

The London School of Economics and Political Science

**Enabling autistic sociality: unrealised potentials in
two-sided social interaction**

Brett Heasman

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Psychological and Behavioural Science for the degree of Doctor of Philosophy

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DECLARATION

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ABSTRACT

Research on autism, which is defined as a life-long developmental disability affecting social interaction, has focussed predominantly on how autistic individuals perceive and interact with others with less emphasis on the perspectives of their interactional partners. Yet autistic viewpoints have highlighted how other people are part of a two-way breakdown in interaction originating from differences between people rather than the deficit of any one individual, a phenomenon known as the *double empathy problem*. A gap therefore exists in the literature in terms of understanding how autistic sociality (i.e. the range of social opportunities possible for a given individual on the spectrum) is shaped by different interactional partners.

This thesis examines the double empathy problem in three interactional contexts. Study 1 examines relationships between autistic people and their family members through focussing on perspective-taking, the ability to impute mental states to others. In light of prior research where autistic abilities have been assessed using abstract scenarios, Study 1 implements a two-way measure of perspective-taking which considers both sides of 22 real-life relationships (n=44) consisting of autistic adults and their family members, to understand how autistic people are seen by familiar others as well as vice versa. It uses a mixed-methods approach, where members of each dyad were individually asked about 12 topics, providing quantitative scores and qualitative explanation of their rating of Self, their rating of their partner, and their predicted rating by their partner. Comparison of perspectives provided a means for detecting misunderstandings and their underlying rationale. The contribution of Study 1 is that it shows perspective-taking is two-sided: family members can be biased in underestimating the perspective-taking of their autistic relatives, while autistic adults are aware of being negatively viewed despite disagreeing with such views.

Study 2 examines interactions between autistic adults (n=30) partaking in a naturally occurring activity of video-gaming at a charity. It is a qualitative study using participant

observation, with each conversational turn systematically rated in terms of coherence, affect and symmetry to identify the key features of neurodivergent intersubjectivity, the process through which autistic people build shared understanding in their own non-normative ways. The contribution of Study 2 is to identify two forms of neurodivergent intersubjectivity which enable shared understanding to be achieved, but which have traditionally been viewed as undesirable from a normative social viewpoint: a generous assumption of common ground that, when understood, lead to rapid rapport, and, when not understood, resulted in potentially disruptive utterances; and a low demand for coordination that ameliorated many challenges associated with disruptive turns.

Study 3 examines interactions involving lay people (n=256) who believe they are interacting with an autistic partner through an online collaborative game, when in fact they are playing with an intelligent virtual agent (IVA) who behaves the same way for all participants. Its contribution is methodological as it develops a new application for simulating interactions in experimental research called *Dyad3D*. Study 3 uses *Dyad3D* to explore how disclosure of an autism diagnosis by the IVA affects social perception and social behaviour in comparison to a disclosure of dyslexia and a condition where there is no diagnostic disclosure. Combined with a post-game questionnaire, Study 3 triangulates self-reported (quantitative rating scales and qualitative explanation) and behavioural measures (quantitative scores of actions within the game) to understand the interplay of positive and negative discrimination elicited through using the label of autism. It highlights that diagnostic disclosure of autism leads to significant positive bias in social perception when compared to a disclosure of dyslexia or a no disclosure condition; yet participants are not as helpful towards the autistic IVA as they think they are, indicating a potential bias in helping behaviour.

The thesis takes an abductive methodological approach which integrates with a wider call for a more participatory model of research in the study of autism. Abduction is a form of

reasoning which involves the iterative development of a hypothesis that holds the best explanatory scope for the underlying phenomena observed. It is inherently aligned with a participatory model of research because abduction involves the ongoing exploration of ideas that may originate from multiple sources (i.e. interactions with autistic people as well as research outputs). Taking a more holistic approach to the development of knowledge with autistic people which recognises the legitimacy of different claims to knowledge is important, because prior research in the field has often failed to critically reflect on researcher-participant positionality and the principals underlying the development of research agenda. For this reason, the thesis details the participatory activities which surround and interconnect with the development of the three empirical studies.

Overall the thesis contributes to understanding autistic sociality as a dynamic, interactionally shaped process. It reasons that autistic people have unrealised social potential, both in terms of imagining other perspectives (Study 1) and coordinating with others (Study 2). However, such social potential may not be easily recognised by other non-autistic people who may be biased in their assumptions about autism (Study 1 and Study 3). Consequently, the evidence presented in this thesis helps to explain some of the processes that underscore the double empathy problems reported in literature, including poor mental health (because autistic people are aware that they are misunderstood by others, see Study 1), employment prospects (because autistic social potential is under-recognised by others, see Study 1 and 3), and quality of life (because neurotypical standards of communication are not compatible with neurodivergent forms of intersubjectivity, see Study 2). The thesis therefore makes suggestions for how we design enabling environments which are sensitive to the dynamic factors that can enable autistic sociality to flourish.

