. Dot and Midge then come back into the room. The child is then asked which one, Dot or Midge, can choose between containers A and B. If the person the child chooses successfully points to the container with the toy, that person can take the toy and the child would have nothing as the prize of the game. If the person the child chooses points to the container with no toy in it, the child can have the toy as the prize. In order to win the toy, the child needs to choose Dot because Dot does not know that the toy was moved to container B when he was not in the room. Dot still believes that the prize is in the container A, which is now a false belief. The child needs to track this false belief of Dot in order to win the prize.

Peterson et al.'s (2013) study result shows that autistic children might not lack the theory of mind as the theory theory suggests. This study had four groups of children as subjects: autistic children with average mental age of ten years old, older typically developing four year-old with mean age 4.8, younger typically developing four year-old with mean age 4.2, and typically developing three-year old with mean age 3.7. The results showed that the first three groups are equally good at passing the Dot-Midge test, while the three-year-old has very low passing rate. Peterson et al. (2013) also employed the standard Sally-Ann test (Baron-Cohen et al., 1985) as a comparison. They found that even though only 13% autistic children pass the Sally-Ann test, 74% of them pass the Dot-Midge test. This difference supports the hypothesis that autistic children fail typical false belief tests

because the typical tests are motivationally barren rather than that autistic children lack the ability to attribute false beliefs to other people. According to Peterson et al.'s (2013) results, most autistic children do not lack the capacity to track other people's false beliefs. In particular, this result disproves the theory theory's claim that autistics lack the theory of mind capacity.

Second, Pentzell (2013) explains that people with autism fail false belief tests not because of theory of mind deficits, but because of sensory overload. Pentzell explains how sensory overload can prevent one from being motivated to take part in false belief tests in the following passage and thus explains Peterson et al.'s (2013) study result.

> It doesn't surprise me that many autistic children, even those who can speak or have Asperger's, flunk theory of mind tests. At age four I was too lost in sensation to respond to, let alone pass or fail, such a test. I think just maneuvering through a day's stimuli prevented me from thinking from other people's point of view. … Sensory overload inhibits *anyone* from thinking about much more than surviving its barrage. (p. 105-107)

Pentzell (2013) explains why sensory overload "inhibits *anyone* from thinking about much more than surviving its barrage" by a very vivid description of what it is like to experience sensory overload:

> Imagine yourself sitting in a room full with other people, listening to someone speak, focusing on what is being said to you. Perhaps, on a subliminal level you are aware of the room's temperature, the feel of your clothes on your skin, the smells of the people in the room around you – their movements as they shift or scratch and their moods and energy, the colors

> and textures in your visual field, the brightness or pulsating of the room's lighting, the sound of air handlers – of coughing, sneaky chairs, background noise from the hall or other rooms, and many electrical or plumbing sounds. If you have attention-deficit disorder, some of these stimuli may be distracting. If you have a migraine, it might be painful. If you are on recreational drugs, the stimuli may be fascinating and entertaining. If you are autistic, it may be some or all of the above. The more you are aware of this sensory stimuli, the more you are probably feeling uncomfortable, irritated or upset, nervous or out of control of the environment and situation, and too overloaded to hold onto thought. (p. 104)

Indeed, anyone who undergoes sensory overload might just be too busy dealing with the overload to care about participating in any experiments. Many autistic autobiographers suggest that sensory overload plays a central role in autistic social interaction problems (Grandin, 2006; Pentzell, 2013; Tammet, 2007; Willey, 1999), especially because sensorimotor experiences play an important role in establishing social intuitions.

9 Conclusion

To sum up, far from providing decisive support for the theory theory, autism suggests that the theory theory is an inadequate account of autistic social interaction problems and the problem of other minds. A proper understanding of autistic social interaction problems suggests that we understand others through social intuitions, rather than by employing a theory of mind reliant on mechanisms such as Baron-Cohen's ToMM. The cognitive, rationalizing, "theory of mind" proposed by the theory theory is an auxiliary

mechanism on which people, autistic and non-autistic alike, rely when the usual mechanisms we use to understand other people is not available.

Chapter 3

Simulation Alternatives: Broken Mirrors and Imagination Problems

In this chapter, I shall argue against the simulation approach to autism, according to which autistic social interaction problems result from autistics' missing capacity to simulate other people's mental states, a deficit due to dysfunction in the mirror neuron system, the underlying mechanism of simulation. After explaining key approaches to simulation theory in Sections 1 to 4, in Sections 5 to 7 I shall present my arguments against the simulationist account of autism. First, I shall argue that both autistic autobiographies and further studies show that autistics actually have the capacity to simulate other people's mental states. Second, I shall suggest that a review of autistic mirror neuron studies suggests that it is far from conclusive that autistics have dysfunctional mirror neurons. Alternatively, I argue that the capacity to simulate is not sufficient for explaining autistic social interaction problems and our understanding of other minds; similar sensorimotor experiences, which are the materials for simulation, are what is required to complete the explanation.

1 Introduction: Simulation Theory as an Alternative to the Theory Theory

Recent debates between the theory theory and simulation theory can be traced back to the 1980s, when simulation theory was more fully developed as an alternative to challenge the theory theory as the dominant view for the problem of other minds. Robert Gordon (1986) and Jane Heal (1986) were the first to propose more detailed accounts of simulation. Alvin Goldman (1989) later joined this camp of simulationists against the

theory theory. Unlike the theory theory, which views theorization as the main way to understand other people, simulation theory proposes simulation as the major way we understand other people. Specifically, when we simulate other people, we imagine ourselves in other people's shoes and go through other people's experiences ourselves. In this way, simulation is a first-person process, as opposed to theorization, which is a third-person process (Gordon, 1995). In addition, when we simulate other people, we predict and explain their mental states and behaviours by the same resources and processes we predict and explain our own. Simulationists suggest that this potential to conserve resources is one of the reasons why simulation theory is a better account than the theory theory (Gordon & Baker, 1994).[22]

Recent development of simulation theory consists of two main interrelated directions. The first direction develops the concept of simulation into imagination and pretence and suggests that these two cognitive functions lead to mindreading and other high-level mental activities (Gordon, 1986, 1992, 1995, 1996, 2000, 2009; Goldman, 1989, 1992, 2006). The second approach focuses on the underlying mechanism of simulation: mirror neurons (Gallese, 2001, 2006, 2007; Gallese & Goldman, 1998; Goldman, 2006). Both of these approaches provide explanations for autistic social interaction problems and employ their explanations of autism as arguments against the theory theory. The first

[22] Nevertheless, theory theorists might argue that we theorize our own mental states and others' mental states with the same resources and processes as well. If this is the case, then the theory theory is as resource conservative as simulation theory. In addition, some argue that simulation is just a subtype of theorization since simulation still involves implicit induction from me to you (see Hutto (2003)). While the simulationist Robert Gordon (1995) disagrees and suggests that it is possible to simulate without inferring from me to you.

approach argues that simulation theory provides better explanations for autistic studies on pretence and imagination than the theory theory (Goldman, 2006; Gordon & Baker, 1994). According to the second approach, autistics' theory of mind deficits result from their impaired mirror neurons and thus the simulation deficiency is more fundamental than the theory of mind deficits (Gallese, 2006; Goldman, 2006). This second account of autism is also called the *broken mirror theory* of autism.

In what follows, I first develop the above two elaborations of simulation theory in Section 2 as preparation to introduce their accounts of autism in Sections 3 and 4. Sections 5 to 7 will be devoted to evaluate these simulationist accounts of autism. I shall argue against these simulationist accounts of autism, and in Section 8, provide alternative explanations of autism based on autistic sensory issues.

2 Simulation Theory

In this section, I discuss three main simulationists – Robert Gordon, Alvin Goldman, and Vittorio Gallese – for two reasons. First, each of these three simulationists represent one of the three major simulation theories of recent discussion (Gallagher, 2007). Second, all three of them include explanations for autism as part of their theories. Gordon's and Gallese's simulation theories develop the first and the second directions of simulation theory discussed in the last section, respectively. Goldman provides a hybrid version of both directions.

For Gordon, our understanding of other people is achieved through simulation, which is an off-line process including recentring and ascent routines. Simulation is an off-line process because we simulate through the same resources we use to produce our own

mental states and actions without acting out these actions. This off-line process involves pretending and imagining (Gordon & Baker, 1994). More specifically, Gordon suggests that when we simulate, say, Mr. Tees in a situation of missing the plane, we imagine what Mr. Tees would do in that situation, instead of what we would do if we were Mr. Tees. We are able to do so by using recentring and ascent routines. We first recentre our egocentric map: Mr. Tees "becomes in my imagination the referent of the first person pronoun 'I,' and the time and place of his missing the plane become the referents of 'now' and 'here.' And, I RMG, cease to be the referent of the first person pronoun…" (Gordon, 1995, p. 55). Next, through an ascent routine, we decide the possible actions in response to the imagined situation, without thinking from our or Mr. Tees' perspectives. In other words, the ascent routine enables us to decide what to do under the imagined situation, rather than what Mr. Tees or us will do under the imagined situation. Because we have already recentred our egocentric map to that of Mr. Tess, an ascent routine enables us to transfer the imagined actions to Mr. Tees. As Gordon explains,

> A point that needs emphasis is that, unlike introspection, an ascent routine for identifying beliefs would be as well suited to identifying another's beliefs as it is to identifying one's own. Whether in my own person or within a simulation of O, I can settle the question, "Do I believe that *p*?" by asking, within the constraints indicated earlier, whether it is the case that *p*. But in a simulation of O, remember, "I" refers exclusively to O, the individual on whom my egocentric map has been reentered. So I settle the question of whether O believes that *p* simply by asking, within the context of a simulation of O, whether it is the case that *p*. That is, I simply concern myself with *the*

> *world* – O's world, the world from O's perspective (metaphors we can now moor securely to a particular operation or procedure) – and, reporting what is there, I am reporting O's beliefs. That is, reporting O's beliefs *is* just reporting what is there. That is why I held (in Gordon, 1986) that to ascribe to O a belief that *p* is to assert that *p* within the context of a simulation of O. (Gordon, 1995, p. 60)

In this way, when we simulate Mr. Tees, we imagine what Mr. Tees would do in the imagined situation, instead of what we would do if we were Mr. Tees.

Gordon suggests that there are also "a number of automatic, unconscious responses" happening when we simulate other people, such as imitating and mimicking other people's behaviours and facial expressions (Gordon & Baker, 1994). Imitating other people's facial expressions enables us to experience what others are feeling or at least to recognize other's emotions. Also, when imitating others, we pay attention to the objects of others' intentions and thus find the environmental explanations of others' actions and emotions. This character of imitation suggests its role in the shared attention mechanism (Gordon & Baker, 1994).

There are three main traits that distinguish Gordon's view from other simulationists. First, Gordon (1995) proposes the idea of recentring an egocentric map to replace the role of inference from me to you ("an analogical inference from oneself to others" or "the argument from analogy") in other simulation theories. Second, Gordon's ascent routine replaces the role of introspection in other simulation theories. Third, Gordon (1995) disagrees that simulation requires "prior possession of the concepts of the mental states ascribed" ("the solipsistic possession of mental concepts") that most

simulationists assume. Instead, with the egocentric map recentring and ascent routines, we simulate mental states without prior possession of the concepts of these mental states.

Next, Goldman defines simulation as perspective-taking, by which we shift our perspective to other people's perspectives so that we can imagine what they will do under certain situations (Goldman, 2006; Goldman & Lucy, 2013). Perspective-taking includes two different levels of mindreading. Low-level mindreading enables us to shift perceptual perspectives and thus to simulate what others perceive. In high-level mindreading, we shift our intentional perspectives as well to simulate other people's beliefs and desires (Goldman & Lucy, 2013).

When we simulate other people through high-level mindreading, we enact others' mental states in our imagination. Thus, high-level mindreading is also called E-imagination or enactment imagination (Goldman & Lucy, 2013). High-level mindreading is a multi-step simulation and is "comparatively slow, reflective, and controlled" (p. 449): we simulate others' decision-making process with our own system and gain understanding of others through this simulation. The only difference between simulating others and those of our own mental states is that we do not carry out the actions when simulating others. In this way, Goldman's high-level mindreading is similar to imagination in Gordon's theory and is also responsible for attributing attitudes, such as beliefs.[23] By contrast, low-level mindreading is responsible for attributing non-propositional states, such as emotions and

[23] Nevertheless, for Goldman, mental concepts are essential for mindreading and simulation, while Gordon disagrees. Gordon thinks that recognizing the mental concepts we attribute to others is not a pre-condition for attributing these mental concepts to others. Otherwise, we cannot explain how children start attributing mental concepts to others at the first place (see Gordon (2009)).

sensations, and is a single-step simulation, which is "comparatively fast, stimulus-driven, and automatic" (Goldman & Lucy, 2013, p. 449). Low-level mindreading is realized by mirror neuron functioning and this idea is supported by evidence from neuroscience: when we see other people with certain emotions (such as disgust[24]and fear[25]) or experiences (such as pain[26]), our brain areas dealing with these emotions and experiences activate as if we were experiencing these mental states ourselves. In addition, a patient with problems in the brain areas responsible for disgust failed to sympathize with other people's experiences of disgust.[27] Goldman suggests, these two levels of mindreading complement each other and provide more sufficient accounts than the theory theory and other one-level simulation theories of how we understand not only other people's beliefs and desires but also their emotions and sensations (Goldman & Lucy, 2013).

Finally, Gallese's theory of simulation is largely grounded in the idea of mirror neurons, which was first proposed by Gallese and Goldman (1998). In this article, Gallese and Goldman argue that there are links between mirror neurons and imitation and between mirror neurons and simulation. Based on these two links, Gallese and Goldman propose that mirror neurons are the neural basis of the simulation process. Later on, Gallese (2001) develops the idea of simulation into a version of embodied cognition, with which individuals understand each other and recognize each other as agents similar to

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[24] See Wicker, Keysers, Plailly, Royet, Gallese, and Rizzolatti (2003).

[25] See Goldman and Srilada (2005) and Goldman (2006).

[26] See Avenanti, Bueti, Galati, and Aglioti (2005) and Avenanti, Paluello, Bufalari, and Aglioti (2006).

[27] See Calder, Keane, Manes, Antoun, and Young (2000).

themselves. This mirror-neuron-based embodied simulation also plays an important role in many aspects of social cognition, such as actions, communicative actions, understanding of intentions, and motor simulation in language and syntax (Gallese, 2007)

Among the above three simulationists, Goldman (2006) and Gallese (2006) both suggest that mirror neurons might be the underlying mechanism of imitation, which then leads to other more complex cognitive abilities, such as the theory of mind; Gordon (2004) states that he agrees with Goldman and Gallese that mirror neurons might play a very important role in simulation; despite that, his focus is not the underlying mechanism of simulation but how simulation works.

3 Gordon's and Goldman's Accounts of Autism: Autism as Imagination and Pretence Deficits

Both Gordon and Goldman understand autism as having problems in imaging or pretending. I shall elaborate on both accounts in what follows.

According to Gordon, deficits in the capacity to simulate are more fundamental than deficits in the theory of mind when explaining autistic children's social difficulties and these children's poor performances in the false belief test (Gordon & Baker, 1994). Gordon argues for this view from the contrasts between autistic children and Down syndrome children and their different capacities to take part in pretend play.

First, Gordon and Baker (1994) compare autistic children's and Down syndrome children's differences in the capacity to theorize and to pass the false belief test. As Baron-Cohen, Leslie, and Frith's (1985) study shows, Down syndrome children with mental age of four, like normal children with the same mental age, have the capacity to understand other

people and to pass the false belief test, despite Down syndrome children's lower IQ and weaker capacity to theorize. On the contrary, autistic children with mental age higher than four and higher IQ (thus better capacity to theorize) are less able to pass the false belief test. Based on these differences, Gordon and Baker (1994) suggest that the psychological competence that develops at the mental age of four for children to understand other people does not necessarily depend on the capacity to theorize. Instead, this psychological capacity is based on the capacity to simulate.

Second, Gordon and Baker (1994) suggest that several studies show that autistic children have problems pretending, while Down syndrome and normal children normally initiate pretend play before they develop the psychological capacity to pass the false belief test. Furthermore, as Gordon and Baker (1994) suggest,

> Although studies have shown that many autistic children can, with appropriate prompting, engage in some forms of pretend play (Lewis & Boucher 1988; Ungerer & Sigman 1981), the play is characterized by lack of spontaneity and by stereotypical, inflexible, and repetitive patterns. What is most conspicuous is the absence of other-regarding pretending, typified by role play and joint pretend play, in which two or more children act on a shared pretence (Harries, forthcoming). (p. 170)

These three studies discussed by Gordon and Baker are explained in what follows.

First, Ungerer and Sigman (1981) tested the relation between the capacity to engage in pretend play and the capacity to comprehend language in sixteen autistic children with a

mean mental age of three. This study found that autistic children with low language comprehension show less functional[28] and symbolic[29] play and shorter sequences of meaningfully integrated play acts than autistic children with high language comprehension.[30] Based on this result, the authors suggest that there is a link between pretend play, especially symbolic play, and language comprehension.

Second, in Lewis and Boucher's (1988) study, autistic children with a mean mental age of six produced less functional (reality) play[31] than younger normal children[32] and younger children with moderate learning difficulties [33] under spontaneous play

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[28] Four different types of functional play were employed in this study: "self-directed acts (e.g., brushing one's hair), doll-directed acts (e.g., feeding a doll with a spoon), other directed acts (e.g., holding a telephone receiver to the mother's ear), object-directed acts (e.g., placing the top on the teapot or pushing the truck into the garage)" (Ungerer & Sigman, 1981, p. 324).

[29] Three kinds of symbolic acts were tested in this study: "substitution play defined as the use of one object as if it were a different object (e.g., using a teacup as a telephone receiver), agent play defined as the use of a doll as an independent agent of action (e.g., propping a bottle in a doll's arms as if it could feed itself), and imaginary play defined as the creation of objects or people having no physical representation in the immediate environment (e.g. making pouring sounds as imaginary tea is poured from a teapot into a cup)" (Ungerer & Sigman, 1981, p. 324).

[30] The authors suggest that symbolic capacity is required for the development of language and this requirement explains why autistic children have both weaker language comprehension and symbolic play. Nevertheless, autistic children's simple manipulation and relational play, which develop earlier than symbolic play, seem to be working fine.

[31] Function (or reality) play in this study is defined as "play in which objects (including miniature representations of real objects) are used in ways appropriate to their conventional function" (Lewis & Boucher, 1988, p. 326).

[32] Mean mental age: four years and six months.

[33] Mean mental age: four years and nine months.

conditions,[34] while autistic children showed same amount of functional play and symbolic play[35] as other children in elicited play conditions.[36] According to the authors, this result shows that autistic children's capacity to engage in pretend play is normal, since autistic children are able to engage in similar amounts of functional play and symbolic play as other children in elicited play conditions. In this way, autistic children's lack of spontaneous play compared to other children is more likely due to the abnormalities in employing the symbolic system involved, rather than due to a defective symbolic system.

Third, in Harris and Muncer's (1988) study, twenty autistic children and twenty normal children were compared to predict how a story character feels when this story character's desire matches or mismatches reality. "For example, 'John wants to go to the zoo but Mary wants to go to the swimming-pool; their mother tells them that they are going to the zoo.' We then asked 'How does John feel? And how does Mary feel?'" (Harris, 1991, p. 296). This study found that both normal and autistic children are equally good at predicting the character's feeling when the desire matches reality (John is happy), but autistic children are worse when predicting the mismatch case (many of them answer that Mary is

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[34] In the spontaneous play setting, the child was invited to play with the toys ("four sets of toys were assembled: a toy car and (i) junk accessories and (ii) conventional toy accessories; a doll (a boy or a girl, depending on the child's choice) and (iii) junk accessories and (iv) conventional toy accessories" (Lewis & Boucher, 1988, p. 328)) while the experimenter was sitting there 'did some writing' (Lewis & Boucher, 1988, p. 329).

[35] Here symbolic play is defined as "(i) the subject is using an object as if it were another object; or (ii) the subject is attributing properties to an object which it does not have; or (iii) the subject is referring to absent objects as if they were present" (Baron-Cohen (1987), cited by Lewis & Boucher, 1988, p. 326).

[36] In the elicited condition, for instance, "the child was handed the car and one accessary and asked 'What can these do? Show me what you can do with these'" (p. 329).

happy). To explain this result, Harris (1991) suggests that autistic children lack the capacity to imagine the mismatch case, which requires more advanced capacities to imagine.

Based on the above three studies, Gordon and Baker (1994) characterize autistic children as having problems in spontaneous pretending, e.g. autistic children's play is more repetitive and lacks spontaneity, and lacks joint pretend play and other-regarding pretence. This character of autistic children's pretend play is used by Gordon and Baker (1994) to argue for simulation theory. Gordon and Baker argue that because pretence is the underlying mechanism for us to understand other people, autistic children's problems in pretence limit their competence in understanding other people. In addition, the contrast between autistic children and Down syndrome children implies that the psychological competence to understand others is not the theorizing ability, since Down syndrome children have worse capacity to theorize but have no difficulty understanding other people and pretending, while autistic children have better capacity to theorize but have problems in both activities.

Gordon and Baker (1994) further argue that their simulationist account of autistic pretence is better than the theory-theorist's, especially the dominant one proposed by Alan Leslie (1987). According to Leslie (1987), autistic children's problems in pretence result from their impaired capacity to theorize, such as the symbolic capacity. In response to Leslie, Gordon and Baker argue that even though Leslie's theory might be correct about understanding pretence, which might involve the capacity to theorize or the capacity to understand symbols, pretending itself does not depend on the capacity to theorize or the symbolic capacity. Instead, pretending is a simulation-based process, which also underlies

the psychological competence to understand other people. Gordon and Baker support this idea with the contrast between autistic children and Down syndrome children discussed earlier.

There are two more reasons Gordon and Baker provide for their account and against that of Leslie. First, off-line simulation requires fewer resources than theorization to produce pretence. Second, the simulationist approach incorporates imitation and mimicry in its account, thus can explain these two problems in autism as well. For instance, since imitation and mimicry are important for us to explain other people's emotions and actions from factors in the environment, we can predict that autistic children cannot find the environmental explanations for others' actions and emotions. Given these reasons and the discussion of autistic pretence, Gordon and Baker (1994) conclude that the simulationist account of autism and pretence is better than that of theory-theorists'.

Next, in Goldman's account of autism, autistic social interaction problems are explained by deficits in simulation. Specifically, autistic children lack the capacity to imagine, which is necessary to simulate and understand other people. Goldman (2006) supports this idea by Baron-Cohen's (2003) systemizing and empathizing distinction. According to this distinction, people with autism have stronger capacities to systemize but weaker capacities to empathize and the latter is why people with autism have social interaction problems. Goldman suggests that this capacity to empathize is in fact the capacity to imagine, which plays an important role for us to understand other people. This link between the capacity to empathize and the capacity to imagine explains why people with autism have social interaction problems: it is due to their lack of the capacity to imagine.

Meanwhile, Goldman (2006) suggests that autism also provides evidence to support two important claims of his simulationist account. First, the simulation mechanism is what underlies imitation and mindreading. This claim is supported by the fact that people with autism lack the capacity to simulate other people's mental states and have deficits in both imitation and mindreading. Second, the underlying process of simulation is mirror neuron functioning. This second statement is supported by autistics' mirror neuron dysfunction and their problems in simulating other people's mental states.

4 Gallese's and Goldman's Accounts of Autism: Autism as Mirror Neuron Deficits

According to both Gallese (2006) and Goldman (2006), autistic social difficulties result from their mirror neuron deficits, which undermine the capacity to simulate. Specifically, mirror neurons, as the underlying mechanism of simulation, are also proposed to support the account that simulation is a more fundamental explanation of autistic social difficulties than the theory of mind: mirror neuron dysfunction leads to a cascade that covers different aspects of autistic social deficits. This simulation approach to autism is also called the broken mirror theory.

According to the broken mirror theory, autistic social impairments are caused by mirror neuron dysfunction that leads to a series of problems, including imitation deficits, emotional-affective deficits, joint attention, theory of mind, and empathy, which are characteristic of autistic social impairments. These mirror neurons are the same mirror neurons responsible for representing and understanding of goal-directed hand actions (Hickok, 2014) and were originally found in monkeys when these monkeys observed other monkeys and human beings performing simple actions. In what follows, I review two main

pieces of evidence for the broken mirror theory: the first study suggesting the link from mirror neurons to other socio-cognitive functions, and the original evidence of dysfunctional mirror neurons in autism. After that, I review Gallese's and Goldman's proposals that mirror neurons are the underlying mechanism of simulation and how their proposals account for autistic social interaction problems.