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1) INTRODUCTION

Background and motivation

In 2012 I started being a carer for Cambell, a young autistic man with severe learning difficulties. Our main activity was walking across town together from his home to his learning centre, a 3-mile round trip involving dual carriageways, road crossings, bus stops, parked cars, shops, leafy pavements, and pedestrians with animals.

On some days my presence was surplus to requirements. Cambell knows the route to the learning centre and he can navigate there without so much as a second glance towards me (trailing behind since he walks so fast). However, on other days this same journey became impossible without my help. Bus stops (where Cambell has to wait for all passengers to board), drivers in parked cars (where Cambell has to wait for the driver to leave) and dogs (whose unpredictable bark may be painful to Cambell's hypersensitive hearing) are all obstacles that can cause great anxiety and completely disrupt the task of arriving at the learning centre.

Cambell's autism was not the variable that explained these different outcomes. It was the environment and the behaviours of others which changed on a day-to-day basis. At one extreme, Cambell was unhindered in pursuing an everyday activity independently, yet at the other extreme, this same activity becomes impossible to independently complete.

I therefore wanted to understand the interface between autism and society because I believe a huge margin exists for optimising environments and situations to enhance the experiences, independence and quality of life for people on the spectrum. I wanted to explore the potential that could be unearthed when making environments more enabling for autistic people.

This line of thinking was not particularly radical for 2012. The social model of disability had long since paved the way for shifting the focus from individuals to the social and physical context which disables people (Oliver, 2013), while more specifically to autism the neurodiversity movement has over the last twenty years made great inroads into breaking up the normative framing of social behaviour by medical discourses (Runswick-Cole, 2014).

However, a number of challenges lay ahead. The first was how to fund such an ambition. An analysis of 106 funding awards made between 2007 and 2011 by Pellicano et al. (2014) showed that 56% of resources were allocated to projects in the areas of biology, brain and cognition, whereas only 1% was spent on societal issues (Pellicano, Dinsmore, & Charman, 2014). I therefore had limited funding opportunities for conducting a PhD where I could be truly exploratory and interdisciplinary in my psychological investigation. Every funding opportunity available was already rooted in a research project that had *a priori* theoretical assumptions and methodological approaches. Thankfully, the LSE had a small number of funded studentships and my proposal for research was successful in 2014 and funded by the Economic and Social Research Council.

A second challenge was how to find the right intellectual support. I really wanted to be truly interdisciplinary and connect psychological empiricism with sociological insight. I wanted my research to bridge these dialogues because it is the psychological discourse which holds all the power in terms of shaping definitions and clinical practice. To this end the Department of Psychological and Behavioural Science at the LSE, which grew from sociological roots, was a perfect intellectual environment to nourish my ideas. I also found the ideal supervisor in Dr Alex Gillespie, whose expertise in perspective-taking and broad intellectual interests provided outstanding guidance for me to harness my ideas.

A third challenge was access. Most studies of autism are based on very small samples potentially only covering 15-20% of autistic people (Boucher, 2008), partly because by nature accessing autistic people is not easy. To do so often requires large research teams, with significant funding, working with equally large charities or institutions. To this end I am extremely fortunate that my PhD aligned with the establishment of the Matthew's Hub charity for supporting young adults on the spectrum, based in Hull, East Yorkshire. They provided outstanding access, not just in support of my research projects, but also in terms of simply allowing me to be part of their community, to sit in and listen to members on a day-to-day basis, and to help out where possible in their operations. This experience has enriched me immeasurably and provided the much-needed practical understanding to compliment my intellectual endeavours.

These challenges are mentioned here because they are all significant obstacles facing any early-career researcher undertaking interdisciplinary research on autism. Exploring the question of how environments are enabling for people on the spectrum is not without its own enabling conditions.

Researcher's identity

Chapter 4 provides further detail about positionality in my discussion of methodology. It is however necessary from the outset of the thesis to clarify a number of points. I do not have a diagnosis of autism and I do not believe myself to be autistic. I consider myself to be independently functional (despite the views of my partner!). I do identify as neurodivergent on account of my hyper-sensory auditory profile (which has profoundly shaped my life), my IQ, and consistent feedback throughout my life about the idiosyncrasy of my interests and behaviour – all of which indicate I am divergent from the majority norm. The social difficulties I have experienced in life are largely attributable to anxiety and mental health

fluctuations and do not reflect a consistent disposition. It is likely that my neurodivergence may have contributed to my empathy-link towards autistic people, although empathy is something I have never been short of for any living person, creature or sentimental object.

Overview and aims

This thesis aims to understand the processes behind the *double empathy problem* (Milton, 2012), the two-way breakdown in understanding between autistic and non-autistic people which inhibits autistic sociality. It examines interactions between autistic people (who have a neurological configuration which results in social impairment) and Others (i.e. the interactional context which has the power to limit or extend social opportunities) to identify inhibiting and enabling psychological features. The thesis does not seek to build an enabling environment in itself, but aims to contribute to understanding how we can optimise the potential for social interaction, independence and quality of life for people on the spectrum. Each of the three studies presented in this thesis therefore explores a different context of social life, making empirical contributions to our understanding of autistic social ability and the perception and behaviour of Others towards autistic people.

A sociological theory which has been used to describe the two-way interactional nature of autistic sociality has been termed the “double empathy problem” (Milton, 2012, p. 884). This problem relates to a two-way breakdown in interpersonal relations when interactants hold different norms and expectations of each other on account of their differing dispositional outlooks (Milton, Heasman, & Sheppard, 2018). However, although a well-attested phenomenon from the perspective of autistic people (Boucher, 2012), there remains a paucity of psychological research about the perspectives of non-autistic people (Jaswal & Akhtar, 2018). Therefore, this thesis also makes a theoretical contribution by examining how the double empathy problem extends across psychological features that shape interaction. Study

1 examines perspective-taking in relationships, Study 2 examines neurodivergent intersubjectivity in naturally occurring activities between autistic actors, and Study 3 examines the cultural effect of the label of autism on social perception.

A third contribution of the thesis is methodological in terms of developing tools for investigating neurodiversity in action. By nature, autism involves diversity, both in terms of the breadth of sensory profiles, skills, and abilities of people on the spectrum and also depth in terms of the complexities of challenges faced in everyday life and the way in which such challenges play out in co-regulated interactions with others. However, most tools for understanding autism are derived from cognitive science, which focusses on the processes of individuals, divorced from their ecological context. Consequently, there is a mismatch between the existing tools and methods used in research on autism which seek to isolate individual stable properties, and the unpredictable phenomena of neurodiversity that is played out in everyday life. Each of the three empirical studies presented in this thesis therefore present a new tool for unpacking the nature of this complexity. Study 1 adapts an existing methodology called the Interpersonal Perception Methodology for use in detecting misunderstandings in autistic-family member relationships. Study 2 develops a rating framework for analysing neurodivergent intersubjectivity longitudinally. Study 3 develops a new computer programme for simulating interactions and analysing psychological attribution and its interpersonal effects.

Ontological framework of the thesis

In investigating the intersection between autism and society, this thesis posits our ability to be social requires an appreciation of human sociality that extends beyond one's genetic or neurological configuration alone. To understand an impairment of one's ability to be social requires an examination of the contexts in which we are social which have the power to limit

or extend our opportunities for independence and quality of life (Ochs & Solomon, 2010). This thesis acknowledges that autism involves varying degrees of challenges, and that these challenges can prevent some autistic people from being independent in any context. It also recognises the valuable insights and contributions from fields of study including research on genetic, neurological or cognitive capacities which have meant that autism has the status of a disability and has the associated political and social power to be institutionally recognised, funded and researched. In accordance with the perspectives of autistic voices, which to date have been largely excluded from the process of research, it does believe that there is an unexplored margin for optimising environments, including its socio-cultural dynamics, to enable autistic ways of interacting.

A research framework which is suited to the project of exploring double empathy contexts for autistic people, and one which encapsulates the fundamental principles of the neurodiversity paradigm, is dialogism. Dialogism is a theoretical orientation which views the individual as interdependent with “others’ experiences, actions, thoughts and utterances” (Linell, 2009, p. 11). Meaning is understood to be contextually determined, temporal (composed of preceding elements at a specific point in time), and having addressivity (always designed for someone: Linell, 2009). A dialogic view is therefore based on an interactional epistemology which sees the subject who knows, and the environment in which objects occur, as “irreducible ontological, i.e. existential, units” (Markova, 2016, p. 127). Dialogism therefore rejects the idea that Self-Other relations are the sum of their respective parts, and instead views such relations as an interdependent whole.