Williams, Whiten, Suddendorf, and Perrett (2001) were the first to propose the link from mirror neuron deficits to other socio-cognitive functions. Williams et al. (2001) focus on imitation deficits in autism, including "difficulties in copying actions and difficulties in inhibiting more stereotyped mimicking, such as echolalia" (p. 287) and suggest that the dysfunction of mirror neurons (neurons in the frontal cortex) is the basis of autistic deficits. These neurons "show activity in relation both to specific actions performed by self and matching actions performed by others" (p. 287). Williams et al. (2001) suggest that mirror neurons are related to speech, theory of mind, "more basic intersubjective phenomena: emotional contagion and shared attention," and imitation. These authors also suggest that problems in imitation, which are caused by mirror neuron dysfunction, lead to the "formation/co-ordination of specific self-other representations", which explains "the failure to develop reciprocal social abilities, including shared/joint attention, gestural recognition", and language (especially the social and pragmatic aspects), and "breakdowns in the development of empathy and a full ToM" (p. 291). In addition, mirror neurons are linked to an inhibitory system, which might also explain autistic "features of repetitive, inflexible and stereotyped behaviour and language" (p. 291).

Oberman, Hubbard, McCleery, Altschuler, Ramachandran, and Pineda (2005) were the first to observe mirror neuron dysfunction in autistic individuals. Usually when a

person sees another person performing actions, the observer will suppress his/her own mu wave, which can be observed by EEG. In this way, EEG oscillation in mu frequency (8-13 Hz) over sensorimotor cortex is thought to reflect mirror neuron activity. In Oberman et al.'s (2005) study, ten high-functioning individuals with autism spectrum disorder (ASD) and ten age-matched gender-matched control subjects watched video of a moving hand, a bouncing ball, visual noise, or moving their own hand, and their brain activity was measured by EEG. Control subjects showed significant mu suppression to both self and observed hand movements, while ASD individuals showed significant mu suppression to self-performed hand movements but not to observed hand movements. The authors suggest that this result supports the hypothesis of a dysfunctional mirror neuron system in high-functioning individuals with ASD.

Based on the above studies, Gallese (2006) proposed that the functioning of mirror neurons is the underlying mechanism of embodied simulation, and this is why mirror neuron dysfunction leads to all the other social impairments in autism. Besides Gallese, Goldman (2006) also argues separately that mirror neuron dysfunction in autism supports simulation theory. Goldman (2006) suggests that the mirror neuron studies in autism might be able to support Baron-Cohen's (2003) empathy theory of autism, which suggests that autistic individuals have low capacity to empathize but high capacity to systemize. However, as Goldman (2006) notes, because Oberman et al.'s (2005) study only investigates *motor* mirror neurons, more studies (e.g. on pain and emotions) are needed to support the link between mirror neuron and empathy more generally. However, despite Goldman's theory of simulation (Goldman, 2006; Goldman & Lucy, 2013) distinguishes high-level mindreading from low-leveling mindreading, his discussion did not address

much link between the two, especially in the case of autism. Specifically, when Goldman (Goldman & Lucy, 2013) discusses the neural mechanism of mindreading, he suggests to focus on low-level mindreading, given that most available researches have centred around the neural mechanism of mirror neurons. It is thus not clear that, whether Goldman would suggest that mirror neuron dysfunction in autism results in problems in high-level mindreading as well.

Overall, the above three simulationists' views provide two main accounts of simulation: simulation as a cognitive process, such as imagination and pretence, and simulation as a neural mechanism, i.e., mirror neurons. Each has its own account of autism. According to the first account, people with autism have problems understanding other people because they cannot employ pretending and imagining mechanisms to simulate other people. This approach further suggests that autistic pretence problems are what lead to autistic deficits in the theory of mind and autistic poor performance in the false belief test (Gordon & Baker, 1994). The second simulation account of autism suggests that autistic social deficits originate from impaired mirror neuron systems, which then lead to other deficits, such as the deficits in imitation and in the theory of mind (Gallese, 2006; Goldman, 2006).

In what follows, I present evidence from both scientific studies and autistic first-person narratives to argue against the simulationist accounts of autism from Gordon, Goldman, and Gallese.

5 Arguments Against Gordon's Account of Autism

In this section, I present two arguments against Gordon's account of autism. The first argument is motivated by autistic first-person narratives, in which autistics demonstrate not only the capacities of egocentric map recentring and ascent routine, but also imaginative and pretend play. All of these activities are what underlie our simulation of other people in Gordon's theory. For the second argument, several recent scientific studies suggest that autistics are capable of passing the false belief tests and having pretend play, both of which indicate the capacity to simulate according to Gordon.

In what follows, I present some of these striking examples from autistic autobiographies to confirm autistics' capacity to simulate other minds. First, I analyze some passages from Grandin's (2006) autobiography to show that she is capable of recentring egocentric map and ascent routine, which are the two main steps to simulate other minds in Gordon's theory. Next, I discuss further examples from Grandin (2006) and Tammet (2007) to disprove Gordon's view that autistics lack imaginative and pretend play, both of which are involved in simulating other minds.

In Gordon's theory, the first step to simulate other minds is egocentric map recentring. When we recentre our egocentric map, the person we simulate "becomes in my imagination the referent of the first person pronoun 'I,' and the time and place of his missing the plane become the referents of 'now' and 'here.' And, I …, cease to be the referent of the first person pronoun…" (Gordon, 1995, p. 55). This characterization of recentring is precisely what Grandin describes herself when she simulates a cow,

> When I put myself in a cow's place, I really have to be that cow and not a person in a cow costume. I use my visual thinking skills to simulate what an

> animal would see and hear in a given situation. I place myself inside its body and imagine what it experiences. (Grandin, 2006, p. 168)

Grandin's experience of "us[ing] my visual thinking skills to simulate what an animal would see and hear in a given situation. I place myself inside its body and imagine what it experiences" matches Gordon's account of recentring one's egocentric map: the here and now of the person we simulate become my here and now.

The next step in Grandin's simulation also resembles the second step in Gordon's theory of simulation: ascent routine, in which we decide the possible actions in response to the imagined situation, without thinking from our or the simulated person's perspectives.

> … It is the ultimate visual reality system, but I also draw on the empathetic feelings of gentleness and kindness I have developed so that my simulation is more than a robotic computer model. Add to the equation all of my scientific knowledge of cattle behavior patterns and instincts. I have to follow the cattle's rules of behavior. I also have to imagine what experiencing the world through the cow's sensory system is like. (Grandin, 2006, p. 168)

Both detailed descriptions of Grandin's experiences of recentring and ascent routine match what Gordon suggests to be crucial for simulating and understanding others. It is clear that in the above examples, Grandin employs the simulation mechanisms proposed by Gordon to understand other minds.

There are some further examples from Grandin (2006) showing that she does not lack the capacities Gordon proposes to be important for simulation. In the following two examples, Grandin imagines what it is like for a person to operate the machine she designs and what it is like for a worker to be laid-off by "visually" putting herself in others' shoes.

> One of the reasons I am good at designing this equipment is that I can visualize what the device will feel like. I can put myself into a twelve-hundred-pound steer's body and feel the equipment. What would it be like with a gentle person operating it? What would it be like with a rough person operating it? When I see somebody squeeze an animal too hard in a squeeze chute, it makes me hurt all over. (p. 177-178)

> For me to have empathy I have to visually put myself in the other person's place. I can really emphasize with a laid-off worker because I can visualize his family sitting at the dining room table trying to figure out how the bills will get paid. If the worker fails to pay the mortgage he will lose his house. I really relate to physical hardship. (p. 99)

In these examples, when Grandin (2006) puts herself into other people's shoes to understand other people, she recentres her egocentric map and uses ascent routine to simulate the subjects she wants to understand. These activities are what Gordon (Gordon, 1995; Gordon & Baker, 1994) takes to be crucial for understanding other people.

Further, in Gordon's theory, pretend and imaginative plays are what underlie the capacity to simulate, that is, recentring and ascent routine. We can also find an abundance of these plays in autistic first-person narratives. The following are some of these examples from Grandin (2006) and Tammet (2007),

> As a schoolchild, I played hide-and-seek. I learned how to trick the seeker into going the wrong way by stuffing my coat with leaves and putting it in a tree. I also had my entire boarding school believing that they had seen a

flying saucer when I swung a cardboard saucer containing a flashlight in front of another girl's window. … I've always enjoyed these kinds of tricks, because they require a vivid imagination, which I have in abundance. (Grandin, 2006, p. 157)

After watching my mother doing some ironing, I pulled all the clothes in my room and took them downstairs to the living room. My mother agreed to give me the iron once it was switched off and had cooled, then I proceeded to take each piece of clothing and rub the iron over it. My brothers and sisters were watching me and asked if they could play with me. I had seem my mother spraying some of the clothes with water before ironing them, so I told my sister Claire to take the spray and use it for each item of clothing, them pass the item to me. My brother Lee wanted to join in too, so I told him to stand on the other side of me, take the clothes after I had rubbed them over the iron, and fold each item up. I told my brother Steven, who was four at the time, to then put each of the clothes into a pile: one for T-shirts, one for overalls, another for trousers and so on. … We often played for hours at a time. (Tammet, 2007, p. 84)

People with Asperger's syndrome do want to make friends but find it very difficult to do so. The keen sense of isolation was something I felt very deeply and was very painful for me. As a way of compensating for the lack of friends, I created my own to accompany me on my walks around the trees in the

> playground. There is one that I remember very clearly to this day when I close my eyes I can still see her face … Here name, she told me, was Anne. … Every playtime was spent in long, thoughtful conversations with Anne. Her voice was soft and always kind, gentle and reassuring. (Tammet, 2007, p. 78)

> From about the time I first started school I developed a great love and fascination with fairy tales – the stories and intricately detailed illustrations filled my head with vivid mental pictures of towns overflowing with porridge and of princesses sleeping on a bed a hundred mattresses high (with a single pea underneath). … (Tammet, 2007, p. 51)

All the above descriptions indicate the capacity to participate in pretend and imaginative play and to understand and exercise imagination in Grandin (2006) and Tammet (2007).[37] All of these capacities are crucial for our simulating of other minds in Gordon's theory.

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[37] Further, if using metaphors indicates the capacity to imagine, there are several such examples in Grandin (2006) as well. For instance, in the following example, Grandin uses doors and windows as a metaphor to understand personal relationships: "Personal relationships made absolutely no sense to me until I developed visual symbols of doors and windows. It was then that I started to understand concepts such as learning the give-and-take of a relationship. … At that time I still struggled in the social arena, largely because I didn't have a concrete visual corollary for the abstraction known as "getting along with people". An image finally presented itself to me while I was washing the bay window in the cafeteria. … The door jammed while I was washing the inside panes, and I was imprisoned between the two windows. In order to get out without shattering the door, I had to ease it back very carefully. It struck me that relationships operate the same way. They also shatter easily and have to be approached carefully. I then made a further association about how the careful opening of doors was related to establishing relationships in the first place. While I was trapped between the windows, it was almost impossible to communicate through the glass. Being autistic is like bring trapped like this. The windows symbolized my feelings of disconnection from other people and helped me cope with the isolation. Throughout my life, door and window symbols have enabled me to make progress and connections that are unheard of for some people with autism." (Grandin, 2006, p. 18-21)

Given the above counter-examples to Gordon's account of autistics, one might argue that it is possible that Gordon's account of autism is still correct, despite that some, but not all, autistics are able to simulate other people. Nevertheless, despite having the capacity to simulate, Grandin (2006) and Tammet (2007) still experience difficulties in personal relationships. This suggests that counter to Gordon's theory, the capacity to simulate is not sufficient to account for our understanding of other minds. Alternatively, I argue that in addition to the capacities to simulate or to theorize, we also need the materials, that is, similar experiences, in order to understand other minds. And, autistics' social interaction problems are better explained by the lack of the materials, that is, similar experiences, rather than the lack of the capacities. Before elaborating my argument for this proposal, I shall continue my argument against Gordon. I shall show that the above descriptions of autistic imaginative and pretending capacities are confirmed by scientific studies that include a number of autistic individuals.

Next, I present several scientific studies to show that autistic individuals have the capacities to pass the false belief test and to participate in pretend and imaginative play. The existence of both capacities in autistic children problematizes simulationist Gordon's suggestion that lacking spontaneous pretend play in autistic children indicates the problems of simulation in these children, who then have problems developing a theory of mind, or the psychological capacity to explain and predict other people, and thus fail the false belief test (Gordon and Baker, 1994).

First of all, as we have already seen in Chapter 2, based on Peterson, Slaughter, Peterson, and Premack's (2013) study and Pentzell's (2013) first-person explanation, autistic children fail the false belief test not because of the lack of a theory of mind. Instead,

it is because the experimental design of the traditional false belief test is not motivational enough to distract these children from their sensory overloads. In fact, when the experimental design of the false belief test improves its motivational factors, most autistic children can pass the false belief test. This result shows that autistic children do not lack the capacity to predict and explain other people's behaviours that is required to pass the false belief test. Furthermore, if the capacity to simulate is what underlies one's capacity to predict and explain other minds and to pass the false belief test, then the result from Peterson et al. (2013) also indicates that autistics have the capacity to simulate. This suggestion is further supported by re-examining the pretence studies discussed by Gordon and Baker (1994).

In re-examining the pretence studies that Gordon and Baker (1994) employ to support their account of autism, we also find that autistic children show a better capacity to pretend in these studies than Gordon and Baker suggest.[38] First, in the study from Lewis and Boucher (1988), autistic children show intact capacity to participate in pretend play. Despite that autistic children had a better performance in elicited pretend play than in spontaneous pretend play in the experiments, Lewis and Boucher (1988) suggest that their study result shows that autistic children do not have problems in the symbolic system that

[38] According to Gordon, the psychological capacity to explain and predict other people depends on the capacity to simulate and pretend (Gordon & Baker, 1994). Following this rationale, since autistic children are able to pass the false belief test in Peterson et al.'s (2013) study, these children should also show good capacity to simulate and pretend.

produces pretence but have problems using this system.[39] That is to say, autistic children do not lack the capacity to pretend so that they can participate in elicited pretend play.[40] Following this idea, it is likely that even though autistic children show fewer activities in spontaneous pretend play, they may not lack the capacity to pretend. Instead, there are other possible explanations for why they engage in less spontaneous pretend play. For instance, following Peterson et al.'s (2013) conclusion, it is likely that autistic children's lack of spontaneous pretend play is due to the lack of motivation in the experimental design. Likewise, in Harris's (1991) study, when being asked to predict other people's mental states when these people's desires mismatch reality, it is also likely that the experiment is not motivational enough for autistic children to imagine the target's mental states so that autistic children are worse at predicting the mental states correctly. If the above interpretations are plausible, then the experiments that Gordon and Baker (1994) cite to support their view are not as strong as these authors suggest, and autistic children do have the capacities to pretend, simulate, and imagine.

Indeed, several recent studies support this suggestion that autistic children engage less in pretend play due to the lack of motivation, rather than the lack of the capacity to

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[39] "In the spontaneous condition autistic children produced significantly less functional (reality) play than controls. Very little symbolic play was produced by any children in this condition. By contrast, in the elicited play condition the autistic children produced as much functional play and as much symbolic play as controls. Other measures of play quality showed the autistic children's play to be unimpaired relative to controls with either type of material in any of the three conditions. From these findings it is argued that autistic children's lack of spontaneous creative play relative to controls is associated with conative abnormalities, rather than with a defective symbol system." (Lewis & Boucher, 1988, p. 325)

[40] "Indeed, in a game of pretending with a responsive adult playmate, Lewis and Boucher (1988) found that a clear understanding of pretense was displayed even by children with autism who failed to do so on a standard laboratory test." (Peterson et al., 2013, p. 444)

participate in pretend play. First, Ingersoll, Schreibman, and Tran (2003) argue that autistic children "may be less motivated to imitate by social interaction, but may be motivated to imitate to receive non-social reward (sensory feedback)" (p. 673). Following this idea, a study from Nielsen, Slaughter, and Dissanayake (2013) suggests that autistic children have an intact capacity to imitate, while their worse performance in copying others' bodily oriented actions might be explained by the demand of higher social motivation in this task. Further, based on a systematic review of action imitation in ASD, Williams, Whiten, and Singh (2004) suggest that autistics' delayed development in imitation might be better explained by their sensory and motor problems, in addition to the motivation. In this way, it is clear that autistic children have the capacity to imitate, while their delayed development in imitation and their worse performance in imitation tasks might be explained by their sensorimotor problems and the lack of motivation, respectively.

If the above analysis is successful, then it proves that contrary to Gordon's suggestion, autistics do not lack the capacity to simulate other minds. Gordon's simulation account thus faces a challenge: despite having the capacity to simulate other people, autistics still face social interaction problems. In this way, the capacity to simulate is not sufficient for our understanding of other minds as Gordon suggests. Similarly, any other simulation accounts, such as that of Goldman's (2006), which aim to explain autistic social difficulties with simulation, imagination, and pretence, face the same problem Gordon and Baker (1994) face. I shall present my arguments against Goldman in what follows.

6 Arguments Against Goldman's Account of Autism

My arguments against Goldman consist of two parts. First, as discussed in my arguments against Gordon, there is abundant evidence in autistic first-person narratives indicating autistics' capacity to imagine (Grandin, 2006; Tammet, 2007). This evidence also provides counter-examples to Goldman's account of autism, according to which the capacity to imagine is crucial to simulate other minds and autistics lack this capacity. Next, in what follows, I shall present evidence showing that autistics are able to shift both perceptual and intentional perspective, which are the underlying mechanism of simulation in Goldman's theory: Goldman proposes two kinds of perspective shifts to account for two types of mindreading: perceptual perspective shift enables us to simulate what other people perceive; while intentional perspective shift underlies our simulation of other people's intentional states, such as beliefs and desires. The arguments in this section focus on high-level mindreading in Goldman's theory. The arguments against low-level mindreading in Goldman's theory will be discussed in the next section, together with arguments against Gallese's account of autism.

First, we can find evidence of perceptual perspective shift in autistic first-person narratives. For instance, there are several of these examples in Grandin (2006). When Grandin (2006) tries to see the world from a cow's eye and to understand the hardship faced by a laid-off worker, she performs the skill of perceptual shifts, as discussed in the argument against Gordon's account of autism: she shifts her perspective to those of her simulated subjects' (the cow's or the laid-off worker's) and sees the world from the simulated subjects' perspectives. Further, as discussed in the last section, Grandin (2006) was able to play hide-and-seek, which requires the skill of perceptual perspective shifts.

Since, in order to trick the seeker in this game, one needs to shift one's perspective and see the world from the seeker's perspective. This case further confirms Grandin's perceptual perspective shift skill.

Next, In Goldman's theory, when we shift our intentional perspective, we can simulate other people's beliefs and desires. There are an abundance of evidence showing that autistics are able to shift their intentional perspectives and understand other people's beliefs and desires. Some of these examples are discussed as follows.

First, by revisiting the example in which Grandin (2006) simulates the laid-off worker, we can find that she also performs the intentional perspective shift to understand the worker's beliefs and desires. In particular, when Grandin (2006) simulates the laid-off worker, she considers the situation from the worker's perspective and experiences the worker's intentional state, that is, worrying about the physical hardship that resulted from losing his job. This activity is precisely what Goldman takes to be intentional perspective shift.

Next, Tammet (2007) also shows the capacity to shift intentional perspective. For instance, as Tammet states,

> Many people are surprised when they learn that I am a Christian. They imagine that being autistic makes it difficult or impossible to believe in God or explore spiritual issues. (p. 223)

In this example, Tammet clearly understands how non-autistic people think about his religious beliefs and why they think so. This understanding requires Tammet putting himself into non-autistics' shoes and taking up non-autistics' intentional perspectives.

The following are some more examples from Tammet (2007) showing his capacity of intentional perspective-taking.

> My parents did not want to label me, to feel that they were holding me back in any way. More than anything else, they wanted me to be happy, healthy, and able to lead a "normal" life. When friends, family and neighbours invariably asked about me, my parents told them that I was very "shy" and "sensitive." I think my parents must also have been afraid of the possible stigma attached to having a child with developmental problems. (p. 19)

> If I felt overwhelmed by a situation, I could go very red in the face and hit the side of my head very hard until it hurt a lot. I would feel such a sense of tension within me that I just had to do something, anything, to let it out. … This happened once during a science lesson where Mr. Thraves had helped one of the pupils to prepare an experiment involving a ball of play dough suspended on a piece of string. I was fascinated by this unusual sight and—unaware that it was part of an ongoing experiment—walked over to it and started to touch and pull the dough with my fingers. At this point my teacher became annoyed that I had interfered for no reason (at least as he understood it) and told me off, but I had no idea why he was angry with me and became very confused and upset. I ran from the class, slamming the door behind me with such force that the glass window shattered into pieces. I can still remember hearing the gasps of the children behind me as I ran from the

> room. When I got home my parents explained to me that I had to try very hard not to react in such a way again. (p. 68)

> One of these was pony trekking, an activity run by the local stable. The day consisted of being shown how to control a pony and then going for a trek around the local lanes, accompanied by a guide. I found it very hard to keep my balance on the pony and kept slipping in the saddle, so I held the reins very tight to stop myself from falling off. One of the stable owners saw me and became very angry and shouted at me. She was very passionate about her animals, but I didn't understand at the time what I had done wrong and became very upset. After that, I withdrew more and more, spending as much time as possible on my own in the hut. (p. 71)

In these examples, Tammet clearly has the capacity to understand other people's beliefs and desires. More specifically, he understands his parents' worries about him, and understand why his teacher and the horse guide were annoyed by him and his behaviours. All these understandings require Tammet shift his intentional perspective to the

perspectives of those he tried to understand. These examples confirm the capacity to shift intentional perspective in Tammet.[41]

In addition to the counter-examples from autistic autobiographies discussed here, there are a number of scientific studies (Section 7) that confirm the integrity of the underlying neural mechanism of simulation in autism. In this way, Goldman's account of autistic social difficulties faces the same challenge as those of Gordon's: despite having the capacity to simulate, autistics still face social interaction problems. Thus, having the capacity to simulate is not sufficient to explain both autistic social interaction problems and our understanding of other minds.

7 Argument Against Gallese's Account of Autism

My arguments against Gallese have two parts. First, I argue that contrary to Gallese's suggestion, we can find evidence showing that autistics have the capacity to understand individuals and recognize individuals as agents similar to themselves. After that, I shall present counter-examples to Gallese's view of autistic mirror neurons from several recent

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[41] In these examples from Tammet, even though he was confused most of the time at the moment when the events happened, he was able to understand why others were annoyed by him afterward. One possible explanation of this belated understanding is Tammet's different sensory experiences from the persons he tries to understand: similar sensory experiences allow one to understand another person immediately. This proposal shall be further explained in Section 8. Nevertheless, since Tammet still has the capacity to shift intentional perspectives, it is likely that he does not have lower empathizing capacity, but just that it is easier for him to emphasize another person with similar sensory experiences. In this way, Baron-Cohen's (2003) proposal of higher systemizing capacity and lower empathizing capacity in autism should be revised: autistics do not have lower empathizing capacity, but just do not have similar sensory materials to empathize in some cases. See Section 8 for further elaboration of this distinction between the capacity and the materials for simulating other minds.

studies. This part of arguments can also be viewed as arguments against Goldman's low-level mindreading.

First, in Gallese's theory, simulation is understood as a form of embodied cognition, with which individuals understand each other and recognize each other as agents similar to themselves. Several pieces of evidence from autistic first-person narratives indicate that autistics have this capacity to understand other individuals and recognize other individuals as agents similar to them. I shall discuss some of these evidence in what follows.

Despite having problems understanding other non-autistic individuals, several authors with autism I discuss above have no problems recognizing other non-autistic individuals as similar agents. Further, it seems that these autistic authors are able to understand individuals similar to them better. For instance, Willey (1999) shows a great understanding of her autistic daughter,

> Life with my Asperger's daughter, challenging as it might be, is something very familiar to me. At any rate, I feel I am parenting the daughter who shares my insights as best I can. The connection we share has bound us together hand in hand. I know far ahead of time if she is going to find a particular environment too overstimulating, a person's style and demeanor annoying, or a comment confusing. As soon as I sense my daughter's thoughts, I look to her and am never surprised to see her looking back at me with a You see what I see, don't you mom? expression in her eyes. I feel badly sometimes that she only seems to find that connection with me and not her father or her sisters. They try very hard to understand her uniqueness, but I fully believe there is not much they can do to really 'get' her. To do so, would

> be impossible for three such normally-placed people. My husband, in particular, struggles to stay one step ahead of her, for that is usually the only way to circumvent her from making a social or problem-solving blunder and more important, a sensory fall. (p. 114-115)

As Willey explains, she can relate to her autistic daughter better because of her similar experiences of being an autistic. This is the same case for Tammet (2007), who understands his autistic brother's particularity better because of similar experiences.[42]

I suggest that these counter-examples show that autistics have the intact underlying process Gallese suggests to be crucial for understanding others. Their problems in interpersonal interactions are more likely due to the lack of certain materials, such as similar sensory experiences. This point will be further developed at the end of this chapter. Before that, I shall present further scientific evidence to support my arguments against Gallese.

Next, I review evidence that provides grounds for rejecting the broken mirror theory, which suggests that mirror neuron dysfunction in autism leads to a series of other problems, including understanding and representing goal-directed hand actions, imitating behaviours, and passing the false belief test. First, further reviews show that autistics do not have problems in understanding and representing of goal-directed hand actions and imitating behaviours, which should be impaired if autistics had problems in their mirror neurons. Next, reviews of neuroimaging data suggest that it is not conclusive that autistic

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[42] See Tammet (2007), p. 216-217.

individuals have abnormal mirror neuron activities as the broken mirror theory suggests and an alternative account than mirror neuron dysfunction explains autistic traits better.

First, there is evidence showing that people with autism can understand and represent goal-directed hand actions, which are the most basic functions of mirror neurons, and can imitate behaviours, which are built upon the most basic functions of mirror neurons. In the first study from Hamilton, Brindley, and Frith (2007), twenty-five autistic children with ASD and thirty-one typical children of the same verbal mental age showed the same tendency to imitate an adult's goals, to imitate in a mirror fashion, and to imitate grasps in a motor planning task. In addition, children with ASD showed a superior performance on a gesture recognition task. This study shows that autistic children have intact ability to "represent, understand and imitate goal-directed hand-object interactions, and thus are likely to have an intact hand-goal MNS[43]" (p. 1867). In the second study from Bird, Leighton, Press, and Heyes (2007), both sixteen adults with autism and sixteen non-autistic matched control participants can perform a prescribed hand action in response to observed hand actions performed either by a human or a robotic hand under both compatible and incompatible trials. This study thus undermines the conclusions of other studies suggesting that people with autism have either specific or general problems of imitation (likely due to mirror neuron deficits).[44] The above two studies show that autistic children have the intact capacities to understand and represent goal-directed hand actions

[43] MNS: mirror neuron system.

[44] This evidence of autistics' capacity to imitate can also be viewed as a counter-example to Gordon's theory of autism, according which simulating other minds also involves imitation and autistics have problems imitating.

and to imitate, which are the two most basic functions of mirror neurons. Further, combining the results from Peterson's (2013) study, which proves the capacity to pass the false belief test, these behavioural evidence shows that autistics are capable of participating three main activities that require mirror neurons: understanding and representing goal-directed hand actions, imitating behaviours, and passing the false belief test.

In addition, reviews of neuroimaging data suggest that it is not conclusive that people with autism have mirror neuron dysfunction (Gallese, Gernsbacher, Heyes, Hickok, & Iacoboni, 2011). First of all, as Gernsbacher (Gallese et al., 2011) states, "of the two most prominent studies promoting the broken MN hypothesis of autism, one (Dapretto et al., 2006) failed twice to replicate, and the other (Oberman et al., 2005) not only failed twice to replicate but also failed to control one of the most crucial aspects of the study's design" (p.387). Second, after a systematic review, Gernsbacher (Gallese et al., 2011) suggests, the hypothesis that autistics have mirror neuron dysfunction is not well supported by its major evidence, including fMRI data on imitation, fMRI/PET data on pace processing, structural MRI data on cortical thickness, structural MRI data on grey matter density and volume, and EEG data on mu rhythm suppression.

Further analysis that undermines the hypothesis of mirror neuron dysfunction in autism is presented by Hickok (2014), who discusses another counter-example to the link between autistic traits and mirror neuron deficits and an alternative hypothesis to explain autistic traits than mirror neuron deficits. According to Hickok (2014),

> The very first animal model of autism was based on lesioning the amygdala and studying the effects on social behavior and hierarchy, implying that the

> lack of amygdala activity may explain the lack of social interactions or social intelligence in autism. This view dominated the research performed on the role of the amygdala in autism. Parallels were drawn between amygdala lesioned patients and autistic subjects, functional magnet[ic] resonance imaging (fMRI) studies revealing an insufficiently activating amygdala in autistic subjects were associated with deficits in interpreting other people's state of minds and feelings.[45] However, the opposite could also be true and lead to similar symptoms: rather than being hypo-active or not sufficiently responding, the amygdala could be overly reactive in autism. Consequently, autistic people could be processing too much emotionally relevant information, including enhanced fear and anxiety processing. The outcome could be a similar one to a not sufficiently active amygdala: withdrawal and decreased social interaction due to an enhanced stress-response and socio-emotional overflow. Indeed, as described below our studies on [valproic acid]-treated rat offspring indicate that the amygdala is hyper-reactive, hyper-plastic, and generates enhanced anxiety and fear processing. In accordance with this, more recent fMRI studies as well reveal amygdaloid hyper-activation in autism." [cited from Markram & Markram (2010)] (p. 220-221)

Overall, the above studies show that people with autism do not have problems in either mirror neurons or cognitive functions that are built upon mirror neurons. In other

[45] That is, mirror neuron deficits.

words, autistics have intact capacity to simulate, pretend, and imitate other people, and thus have the capacity that simulation theory suggests is required to understand other people. Further, based on the available neural imaging and animal studies, autistic traits can be better explained by hyper-activation of amygdala[46] than mirror neuron dysfunction. In this way, we can conclude that the capacity to simulate is not sufficient to explain autistic social difficulties and our understanding of other people, other capacities or requirements might be more fundamental to understand other people. I shall argue that based on autistic first-person narratives, sensorimotor similarities might be more fundamental for us to understand other people or other minds: we tend to understand others with similar sensorimotor experiences.[47] This point shall be elaborated in the next section and at more length in the next chapter.

8 An Alternative to Simulation Theory

So far, I have argued that contrary to what simulation theory suggests, the capacity to simulate is not sufficient for explaining autistic social difficulties and our understanding of other minds. Alternatively, I argue that we should distinguish the capacity to simulate

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[46] Amygdala is a structure that is distinct from but connected to mirror neurons in the frontal lobe.

[47] Indeed, there are alternative scientific explanation proposed to account for the social characters of autism that is based on the sensorimotor differences between autistics and non-autistics. Two main examples of this alternative explanation are Ramachandran and Oberman's (2006) landscape theory of autism and Markram, Rinaldi, and Markram's (2007) intense world theory. According to the first theory, the landscape theory of autism, autistic children have scrambled connections between the limbic system and the rest of the brain, which then lead to sensory oversensitivity, autistic self-stimulation, repetitive motions like rocking to and fro, avoidance of eye contact, hypersensitivities, and aversion to certain sounds in autism. Ramachandran and Oberman (2006) also suggest that it is likely that mirror neuron dysfunction in autism is caused by this distorted salience landscape in autism.

and the materials we use to simulate other minds. More specifically, when explaining autistic social interaction problems, I argue that perspective-taking, which is an important step to simulate other people's mental states according to simulation theory, depends more on similar sensorimotor experiences than the cognitive capacity to simulate. In what follows, I develop this argument from Grandin's account: it is easier for autistics to empathize with agents that have similar sensory experiences than with agents that have rather different sensory experiences.

In several places of her autobiography, Grandin (2006) explains that her achievements in farm animal studies are mostly due to her capacity to empathize with cattle. This kind of empathy is in fact, as Grandin suggests, due to the similarities of sensory and emotional experiences between autistics and animals. For instance,

> Being autistic has helped me to understand how they [cattle] feel, because I know what it is like to feel my heart race when a car horn honks in the middle of the night. I have hyperacute senses and fear responses that may be more like those of a prey-species animal than of most humans. People often fail to observe animals. Recently I visited a slaughter plant where the cattle were terrified of air that hissed from a pneumatically powered gate. Every time the gate opened or closed, the cattle recoiled and backed down the chute. They reacted as if they had seen a rattlesnake. It was obvious to me that the hissing air scared them but other people failed to see it. Purchase of a few air silencers solved the problem. With the hissing gone, the animals were no longer afraid of the gate. All it took was a cow's eye view. (p. 180)

> … I have a sensory empathy for the cattle. When they remain calm I feel calm, and when something goes wrong that causes pain, I also feel the pain. I tune in to what the actual sensations are like to the cattle … (p. 94)

> Cattle have a very wide, panoramic visual field, because they are a prey species, ever wary and watchful for signs of danger. Similarly, some people with autism are like fearful animals in a world full of dangerous predators. They live in a constant state of fear, worrying about a change in routine or becoming upset if objects in their environment are moved. This fear of change may be an activation of ancient antipredator systems that are blocked or masked in most other people. (p. 168)

As Grandin explains, it is easier for her and people with autism to empathize or simulate what it is like for a prey animal to experience certain circumstance due to their similar sensory and emotional experiences. On the other contrary, when simulating or empathizing agents with different sensory and emotional experiences, such as people without autism, Grandin states that her experiences are more objective and third-personal, compared to those of empathizing the cattle. For instance, though she can see the world from the cow's eye, she feels more like a third-person observer when she tries to understand other people.

> In my high school diary I wrote: "One should not always be a watcher – the cold impersonal observers – but instead should participate." Even today, my thinking is from the vantage point of an observer. I did not realize that this was different until two years ago, when I took a test in which a piece of classical music evoked vivid images in my imagination. My images were

> similar to other people's, but I always imagined them as an observer. Most people see themselves participating in their images. For instance, one musical passage evoked the image of a boat floating on a sparkling sea. My imagery was like a postcard photograph, whereas most other people imagined themselves on the boat. (Grandin, 2006, p. 153)

The above narrative suggests that Grandin empathizes people and animals differently and this difference is due to the fact that her emotions and sensations are more similar to prey animals, such as cows. This difference also explains why she is more capable of seeing the world from the cow's perspectives than those of non-autistics'. Given these ideas, we might conclude that in order to understand other minds, it might require similar sensorimotor experiences, rather than just the cognitive ability to shift one's perspective as Gordon (Gordon, 1995; Gordon & Baker, 1994) and Goldman (2006) suggest.

This idea also explains why autistics can imagine and pretend but still have problems interacting with non-autistics: it is because autistics lack similar sensorimotor experiences as non-autistics. Indeed, what limits autistics in simulating and imagining non-autistics in social interactions are their different sensory experiences and their lack of similar sensory experiences due to autistic sensory overload.[48]

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[48] People with autism usually have more sensitive sensations, including auditory, visual, and tactile sensations, and have trouble filtering out background noises and focusing on social signals. See Grandin (2006), Tammet (2007), and Willey (1999) for examples of sensory overload and for the influences of sensory overload on social interactions. See especially 'Chapter 4 Learning empathy: Emotions and autism' and 'Chapter 7 Dating data: Autism and relationship' of Grandin (2006) for the details of how different sensory experiences of autistics hinder their simulation about people without autism.

At the same time, it is also easier for autistics to understand other people with autism, because of similar sensory and emotional experiences. As Grandin (2006) suggests,

> Normal people have emotional empathy but some of them lack empathy for sensory over sensitivity in autistic people. Some of the best therapists who work with individuals with sensory problems can empathize with these difficulties because they themselves have struggled with sound, touch, or visual oversensitivity. The people who have the best sensory empathy have experienced the pain or total sense of chaos caused by faulty sensory processing. (p. 99)

This suggestion from Grandin (2006) is confirmed by Willey's (1999) experiences of empathizing her autistic daughter, as discussed in Section 7 of this chapter, and Tammet's (2007) experiences of understanding his brother with Asperger's.

> Steven, my second brother, continues to require a lot of help from the family because of his Asperger's. He takes medication for depression, which is a common issue for individuals on the autistic spectrum. Like me, he walks in circles whenever he is thinking very deeply about something; there is even a well-trodden circle in my family's garden where he has walked round and round so often. Steven is a keen musician with a particular fondness for string instruments. He has taught himself to play both the guitar and the Greek lute. … (p. 216)

To sum up, in addition to the capacity to simulate, similar sensorimotor experiences are also required for us to simulate and understand other people. That is, we are better at simulating people who share similar experiences with us. For instance, just as it is difficult

for autistics to simulate non-autistics, it is also difficult for non-autistics to simulate autistic experiences. In this way, failing to simulate other people's mental states might not be caused by lacking the capacity to simulate, but by lacking similar experiences. This idea also links back to autistics' lack of social intuitions discussed in Chapter 2: shared social intuitions might be based on shared experiences, especially sensorimotor experiences. That is to say, autistics have their own social intuitions for understanding other people (or beings, such as animals) with similar sensorimotor experiences. In this way, social intuitions (of non-autistics) are more likely to be a set of sensorimotor contingency that generates understanding under non-autistic social contexts and non-autistic sensorimotor experiences.

9 Conclusion

To conclude, in this chapter, I have showed that simulation theory faces the same problem as the theory theory: the cognitive capacity they propose to be crucial to understand other people is not sufficient for us to understand other minds. More specifically, I present counter-examples from both scientific studies and first-person narratives to argue against Gordon, Goldman, and Gallese's simulationist accounts of autism. Alternatively, I argue that in order to understand other minds, we need not only the capacity to simulate, but also similar sensory and emotional experiences as the materials for simulation.

Chapter 4

Non-Mindreading Accounts: Interactionism and Enactivism

In this chapter, I examine two non-mindreading accounts of social cognition, the interactive approach (Gallagher, 2001, 2004; Hutto, 2004, 2008; Zahavi & Parnas, 2003) and the enactive approach (De Jaegher, 2007, 2009; De Jaegher & Di Paolo, 2007), by evaluating their explanations of autistic social interaction problems. More specifically, I shall argue that among these two accounts, the enactive approach explains autism better than the interactive approach does. This is because the enactive approach includes the sensorimotor differences between autistics and non-autistics in its explanation in addition to the capacity to interact, which is the only explanation provided by the interactive approach.

In what follows, I shall first introduce non-mindreading accounts of social cognition and their arguments against mindreading accounts in Section 1. In Sections 2 and 3, the first non-mindreading approaches to social cognition, the interactive approach, and its account of autism are discussed. In Section 4, I shall present my argument against the interactive approach to autism. In Sections 5 and 6, I shall elaborate on the enactive approach to social cognition and its account of autism. After that, I shall discuss the advantages of and the problems for the enactive approach to autism in Sections 7 and 8, respectively.

1 Introduction: Non-Mindreading Accounts

Non-mindreading accounts were developed intensely in the last ten years as the third alternative to two major mindreading accounts, the theory theory and simulation theory. One motivation of this development is mindreading accounts' insufficiency in explaining our understanding of other minds. This insufficiency of mindreading accounts is due to several of these accounts' characteristics, according to proponents of non-mindreading accounts.

First, mindreading accounts are disembodied (De Jaegher, 2013; Hutto, 2004), mentalistic (Gallagher, 2004), and unduly cognitive (Gallagher, 2001). More specifically, mindreading accounts do not consider the role the body plays in our understanding of other minds, but only the role of cognitive abilities. Second, mindreading accounts are methodologically individualistic (De Jaegher, 2013; Gallagher, 2001; Hutto, 2004). This criticism suggests that when explaining social understanding, mindreading accounts reduce interpersonal or second-person social interaction to individualistic activities, such as theorization or simulation. Third, mindreading accounts suppose that "our reliance on theory (or our reliance on simulation or some combination of theory and simulation) is close to universal (Gallagher, 2004, p. 200)". In other words, for mindreading accounts, the capacities to theorize or to simulate are the only capacities we have to understand other people; there are no other capacities that we employ to understand others. One problem of this feature, especially for the theory theory, is that our capacities to theorize (or to simulate) and the beliefs and desires these capacities employ are not sufficient for us to

explain and predict others' mental states and behaviours; sometimes, emotions are more helpful for our understanding of other minds (Hutto, 2004).[49]

In order to avoid the above problematic characteristics, non-mindreading accounts propose alternative theories that are embodied and interactive (i.e., non-individualistic), consider emotions in addition to beliefs and desires, and propose ways to understand other minds other than theorization and simulation.[50] More specifically, the non-mindreading approach argues that we understand other people mostly through interacting with them and this interaction depends heavily on our perceptual and motor systems (Gallagher, 2001; 2004; Gipps, 2004; Zahavi & Parnas, 2003). Focusing on perceptual and motor systems enables non-mindreading accounts to explain not only social traits of autism, as mindreading accounts have done, but also non-social autistic traits that mindreading accounts have not been able to explain (De Jaegher, 2013; Gallagher, 2004).

Nevertheless, De Jaegher and Di Paolo (2007) argue that most prior non-mindreading accounts, especially those from Gallagher (2001, 2004), Hutto (2004, 2007), Ratcliffe (2007), and Thompson (2001), did not cash out the role of social interaction in our social understanding and were still methodologically individualistic, despite their emphasis on social interaction, compared to mindreading accounts. As an alternative, De Jaegher and

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[49] In Chapter 5 of this dissertation, I shall discuss further the role emotions play in our understanding of other minds.

[50] Based on these differences, Gallagher (2004) suggests that we understand other people through second-person interaction, rather than third-person observation. In this second-person interaction, we gain understanding of other minds through interacting with them; by contrast, understanding other minds by the third-person observation is like observing and reasoning about other minds from a Cartesian theatre.

Di Paolo (2007) propose an enactive account of social cognition, which aims to solve the above problem of other non-mindreading accounts. Based on this criticism from De Jaegher and Di Paolo (2007), I shall separate non-mindreading accounts into two main approaches, the interactive approach (Gallagher, 2001, 2004; Hutto, 2003, 2004; Ratcliffe, 2007; Thompson, 2001; Zahavi & Parnas, 2003) and the enactive approach (De Jaegher, 2007, 2013; De Jaegher & Di Paolo, 2007). These two approaches to social cognition and autism are introduced and evaluated in what follows.

2 The Interactive Approach to Social Cognition

Gallagher (2001, 2004), Hobson (2002, 2005), Hutto (2004), Zahavi and Parnas (2003) were among the first to apply both phenomenological and developmental approaches to social cognition and autism. Following Gallagher's (2004) suggestion, I shall call these authors' attempt the interactive approach. According to the interactive approach, we understand other people mostly through interacting with them and this interaction depends heavily on our perceptual and motor systems. Gallagher (2001, 2004) and Zahavi and Parnas (2003) characterize this interaction with the notion of intersubjectivity, while Hutto develops (2003, 2004) a theory of narratives and perspective-recognizing capacity from the idea of intersubjectivity.

In what follows, I shall first discuss Zahavi and Parnas's (2003) studies, which criticize the theory theory from the phenomenological tradition and set up the conceptual foundation for the interactive approach. Next, I shall elaborate Gallagher's (2001, 2004) proposal, which broadens Zahavi and Parnas's (2003) theory by drawing on developmental studies. Hobson's (2002, 2005) work on autism will be elaborated in the Section 4 of

Chapter 6 because it centres around the issue of emotions and thus deserves a separate discussion. Hutto's (2003, 2004) account provides an embodied understanding of the folk psychology as an alternative to those from the theory theory, and can be viewed as a complement to Gallagher's theory.[51] However, due to the fact that Hutto's account on autistic social interaction problems[52] is less developed, his account will not be further discussed in what follows.

Zahavi and Parnas (2003) developed their interactionism by rejecting the central assumption of the theory theory, namely, that we understand other minds by making a theoretical inference from external behaviours to internal mental states. This inference

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[51] Hutto (2003, 2004) has further developed the theory of intersubjectivity by proposing an embodied account that emphasizes the role of narratives in our understanding of other minds. Specifically, Hutto adopts Jerome Bruner's (1990) notion of narratives, according to which narratives play a crucial role in forming our explanation of others and in shaping our expectations of others' behaviours under the context of commonsense psychology. Even though Hutto agrees with Bruner's emphasis on the importance of narratives, he argues that Bruner's characterization of narratives has already assumed the capacity to understand other minds, and this assumption makes the role that narratives play in our understanding of other minds circular. Alternatively, Hutto proposes that we should understand narratives in terms of sensorimotor processes, which allow us to explain and expect others' actions and require us to recognize others as agents with perspectives. In other words, we understand other people through reading their bodies, instead of through pure theoretical explanations and predictions, as the theory theory and simulation theory suggest.

[52] According to Hutto (2003), autistics' social interaction problems are due to their problems in recognizing others' perspectives, which is necessary for engaging in embodied narratives that explain and predict others' behaviours. Hutto suggests that this perspective recognizing capacity develops earlier than the capacities to theorize and to simulate since the latter two depend on the former. Even though autistic children might lack the capacity to recognize perspective, they might not lack all the capacities to understand others as agents. Nevertheless, autistic children do not develop the capacity to recognize perspective completely and thus have social interaction problems. In addition, Hutto (2003) suggests that studies on autistic pretend play support his suggestion. Since pretend play requires the ability to shift perspective and engage in certain narratives with the co-participants, autistic children's impairment in pretend play studies suggests the lack of the capacity to recognize perspectives. Since the narratives are embodied and require sensorimotor engagements, autistic children's deficits in sensorimotor processes might explain (partially) why they have problems engaging in narratives.

itself assumes that behaviours are external and mental states are internal and that theoretical inference bridges the gap between the two. This distinction between external behaviours and internal mental states is problematic from the perspective of the phenomenological tradition. As Zahavi and Parnas (2003) explain,

> phenomenology is concerned with the phenomena, the appearances, their essential structures, and their conditions of possibility, and phenomenologists would typically argue that it is a metaphysical fallacy to locate these appearances within the mind, and to suggest that the way to access and describe them is by looking inside (*introspicio*) the mind. The entire facile divide between inside and outside is phenomenologically suspect, but this divide is precisely something that the term 'introspection' buys into and accepts. (p.54)

In other words, the putative need to introspect (in order to understand one's own mind) results from a false dichotomy between external behaviours and internal mental states. Likewise, the need to theorize other people's mental states from their behaviours in order to understand their minds presumes the same false dichotomy.

Alternatively, as phenomenologists suggest, our everyday experiences show that we already understand other people without doing the work of inference, which only happens when this understanding breaks down (Zahavi & Parnas, 2003). More specifically, this suggestion from phenomenologists assumes a rather different understanding of mental states and behaviours. As Zahavi and Parnas (2003) explain,

> In some sense, experiences are not internal, not hidden in the head, but already present in bodily gestures and actions. As both Merleau-Ponty and

> Scheler have argued, the affective and emotional experiences of others are given for us *in* expressive phenomena. Anger, shame, hate and love are not only qualities of subjective experience, but also types of behaviour or styles of conduct, which are visible from the outside. They exist *on* this face or *in* those gestures, not hidden behind them (Merleau-Ponty, 1964, pp. 52–3; Scheler, 1973, p. 254). Moreover, bodily behaviour is meaningful, it is intentional, and as such, it is neither internal nor external, but rather beyond this abstract and artificial distinction. (p. 65)

According to this alternative reading of behaviours and mental states, there is no clear boundary between 'external' behaviours and 'internal' mental states.

This above reading of behaviours and mental states also implies that we understand other people in a more 'embodied' and 'interactive' fashion. As Zahavi and Parnas (2003) explain,

> Based on considerations like these, phenomenologists have argued that we do not first perceive a physical body in order then to infer, in a subsequent move, the existence of a foreign subjectivity. In other words, intersubjective understanding is not a two-stage process of which the first stage is the perception of meaningless behaviour, and the second is an intellectually based attribution of psychological meaning. On the contrary, in the face-to-face encounter, we are neither confronted with a mere body, nor with a hidden psyche, but with a unified whole. … When we seek to understand others, we do not normally, and at first, attempt to classify their actions under lawlike generalizations, rather we seek to make sense of them. (p. 65)

That is to say, our understanding of other minds happens naturally because others' behaviour has already revealed its meaning and the corresponding mental states, which are also types of behaviours. This explains why there is no need to infer from other people's behaviours to their mental states when we try to understand them. Instead, as the phenomenologists suggest, this understanding happens naturally when we interact with other people. And, the interactive and embodied process that happens when we interact with and understand other people is called *intersubjectivity* by Zahavi and Parnas (2003).

Next, in Gallagher (2004), the notion of intersubjectivity is further elaborated and distinguished into primary and secondary intersubjectivity, which are two developmental stages proposed by Trevarthen (1979) and Trevarthen and Hurley (1978). Gallagher (2004) argues that primary and secondary intersubjectivity are the most fundamental ways by which we understand other people, even after the development of a theory of mind, whose development builds upon intersubjectivity. In what follows, Trevarthen's (1979) and Trevarthen and Hubley's (1978) definition of intersubjectivity and Gallagher's (2004) interactive theory of social cognition are explained.

First, Trevarthen (1979) suggests that from two months of age, infants start to respond differently to objects and agents and thus start to have intersubjectivity. This development of intersubjectivity enables infants to communicate with the external world, with the help of a more primitive mental function, subjectivity, which exists since birth. As Trevarthen (1979) explains,

> For infants to share mental control with other persons they must have two skills. First, they must be able to exhibit to others at least the rudiments of individual consciousness and intentionality. This attribute of acting agents I

> call subjectivity. In order to communicate, infants must also be able to adapt or fit this subjective control to the subjectivity of others: they must also demonstrate intersubjectivity. (p. 322)

More specifically, intersubjectivity is developed in two stages, primary and secondary intersubjectivity. Primary intersubjectivity develops earlier and its function is explained as follows,

> … innate or early developing capacity to interact with others manifested at the level of perceptual experience – we see or more generally perceive in the other person's bodily movements, facial gestures, eye direction, and so on, what they intend and what they feel. … in addition to the eyes, it is likely that the infant perceives various movements of the head, the mouth, the hands, and more general body movements as meaningful, goal-directed movements. ... In seeing the actions and expressive movements of the other person, one already perceives their meaning; no inference to a hidden set of mental states (beliefs, desires, etc.) is necessary. (Gallagher, 2004, p. 204-206)

In other words, primary intersubjectivity is a capacity that enables infants to interact with other subjects through perceiving their eyes, facial muscles, and bodily movements, which are meaningful and intentional and can be understood by the infants without further inference. Based on this feature, Gallagher (2004) suggests that the Intentionality Detector

(ID) and the Eye Direction Detector (EDD)[53] are the components of primary intersubjectivity, since these two detectors allow one to perceive other people's intentions and eye direction.

The second developmental stage of intersubjectivity is secondary intersubjectivity, which happens from ten months after birth and is defined as follows,

> that an object or event can become a focus between people. Objects and events can be communicated about… the infant's interactions with another person begin to have reference to the things that surround them. (Hobson 2002, 62) (quoted by Gallagher, 2004, p. 207)

That is to say, secondary intersubjectivity enables an infant to interact with both an object and an agent and to modify her relationship with the object according to her relationship with the agent and her understanding of this agent's intentions. Before the development of secondary intersubjectivity, as Trevarthen and Hurley (1978) explain, the interaction between the mother and the infant is mostly determined by the infant and the infant is not able to work both with objects and agents or to coordinate its actions according to the agents' intentions. However, after the development of secondary intersubjectivity, the infant is able to actively interact with its mother and to coordinate its action according to the mother's intentions.[54] Based on this feature, Gallagher (2004) suggests that the Shared

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[53] These two notions were first introduced in Section 4 of Chapter 2.

[54] See Trevarthen and Hurley (1978), especially p. 210-211, for examples of the difference between the infant's behaviours at twenty-five weeks old (before the development of secondary intersubjectivity) and at forty-five weeks old (after the development of secondary intersubjectivity).

Attention Mechanism (SAM)[55] is a component of secondary intersubjectivity, since the former enables a subject to interact with an agent and an object simultaneously.

Gallagher incorporates the above accounts of primary and secondary intersubjectivity into his theory and further suggests that even after the development of the theory of mind, primary and secondary intersubjectivity are still the predominant ways for us to understand other people: their roles are not replaced by the theory of mind (Gallagher, 2001; 2004; Zahavi & Parnas, 2003). Even though we use the theory of mind on some occasions, especially some novel situations that we are not familiar with, we still depend on intersubjectivity to understand other people mostly (Gallagher, 2004).[56]

3 The Interactive Approach to Autism

In the last section, I have introduced the major studies of the interaction approach to social cognition. In this section, I shall discuss how this approach explains autism by focusing on Gallagher's account. Even though Zahavi and Parnas's (2003) theory of social cognition forms the theoretical foundation for those of Gallagher's (2001, 2004) and Hutto's (2003, 2004), Zahavi and Parnas's (2003) discussion of autism focuses on autistic self-awareness, which will be addressed in Chapter 7.

In Gallagher's (2004) neurophenomenological account of autism, autistics have social interaction problems because of their defective primary and secondary

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[55] SAM was first introduced in Section 4 of Chapter 2.

[56] As a comparison, Baron-Cohen (1995) suggests that our dominant way to understand other people is the theory of mind, whose development depends on and follows ID, EDD (together they are called primary intersubjectivity), and SAM (secondary intersubjectivity).

intersubjectivity. In particular, Gallagher suggests that autistics' problems of primary and secondary intersubjectivity are more fundamental than that of the theory of mind for two reasons. First, primary and secondary intersubjectivity develop before the theory of mind, which develops at the age of four. Second, autistics' problems in the theory of mind result from their deficits in primary and secondary intersubjectivity. As Gallagher (2004) explains,

> On this neurophenomenological account, the problem of specialized cognitive functions related to theory of mind appears at the end of a long line of effects that are more basic and that are generated in neurological disruptions that affect sensory-motor processes. In turn, these sensory-motor problems infect the development of social interaction and understanding at the level of primary intersubjectivity. Further along this line of development, the problems of primary intersubjectivity combine with certain cognitive deficits to disrupt secondary intersubjectivity, which, in turn, contribute to problems with social cognition and theory of mind. (p. 210)

Further, Gallagher suggests that in fact, autistics deploy a theorizing capacity to compensate for their defective primary and secondary intersubjectivity (Gallagher, 2004; Zahavi & Parnas, 2003). As Zahavi and Parnas (2003) explain the case of Temple Grandin,

> In fact, it seems to us that Grandin's compensatory way of understanding others perfectly resembles how *normal* intersubjective understanding is portrayed by the proponents of the theory-theory. To put it somewhat ironically, the evidence suggests that autists (provided that they possess a

> sufficiently high IQ) might be more characterized by an excessive reliance on a theory of mind (in the proper sense of the word) than by a lack of such a theory. They seem to have to rely on wooden algorithms and formulas if they are to understand other people. This is not to deny, of course, that autists have difficulties passing theory of mind tasks. Rather, the point is that they have these difficulties not because of a lack of a theory of mind, but because of other deficiencies. In this sense, it really is question-begging to label false-belief tasks or appearance-reality tasks as 'theory of mind' tasks; it prejudges the issue by suggesting that psychological competence consists in the possession and use of a theory. (p. 69)

In other words, even though it seems that Grandin is able to understand other minds with theorization, this appearance should be understood as a compensatory way to understand other minds due to autistics' defects in primary and secondary intersubjectivity, rather than having an intact capacity to understand other minds.

To further support the neurophenomenological account of autism, Gallagher (2004) employs studies from developmental psychology and suggests that autistic problems in intersubjectivity are caused by sensorimotor problems and the central coherence problem. First of all, autistics' deficits in primary intersubjectivity result from their sensorimotor issues, since an intact sensorimotor functioning underlies one's neuronal representation of other people's behaviours and thus one's understanding of those behaviours. As Gallagher (2004) explains,

> There is good evidence that a subject's understanding of another person's actions and intentions depends to some extent on a mirrored reverberation

> in the subject's own motor system. When I observe someone else performing a certain action, or imagine myself doing that action, the neuronal patterns that are activated in my premotor cortex, supplemental motor area (SMA), and other brain areas are in large part the same neuronal patterns that are activated when I perform action myself. The neurology of "shared representations" for intersubjective perception (Georgieff and Jeannerod 1998), then, suggests that problems with our own motor or body-schematic system could significantly interfere with our capacities for understanding others. Accordingly, it is possible that developmental problems involving sensory-motor processes may have an effect on the capabilities that make up primary intersubjectivity, and therefore the autistic child's ability to understand the actions and intentions of others. (p. 210-211)

According to Gallagher, the problem of these "shared representations for intersubjective perception" underlies autistic children's defective primary intersubjectivity. In addition, several studies show that autistic children start to show sensorimotor problems from very early on, around the time when primary intersubjectivity starts to develop (from two months after birth):

> It has been demonstrated that a variety of basic sensory-motor problems exist in autistic children between ages three and ten years (see Damasio and Maurer 1978; Vilensky, Damasio, and Maurer 1981) and even before that, in infants who are later diagnosed as autistic. Teitelbaum, Teitelbaum, Nye, Fryman, and Maurer (1998) studied videos of infants who were diagnosed as autistic around age three years. Movement disturbances were observed in all

> of the infants as early as age four to six months, and in some from birth. These include problems in lying, righting, sitting, crawling, and walking, as well as abnormal mouth shapes. They involve delayed development, as well as abnormal motor patterns, for example, asymmetries or unusual sequencing in crawling and walking. (Gallagher, 2004, p. 210)

With the above studies, Gallagher suggests that autistic infants' sensorimotor problems contribute to their problems in social understanding, since understanding other people with primary intersubjectivity requires sensorimotor coordination.

Next, Gallagher (2004) argues that autistics' deficits in secondary intersubjectivity are explained by their problems of central coherence, the problem of integrating parts into wholes. In particular, many autistics are unable to perceive objects with groupings or patterns as a whole, even though they are able to perceive the individual components of groupings and patterns (Frith, 1989; Happé, 1995). This trait of perceiving parts with patterns into a whole is called the Gestalt principle and it breaks down in autism (Frith, 1989). Gallagher (2004) suggests that this perceptual problem is what underlies autistics' deficits of secondary intersubjectivity because both problems share the incapacity to process the information about the context:

> If we characterize these Gestalt problems of central coherence to be problems that involve understanding context, then it is clear that such problems may interfere with the capabilities that make up secondary intersubjectivity—intersubjective capabilities that depend on understanding others and interacting with them in contexts—contexts that are pragmatic, but also social. Seeing another person move in a certain way could mean

> many different things if it is done outside of any particular context. If, for example, you see my right arm, with open hand, drop through the air, but nothing else that would provide the context for what it means, then it could mean many different things. It might be part of a gesture that means *hello* or *goodbye*; it might mean *get out of here*; it might be that I intend to make an important point by bringing my hand down hard on the desk in front of me. Without the context, my intention is simply not clear to anyone who would be watching me, or trying to interact with me. (p. 211)

As Gallagher suggests, autistic children's incapacity to interpret the intention of another person's actions is due to their incapacity to understand the contexts of these actions, which is the same problem as the problem of central coherence. This problem is what underlies the defective secondary intersubjectivity in autistic children, according to Gallagher.

In addition to the above account of autistic social cognition, Gallagher (2004) suggests that another advantage of the neurophenomenological account is its capacity to explain non-social traits of autism, such as "restricted range of interest, obsession for sameness, non-semantic form of perception, and gestalt problems" (p. 213). As Gallagher (2004) explains,

> Importantly, however, the disrupted development of these sensory-motor processes may contribute not only to deficiencies in primary inter-subjectivity, but are likely to offer some explanation of the other sensory-motor symptoms of autism: oversensitivity to stimuli, repetitious and odd movements, and possibly, echolalia. … Problems with central coherence can

> contribute to the explanation of other nonsocial problems as well. Specifically, we would expect someone with a central coherence problem to manifest certain nonsocial symptoms found in autistic subjects: restricted range of interest, obsessive concern for sameness, preoccupation with objects or parts of objects, high cognitive ability for rote memory, and nonsemantic form perception. (p. 211)

To sum up, Gallagher (2004) argues that the neurophenomenological account provides a better alternative to the theory of mind for two main reasons. First, the defective primary and secondary intersubjectivity is a more fundamental explanation of autistic social interaction problems. Second, the neurophenomenological account is able to account for not only the social traits of autism but also the non-social traits, whose explanation is lacking in the theory of mind account of autism.

4 Evaluating the Interactive Approach to Autism

In this section, I evaluate the interactive approach to autism by focusing on Gallagher's account.

Overall, I agree with Gallagher that the interactive approach explains autism better than do mindreading accounts, since by including autistic sensorimotor issues in its account, it thus is able to explain not only social but also non-social problems of autism. Nevertheless, I still take issue with certain aspects of the interactive approach to autism, especially its account of autistic social interaction problems. In what follows, I shall argue that there are two main difficulties faced by the interactive approach to autism.

First, according to interactionists, the development of the theory of mind depends on the development of primary and secondary intersubjectivity, which develop prior to the theory of mind (Gallagher, 2004). Following this idea, if autistics have defective primary and secondary intersubjectivity, it is very unlikely for them to develop a well-functioning theory of mind. Nevertheless, in order to explain why some autistics are still able to pass the false belief test and to function under social situations, despite defective primary and secondary intersubjectivity, interactionists suggest that people with autism develop a compensatory way to theorize about other minds (Gallagher, 2004; Zahavi & Parnas, 2003). The above two suggestions from the interaction approach seem contradictory to each other. If primary and secondary intersubjectivity are the necessary condition for the development of a theory of mind, which is the cognitive capacity to theorize about other minds, then the defective development of intersubjectivity should prevent both the development of a theory of mind and of the cognitive capacity to theorize about other minds. It would be contradictory to suggest that defective intersubjectivity prevents only the development of a theory of mind, but not the development of the capacity to theorize about other minds. To avoid this contradiction, interactionists would have to give up either one of the following two claims: (i) intersubjectivity underlies the development of the theory of mind or (ii) autistics have developed a compensatory theorization to understand other minds. But either option means that the interaction approach would lose much of its explanatory power.

The second problem faced by the interactive approach is its inconsistency with autistic first-person narratives of social understanding. More specifically, this problem is directed toward the interactionists' explanations of autistic social difficulties and of

autistics' lack of intuitive social understanding (Gallagher, 2004; Zahavi & Parnas, 2003). If the capacity to understand other people depends on primary and secondary intersubjectivity as the interaction approach suggests, then, due to the defective primary and secondary intersubjectivity, autistics should not be able to understand other people, including both people *with* and *without* autism. Nevertheless, several autistic autobiographies suggest that even though autistics lack intuitive understanding of people *without* autism, autistics are able to easily understand people *with* autism or with similar thinking patterns. For instance, Grandin (2006) mentions in her autobiography that it is easier for her to get along with like-minded people, such as construction workers, who are mostly visual thinkers like her. As she describes,

> I can relate to people who produce tangible results…. They all like to complain and tell construction stories. I have no trouble being with them, and I become one of the guys. Another reason I fit in with construction workers and technical people is that we are mostly visual thinkers. (p. 160)

Another autistic autobiographer, Willey (1999), mentions that is easier for her and her autistic daughter to understand each other than for her non-autistic husband to understand her autistic daughter, as discussed in Section 7 of Chapter 3. These first-person narratives suggest that autistic individuals have better capacities to understand other people with similar traits, such as other autistics, than they do to understand people without autism. In this way, autistic individuals still have a certain capacity for social understanding, and the interactive approach's proposal of defective intersubjectivity would not be able explain this character of autistic social understanding.

Alternatively, as I suggested in Chapter 2, a better explanation of autistic social difficulties appeals to the sensorimotor differences between autistics and non-autistics, rather than the lack of social understanding capacities in autistics. In the next two sections, I introduce the enactive approach to social cognition and to autism, which includes these sensorimotor differences in its account and thus avoids the above problem faced by the interactive approach.

5 The Enactive Approach to Social Cognition

The enactive approach proposes a theory of social cognition that shifts the explanatory focus from individual capacities to the social interactions. That is, for the enactive approach, social understanding happens *in* the social interaction, rather than only *within the individuals* who participate in this social interaction. In what follows, I shall explicate the enactive approach to social cognition proposed by De Jaegher and Di Paolo (2007).

According to De Jaegher and Di Paolo (2007), individuals coordinate between each other during social encounters, creating a sense-making process that results in social understanding. This process is named *participatory sense-making* because individuals engaged in such coordinated social encounters also participate in a sense-making process, which generates social understanding. If we apply this idea to social sense-making, which includes two cognizers, then it would be the case that the two cognizers interact and coordinate, and at the same time, make sense of themselves and of each other in this interactive process. As De Jaegher and De Paolo explain this participatory sense-making process and indicate required conditions for this process:

> This means that the sense-making of interactors acquires a coherence through their interaction and not just in their physical manifestation, but also in their significance. This is what we call participatory sense-making: the coordination of intentional activity in interaction, whereby individual sense-making processes are affected and new domains of social sense-making can be generated that were not available to each individual on her own. (De Jaegher & De Paolo, 2007, p. 497)

> If, as indicated above, we make sense of the world by moving around in it and with it (sense-making is thoroughly embodied), and we coordinate our movements with others when interacting with them, this means that we can coordinate our sense-making activities, affecting not only how we make sense of the world but also of others and of ourselves. That is we literally *participate in each other's sense-making*. We generate and transform meaning together, in and through interacting. (De Jaegher, 2013, p. 7)

In this way, participatory sense-making requires that two cognizers coordinate both physically and intentionally in a way that is not available to individual cognizers alone. In addition, this description of the participatory sense-making process explains why, for De Jaegher and De Paolo (2007), social understanding happens *in* social interactions, in addition to *between* the interaction partners.

To further explain this participatory sense-making process, De Jaegher and De Paolo suggest that there are two functions of this sense-making process. The first function of this sense-making process is for the individual to adapt to her environment. As De Jaegher

(2013) explains, this enactive characterization of cognition as sense-making can be understood as:

> a cognizer's adaptive regulation of its states and interactions with the world, with respect to the implications for the continuation of its own autonomous identity. In other words, sense-making is concerned with acting and interacting, a concern that comes directly from the sense-maker's self-organization under precarious circumstances. (p. 6)

That is, through this interactive process, the cognizer 'makes senses' of and adapts to her environment, which in the case of social interaction, includes an interaction partner.

Another function of this sense-making process allows the cognizer to generate her identity or maintain herself as an autonomous individual. As De Jaegher and De Paolo (2007) explain,

> The enactive approach takes as its point of departure the organizational properties of living organisms that make them paradigmatic cases of cognisers. One such crucial property is the constitutive and interactive autonomy that living systems enjoy by virtue of their self-generated identity as distinct entities in constant material flux. An autonomous system is defined as a system composed of several processes that actively generate and sustain an identity under precarious conditions. To generate an identity in this context is to possess the property of operational closure. This is the property that among the enabling conditions for any constituent process in the system one will always find one or more other processes in the system (i.e., there are no processes that are not conditioned by other processes in

> the network – which does not mean, of course, that conditions external to the system cannot be necessary as well for such processes to exist). (p. 487)

According this excerpt, the sense-making process also helps the interaction participant to maintain her autonomous identity, which in turn enables the interaction participant to continue participating in this sense-making process. One analogy would be the cell membrane of biological organisms (Thompson, 2007): the molecules of the membrane form the cell membrane by maintaining a dynamic yet relatively stable organization. This organization is maintained through a balanced interaction between the molecules of this cell membrane and other surrounding molecules. Though at the molecular level, it might not be possible to distinguish the molecules of this cell membrane from other surrounding molecules; it is possible to do so at the cellular level. Given that the structure of the cell membrane, which is maintained by the interaction between the molecules of this cell membrane and other surrounding molecules, helps to maintain the autonomous identity of the cell. Similarly, in the case of social sense-making, the interaction helps the individuals to maintain their autonomous identity through the physical and intentional coordination that makes the interaction possible.

As an example, within this participatory sense-making framework, social skills are a relational, rather than an individualistic skill. This is because participatory sense-making requires physical coordination between the interaction partners, the success of the former would require both interaction partners to have similar timing in both acting and reacting to each other in the interaction. This capacity to coordinate physically with an interaction partner at the right timing is called the *rhythm capacity* by De Jaegher and De Paolo (2007).

6 The Enactive Approach to Autism

De Jaegher (2013) proposes the *enactive account* of autism, which applies the concepts of embodiment and participatory sense-making to explain autism. In particular, this account centres on two main claims. First, autistic experiences should be understood in terms of the way autistics make sense of the world, which includes elements such as perceiving, moving, and emoting, in addition to high-level cognitive capacities. Second, autistic social difficulties should be explained by their coordination problems that result in problems in participatory sense-making. These two claims are explained as follows.

First, De Jaegher (2013) analyzes autistics' focus on details and their restricted interests and repetitive behaviours as examples to illustrate sense-making in autism. Rather than viewing these autistic traits as meaningless, as most psychological theories of autism suggest, De Jaegher proposes that there is evidence showing that these activities bring salience to, and thus help autistics make sense of the world, due to their specific way of perceiving and processing information. As De Jaegher (2013) explains the difference of sense-making between non-autistics and autistics:

> Sense-making is a narrowing down of the complexity of the world. Non-autistic sense-making often ignores certain details and jumps to a particular significance (I'm thirsty, I want water, I get it but hardly care about whether the glass is tall or short, transparent, opaque, etc.). People with autism often perceive more detail, but to the detriment of not perceiving quickly enough that which is more salient in a non-autistic context (for instance, when a person with autism grabs someone else's glass of water and drinks from it, not noticing whether this is appropriate or not in the social context,

> Vermeulen, 2001). … In direct support of the enactive hypothesis, repetitive activities in autism—unlike obsessions and compulsions in obsessive compulsive disorder—have been found to be "beloved activities apparently associated with great positive valence" (Klin et al., 2007, p. 97; see also Baron-Cohen, 1989; Klin et al., 1997). (p. 9-10)

According to De Jaegher, autistics have activities such as focusing on details, restricted interests, and repetitive behaviours because these activities help autistics make sense of the world, even though these activities are meaningless for non-autistics, who do not have the similar need to make sense of the world in this way (due to different sensory sensitivities).

This different need of sense-making in autistics is further supported by their different ways of perceiving and moving in the world. For instance, studies show that autistics perceive in a different speed: "… people with autism find it easier to perceive emotion in moving displays of faces when the images are shown slowed down (Gepner et al, 2001). (De Jaegher, 2013, p. 9)". Additionally, studies suggest that autistics have movement difficulties, which are fundamental to their social interaction problems. As De Jaegher (2013) explains,

> Leary and Hill (1996), in their review article on movement disturbances in autism, also argue that movement difficulties should be seen as core to the condition and that they are at the basis of the social difficulties of people affected. According to them, movement difficulties in autism include problems of movement function such as posture, muscle tone, non-goal directed movements such as nervous tics and action-accompanying

> movements, and difficulties with voluntary movements, which implicate language and movement planning. (p. 9)

All these differences in moving and perceiving contribute to autistic experiences and should be included when explaining autistic sense-making, as De Jaegher suggests.

Next, De Jaegher (2013) proposes that autistics' social difficulties should be explained by their "reduced flexibility in interactional coordination," which "correlates with difficulties in participatory sense-making" (p. 1). In other words, considering that successful participatory sense-making, in which interaction partners understand or 'make sense' of each other, requires interactional coordination between these interaction partners, autistics' reduced flexibility in interactional coordination implies different sense-making and impedes their participatory sense-making with non-autistic individuals. As De Jaegher (2013) explains,

> Participatory sense-making relies on the capacity to flexibly engage with your social partner from moment to moment, where this engagement involves emotion, knowledge, mood, physiology, background, concepts, language, norms, and, crucially, the dynamics of the interaction process and its coordinations and breakdowns. I have conjectured that a sensorimotor interactional coordination ability is at the basis of this connection. … We have seen that sensorimotor differences imply a different sense-making in autism. Sensorimotor differences, especially those involving temporal aspects of perception and movement, will affect interaction and coordination in social encounters, and therefore introduce systematic differences in participatory sense-making. (p. 10-11)

In particular, several autistic traits contribute to this above "reduced flexibility in interactional coordination." For instance, autistics have different timing in moving and perceiving and are more sensorily sensitive than non-autistics. These differences between autistics and non-autistics would hinder the interactional coordination and thus the participatory sense-making between them. In particular, De Jaegher (2013) discusses the following studies to support her thesis:

> Trevarthen and Daniel (2005) report on interactional timing and rhythmic difficulties in autism in a study of the interactions between a father and his twin daughters, one of whom was later diagnosed with autism (see also St. Clair et al., 2007). With this twin, the father was unable to engage in rhythmic interaction. This is reminiscent of Hobson's Hello and Goodbye study, which also showed that an interaction partner is less able to engage with a partner who is less rhythmically able. Again, it becomes apparent that social capacity is interactional and not just individual. (p. 12)

To further her proposal De Jaegher suggests that this problem of interactional coordination and of participatory sense-making between autistics and non-autistics also explains why autistics often retract from or avoid social interactions,

> … because of the experience of negative affect that results from more frequent coordination breakdowns, social interaction may be less often sought by people with autism, resulting in fewer opportunities to engage in participatory sense-making. (De Jaegher, 2013, p. 13)

Nevertheless, despite having troubles coordinating with non-autistics, autistics are still able to make sense of the social worlds, but just in a distinctive way due to their different timing and sensory sensitivities from non-autistics. As De Jaegher (2013) states,

> I suggest that people with autism make sense of the world differently, and that, in the social realm, they are differently able to participate in sense-making with others. (p. 14)

In particular, De Jaegher (2013) uses echolalia[57] as an example to explain how this activity helps autistics make sense of the world:

> From the enactive point of view, in which a cognizer self-maintains and self-organizes, it can be proposed that the boy is self-affirming his place in an interaction in which he feels that something is taken away from him, by uttering knowledge that he has. These utterances could be a way of maintaining individual autonomy in an interactional situation. (p. 13)

That is, by echolalia, autistics are able create a condition in which they can make sense of the world and maintaining their own identity within the world. In this way, autistics are still making sense of the world, while in a way that is different from that of non-autistics'.

To sum up the two main claims of the enactive approach to autism: the social difficulties of autism are explained by the non-synchronous participatory sense-making between autistics and non-autistics. Autistic experiences should be understood in terms of the way autistics make sense of the world, especially their different perceiving and moving;

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[57] "Echolalia is the repetition of utterances (one's own or an other's), and is often considered meaningless and uncommunicative, and the general advice is to ignore it." (De Jaegher, 2013, p. 13)

autistic traits, such as echolalia, are explained by autistics' needs to make sense of the world.

7 Evaluating the Enactive Approach to Autism: The Advantages

In this section, I present my arguments for the enactive approach to autism. I shall argue that the enactive approach to autism is well-supported by first-person narratives of autism. While, in the next section, I shall point out some problems faced by the enactive approach to autism.

First, according to the enactive approach, the social difficulties of autism are explained by the non-synchronous participatory sense-making between autistics and non-autistics. This proposal is well-supported by examples of social difficulties in autistic first-person narratives. Specifically, we can find numerous examples of disrupted interactional coordination from autistic first-person narratives describing their problematic social encounters. For instance, in the following passage, Tammet (2007) describes his uncoordinated interaction with other children in his class.

> Sometimes other children in the class would try to talk to me. I say "try" because it was difficult for me to interact with them. For one thing, I did not know what to do or say. I almost always looked down at the floor as I spoke and did not think to try to make eye contact. If I did look up, I would look at the other person's mouth as it moved while they were speaking. Sometimes a teacher speaking to me would ask me to look him in the eye. Then I would bring my head up and look at him, but it took a lot of willpower and felt strange and uncomfortable. When I talked to someone, it was often in a long,

> unbroken sequence of words. The idea of pausing or of taking turns in a conversation just did not occur to me. (p. 74-75)

In these interactions, it is obvious that Tammet's actions and movements did not coordinate well with those of his classmates to create a smooth participatory sense-making between them.

Another example from Tammet (2007) also indicates the non-synchronous participatory sense-making. This example focuses on having a conversation.

> Listening to other people is not easy for me. When someone is speaking to me it often feels like I'm trying to tune in to a particular radio station and a lot of what is said just passes in and out of my head like static. Over time, I have learned to pick up enough to usually understand what is being talked about, but it can be problematic when I am being asked a question and I don't hear it. Then the questioner can sometimes get annoyed with me, which makes me feel bad. (p. 75) [58]

[58] See Tammet (2007), especially p. 86-89, for more examples of physical coordination problems.

In this example, Tammet has trouble listening to other people and responding attentively. This is another example of problematic coordination that results in problematic participatory sense-making.[59]

Next, the enactive approach suggests that autistic traits, such as echolalia, are explained by autistics' needs to make sense of the world. We can find a number of supporting examples from autistic narratives as well. For instance, the following are two examples from Tammet (2007):

> When I felt excited by something, I would cup my hands together close to my face and press my fingers against my lips. Sometimes my hands would flap together and make clapping sounds. If I did this at home, my mother would

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[59] Willey (1999) also mentions several of her experiences of not being able to fit in with or make sense of her peers: "I did not expect much from my social life at college. I did not need much. I was accustomed to defining friendship in very simplistic terms. … At first, this seemed to be all other freshman needed or expected, too. But as the first semester moved on, I seemed to be left behind. I noticed groups forming and all of them without me. I noticed people who I thought reminded me of people I had gotten along with from home, but they did not seem to notice me. … Soon, I found that my smiles were unreturned, my steps were never followed and my phone was never called. Soon, I saw I was invisible. On one level, this did not bother me. I liked my time alone and my personal space. But, day in and day out, rejection began to lay heavy on my shoulders most likely because I did not understand why I was being excluded. To choose to be left out is one thing, but to be looked out, is quite another. A smile and a few minutes of conversation used to be enough to make a friend, and for the life of me, I could not figure out when or why this had stopped being the rule. … I think the real problem laid just below the surface of another of my most mysterious and difficult AS traits – my inability to understand my peers' conversations. I understood their language, knew if they had made grammatical errors in their speech, and I was able to make replies to anything that was spoken to me; but, I never came to hear what they were really saying. I never understood their vernacular. Suffice to say that, at that point, I was unable to read between the lines. Subtext and innuendo may as well have been birds flying by my window. It was frustrating being unable to break into the thought processes of my peers but I was more upset when I came to discern I never learned from one experience to the next. I kept falling into the same kinds of traps, even after my father warned me it sounded like people were only using me, even after I discovered it was an acquaintance from high school who had stolen my bike, even after I overheard a girl from my dormitory tell her boyfriend I was a fat slob. No matter what I saw or heard, I failed to get the message. I was not fitting in." (p. 52-57)

> get upset and tell me to stop. But I wasn't doing it deliberately – it just happened – and many times I did not even realize I was doing it until someone pointed it out to me. … The same was true when I talked to myself. A lot of the time I did not even realize I was doing it. I sometimes find it very hard to think my thoughts and not say them out loud. Whenever I am absorbed in my thoughts, there is a lot of intensity involved and this affects my body; I can feel it tense. To this day I cannot stop my hands moving around and pulling unconsciously at my lips as I think to myself. When I talked to myself, it helps me to calm down or to focus on something. (p. 77)

> There were lots of things that I found difficult, like brushing my teeth. The scratchy noise of teeth being brushed was physically painful to me, and when I walked past the bathroom I would have to put my hands over my ears and wait for the noise to stop before I could do anything else. (p. 85-86)

In these two examples, Tammet explains that he has movements that non-autistics do not have. These movements help to calm him down and to cope with either the emotions he has or the environmental stimuli he encounters. This is exactly what De Jaegher (2013) describes about autistics' unique sense-making: through these unique or autistics-only movements, autistics reaffirm his or her sense of self in the (social) world and adapt to the environment.

Also, Grandin (2006) discusses several examples in which autistics cope with their sensory issues, such as visual and tactile over-sensitivities. These coping strategies can also

be understood as autistics' way to make sense of and to adapt to their environment, like De Jaegher suggests.

> Donna Williams has been greatly helped by Irlen tinted glasses, which filter out irritating color frequencies and enable her defective visual system to handle sharp contrast. The glasses stopped fractured visual perception. She is now able to see an entire garden instead of bits and pieces of flowers.[60] Tom McKean has less severe visual processing problems, but he finds that wearing rust-colored glasses with a purplish tint has stopped areas of high contrast from vibrating. Another woman with mild visual problems has also been greatly helped by rose-colored glasses; her depth perception improved, and now she can drive at night. (p. 73-74)

> From as far back as I can remember, I always hated to be hugged. I wanted to experience the good feeling of being hugged, but it was just too overwhelming. It was like a great, all-engulfing tidal wave of stimulation, and I reacted like a wild animal. Being touched triggered flight; it flipped my circuit breaker. I was overloaded and would have to escape, often by jerking away suddenly. … Many autistic children crave pressure stimulation even though they cannot tolerate being touched. … Parents used to report that

[60] The visual oversensitivity Williams has seems similar to the Gestalt problem of autism. If this is the case, then this phenomenon might suggest that the Gestalt problem in autism is due to visual oversensitivity and might be 'cured' by Irlen tinted glasses.

> their autistic children loved to crawl under mattresses and wrap up in blankets or wedge themselves in tight places, long before anyone made sense of this strange behavior. (p. 59)[61]

To sum up, the above first-person narratives from autism support the second claim of the enactive approach to autism: autistics' reduced flexibility in interactional coordination implies different sense-making and impedes their participatory sense-making with non-autistic individuals. All these above examples from autistic first-person narratives also confirm the first claim of the enactive approach: autistic experiences should be understood in terms of the way autistics make sense of the world, which includes elements such as perceiving, moving, and emoting, in addition to high-level cognitive capacities.

Indeed, narratives from autistic autobiographies support the enactive approach better than they do other accounts. Several autistic autobiographies suggest that most of the time, people with autism face social interaction problems because of sensorimotor

[61] Willey (1999) also includes a list of coping strategies for autistic sensory issues in her autobiography. See p. 155-159: Coping Strategies for Sensory Perception Problems for coping strategies on tactile, visual, auditory, food, and olfactory sensitivities.

problems[62] (Grandin, 2006; Willey, 1999; Tammet, 2007). For instance, people with autism are more sensitive to sensory stimuli and are more likely to be disturbed by lights, sounds, and tactile sensations that are within comfortable ranges for people without autism. Under those situations, people with autism simply shut down their sensory systems and cannot receive information from the people they are interacting with. This makes it impossible for people with autism to receive enough information to interpret what the person they are interacting with is communicating.

As I argued at the end of Chapter 3, the key to explain autistic social interaction problems is the sensory differences between autistics and non-autistics, rather than the lack of the capacity to understand other people. More specifically, as my arguments in Chapters 2 and 3 suggested, lacking the capacities to understand other people is not the reason why autistics have troubles understanding other minds. Rather, autistics do not lack the capacity but the materials, that is, similar sensory experiences, to understand people without autism. The enactive approach to autism successfully captures this crucial point from its compatibility with autistic first-person narratives, which the other accounts of

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[62] As Grandin (2006) suggests: "I am frustrated by the fact that some teachers and therapists still do not recognize the importance of sensory over sensibility. It must be difficult for them to imagine a totally different way of perceiving the world where sounds and lights are super intense. … Fortunately there are more books available now on sensory over sensitivity problems. Research by S. J. Rogers and others at the Department of Psychiatry, University of California at Davis clearly shows that autistic children have abnormal sensory reactivity. There were also more likely to have abnormal responses to taste and smell compared to children with other developmental abnormalities. Individuals who scream and tantrum every time they go into a large supermarket have the most severe problems with sensory oversensitivity. They probably feel like they are inside the speaker and the light show at a rock concert. Problems with sensory overload get worse when a person is tired. These individuals will need a quiet environment that is free of fluorescent lights and distractions in order to learn." (p. 82-83)

autism: the theory theory, simulation theory, and the interactive approach, fail to account for.

8 Evaluating the Enactive Approach to Autism: The Problems

However, despite the fact that the enactive approach incorporates social interactions into its explanations of autism and explains autistic social interaction problems better than do alternative accounts, I suggest that the enactive approach still does not go far enough. In particular, there are two interrelated problems for the enactive approach.

First, the enactive approach (De Jaegher & Di Paolo, 2007; De Jaegher, 2013) is methodologically behaviouristic, sacrificing discussion of the rich phenomenology and conscious experiences in social interactions, both in general and in autism more particularly. The enactive account of autism faces the problem of being behaviouristically limited because its explanations of autism focus on the behavioural level, rather than what is underneath, such as the underlying physiological states or the corresponding phenomenological states. This is an unfortunate aspect of the enactive approach, due to its explanatory focus on the physical coordination that results in sense-making. Even though the sense-making process might have its physiological and phenomenological aspect, this aspect was not mentioned in the original enactive approach. Indeed, the enactive approach aims to be more compatible with the autistic experiences, and by focusing on sensorimotor issues on autism, the enactive approach does successfully capture the autistic experiences better than other alternative accounts. However, even though the enactive approach is able to account for why autistics behave in a certain way (due to their need of sense-making),

this approach did not explain how and what would autistics feel under certain situations, and this information would provide further information why autistics behave in a certain way. In fact, De Jaegher and Di Paolo (2007) emphasizes the importance of addressing the issue of experiences for the enactive approach:

> Far from being an epiphenomenon or a puzzle – as it is for cognitivism – experience in the enactive approach is intertwined with being alive and enacting a meaningful world. As part of the enactive method, experience goes beyond being data to be explained. It becomes a guiding force in a dialogue between phenomenology and science, resulting in an ongoing pragmatic circulation and mutual illumination between the two (Gallagher 1997; van Gelder 1999; Varela 1996, 1999). (p. 488)

Nevertheless, it is far from clear how De Jaegher and Di Paolo's enactive view incorporates an account of experiences. This is why I suggest the original enactive approach is behaviouristically limited.

Second, a related problem is that the original enactive approach did not explain why participatory sense-making would generate social understanding, while seeming to take it for granted that participatory sense-making is a process that generates social understanding. To frame this question differently, the enactive approach did not explain why a signal is perceived as a social signal, but just assumes the "social-ness" of the social signal. For instance, this approach did not include the explanation of why a sound, e.g. "hello," is perceived as a meaningful and social sound in social encounters, while seeming to assume that the participatory sense-making process naturally generates the social meaning of this sound.

9 Conclusion

To conclude, the enactive approach explains autistic social interaction problems better by emphasizing sensorimotor issues, rather than the capacity to interact, as the interactive approach does. I have presented evidence from autistic first-person narratives to show that sensory similarities and differences are the key to explain why we are able to understand someone better while not others, and this feature is captured by the enactive approach but not the interactive approach to autism. Nevertheless, I still take issues with the enactive approach, mainly due to its problem of being behaviouristically limited. This problem of the original enactive approach motivates a novel version of the enactive approach that will be presented in the next chapter.

Chapter 5

Understanding the Autistic Mind: Enactivism and Emotions

1 Introduction

In Chapters 2 to 4 of this dissertation, I discussed how the theory theory, simulation theory, interaction theory, and the enactive approach each explains autistic social difficulties and tackles the problem of other minds. The conclusion of that discussion maintained that the enactive approach provides a better explanation of why autistics encounter social difficulties and how we understand other minds typically than the other three theories because it assumes a different understanding of (a) the location of the problem that results in difficulties in understanding other minds and (b) the fundamental problem of autism that results in autistic social difficulties.

First, the theory theory, simulation theory, and interaction theory suggest that the problem that causes difficulties in understanding other minds is located inside the individual, being supervenient on the individual's cognitive or sensorimotor deficits, while the enactive approach suggests that this problem is situated in the interaction between the individuals, being a function of the differences between the individuals, which does not so supervene. Second, the theory theory and simulation theory both imply that the fundamental problem in autism that results in autistic social difficulties results from cognitive deficits, while interaction theory suggests that it results from sensorimotor deficits. By contrast, the enactive approach suggests that the fundamental problem lies in the sensorimotor differences *between autistics and non-autistics*.

In this chapter, I continue this line of argument and further develop the enactive approach introduced in Chapter 4 by discussing the issue of emotion recognition in autism. I argue that emotion provides the key to understanding autistic social interaction problems and to developing the enactive approach in a more satisfactory manner. More specifically, I suggest a shift in the explanatory focus from perception and movement to emotion so that the enactive approach can avoid the problem of behaviouristic bias and thus expand to provide an enriched account of the folk psychological lives of autistic people that recognizes not only emotions, but narratives and self-understanding. Another advantage of concentrating on emotion is that it enables the enactive approach to explain many emotional traits of autism described both in Asperger's (1944/1991) and Kanner's (1943) first scientific characterization of autism and in first-person reports from autistics. An enactive account that focuses on emotion thus explains the fundamental problem of autistic social difficulties in more detail than do existing enactive views; it also suggests what can be done to expand autistic social experiences and emotions.

With the definition of emotions as the prelude (Section 2), the substantive discussion in this chapter consists of three parts. First, I investigate and support Asperger's and Kanner's suggestion that emotion is the key to understanding autistic social interaction problems by appealing to the perspective of first-person autistic reports (Section 3). Next, I illustrate an enactive account of autistic emotions (Section 4), and further develop my enactive account by including the explanation on autistic facial emotion recognition (Section 5). This part also serves as a response to Asperger's and Kanner's suggestion and to the first-person autistic perspective discussed in Section 3.

2 Defining Emotions

Before diving into my arguments, I shall first define emotion and emotion recognition to ground the discussion of this chapter.

As Gazzaniga, Ivry, and Mangun (2014) say in the classic textbook *Cognitive Neuroscience: The Biology of the Mind* (4th ed.), "Emotions are made up of three psychological components—a physiological response, a behavioural response, and a subjective feeling" (p. 437). This kind of characterization of emotions has a long history in philosophical thinking. As Ronald de Sousa (2014) says in his Stanford Encyclopedia of Philosophy article on emotion, "most of the great classical philosophers—Plato, Aristotle, Spinoza, Descartes, Hobbes, Hume—had recognizable theories of emotion, conceived as responses to certain sorts of events of concern to a subject, triggering bodily changes and typically motivating characteristic behavior".

Beyond the above general understanding of emotions, there is much disagreement and diversity in how philosophers and cognitive scientists conceptualize emotions. Emotions have a diverse connotation in addition to their various definitions and meanings, partially due to the fact that emotion is the topic that attracts many philosophical and scientific interests. For instance, there are different understanding of emotions with respect to their categorization, theoretical explanation, and ontology.

First of all, there are different categorizations of emotions. The one that is most widely accepted by the scientific community is the distinction between basic and complex emotions proposed by Ekman (1972, 1984). This distinction derives from Ekman's (1972) classic work, which posits a series of affective programs underlying putatively universal emotional expressions shared by people across cultures. These universal emotions are

named basic emotions, which include anger, fear, sadness, enjoyment, disgust, and surprise (Ekman, 1999). Emotions other than the basic emotions are called complex emotions, which are influenced by the culture in which these emotions are situated. Examples of complex emotions are contempt, shame, guilt, embarrassment, awe, amusement, excitement, pride in achievement, relief, satisfaction, and sensory pleasure (Ekman, 1999; Gazzaniga, Ivry, & Mangun, 2014).[63] Some philosophers and scientists suggest that a subgroup of complex emotions can be further categorized as self-conscious emotions, "which directly involve self-reflection and self-evaluation" (Tangney & Tracy, 2012, p. 446). Examples of such self-conscious emotions are shame, guilt, embarrassment, and pride.

Besides Ekman's (1972, 1984) categorization of basic and complex emotions, there are several other categorizations of emotions, such as Plutchik's (2001) wheel of emotions, which composes of eight basic emotions (admiration, amazement, ecstasy, grief, loathing, rage, terror, vigilance) and their derivative emotions, and Lövheim's (2012) three-dimensional model that categorize emotions according to three different neurotransmitters (dopamine, noradrenaline, serotonin) that regulate emotions. In addition, emotions can also have different dimensions, such as valence and arousal, approach or withdraw (Gazzaniga, Ivry, & Mangun, 2014).

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[63] In Greenwood's (2015) recent discussion, she suggests that basic emotions were evolved from reptilian brains and regulate basic physiological functions, while complex emotions are based on human cortex, are social emotions, and might require language. In addition, Greenwood (2015) suggests that this distinction of basic and complex emotions reflects other distinctions, such as nature vs. nurture and biology vs. culture.

Secondly, there are four main theories aiming to present a more refined version of what emotions are, involve, and consist of.[64] First, the evolutionary psychology approach suggests that emotions are our evaluations of objects and events in the world. In this way, emotions are our guides to avoid or pursue things that might decrease or increase our chance of survival (Arnold, 1960; Ekman, 1972; Lazarus, 1991). Second, constructivist theories understand emotions as social constructions, that is, a socio-cultural product developed by socio-cultural practices and acquired by the individuals through experiences (Averill, 1980; Parkinson, 1996). Next, cognitive theories suggest that emotions typically involve propositional attitudes. For instance, Nussbaum (2001) and Solomon (1980) identify emotions as judgments. Finally, feeling theories of emotion (James, 1884) suggest that emotions are a type of feelings that results from our physiological changes. That is, the feelings, such as happiness, that are triggered by our physiological changes (e.g. smiling), are emotions. A more recent version of feeling theories, the somatic marker theory (Damasio, 1999, 2003a, 2010), suggests a different understanding of feelings and emotions. That is, emotions are the physiological states, while feelings are the perception of these physiological states.[65]

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[64] See Greenwood (2015), especially Chapter 2 for a more detailed discussion of some of these accounts. See also de Sousa (2014) and Chapter 10 of Gazzaniga, Ivry, and Mangun (2014) for discussions of major theories of emotions.

[65] As Damasio (2010) explains, "Emotions are complex, largely automated programs of actions concocted by evolution. The actions are complemented by a cognitive program that includes certain ideas and modes of cognition, but the world of emotions is largely one of actions carried out in our bodies, from facial expressions and postures to changes in viscera and internal milieu…. Feelings of emotion, on the other hand, are composite perceptions of what happens in our body and mind when we are emoting. As far as the body is concerned, feelings are images of actions rather than actions themselves; the world of feeling is one of perceptions executed in brain maps" (p. 109-110).

Finally, there are also different views on the ontology of emotions. As de Sousa (2014) suggests, there are currently three major non-exclusive theories on the ontology of emotions. The first theory understands emotions as physiological processes and is accepted by almost all theorists of emotions. The second theory, which is part of the computational theory of mind, understands emotions as computational or functional states (Wright, Sloman, & Beaudoin 1996; Thagard, 2005; 2006). Third, dynamical systems theories understand the development and the transformation of emotions from the perspective of dynamic systems approach (Fogel, Nwokah, Dedo, Messinger, Dickson, Matusov, & Holt, 1992; Magai & Haviland-Jones 2002). In particular, "emotions are not states but self-organizing dynamic processes intimately tied to the flow of an individual's activity in a context" (Fogel et al., 1992, p. 122). Though the ontology of emotions has less relevance for the arguments in this chapter, I suspect that each of the above three accounts (physiology, computation, and dynamical systems) might be compatible with the enactive approach.

Next, for the theory of emotion, I suggest that a revised version of Damasio's somatic marker theory of emotion[66] and the enactive approach are readily integrative with each other. As I shall argue and elaborate in Section 4, Damasio's theory of emotion would

[66] When discussing the classification of emotions, Damasio (2010) mentions that there are universal emotions (i.e. Ekman's basic emotions), background emotions, and social emotions (i.e. complex emotions and self-conscious emotions). I suggest that Damasio's theory of emotion would be more compatible with the enactive approach if abandoning the distinction between universal emotions and social emotions. In addition, when briefly mentioning how we perceive feelings in others, Damasio (2010) seems to accept a version of the theory of mind account. In this case, I suggest to replace the theory of mind account with the enactive approach when explaining how we perceive feelings in others.

provide a mutually supportive understanding of the 'sense' that is being made in the participatory sense-making process. In addition, Damasio's theory of emotion would expand the enactive account to cover memory, feeling, consciousness, and the self. At the same time, the enactive approach complements Damasio's theory of emotion by appending how we understand and regulate other people's emotions and feelings and how our own emotions and feelings are regulated by social interactions.

Finally, although most of the scientific studies and the first-person reports from autism used in this chapter accept Ekman's distinction between basic and complex emotions, this distinction is not unproblematic. In fact, several persuasive arguments against, and promising alternatives to, that distinction have been proposed in the last few years.[67] I am sympathetic to the idea of discarding the distinction between basic and complex emotions, and suspect that the enactive approach is more compatible with abandoning this distinction. Nevertheless, since whether or not to abandon this distinction would not affect my arguments in this chapter, I shall still use this distinction to describe the problem of emotion in autism.

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[67] For instance, as Greenwood (2015) says: "More recently, however, these views have begun to be challenged. Griffiths (2003) and Griffiths and Scarantino (2009) acknowledge that some HCEs [complex emotions, or in Greenwood's term: higher cognitive emotions] may have simpler, basic forms and may profitably be discussed within a common theoretical framework. Rather more strenuously, Jason Clark (2010) argues that BEs [basic emotions] and HCEs are not distinct categories but serial homologues, which means, although Clark fails to claim this explicitly, that they do form a natural kind, and BEs are more basic. My own research also challenges the distinction between BEs and HCEs, albeit from an ontogenetic perspective. I argue that both BEs and HCEs evolve from the emotion precursors with which neonates are biologically preadapted and through exactly the same developmental mechanisms." (p. 12)

In this chapter, my discussion of autistic emotions focuses specifically on facial emotion recognition.[68] There are three reasons for this choice.

First, facial emotion recognition provides a more specific example to discuss how the enactive approach characterizes the emotion regulation process as a participatory sense-making process. In particular, I suggest that an enactive account of emotion can give us a better understanding of the role emotions play in participatory sense-making, and a better understanding of emotion and emotion recognition in autism.

Second, the dominant accounts of autistic emotions, such as the theory of mind account (e.g. Capps, Yirmiya, & Sigman, 1992; Heerey, Keltner, & Capps, 2003) and the interactive approach (e.g. Hobson, 2005) usually support their views with studies on facial emotion recognition.[69] In this way, facial expression recognition is an exemplar that highlights the contrast between how the enactive approach and other theories, such as the theory of mind account and the interactive approach, understand autistic emotions.

Third, facial emotion recognition is the paradigm case to study emotions. For examples, Ekman's (1972, 1984; Ekman & Friesen, 1970) finding of basic emotions resulted from studying his experimental subjects' responses to different facial expressions. Another more recent example is the finding that amygdala is a brain area that processes fear. This finding is supported by studies that compare the experimental subjects' brain activity with respect to photos with fearful and neutral facial expressions: amygdala's

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[68] In this chapter, 'facial emotion recognition' and 'facial expression recognition' are used interchangeably.

[69] I discuss these dominant accounts and their supporting studies in Sections 3 and 4 in Chapter 6, arguing that these studies are better explained by the enactive approach in Section 5 in Chapter 6.

activity increases when both seeing fearful faces consciously (Breiter, Etcoff, Whalen, Kennedy, Rauch, Buckner, Strauss, Hyman, & Rosen, 1996) and when the fearful faces were present so quickly that the experimental subjects are unaware of the presentation (Whalen, Rauch, Etcoff, McInerney, Lee, & Jenike, 1998).

3 Autistic Emotions: Basic Issues

In this section, I take up Asperger's (1944/1991) and Kanner's (1943) suggestion that emotion is central to understanding autism, a suggestion that has largely and perhaps ironically been overlooked or forgotten by the accounts of autism that we have so far considered.

Emotional deficiency is one of the central features in Asperger's (1944/1991) and Kanner's (1943) first documentation of autism. Basically, both Asperger and Kanner suggest that autistic children lack the normal range of emotions. Specifically, Kanner (1943) entitles his report "autistic disturbances of affective contact." And, Asperger (1944/1991) suggests this "impoverished emotionality" might be the cause of many behavioural problems in autistic children:

> They lack the displays of affection which normally make life with a small child so richly rewarding. One never hears that they try to flatter or try to be nice. Indeed, they often turn nasty when one tries to be nice to them. Their malice and cruelty too clearly arise from this impoverished emotionality. (p. 81)

Despite this diagnosis of impoverished emotions in autistic children, Asperger (1944/1991) suggests that these children are nonetheless "capable of strong feelings," rather than lacking feelings and emotions completely.

> Again and again, we have been surprised by the severe bouts of homesickness of autistic children when newly admitted to the ward. At first, this phenomenon did not seem to us to fit at all with the otherwise blatant signs of emotional poverty. … Autistic children suffer from homesickness much more severely. … This all lasts very much longer than the homesickness of normal children, until at last they too get used to us and start to feel happy under the inescapable structure and guidance that we impose. It is possible that an exceptional degree of bonding to the objects and habits of the home, broadering on the obsessional, causes these children to suffer so much at separation. … Nevertheless, the phenomenon of severe homesickness shows that autistic children are capable of strong feelings. (p. 83)

These remarks from Asperger suggest that autistic children are deficient in some but not all emotions and feelings. This suggestion leads to two further questions: 'what kind of "strong feelings" are autistic children capable of?' and 'what specifically are the "impoverished emotionality" and "disturbances of affective contact" that autistic children have?'.

More recent first-person reports from autistic authors confirm Asperger's (1944/1991) and Kanner's (1943) observations and help to partially answer the above two questions. For instance, the autistic author Temple Grandin (2006) suggests that autistic

emotions are simpler, or less developed, much like the emotions of a child. As Grandin (2006) states,

> Some people believe that people with autism do not have emotions. I definitely do have them, but they are more like the emotions of a child than of an adult. (p. 89)

More detailed descriptions of these less developed emotions in autism are given in the following examples Grandin (2006) discusses,

> At a conference a man with autism told me that he feels only three emotions, fear, sadness, and anger. He has no joy. He also has problems with the intensity of his emotions, which both fluctuate and get mixed up, similar to sensory jumbling. My emotions don't get mixed up, but they are reduced and simplified in some areas. The emotional jumbling described by this man may be like the sudden emotional changes that normally occur in two-year-old children. They can be laughing one minute and having a tantrum the next. The tendency to shift emotional states rapidly often occurs in autistic children at a later age, whereas older autistic children may have the emotional patterns of a younger child. (p. 93)

> My emotions are simpler than those of most people. I don't know what complex emotions in a human relationship is [sic]. I only understand simple emotions, such as fear, anger, happiness, and sadness. I cry during sad movies, and sometimes I cry when I see something that really moves me. But complex emotional relationships are beyond my comprehension. I don't

> understand how a person can love someone one minute and then want to kill him in a jealous rage the next. I don't understand being happy and sad at the same time. … As far as I can figure out, complex emotion occurs when a person feels two opposite emotions at once. Samuel Clemens, the author of *Tom Sawyer*, wrote that "the secret source of humor is not joy but sorrow," and Virginia Woolf wrote, "The beauty of the world has two edges, one of laughter, one of anguish, cutting the heart asunder." I can understand these ideas, but I don't experience emotion this way. (p. 91)

Note two features of these reports. First, in Grandin's descriptions of her own and the other autistic's emotions, there is a shared character, that is, autistics seem to experience only "basic" emotions (or simple emotions, in Grandin's term), such as happiness, anger, sadness, and fear. These simpler and less developed emotions in autism echo Asperger's (1944/1991) idea of "impoverished emotionality."

Second, in addition to having fewer varieties of emotion, Grandin (2006) mentions that she also has deficiency in "complex" emotions. Grandin (2006) specifies that the emotions she has problems experiencing are complex emotions, which guide human relationships. Even though she could have some ideas of these complex emotions, she does not experience these emotions. Grandin's deficiency in the emotions that guide human relationships exemplifies Kanner's (1943) notion of "autistic disturbances of affective contact." Overall, it seems that autistics generally have problems experiencing complex emotions but not basic emotions, despite some individual differences, such as the autistic man in the above report from Grandin does not experience joy or happiness, but only the other three basic emotions: anger, sadness, and fear.

Furthermore, Grandin (2006) suggests that her relationships with other people are guided by the intellect, instead of emotions.

> Yet, it has only been during the last two or three years that I have discovered that I do not experience the full range of emotions. My first inkling that my emotions were different came in high school, when my roommate swooned over the science teacher. Whatever it was she was feeling, I knew I didn't feel that way toward anyone. But it was years before I realized that other people are guided by their emotions during most social interactions. For me, the proper behavior during all social interactions had to be learned by intellect.[70] (p. 97)

> I still have difficulty understanding and having a relationship with people whose primary motivation in life is governed by complex emotions, as my actions are guided by intellect. … I relate better to scientists and engineers, who are less motivated by emotion. (p. 92-93)

From the above reports, it is clear that different emotionality in autistic people influences their social activities and relationships. This phenomenon re-enforces Kanner's (1943) notion of "autistic disturbances of affective contact".

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[70] This point resonates the two traits of autistic social interaction discussed in Chapter 2: lack of social intuitions and over-intellectualization.

In addition, Grandin (2006) confirms Asperger's (1944/1991) observation that autistics are capable of strong feelings, providing a brief, autobiographical elaboration of the observation:

> People with autism are capable of forming very strong emotional bonds. Hans Asperger, the German doctor after whom the syndrome is named, states that the commonly held assumption of poverty of emotion in autism is inaccurate. However, my strong emotional bonds are tied up with places more than people. (p. 92)

Grandin's comment that autistics' emotional bonds are simpler and place-specific fits well with Asperger's (1944/1991) explanation of why autistic children feel stronger homesickness. As discussed earlier, Asperger found that autistic children's home sickness seemed to be relieved when these children started bounding with the new environment and its schedule. Asperger thus suggests that autistic children's stronger homesickness might be due to their stronger bonding to objects and places, rather than people. This is a common observation that both Asperger (1944/1991) and Kanner (1943) mention in their reports repeatedly. Grandin's (2006) explanation of this common observation is that autistics lack the emotions that guide human relationships, and are thus more readily form bonds with objects and places than with people.

Even though the above investigation provides further information to the two questions of autistic emotions, 'what kind of "strong feelings" are autistic children capable of?' and 'what are the "impoverished emotionality" and "disturbances of affective contact" autistic children are facing?', a question remains unanswered: why do autistic children lack complex emotions or emotions that guide human relationships at the first place?

For the rest of this chapter, I expand the enactive account described in Chapter 4 to answer this question and its relationship to the preceding pair of questions. This explication also serves as a response to Asperger's and Kanner's call to give emotions a central role in understanding autism. After laying out my account of autistic emotions, I shall come back to re-examine the above first-person reports of autistic emotions and some recent scientific studies on autistic emotion.

4 Enactivism and Autistic Emotions

In this section, I shall first review the enactive approach to autistic emotions in the current literature. More specifically, I evaluate De Jaegher's (2013) and Shanker's (2004) enactive approach to autism and autistic emotions. At the same time, I shall present my enactive approach to autistic emotions, and answer the question of why autistic children lack complex emotions or emotions that guide human relationships at the first place. At the end of this section, I apply my account to explain Asperger's and Kanner's characterization of autistic emotions discussed in Section 3.

In "Embodiment and Sense-Making in Autism," De Jaegher (2013) sketches an enactive account of autism, suggesting that in order to understand how autistics make sense of the world, we need to understand how autistics move, perceive, and emote in a way that is different from non-autistics. However, De Jaegher's (2013) discussion focuses more on how moving and perceiving connect to participatory sense-making in autism, while only briefly mentioning the role of autistic emotions. Even though De Jaegher's (2013) discussion does not focus on emotions but on perception and movement, I suggest that the role of emotions in participatory sense-making should be stressed. In addition, as

discussed at the end of Chapter 4, by shifting the explanatory focus from perception and movement to emotion, the enactive approach would be able to avoid the problem of being behaviouristically limited.

More specifically, I suggest that it would be useful for the enactive approach to understand emotions as the personal significance we register of things in the external world (Damasio, 1999; 2010) or as the sense that we make about things in the external world. And, the corresponding physiological states of emotions are what underlie this personal significance or sense-making. Including this idea in the current enactive approach can avoid the problem of behaviouristic bias, which might occur if the enactive approach only focuses on describing coordinated bodily movements between the interaction partners. This idea of emotion also has an important implication for autism: Having fewer emotions means having fewer categories to register the significance of things in the world and less complicated narratives, which consist of a network of personal significance we register to things and events around us (Damasio, 1999; 2010; Feinberg, 2009). Nevertheless, I shall argue from the case of autism that it is possible to expand the complexities of one's emotions and one's narratives.

As we have seen, De Jaegher's view focuses on describing the peculiarity of autistic sense-making. However, since autism is a developmental disorder, it is important to recognize how participatory sense-making operates in the autistic developmental process. Shanker's view supplies the developmental aspect of the enactive approach by describing how autistic embodiment connects to autistic emotional development, as I shall argue as follows.

According to Shanker (2004; Greenspan & Shanker, 2004), emotions are formed and developed in the interaction between the baby and the caregiver; and, there is no genetically pre-determined plan of emotional development. As Greenspan and Shanker (2004) suggest, "Without learning and practice, the baby will remain locked into global emotional states (catastrophic emotions) and fixed action" (p. 32).[71] More specifically, the baby's emotional signalling, emotional expression, and emotional regulation develop through co-regulated interaction between the baby and the caregiver.[72] These interactions and development, which are mixed with the development of intentions, later lead to the development of symbols and language in the baby (Greenspan & Shanker, 2004). I suggest that this co-regulated process described by Shanker is exactly the participatory sense-making proposed by the enactive approach to social cognition (De Jaegher, 2009, 2013; De Jaegher & Di Paolo, 2007), due to the matching characterizations of the co-regulated interaction process described by both accounts. In this way, Shanker's view expands the enactive approach on the developmental front, which should be an important aspect of the enactive approach to autism, given the nature of autism as a developmental disorder.

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[71] This point echoes Grandin's (2006) description of an autistic man whose emotions are less developed and mixed up with disrupted sensations.

[72] In a more specific example, Shanker (2004) suggests that several factors are relevant in an infant's development of a certain smile: "the infant's state of physiologic arousal; the care-giver's emotional state; the activity in which the infant is engaged with her caregiver; the environment in which this activity is taking place; the direction of the infant's gaze; other muscular contractions in the infant's face; the type of smile on the caregiver's face (p. 224)". These factors give an idea of what are involved in the co-regulation between the infant and the care-giver.

In the case of autism, Shanker (2004) suggests that autistic children's sensory problems prevent these children from engaging in sufficient social interactions to develop a full range of emotions. As Shanker notes, this proposal is supported by several studies:

> Dawson, Spencer, and Galpert showed that co-regulated interactions between infants at risk of developing autism and their caregivers are jeopardized because children withdraw in order to reduce arousal created by social interaction (1990). Hobson has shown that deficits in facial expressions of affect may further exacerbate problems in social interactions and the development of intersubjectivity (1986a, 1986b, 1989). Deficits in facial expressions of affect may also impair a caregiver's responsiveness to child, thereby further undermining co-regulated affective interactions (Dawson et al. 1990), and interfering with opportunities for the caregiver to imitate and enhance infant's facial expressions, which may further impair infant's affective development (Malatesta and Izard 1984). Finally, deficits in facial expressions of affect could impair the shared gaze interactions needed for affective development (Mundy and Sigman 1989). (Shanker, 2004, p. 226)

In addition to these co-regulation problems, autistic children's sensory problems arise in the second year of life, causing them to avoid sensory stimuli, many of which are socially significant. This avoidance prevents autistic children from gaining further interactions with their caregivers (Shanker, 2004). Given that these interactions are essential to develop social skills, feelings, emotions, thoughts, and linguistic abilities, lacking these interactions also explains why autistic children are less developed in these aspects.

To sum up De Jaegher's and Shanker's views: both of them seem to suggest that many autistic problems, such as restricted emotions, are not genetically determined but result from the restricted social interactions autistics have had since birth. Nevertheless, it is not clear from either view whether, with the proper environment, it is possible for autistics to further develop their emotions. In other words, both De Jaegher and Shanker explain why there is a problem in autistic emotions, but De Jaegher does not specify whether it is possible to avoid this problem or how to fix it, while the intervention proposed by Shanker focuses on language development and social interactions in general.[73] I suggest that having a more detailed description of the emotional regulation process, such as facial emotion recognition, will help answer this question; I shall present my account of facial emotion recognition in the next section. In addition, I shall argue later in this section that it is possible for autistic children to expand emotions later on in their life, given proper social interactions and sensorimotor conditions.

I can now present my answer to the question of why autistic children lack the complex emotions or emotions that guide human relationships at the first place. First of all, I agree with Shanker (2004) that sensorimotor problems prevent autistics from engaging in social interactions that are sophisticated enough for developing complex emotions in the

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[73] There is an intervention program for autistic children called Floortime, which was proposed by Greenspan and adopted by scientists and philosophers, including Shanker, into what is named Developmental Individualized Relationships-based intervention. Some preliminary studies found that this intervention had improved autistic children's social interactions (Casenhiser, Shanker, & Stieben, 2011) and language function (Casenhiser, Binns, McGill, Morderer, & Shanker, 2015). Given the integration between emotions, language, and social interactions in Greenspan and Shanker's (2004) view, it is likely that autistic children's improvement in language function and social interactions also implies further development of their emotions.

first place. I suggest that it is also sensorimotor problems that prevent autistics from forming complex emotions when interacting with non-autistics later on in their lives. This explains why autistics have difficulties experiencing these complex emotions themselves and recognizing complex emotions in others, since both require engaging in social interactions of a certain complexity.

Second, if sensorimotor problems are what prevent autistic children from developing complex emotions, one follow-up question would be when autistic children start having problems developing emotions, especially complex emotions. For this question, I suggest that the answer lies in the time when autistic children's sensorimotor issues start to interfere their social interactions and the time when typical children start to develop complex emotions. According to Fox, Reeb-Sutherland, and Degnan (2013),

> … infants display distress and pleasure at birth, but only display joy, sadness, and disgust around 3 months of age, anger around 4 months of age, and fear around 7 months of age (Lewis & Michalson, 1983). … the emotions of shame, guilt, embarrassment, and pride … emerge later in the second and third years of life (Lewis, 1992). (p. 18)

Given this suggestion, it is likely that most children would develop their basic emotions before 7-8 months of age, and then start to develop complex emotions after 8-9 months of age, moving on to develop self-conscious emotions between 24 and 36 months of age.

When we apply this timeline of emotional development to the case of autism, it is easy to see why autistic children's sensorimotor problems would interfere their emotional development, give these times are also the times when autistic children start to exhibit sensorimotor problems. In particular, as Gallagher (2004) suggests, autistic children have

problems in primary intersubjectivity, which includes ID and EDD[74] and develops from birth to 9 months. If an autistic child has sensorimotor problems that lead to defective ID and EDD, it is likely that this autistic child would also have problems developing basic emotions. In addition, autistic children who have problems in secondary intersubjectivity or SAM, which develops around 9-18 months after birth, would have problems developing complex emotions and also self-conscious emotions.

Furthermore, as Shanker (2004) suggests, autistic children's sensory problems between 12-24 months make them avoid sensory stimuli and prevent autistic children from gaining further interactions with the caregivers. Since 12-24 months after birth is also the time a child starts to develop complex emotions, as discussed above, it is easy to understand why most autistic children have problems developing complex emotions. However, it is still likely that some autistics would have problems developing basic emotions as well. In one of the examples discussed by Grandin (2006) an autistic man she met at a conference reports having only fear, sadness, and anger, but not joy. In this case, I suggest it is likely that this autistic man's sensorimotor problems manifest earlier so that it interferes the development of even basic emotions.

I now discuss Asperger's and Kanner's first characterization of autistic emotions to present another aspect of my view on autistic emotions. In this discussion, I also apply my

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[74] ID (Intentionality Detector), EDD (the Eye Direction Detector), and SAM (the Shared Attention Mechanism) are the three components of Baron-Cohen's (1995) mindreading system in addition to the theory of mind mechanism (ToMM). These notions were first introduced in Section 4 of Chapter 2.

proposal that a helpful direction for the enactive approach to emotions to take is to understand emotions as personal significance.

In Asperger's (1944/1991) and Kanner's (1943) description, autistic children have simple but strong feelings, such as homesickness. To explain these simple yet strong feelings in autistic children, I suggest that autistic children have stronger feelings or emotions because they have fewer emotions. Since autistic children have fewer emotions, they have fewer emotional categories to register significance. At the same time, if it is fundamental for each individual human being, including autistic children, to maintain a certain level of significance, then autistic children's fewer emotional categories provide a certain constraint, and one solution to this constraint is to form stronger emotional bonds drawing on fewer emotions. In other words, this trade-off between the diversity and the strength of the emotional bonds autistic children form explains why even though autistic children have simpler or fewer emotions, their emotions are stronger.[75]

In addition, as Grandin suggests, autistics' less developed emotions are similar to those in younger children. Combining this comment from Grandin with the emotional trade-off I propose, we can project that the process of the typical emotional development is to diversify the child's emotional varieties both in kinds and in degrees, so that the child can form various kinds and degrees of personal significance toward things and people around her. Furthermore, since the emotional states are the physiological or embodied

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[75] At the same time, the opposite would not be the case: that having strong feelings limits the number of categories one has to describe emotional experiences. This is because, in the somatic marker theory of emotions, the feelings are associated with certain events, objects, and people, and are the "results" of the interactions with these events, objects, and people.

state in the enactive approach I argue for, this understanding of the development of emotion echoes my suggestion that it is possible for autistics to further develop their emotions by regulating their sensorimotor interactions with the external world.

Another feature of autistic emotions in Asperger's (1944/1991) and Kanner's (1943) discussions is that autistic children seem to form stronger bonding to objects than to people. I suggest that this feature can be explained by autistic oversensitivity as well. First of all, it is likely that people are sensorily overwhelming for autistics to deal with, give that autistics usually find that people's eye contact and mouth movements present more information than they can deal with. This phenomenon can also be explained by the fact that autistics require more time to process sensory information, as discussed in Chapter 4. In this way, since it is less easy for autistics to successfully 'make sense' of other people, it is less likely that they would form emotional bonding with people. Secondly, given that autistics have fewer emotions, and lack especially those emotions that require complicated social interactions to form, due to their sensory oversensitivity, autistic sensory oversensitivity prevents autistics from forming both complex emotions and bonding with people. By contrast, since compared to people, objects are less mobile and their motions are easier to predict, it is thus easier for autistics to make sense of and bond with objects.[76]

[76] However, many scientific and first-person reports suggest that autistics usually have stronger bonding with their close family members but find it difficult to bond with other people. This might be due to the fact that close family members of autistics have better knowledge about how autistics interact with other people and thus interact accordingly to bond with their autistic family members.

5 The Enactive Approach to Autistic Facial Emotion Recognition

In this section, I expand my view by analyzing facial emotion recognition in general and facial emotion recognition in autism. First of all, I analyze the notion of facial emotion recognition and suggest that by using the term 'recognition,' one would already be favouring the theory of mind approach. Alternatively, I propose to understand facial emotion recognition in terms of participatory sense-making and suggest that 'sense-making' is a better alternative than 'recognition' when describing the process of recognizing others' facial expressions. Next, I explain the issue of facial emotion recognition in autism and apply the enactive approach to address this issue.

Facial emotion recognition involves recognizing others' emotional states from their facial expressions. This description assumes the distinction between external facial expressions and internal mental states (Zahavi and Parnas 2003), and thus requires an inference from the external facial expression to the internal mental state. I suggest this understanding of facial emotion recognition would already be favouring approaches such as the theory of mind approach.

By contrast, in a participatory sense-making process, though one still recognizes or 'makes sense' of the other's facial expressions, this sense-making is integrated in a series of sense-making processes. In this series of sense-making processes, one interacts, regulates, and is regulated by one's interaction partner and the interaction process, while facial emotion expression is part of this interaction process. More specifically, one's facial expression and one's interaction partner's facial expression are both the results and the agents of the participatory sense-making.

For instance, if A is about to smile, while A's interaction partner B is about to cry, B's facial muscle movements are likely to regulate or change A's facial muscle movements and A's physiological states that underlie these facial muscle movements and corresponding emotions. And, through a series of back and forth between both partners' facial muscle exchange and regulation, both interaction partners might reach facial expressions that are different from the ones they originally were about to have. For instance, A might have a neutral facial expression and B might have a sad facial expression in the end. However, it is likely that throughout this above interaction between A and B, A can recognize the change of B's emotional state (from very sad to sad), and so does B (from happy to neutral in A). In this way, the recognition of facial expression is a series of mini-interaction and sense-making between A and B.

Thus, "recognition" would be a misleading word to describe these interactions and sense-making processes, since recognition implies inference, which might not happen or happens unconsciously in these interactions and sense-making processes. Alternatively, sense-making should be a better word to describe the 'recognition' here, since sense-making is both the result of the regulation and the initiator of further regulation between both interaction partners. In fact, both De Jaegher's and Shanker's enactive approaches share this same 'interactive' feature of describing social interaction and emotional communication. For instance,

> The consequence of these developments for social understanding—and here we come to the concept of *participatory sense-making*—is that, when we engage in interaction, not only the participants, *but also* the interaction process as such modulates the sense-making that takes place. This means

> that intentions can be truly understood as generated and transformed interactionally. Sometimes, it is impossible to say who is the 'author' of the intention, whether it be an emotion, a thought, a belief, or something else. Interacting with each other thus opens up new domains of sense-making that we would not have on our own. There are, moreover, degrees of participation; we sometimes participate a lot (joint meaning-making) and sometimes minimally (one-sided coordination, where, for instance, we point out an object or an idea to someone). (De Jaegher, 2013, p. 7)

> Whereas Cartesianism construes emotional communication as a linear process of information transmission in which agents encode and decode affective messages, a dynamic developmental model sees emotional communication as a co-regulated interactive process in which an agent's affects and intentions emerge (Shanker and King 2002). (Shanker, 2004, p. 228)

Next, I apply the above analysis of facial emotion recognition to the case of autism, suggesting that sensory oversensitivity is the fundamental cause of autistics' problems of recognizing and experiencing complex emotions in everyday interactions.

First, sensory oversensitivity prevents autistics from engaging in social interactions that help to make sense of others' facial expressions. For instance, studies seem to suggest that autistics have problems processing information from human facial expressions because human facial expressions present more sensory information than those autistics are able to process. In Greenspan and Shanker's (2004) discussion of Gernsbacher's study,

autistics seem to be easily overwhelmed by eye signals, which usually carry more information about emotions than other sources, e.g. mouth signals. In Gernsbacher's study, autistic individuals show abnormal brain imagining results when viewing human faces because they were not looking at the faces. However, when being encouraged to view the human face in this same study, autistic individuals do have the expected brain imaging. In addition, when being encouraged to view the human face in the study, autistic individuals also shows physiological stress response. This shows that autistics are hyper-sensitive, rather than hypo-sensitive, to the sensory information from human faces.

I suggest that this oversensitivity prevents autistics from focusing on others' facial muscle movements or facial expressions, which would otherwise help autistics make sense of the corresponding emotions of these facial expressions. In addition, sensory oversensitivity also prevents autistics from engaging in social interactions that are complicated enough to develop complex emotions. For instance, as discussed in Section 4, Shanker (2004) suggests that autistics children's sensorimotor problems prevent both autistic children and the care-givers from engaging in the co-regulated process that is needed for autistic children to express certain facial emotions and to develop the corresponding emotions. And, the lack of these corresponding interactions to form complex emotions makes autistics lack experience and knowledge of complex emotions. Together, this lack of previous experience and knowledge of complex emotions and sensory oversensitivity contribute to autistics' problem of recognizing and experiencing complex emotions.

My next proposal is that from the perspective of the enactive approach, it is possible to expand autistic emotions after the normal developmental stage of emotions,[77] given appropriate interactions. Since for the enactive approach, autistics fail to develop more sophisticated emotions because their sensory oversensitivity prevents them from engaging in appropriate social interactions that underlie more sophisticated emotions, I suggest that if it is possible to reduce or manage sensory oversensitivity in autistics, it is possible for autistics to engage in appropriate social interactions to further develop their emotions.

Indeed, this suggestion is confirmed by many autistic first-person narratives. For instance, Grandin (2006) created the "squeeze machine," which is a device she can fit her body into two large paddings and control how much her body would be 'squeezed' by the paddings,[78] to help herself gradually adapt to different intensity of tactile sensation. And, this adaptation helps Grandin experience emotions that are related to human relationships and that she did not experience before.

> From the time I started using my squeeze machine, I understood that the feeling it gave me was one that I needed to cultivate toward people. It was clear that the pleasurable feelings were those associated with love for other people. (p. 84)

In addition, Grandin (2006) mentions that the range of emotions she experiences was also modified by her antidepressant medication:

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[77] As discussed in Section 4 of this chapter, complex emotions usually develop after 8-9 months of age, and self-conscious emotions usually develop after 24 or 36 months.

[78] After Grandin's invention, there are commercial versions of the "squeeze machine" sold as a sensory therapy device for autistic children.

> The intense fear and anxiety I used to experience has been almost eliminated by the antidepressant medication I've been on for the last thirteen years. The elimination of most of my fears and panic attacks has also attenuated many of my emotions. The strongest feeling I have today is one of intense calm and serenity as I handle cattle and feel them relax under my care. The feeling of peacefulness and bliss does not dissipate quickly like my other emotions. It is like floating on clouds. I get a similar but milder feeling from the squeeze machine. (p. 91)

Grandin's antidepressant medication brings her the feeling of intense claim and serenity, or of peacefulness and bliss, which is a feeling different from the basic emotions (fear, anger, happiness, and sadness) she said she only had.[79] Another example is from Willey (1999), who mentions that she tried to exhibit a variety of emotions on the theatre stage and these emotions are what she was unable to have in real life. Even though Willey did not explain the details of this incidence, I suspect that she was able to try these emotions because the theatre stage provides a slower, repeatable, and possibly less sensory-stimulated social interaction environment for her. Similarly, because of Willey's own experience of sensory oversensitivity, she was able to prevent her autistic daughter from having too much overstimulation. In this way, her autistic daughter can enjoy more experiences without

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[79] In this passage, Grandin also mentions that she used to have anxiety, which is not a basic emotion, either. It would be interesting to investigate whether Grandin in fact has more emotions than those she can recognize and whether she simply cannot recall those emotions when she wrote that she only has basic emotions. One underlying philosophical issue of these questions is autistic self-awareness. See Frith and Happé (1999) and McGeer (2004) for the discussion on autistic self-awareness.

being burned out by sensory oversensitivity so fast.[80] These first-person reports show that it is possible for autistics to expand their social interactions and thus further develop their emotions, even after the typical developmental stage of emotions, as long as appropriate social interactions are provided.

Next, as De Jaegher (2013) suggests, one of the reasons why autistics were not able to have smooth social interactions with non-autistics is because autistics require longer periods to process sensory and motor information.[81] Thus, I conjecture that if we can slow down the social interactions for autistics, it will be possible for autistics to engage in complex social interactions that underlie complex emotions. At the same time, I suspect that this different speed of sensorimotor processing between autistics and non-autistics explains why it is usually difficult for non-autistic parents to interact with autistic children in a way that enables autistic children to develop their complex emotions. By contrast, even though Willey (1999) did not mention whether her autistic daughter is more emotionally complex than other autistic children raised by non-autistic parents, if the above conjecture is correct, then Willey's autistic daughter could be more emotionally complex than other autistic children raised by non-autistic parents, since Willey knew what would make a social interaction smoother for an autistic person.

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[80] A theater in the United Kingdom that tries to reduce sensory stimuli so that autistics can enjoy theatre shows as well. See Trueman (2016).

[81] "… people with autism find it easier to perceive emotion in moving displays of faces when the images are shown slowed down (Gepner et al., 2001)." (De Jaegher, 2013, p. 9)

Chapter 6

Emotion-Enriched Enactivism and Scientific Studies

1 Emotion-Enriched Enactivism

Before diving into the science of autistic facial emotion recognition, I shall first sum up my proposal in the last chapter. I have proposed an enactive approach to autistic facial emotion recognition. This proposal is an enactive account since it suggests that autistics fail to develop complex emotions because the sensorimotor differences between autistics and non-autistics prevent them from engaging in proper social interactions that help to develop complex emotions. In particular, when we understand emotions as physiological states, as I suggested, it is clear why social and sensorimotor interactions are necessary for the development of emotions: when we interact with other people, we co-regulate each other's emotional and underlying physiological states. In the case of autism, the sensorimotor differences between autistics and non-autistics prevent autistics from engaging in certain social interactions that would help develop certain emotional and physiological states in autism. This explains why autistics fail to develop certain emotions, such as complex emotions. However, as I suggested earlier, it is still possible for autistics to develop their emotions further, given proper sensorimotor conditions or social interactions.

The above proposal combines the original enactive approach (De Jaegher, 2009, 2013; De Jaegher & Di Paolo, 2007) and Damasio's somatic marker theory of emotions (Damasio, 1999, 2003a, 2010). There are two advantages of doing so. First, doing so includes the descriptions of the internal states to the enactive approach thus avoids the

problem of behaviouristic bias. Second, Damasio's somatic marker theory of emotions understands feelings as being conscious of emotions. As Damasio (2010) explains,

> Emotions are complex, largely automated programs of *actions* concocted by evolution. The actions are complemented by a *cognitive* program that includes certain ideas and modes of cognition, but the world of emotions is largely one of actions carried out in our bodies, from facial expressions and postures to changes in viscera and internal milieu.… Feelings of emotion, on the other hand, are composite *perceptions* of what happens in our body and mind when we are emoting. As far as the body is concerned, feelings are images of actions rather than actions themselves; the world of feeling is one of perceptions executed in brain maps. (p. 109-110)

This understanding of emotions and feelings enables the enactive approach to describe emotions from the first-person perspective as reports of conscious experiences. Third, the enactive approach supplements the characterization of social understanding and of the co-regulation of emotions to Damasio's theory, which focuses more on describing emotions at the individual level.

In this chapter, I review the science of autistic facial emotion recognition (Sections 2 to 5), and evaluate these studies from the perspective of the enactive account I proposed (Section 6). The discussion in this chapter thus serves two functions. First, the scientific studies discussed can be viewed as a test for the version of the enactive account that I proposed. Second, I shall argue that my enactive account explains the scientific studies on autistic emotions better than the alternative accounts I argued against from the previous chapters, especially the theory of mind account and the interactive approach.

2 The Science of Autistic Facial Emotion Recognition

Scientific studies of autistic emotion recognition indicate something quite different from Grandin's suggestion (2006) that autistics generally have problems with complex emotions but not basic emotions. These studies can be distinguished into two main groups.

The first group of scientific studies suggest that autistics might not lack all complex emotions, but only self-conscious emotions. This group of scientific studies usually explain autistic emotional problems with a theory of mind deficit (Capps, Yirmiya, & Sigman, 1992; Heerey, Keltner, & Capps, 2003) or a problem in interpersonal relatedness (Hobson, 2005). In the second group of scientific studies, it is shown that not only autistics, but also parents of autistic children and typically developed individuals with autistic traits, have difficulty recognizing basic emotions. This second group of studies provides counter-examples not only to the studies of first group, but also to the explanations from the theory of mind and interpersonal relatedness.

After reviewing two groups of scientific studies, I shall discuss why there is a conflict between the science of autistic facial emotion recognition and first-person autistic narratives, and how to resolve this conflict.

3 Autistic Self-Conscious Emotions and the Theory of Mind

Two main studies are usually used to support the case that autistics have difficulties recognizing self-conscious emotions, but not other complex or simple emotions.

The first study is from Capps, Yirmiya, and Sigman (1992). This study shows that when compared with controls, autistic children with normal IQ generally do not have problems labeling basic and complex emotions in pictures, but have some difficulties

describing their experiences of self-conscious or socially derived emotions, such as pride and embarrassment. This study consists of two parts. In the first part, eighteen high-functioning autistic children and fourteen typically developing children are asked to describe their experiences of happiness, pride, sadness, and embarrassment. The results show that autistic children are less able to provide instances that separate their experiences of pride and embarrassment (internal and controllable) from those of happiness and sadness (external and uncontrollable). When autistic children describe their experiences of pride and embarrassment, most instances they provide are external and uncontrollable. In other words, autistic children seem to have problems separating experiences of pride and embarrassment from those of happiness and sadness.

In the second part of this study, the same children are shown eight photographs of different facial emotions[82] one by one and asked to identify what emotion was depicted in the photographs with the prompt question "Can you tell how the boy feels by what's going on and how he looks?". The study found that autistic children in general do not have problems labeling basic and complex emotions in the photographs, when compared to typically developing children.

Combining the above two studies, the authors conclude that autistic children's problems of emotions are specific to self-conscious or socially derived emotions, but not basic or complex emotions. To explain this result, the authors suggest that theory of mind impairment in autism plays a role in this specific deficit, due to the link between

[82] The authors did not provide a list of these eight emotions, but only mentioned that this list includes both basic and complex emotions.

understanding complex emotions, metarepresentation, and the theory of mind. This suggestion was further elaborated and investigated in the next study from Heerey, Keltner, and Capps (2003).

Heerey, Keltner, and Capps's (2003) study shows that autistic children have difficulty recognizing self-conscious emotions (embarrassment, shame) but not non-self-conscious emotions (anger, contempt, disgust, fear, sadness, happiness, surprise). More specifically, twenty-five children with high-functioning autism or Asperger syndrome and twenty-one typically developing children[83] are shown nine colour photographs with a male exhibiting nine different facial expressions (anger, contempt, disgust, embarrassment, fear, happiness, sadness, shame, and surprise), then asked either to choose an emotion word from a list of ten (anger, contempt, disgust, embarrassment, fear, happiness, neutral, sadness, shame, and surprise) or to generate labels to describe the emotions depicted in the photographs. The result shows that compared to controls, autistic children generally have difficulties labeling photographs with self-conscious emotions, but not with non-self-conscious emotions.

To interpret these study results, the authors suggest that autistics' problems of recognizing emotions are specific to self-conscious emotions, but not complex emotions. For in this study, autistic and non-autistic children have very similar performance in recognizing contempt, which is a complex facial expression. Also, the study found that autistic and non-autistic children are equally good at identifying non-self-conscious emotions (anger, contempt, disgust, fear, sadness, happiness, surprise). The authors thus

[83] The participants of this study are from 8- to 15-year-old.

concluded that autistic children should not have problems recognizing complex facial expressions and other emotions, but only self-conscious emotions. To explain their findings, Heerey, Keltner, and Capps (2003) suggest that because recognizing self-conscious emotions involves "the understanding of social norm violations and negative social evaluations, both important aspects of ToM" (p. 398), ToM deficit in autistic children is the reason why these children have difficulty identifying self-conscious emotions in other people.

4 Autistic Self-Conscious Emotions and Interactionism

By contrast, though agreeing with the theory of mind account's claim that autistic children have problems recognizing self-conscious emotions, rather than complex emotions, interactionist Hobson (2005) disagrees that the theory of mind deficit is the explanation. According to Hobson (2005), an interpersonal relatedness problem, rather than a theory of mind deficit, is a more fundamental explanation for why autistics have difficulties in understanding and expressing self-conscious or other-toward emotions[84]. As Hobson explains,

> Bosch (1970) remarked how the child with autism often seems to lack a sense of self-consciousness and shame and to be missing something of the "'self-involvement,' the acting with, and the identification with the acting

[84] Hobson (2005) finds that autistic children generally have problems in guilt and embarrassment, but not the case for jealousy, which is a self-conscious emotion. To explain this, Hobson suggests that though jealousy might indicate the existence of "interpersonal relationships" in autistic children, these children might still lack "interpersonal *relatedness*" (p. 417). Further, he suggests that jealousy in autistic children might be some biological mechanism of attachment.

> person" (p. 81). In my view, this processing of identifying with others is critical in establishing the kinds of inward-facing attitudes that come to be experienced as guilt and other self-conscious emotions; also in my view this is an area of basic impairment in autism. (p. 414)

To further explain this autistic deficit in interpersonal relatedness, Hobson reviews cases of atypical autism, such as congenitally blind children[85] and Romanian orphans[86], and suggests that autism, whose essence is the deficit in establishing interpersonal relatedness, might be (partially) caused by the deficit in sensory perceptions and the abnormalities of interpersonal interactions, which provide materials to establish interpersonal relatedness.

When establishing the claim that autistics have problems recognizing self-conscious emotions, but not complex emotions, Hobson (2005) refers to several studies on autistic self-conscious emotions, such as Capps, Yirmiya, and Sigman's (1992) study discussed above. In addition, Hobson discusses a review from Kasari, Chamberlain, and Bauminger (2001), which focuses on three self-conscious emotions, pride, embarrassment, and guilt, and collects data from interviews with older high-functioning autistic children. In this review, the authors suggest that these self-conscious emotions emerge later or emerge less

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[85] For instance, studies from Brown, Hobson, Lee, and Stevenson (1997) and from Hobson, Lee, and Brown (1999) suggest that congenitally blind children's social impairments might due to their visual impairments.

[86] In Rutter, Andersen-Wood, Beckett, Bredenkamp, Castle, Groothues, Kreppner, Keaveney, Lord, O'Connor, and the English and Romanian Adoptees (ERA) Study Team's (1999) study, Romanian orphans who had been placed in orphanages early in the first year of life and thus lacked sufficient social interactions had developed autistic-like traits and social impairments. However, after these children moved to the United Kingdom in their first or second year and started to have social interactions like an ordinary child, the autistic-like traits and social impairments started to disappear when these children were around 4- to 6-year-old.

readily in autistic children because of their deficits to engage socially. Further, Hobson (2005) finds support for his view from a study by Chidambi, Hobson, and Lee (2003). Similarly, this study shows that autistic children generally have problems expressing and recognizing three self-conscious emotions, pride, guilt, and shame.[87]

5 Autistic Problems of Recognizing Basic Emotions

Contrary to what the above studies and theories suggest, several studies show that not only autistics, but also parents of autistic children and typically developed individuals with autistic traits, have problems recognizing basic emotions. Given the results of these studies, the problem of autistic emotions shall be framed differently from what the theory of mind account and the interactive approach suggest. In what follows, I shall first review three of such studies, then in Section 6, come back to these studies' implications for autistic emotions.

The first study is from Sachse, Schlitt, Hainz, Ciaramidaro, Walter, Poustka, Bölte, and Freitag (2014). This study shows that compared to schizophrenic individuals and typically developed controls, autistic individuals generally have difficulties recognizing basic and complex emotions. The participants of this study consist of twenty-two high-functioning autistic individuals, nineteen schizophrenic individuals, and twenty controls. First, in the task of basic emotions, participants are shown fifty black and white

[87] This study consists of three parts: In the first part of the study, the authors interview parents about autistic children's expression of these three emotions. Next, autistic individuals are shown "videotape clips of enacted scenarios" to test their capacity in identifying these three emotions. Finally, the authors interview the autistic participants and try to "elicit expressions of pride and mild guilt in the children".

photographs of faces and forty black and white photographs of the eye region, including seven different facial expressions (sadness, fear, anger, disgust, happiness, surprise, neutral) (see Figure 6.1) and asked to choose an emotion that best describe the person in the pictures. This task is without time limit. Next, in the task of complex emotions, the experiment participants are shown twenty-eight pictures of the eye region (see Figure 6.2) and asked to select one out of four words that best describe the person in the photographs. The authors suggest that the second task is considered a task of complex emotions, since it only showed the eye region and emotions were complex. The results show that autistic individuals' performance in both of the above two tasks was worse compared to the other two groups, schizophrenic patient and typically developed individuals.

Figure 6.1. Examples of the task to recognize simple facial emotions from (a) the face or (b) the eye region. Adapted from "The Development and Evaluation of a Computer-Based Program to Test and to Teach the Recognition of Facial Affect," by S. Bölte, S. Feineis-Matthews, S. Leber, T. Dierks, D. Hubl, and F. Poustka, 2002, *International Journal of Circumpolar Health, 61*(Suppl. 2), p. 63.[88]

[88] This article is the methodology source cited by Sachse et al. (2014).

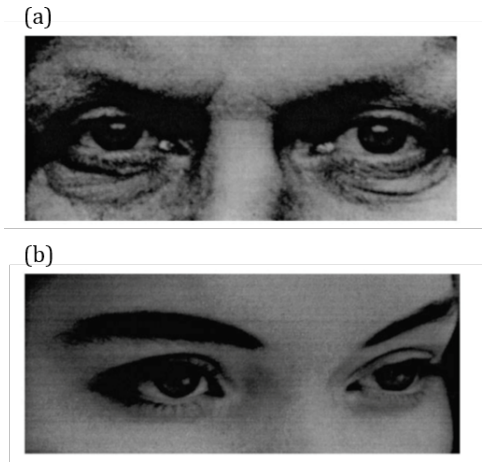

Figure 6.2. Examples of the task to recognize complex facial emotions from the eye region. The word choices for photo (a) are serious (correct), ashamed, alarmed, and bewildered. The word choices for photo (b) are reflective (correct), aghast, irritated, and impatient. Adapted from "The 'Reading the Mind in the Eyes' Test Revised Version: A Study with Normal Adults, and Adults with Asperger Syndrome or High-Functioning Autism," by S. Baron-Cohen, S. Wheelwright, J. Hill, Y. Raste, and I. Plumb, 2001, *Journal of Child Psychology and Psychiatry, 42*(2), p. 242.[89]

The second study from Kadak, Demirel, Yavuz, and Demir (2014) shows that parents of autistic children also have problems recognizing basic emotions. This study includes thirty-six autistic children and their parents (thirty-six mothers and thirty-six fathers), and parents of nineteen typically developing children as the control group. This study used a computer-based emotion recognition test, which consists of fifty-six photos with happy, surprised, fearful, sad, disgusted, angry, and neutral facial expressions from Ekman and Friesen (1976) (see Figure 6.3). The study results show that when compared with controls, parents of autistic children had worse performance in recognizing happy, surprised, and neutral facial expressions. The authors explain that "ASD parents had difficulty recognizing

[89] This article is the methodology source cited by Sachse et al. (2014).

neutral expressions, suggesting that ASD parents may have impaired recognition of ambiguous expressions as do autistic children" (p. 1146).

Figure 6.3. Examples of the Ekman-Friesen Pictures of Facial Affect used in the computerized task. Adapted from "Age, Gender, and Puberty Influence the Development of Facial Emotion Recognition," by K. Lawrence, R. Campbell, and D. Skuse, 2015, *Frontiers in Psychology, 6*(761), doi: 10.3389/fpsyg.2015.00761

The third study is from Poljac, Poljac, and Wagemans (2013), which shows that healthy individuals with autistic traits were "less accurate and needed higher emotional content to recognize emotions of anger, disgust, and sadness" (p. 668), which are all basic emotions. In this study, the authors administered the Autism Spectrum-Quotient (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) in 500 healthy undergraduate students and selected the 5% highest (twenty-one students) and the lowest 5% (eighteen students, as the control group) to participate the task of recognizing basic emotions. In the experiment, the participants are shown video clips that consists of morphing faces with six basic emotions (anger, disgust, fear, happiness, sadness and surprise) and a neutral face. In the video clips, the emotions change from low intensity (0%) to high intensity (100%) (see

Figure 6.4). After each video clip, the subject was forced to choose one of the six emotion labels appeared on the computer screen. The next task with another randomly selected video clips will start only after the participant made the choice from the current task. This study found that healthy individuals with autistic traits perform worse in recognizing basic emotions, when compared with healthy individuals without autistic traits.

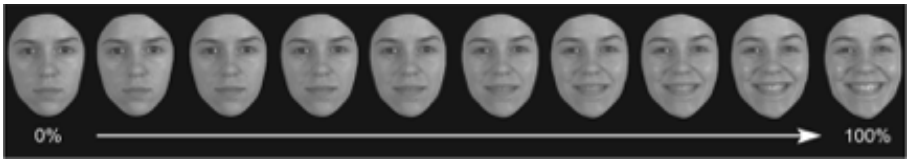

Figure 6.4. "The Emotion Recognition Task. Depicted is a gradual transition from neutral face to a face with the full-blown emotion of happiness." (p. 671) Adapted from "Reduced Accuracy and Sensitivity in the Perception of Emotional Facial Expressions in Individuals with High Autism Spectrum Traits," by E. Poljac, E. Poljac, and J. Wagemans, 2013, *Autism, 17*(6), p. 671.

6 Conclusion

The above three studies show that not only autistic individuals, but also parents of autistic children and healthy individuals with autistic traits have problems recognizing basic emotions in both static photographs and video clips. Together, these study results not only provide a counter-example to the claim that autistic individuals' emotion recognition problem is specific to self-conscious emotions, but also problematize the explanations offered by the theory of mind and the interactive approaches to autism. This counter-example is a strong one for two reasons.

First, the studies on basic emotions cover both types of experimental procedure used in the test of self-conscious emotions, that is, recognizing facial expressions in static photographs (Kadak et al., 2014; Sachse et al., 2014) and in video clips (Poljac, Poljac, & Wagemans, 2013). Second, the studies on basic emotions include not only autistic

individuals, which were the main subject in the test of self-conscious emotions, but also parents of autistic children and healthy individuals with autistic traits. In this way, the studies on basic emotions show that a broader range of subjects have problems recognizing basic emotions than the studies on self-conscious emotions suggest.

Nevertheless, the above scientific studies on autistics' recognition of basic emotions and self-conscious emotions suggest something different from Grandin's claim that autistics have problems recognizing and experiencing complex emotions but not basic emotions. I suggest that if we look into the experimental design of the above studies, it is possible to dissolve this conflict between scientific studies and first-person reports of autistic emotions. Also, I suggest that the enactive approach can provide us a better standpoint to examine the above conflict and the issue of autistic emotion. In what follows, I shall apply the enactive account of autistic emotion I proposed in Sections 4 and 5 to explain the above conflict.

First, I argue that from the perspective of the enactive approach, the experimental designs of all the above studies on facial emotion recognition are limited. Since according to the enactive approach, making sense of one's own and others' emotional states and facial expressions requires a series of social and sensorimotor interactions, it is likely that merely presenting a photo or a video to an autistic would not provide enough social interactions for the autistic to generate this emotional state or to make sense of this emotional state indicated by the photo or the video, especially when this autistic individual has never experienced this emotional state before. Of course, if one has already experienced a certain emotion, such as pride, before, it is easier for one to recognize the emotion from the photograph. This is not because the photograph provides enough social interaction to

generate the corresponding emotion, but because the experimental subject can compare the emotion in the photograph with their prior experiences or memories. According to my proposal presented in Section 5 of Chapter 5, autistics' sensorimotor problems prevent them from forming such an experience or memory of certain emotions earlier in their life; thus, in the experiment of facial emotion recognition, there is no prior experience for autistics to compare with.

Similarly, in the case of self-conscious emotions, since autistics might never experience certain emotional states themselves, lacking previous knowledge or experience of these emotions further prevents autistics from recognizing these emotions from photos or videos. Another complexity of recognizing complex or self-conscious emotions is that these emotions require more context or interactions to recognize. It is thus likely that autistics' sensorimotor problems would prevent them from recognizing these emotions in the photographs or videos in the experiments.

Given the above considerations, the conflict between the scientific studies discussed in this chapter and first-person autistic narratives discussed in Section 3 of Chapter 5 can be explained by the limit of the experimental designs. In this way, these scientific studies are not counterexamples to Grandin's suggestion that autistics generally have difficulties in complex emotions but not basic emotions.

In this chapter, I have applied the enactive approach to explain the scientific studies on autistic emotion recognition and showed that the enactive approach explains these studies better than alternative approaches. In the next chapter, I shall discuss the theoretical and methodological implications of the enactive account of emotion I proposed.

Chapter 7

Understanding Autism: Beyond Emotions

1 Introduction

In this concluding chapter, I first present a new understanding of autistic social difficulties to justify my evaluation of all the current approaches in Chapters 2 to 6. Next, I use the distinction between individualism and non-individualism to map the views of social cognition and autism discussed in this dissertation. In the end, I discuss the philosophical implications of my account, which shall cover all the philosophical issues of autism introduced in Chapter 1.

2 Rethinking Autistic Social Difficulties

In this section, I present an analysis of autistic social interaction problems from the first-person perspective. This analysis grounds my evaluations of all the accounts of autistic social difficulties and of autistic emotions discussed in Chapters 2 to 6: the theory theory, simulation theory, the interactive approach, and the enactive approach.

There are two ways to understand autistic social interaction problems that bring out what is distinctive of the enactive view that I am articulating. The first appeals to the intrinsically dispositional social awkwardness of autistic individuals, while the second posits a contextually-driven sense of unease experienced by the autistic individuals in social interactions. In effect, I am suggesting that we should understand autistic social interaction problems in the latter way, whereas all the current approaches construe autistic social interaction problems in the former way. For instance, the theory theory,

simulation theory, and the interactive theory explain the social awkwardness of autistic individuals by positing certain deficits of their brains, such as cognitive deficits or sensorimotor deficits. The enactive approach, by contrast, explains the social awkwardness of autistic individuals in terms of the coordination problem between autistics and non-autistics.

I suggest that these two different readings of autistic social interaction problems are motivated by different perspectives. The second reading, which understands autistic social interaction problems in terms of the sense of unease experienced by autistic individuals, is based on the first-person perspective of autistics. By contrast, the understanding of autistic social interaction problems in terms of some kind of autistic awkwardness stems from a third-person observation.

Indeed, most autistic first-person narratives report a sense of unease in social interaction, rather than describing themselves as being awkward. If we instead view autistic social interaction problems from a third-person perspective—or if an autistic person steps back to view her situation from a third-person perspective—this sense of unease usually would be understood as the trait of autistic individuals in social interactions. This is because the third person perspective isolates the feeling of unease from autistic social interaction, and attributes it as a trait of autistic individuals. Even though these two understandings are from different perspectives, I suggest that these two understandings are not viewing the same thing from different perspectives. This is because these two understandings imply two different loci of autistic social interaction problems: the first understanding of autistic social interaction problems as some kind of autistic awkwardness attributes the problems to autistic individuals; while the second reading

does not necessarily. When understanding autistic social interaction problems as a contextually-driven sense of unease experienced by the autistic individuals in social interactions, this sense of unease might be caused by things other than the autistic individuals, such as the sensorimotor differences between autistic and non-autistic individuals, as I have argued from Chapters 2 to 6.

In addition, I suggest that there are good reasons to understand autistic social interaction problems from the first-person perspective, that is, as the sense of unease experienced by the autistic individuals in social interactions, rather than as the social awkwardness of the autistic individuals. First of all, by focusing on the sense of unease experienced by the individuals in social interactions, we have a better characterization of social interaction problems involving autistics: In fact, both autistics and non-autistics experience this sense of unease when they interact with each other. It is not only autistics who experience this sense of unease when interacting with non-autistics, non-autistics also experience this sense of unease when interacting with autistics. Second, focusing on this shared experience of unease in social interactions by autistics and non-autistics enables us to more easily apply the discussion of autistic social interaction problems to social interaction problems in general. This is especially true when this experience of unease in social interactions does not belong to autistic individuals only. When understanding autistic social interaction problems in terms of autistic awkwardness, our explanatory focus would be on autistics individuals, and the corresponding discussion would be less likely to apply to other social interaction problems that do not involve autistic awkwardness. Third, if we understand autistic social interaction problems with the sense of unease experienced by the autistic individuals in social interactions, rather than autistic

awkwardness, it is easier to explain why autistics do not have problems interacting with each other (that is, autistics do not experience or experience less this sense of unease when interacting with other autistics). Conversely, understanding autistic social interaction problems as intrinsically dispositional social awkwardness of autistic individuals would result in problems in explaining why an autistic individual does not experience social interaction problems when interacting with another autistic individual.

The preferred understanding of autistic social interaction problems also gives us a better understanding of the nature of autistic social interaction problems. In particular, from the perspective of the enactive approach, autistics experience unease because their sensory overloads prevent them from making sense of their physical or social situation. However, since autistics also experience sensory overload from physical stimuli that are not social, it is likely that autistic unease is a more general condition due to sensory overload, whose source include both social and non-social signals. In this way, autistic social interaction problems are better understood in terms of a feeling of unease that results from sensory overloads, rather than from specific problems in social understanding.

3 Autism, Individualism, and Social Cognition

In this section, I draw on the familiar distinction between individualistic and non-individualistic views of the mind and cognition to map the views of social cognition and autism discussed in this dissertation. Basically, the views that I have argued against in Chapters 2-4—the theory theory, simulation theory, and the interactive—are all, in varying degrees, individualistic.

Individualistic or internalistic views of cognition hold that cognition or mental properties supervene on the intrinsic, physical properties of the individuals, such as neural states or neural properties and long-dominated the philosophy of mind and cognitive science until the early 1980s (Block, 2005, 2007; Fodor, 1987; Metzinger, 2003, 2009). However, this traditional view of cognition has already been challenged by many recent studies on embodied cognition.[90] I suggest that these challenges from embodied cognitive science to individualism also apply to the theory theory and simulation theory. In addition, I argue that, given the dynamic and ongoing nature of social interaction, social understanding, i.e. our understanding of other minds that is generated by the process of social interaction or that results from social interactions, is better understood in non-individualistic terms. As an analogy, social understanding, much like cognition, is like dancing with a partner.[91] Even though one could describe dancing with a partner by focusing on how one of these two dancing partners dances, this kind of description would not provide a sufficient description of the dance. This is because to describe how dance happens we need to describe how each dance partner moves, and equally important, how these two coordinate with each other. Similarly, in the case of social understanding, we need to describe not only how each interaction partner operates, but also how these two interaction partners coordinate with each other.[92] This is why I suggest that the theory

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[90] See Wilson and Foglia (2015) for examples and an extended discussion on embodied cognition.

[91] This example of social dance is from Morton (2006).

[92] See also De Jaegher (2009), De Jaegher, Di Paolo, and Gallagher (2010) for examples of and arguments for the role social interactions play in social understanding.

theory's and simulation theory's individualistic approach miss an important element of social cognition, social interactions.

While the interactive approach recognizes the coordinative dimension to social understanding, it remains relatively individualistic; the enactive approach's methodological behaviorism not only sacrifices the room to discuss the rich phenomenology and conscious experiences in social interactions but also remains individualistic. As an alternative, I have proposed a novel version of the enactive approach in Chapter 5.

To further clarify and categorize these above views of social cognition and autism, I suggest adapting the account of the distinction between individualism and non-individualism with respect to mental properties and their realization proposed by Robert Wilson (2004). Wilson argues for a version of non-individualism that appeals to wide realization, that is, the realization of a mental property that extends beyond the boundary of the skull, and possibly, the body. Unlike Andy Clark and David Chalmers (1998), who defend the idea of "the extended mind", Wilson emphasizes that the mental property realized widely remains a property *of* individuals, a property possessed by an individual cognizer with its regular bodily boundaries. For instance, Wilson (2004, p. 141-143) suggests that the subject as the owner of conscious experiences is still an individual, despite the conscious experiences of this subject being widely realized, whereas Clark and Chalmers (1998) endorse the view that the subject is itself extended beyond the boundary of the body (see also Clark (2001; 2003)). As Wilson (2004) argues, the advantage of his approach is to preserve our individualistic intuitions about the possession of mental properties while still accounting for what embodied cognitive science has offered.

This contrast between Wilson (2004) and Clark and Chalmers (1998) can be applied to the contrast between my view and the original enactive approach. I suggest that both my view and the original enactive approach accept the 'wide realization' of social understanding, which includes not only the interaction partners but also the social interaction itself as part of the realization of social understanding. Nevertheless, the original enactive approach views social understanding as a property that is beyond the boundary of an individual, or beyond the boundary of the body. But as I argued in Section 8 of Chapter 4, the original enactive approach did not provide sufficient descriptions of social understanding in its account. I suggest that this lack is due to the lack of the conceptual resources to describe social understanding as a property beyond the boundary of the body. A better alternative is to maintain the wide realization of social understanding while viewing the property realized as a property of individuals, as Wilson (2004) suggests. This is why I suggest incorporating Damasio's somatic marker theory of emotion within the original enactive approach, since doing so provides the conceptual resource for the original enactive approach to describe the social understanding as a property of individuals.

By contrast, I argue that although interaction theory tries to understand social cognition as a property that is beyond the boundary of an individual, the realization of social cognition it proposes is still within the boundary of the individual. For instance, to account for autistic social interaction problems, interaction theory appeals to sensorimotor issues of autistic individuals, rather than what is beyond the boundary of the individuals.

To sum up my analysis, I suggest that the above views of social cognition and autism can be categorized according to their understanding of social understanding as a property of an individual versus a property of something that extends beyond the boundary of an

individual and the wide versus narrow realization of this property. First, how these views understand the realization of social understanding differently can be arranged according to a spectrum from narrow realization to wide realization (see Figure 7.1). The theory theory proposes the narrowest realization, likely within the skull. Simulation theory's proposal is within the boundary of the body while mostly around the boundary of the skull: simulation theory focuses on the capacity to simulate and mirror neurons as the underlying mechanism. Even though simulation theory discusses simulating others' bodily movements and facial expressions with our own, this activity is basically realized by our mirror neuron system. Next, interaction theory discusses sensorimotor issues of autism, while all the issues discussed are within the boundary of the body. The original enactive approach and my enactive approach include not only the individuals, but also the social interactions between the individuals, as the realizer of the social understanding, thus have the widest realization of social understanding.

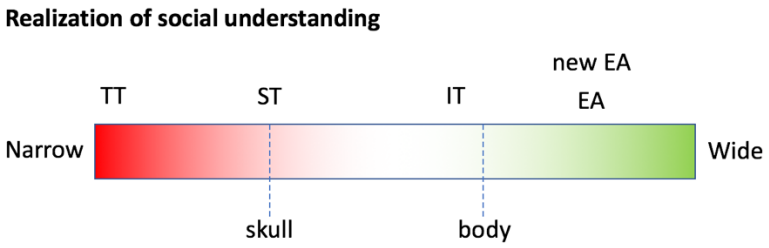

Figure 7.1. Realization of social understanding. The realization of social understanding ranges from narrow to wide in the theories of social cognition and autism: TT: the theory theory; ST: simulation theory; IT: interaction theory; EA: the original enactive approach; new EA: the novel version of enactive approach I proposed in Chapter 5.

Second, when considering the wide versus narrow realization of social understanding together with whether to view social understanding as a property of an

individual versus a property of something that extends beyond the boundary of an individual, we can categorize the views discussed in a two-by-two chart (see Table 7.1). Both the theory theory and simulation rely on the idea of narrow realization and understand social understanding as a property of individuals. Interactive theory proposes a narrow realization of a property of something that extends beyond the boundary of an individual. Both the original and my version of the enactive approach rely on the idea of wide realization. While I understand social understanding as a property of an individual, the original enactive approach views social understanding as a property of something that extends beyond the boundary of an individual. As I argued in the above, viewing social understanding as a property of an individual provides better conceptual resources to describe social understanding than viewing social understanding as a property of something that extends beyond the boundary of an individual. As a comparison, views about cognition in general can be categorized similarly as well (see Table 7.2).

Social understanding	Wide realization	Narrow realization
A property of an individual	My new enactive approach	The theory theory Simulation theory
A property of something extending beyond the boundary of an individual	The original enactive approach	Interactive Theory[93]

Table 7.1. Social understanding as a property of an individual versus a property of something extending beyond the boundary of an individual and wide versus narrow realization of this property.

[93] I suggest that interaction theory's proposal to understand social understanding as a property of something extending beyond the boundary of an individual and its suggestion to understand the realization of this property within the boundary of an individual would result in this puzzling combination.

Cognition in general, e.g. visual consciousness, subjectivity	Wide realization	Narrow realization
A property of an individual	Wilson (2004)	Block (2005, 2007) Metzinger (2003, 2009)
A property of something extending beyond the boundary of an individual	Clark and Chalmers (1998)	

Table 7.2. Cognition as a property of an individual versus a property of something extending beyond the boundary of an individual and wide versus narrow realization of this property.

4 The Self, Narratives, and Personhood

The enactive approach developed in this dissertation provides the conceptual ground to form an integrated view of all the philosophical issues in autism. Chapter 5 provides an example of how the enactive view does so with respect to autistic emotions. The discussion of autistic emotions also provides the preliminary grounding for an integrated treatment of other relevant issues, such as the self, narratives, and personhood, as I shall discuss in this section.

First of all, as discussed in the last section, my version of the enactive approach accepts the wide realization of social understanding as a property of individuals. I shall extend this view to account for the self or the subject of conscious experiences as well. In particular, I shall do so by drawing on Antonio Damasio's (2003b, 2010) theory of self. According to Damasio (2003b), there are three levels of self:

> In effect, the simplest level of self allows us to manufacture the idea that objects and events are perceived from a singular perspective, that of the organism symbolized by the self. At a more complex level, we can generate the idea that the mental processes that occur in this organism are our own

> property. Finally, with the assistance of past memories of objects and events, we can piece together an autobiography and reconstruct our identity and personhood incessantly. (p. 227)

In particular, I suggest this third level of self, that is, the autobiographical self, is the product of the sense-making process in my enactive approach. According to my version of the enactive approach, we make sense of objects and events in the world by attributing personal significance or emotional valence to them. I suggest that the collective results of one's sense-making process just are one's autobiographical self.[94] On this view, narratives, memories, and emotions are components that form the self. Given the enactive nature of my view, I take social interactions naturally to constitute the formation of emotions, narratives, and therefore the self. The role social interactions play in these notions explains why the self is widely realized. In addition, I suggest this widely realized autobiographical self is a property of a narrative subject, which consists of the first-level core self as the first-person perspective and the second level of self that generates ownership of experiences in Damasio's theory. In this way, my enactive view of self agrees with Wilson's (2004, 2014) *narrow subjects, extended systems* view, according to which while properties are often widely realized, subjects typically are not themselves wide.

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[94] This relation between emotions and the autobiographical or narrative self was also suggested and developed by Damasio (2010) and Feinberg (2009). One interesting question that stems from this suggestion is how the trade-off between the diversity and the strength of emotions in autism, as discussed Section 4 of Chapter 5, influences the construction of an autistic narrative self. Since autistics have fewer yet stronger emotions, it is likely that the narrative self they construct from their emotion would be different from those from non-autistics.

In addition, I suggest that the differences between the autistic self and the non-autistic self are located in the autobiographical self, which is the third level of the self in Damasio's theory, rather than the first two levels of self: the first-level core self as the first-person perspective and the second level of self that generates ownership of experiences. This is because autistics are able to experience the world from the first-person perspective and have ownership of their experiences just like non-autistics, while developing emotions differently and making sense of the world differently due to their sensorimotor differences. In this way, my view on autistic self-awareness disagrees with those from the theory of mind approach (Frith & Happé, 1999) and the interactive approach (Zahavi & Parnas, 2003). Both of these views suggest that autistics have problems in self-awareness; the former proposes the lack of a theory of mind as the fundamental cause, while the latter suggests that this problem results from problems in interpersonal relatedness.[95]

Next, I suggest that there are two senses of narratives: first, as a personal narrative that belong to an individual about his or her own biographical memories, and second, as a narrative that is constructed by and shared by more than one individual. For example, autistic narratives, such as autistic autobiographies, memoirs by parents of autistic

[95] This issue about autistic self-awareness is related to the reliability of autistic first-person narratives. As discussed by Frith and Happé (1999) and McGeer (2004), if autistics have problems in self-awareness, i.e. problems in experiencing their own thoughts and feelings, then we have reasons to say that autistic first-person narratives are not as reliable as they should be. However, as I have argued here and as McGeer (2004) has argued, there are good reasons to believe that autistics do not have problems in their self-awareness, and thus to think that autistic first-person narratives are reliable. Given this reliability, there are still some issues concerning using autistic first-person narratives as evidence that are beyond this dissertation yet still worth further exploration. For instance, many autistics have delayed language development and some autistics have problems in understanding sentences with complex grammatical structures, as autistic author Pentzell (2013) discusses. One question that is worth further exploration is how this issue influences the use of autistic first-person narratives as evidence.

children, movies and novels with autistic characters, and the coverage of autism research and autistic individuals in the mass media, belong to the second sense of narratives.

Due to the enactive nature of my view, I suggest that these two senses of narratives inform each other through social interactions. As an example, an autistic author Melanie Yergeau (2013) argues that theories of theory of mind construct a narrative (in the second sense) in which people with autism are disembodied. There is no role for autistic bodies in theories of theory of mind and these theories deny the agency and the very humanity of autistic people. First-person stories (narratives in the first sense) from autistics construct an alternative narrative in which autistic bodies play a role. In this way, autistic narratives in the first sense inform and transform narratives about autism in the second sense.[96] This discussion also provides further support for why it is important to employ autistic first-person narratives as one major source of evidence in addition to scientific research, as I have argued throughout the dissertation.

Finally, my socially enriched view connects emotions, narratives, and the self to personhood, which I suggest is relational, rather than being determined individualistically. In this respect, the view I propose departs from dominant views that emphasize the importance of intrinsic properties, such as reasoning capacity, for personhood.[97] In

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[96] See also Hacking (2009a) and McGeer (2009). Hacking (2009a) suggests that when autistics start to use language to describe their experiences, they also create narratives that become a new language for people without autism to talk about autism and for autistics to talk about themselves. McGeer (2009) argues that this new way of talking about autism and autistics actually transforms how people think about autism and autistics and how autistics think about themselves.

[97] See Campbell (1997, 2003) and Lenart (2014) for interactive and relational accounts of personhood.

particular, narratives about autism (in the second sense) create a certain image of autistics (Hacking, 2009a, 2009b, 2009c) and influences how we think about autistics with respect to their moral status. This is because how we understand the moral status and personhood of autistics within a larger moral community including all human beings is largely determined by how we understand autism and autistic individuals. For instance, our answers to questions such as what kind of care and rights are deserved by autistics, what moral responsibility the caregivers and the society have toward autistics, and whether it is morally justifiable to abort potentially autistic fetuses, are greatly influenced by our view of the nature of autistic personhood.

In addition, given the nature of autism as a developmental disorder and its influence on the social interactions of autistics, several questions can be raised about the autistic personhood. First, many autistics are diagnosed at a very young age. If most people think children do not have complete personhood and autistic children do not develop normally, does this mean that autistic children have even less personhood than normally developed children? Second, do autistics, both children and adults, have less personhood because they do not relate to other people in the way most people do? Third, following the first and the second questions, how should we think about the autonomy of autistic children and autistic adults? These are a few questions on autistic personhood that I suggest my enactive view provides different yet significant answers to from those provided by the dominant individualistic and cognitivist approach.

5 Conclusion: The Nature of Autism and Beyond

As argued initially in Chapter 1 and further developed through Chapters 2 to 6 of this dissertation, the nature of autism should be understood in terms of sensory oversensitivity, rather than cognitive deficits, as most scientific literature has suggested. This shift from understanding autism as cognitive deficits to sensory oversensitivity was informed and motivated by autistic first-person narratives, and can be viewed as another example of how the first sense of individual autistic narratives inform and transform the second sense of collective autistic narratives. In particular, there are four major implications of this shift of understanding of autism.

First, as I have suggested in Chapter 5, managing sensory oversensitivity is one of the keys to help autistic individuals further develop their emotions. In this way, this shifting of understanding autism as sensory oversensitivity would produce further knowledge about autistic sensory oversensitivity and possibly generate more assistance and resource for autistic individuals with respect to their emotional developments. In addition, given my enactive view of emotions, narratives, and the self, further developing autistic emotions will provide autistics more valences of personal significance to construct more enriched narratives and autobiographical self. In addition, given the role social interactions play in constituting emotions, narratives, and the self, situating autistic individuals with people who understand their need to manage sensory oversensitivity can further help autistics to develop their emotions, narratives, and the self as well.

Second, as introduced in Section 2 of Chapter 1, an important issue about the nature of autism is whether the cause of autism can be reduced to variation in the nucleic acid sequences of a single gene. I suggest that such a reductionist view of the cause of autism is

in line with conceptualizing autism as a specific cluster of cognitive deficits, such as those deriving from some problem in the theory of mind module. By contrast, understanding autistic individuals as having different degrees of sensory oversensitivity in different sensations, such as visual, auditory, tactile sensations makes such a monistic, reductionist view of the etiology of autism less plausible. The version of enactivism about autism that I have defended thus suggests a more pluralistic approach to identifying the causes of autism.

Next, going back to my criticism of the diagnostic criteria of autism in various editions of the Diagnostic and Statistical Manual (DSM) presented in Section 3 of Chapter 1, there I argued that there are two main problems of these diagnostic criteria. First, the diagnostic criteria of in DSMs specify some behavioural traits, while autism as a mental condition might manifest differently behaviourally. Second, the diagnostic criteria and categorization of autism change through different versions of DSMs, and this leads to a potential question about the reliability of the DSM itself. Adding on to these two criticisms, given that the diagnostic criteria of autism in the DSM focuses on the cognitive aspects of autism, rather than autistic sensorimotor issues, it is even more likely that the diagnostic criteria of autism DSMs are questionable, and should seriously be reexamined and amended with perspectives from autistic individuals.

In addition, this discussion of the diagnostic criteria of autism in DSMs leads a fourth and relevant issue: should autism be categorized as a mental disorder and appear in the DSM at all? As I noted in Section 4 in Chapter 1, the neurodiversity movement suggests that the answer to this question is “no”. Given that, the neurodiversity movement argues that autism and other cognitive disabilities are among neurological conditions that belong to

human variation, rather than constituting disorders or abnormalities. The understanding of autistic individuals as having different degrees of sensory oversensitivity in different sensations makes it easier to see why the differences between autistics and non-autistics are likely to be variations in degree, whereas understanding autism as having cognitive deficits separates autistics as a group of people different from non-autistics. In this way, the shift from understanding autism as cognitive deficits to sensory oversensitivity fuels and is fueled by the neurodiversity movement. In addition, since both the shift of understanding of autism and the neurodiversity movement are informed by autistic first-person narratives, these two provides further support of my view that individual narratives inform and transform collective narratives.

In particular, it is impossible to have a thorough philosophical investigation of autism without mentioning the neurodiversity movement, which touches on the socio-political issues about autism and disability in general. Autism is not only a disorder that influences the individual, it is also a category the society and its education and health care system use to distribute resources and to inform policy making. In this way, how we think about autism influences not only how each autistic views herself or himself but also how other people interact with autistics and how society as a whole makes policies and treats autism. In this context, the neurodiversity movement can be understood as comprised of autistics who voice their own understanding of autism and how they should be treated, instead of only listening to experts who typically are not themselves autistics.

As I suggested in the beginning of Section 4, the enactive approach developed in this dissertation provides the conceptual ground to form an integrated view of all the

philosophical issues in autism. I summarize how these different philosophical issues connect to each other in the following figure (Figure 7.2).

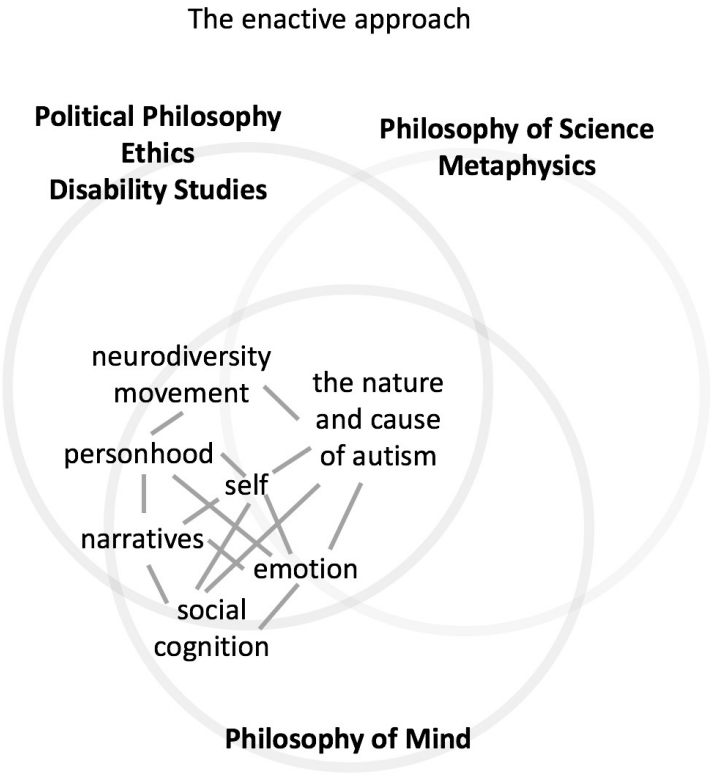

Figure 7.2. The enactive approach and philosophical issues in autism.

I have developed such an enactive view of social cognition with an emphasis on emotions from Chapters 5 to 6. My enactive view naturally bridges emotions to social cognition, given the role social interactions play in emotional development and the role emotions play in social understanding. The connections from emotions and social cognition to narratives, the self, personhood, the nature and cause of autism, and the neurodiversity movement have been illustrated in this and the last sections. I have argued for a socially enriched view of all these elements and, hopefully, have provided an integrated view of all the philosophical issues in autism.

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