There are many advantages to taking a dialogical approach to understanding social relationships involving autistic adults. For example, an interdependent view highlights the role of the Other in the construction of Self. For Mead (1934) other-orientations are the foundation upon which self-consciousness can emerge because it is through the imagined

perspective of others that individuals are able to see themselves as social objects (Mead, 1934). Self-Other dynamics may be observed psychologically in different ways. At a cognitive developmental level social communication with parents enables children to use private speech to guide their own activity and achieve higher cognitive processes (Vygotsky, 1986); at a linguistic level the deictic nature of words such as “you” and “me” depends on one’s position within the field of social action because they involve perspectival reference to make sense (Gillespie, 2009); at a discursive level the relationship between self-other-object within a symbolic field of culture plays an integral role in the constitution of identity (Psaltis & Zapiti, 2014). The dialogical paradigm views social cognition and behaviour as the product of social relations as opposed to individual minds and as such aligns with the call for a more social and contextual approach to studies of autism. It is within the superordinate framework of dialogism that social theories such as the double empathy problem can be easily understood and find natural conceptual extensions.

For example, the dialogical paradigm highlights many social psychological dynamics which may have a significant impact on autistic sociality and have yet to be fully addressed empirically. Modern society, for instance, is characterised by pluralities of thought (Moscovici & Duveen, 2000) about the Self (Aveling & Gillespie, 2008), about possible selves (Markus & Nurius, 1986), about generalised others (Mead, 1934), and about abstract others (Bakhtin, 1981) which take place within a multi-layered historical, cultural and institutional context (Aveling, Gillespie, & Cornish, 2014). Such multiple interdependencies, or dialogues, represent multiple possibilities for construing reality. In this respect the existing literature on autism is narrow in its conception of social understanding because it assumes that perspective-taking is a cognitive activity, between consistent individuals, divorced from such pluralistic social milieu. Dialogism on the other hand emphasises that “the Self interacts with representations of institutions, interprets norms and rules, selects specific meanings and

attempts to change them” as opposed to operating directly with an objective reality (Markova, 2016, p. 130). This perspective identifies new avenues of research for understanding autism. For example, are asymmetries of perspective in autistic relations the result of a failure to perspective-take, or are they the result of unrealistic expectations of self/other imported by non-autistic sociocultural norms? Moreover, are there adaptive strategies for managing representations of Self/Other which are specific to relationships autistic people share with others?

Dialogism is not without its own limitations. It remains a loosely defined paradigm which originates from a number of different research traditions. There are consequently overlapping ideas about what axioms should govern dialogical investigation, and what foci are of interest, including literary (Bakhtin, 1981), moral/ethical (Buber, 1923/2013), pragmatic (Mead, 1934), symbolic (Goffman, 1969), communicative (Habermas, 1984), activity-based (Linell, 2009), and Hegelian (Marková, 1982) criteria. Rather than a weakness, I would argue the cross-disciplinary appeal of dialogism is a strength which reflects its central importance to human life, interaction and meaning. Dialogism aligns with the goal of this thesis which aims to understand the inhibiting and enabling features of autistic sociality, through highlighting the inter-dependent role non-autistic people play in shaping social possibilities. This ontological position therefore shapes the thesis in terms of looking beyond dispositional characteristics of the autistic individual alone, to consider in more detail the people and contexts in which autistic sociality is lived and achieved.

Thesis format

The thesis has been prepared according to the guidelines for a thesis-by-publication outlined by the London School of Economics Department of Psychological and Behavioural Science. Chapters 1 – 4 (introduction, context, literature review, methodology) and Chapter 8

(discussion) are solely authored by me. Three academic journal articles (Chapters 5, 6 and 7) examine the phenomena of the double empathy problem in three overlapping areas pertinent to social life: the relationships autistic people share with others, the activities that autistic people naturally engage in, and cultural influence of the label of autism on non-autistic social perception and behaviour. For each article I acted as the principle investigator, designing the study, recruiting participants, collecting data, analysing findings and writing up the report for publication as lead author. Dr Alex Gillespie provided intellectual guidance and was the secondary author for each paper.

At the time of submitting the thesis, Study 1 (Chapter 5) has been published in print in the journal *Autism* (1st August 2018). Study 2 (Chapter 6) has been published online in the journal *Autism* (3rd August 2018). Study 3 (Chapter 7) has been submitted to the journal *Frontiers* (28th September 2018).

Investigative structure

To investigate double empathy contexts requires an interdisciplinary approach which will be discussed in Chapters 2, 3 and 4. Using theories and terminology from philosophical, sociological and psychological literature presents the challenge of maintaining clarity of argument. For the benefit of the reader I present a conceptual map of this thesis, to include the theories, contexts and methodologies used (Figure 1 below). Many items and relationships within this structure will become clear as the reader progresses through the thesis. Hopefully this conceptual map will serve as a useful aid for foregrounding and orientating to discussions presented.

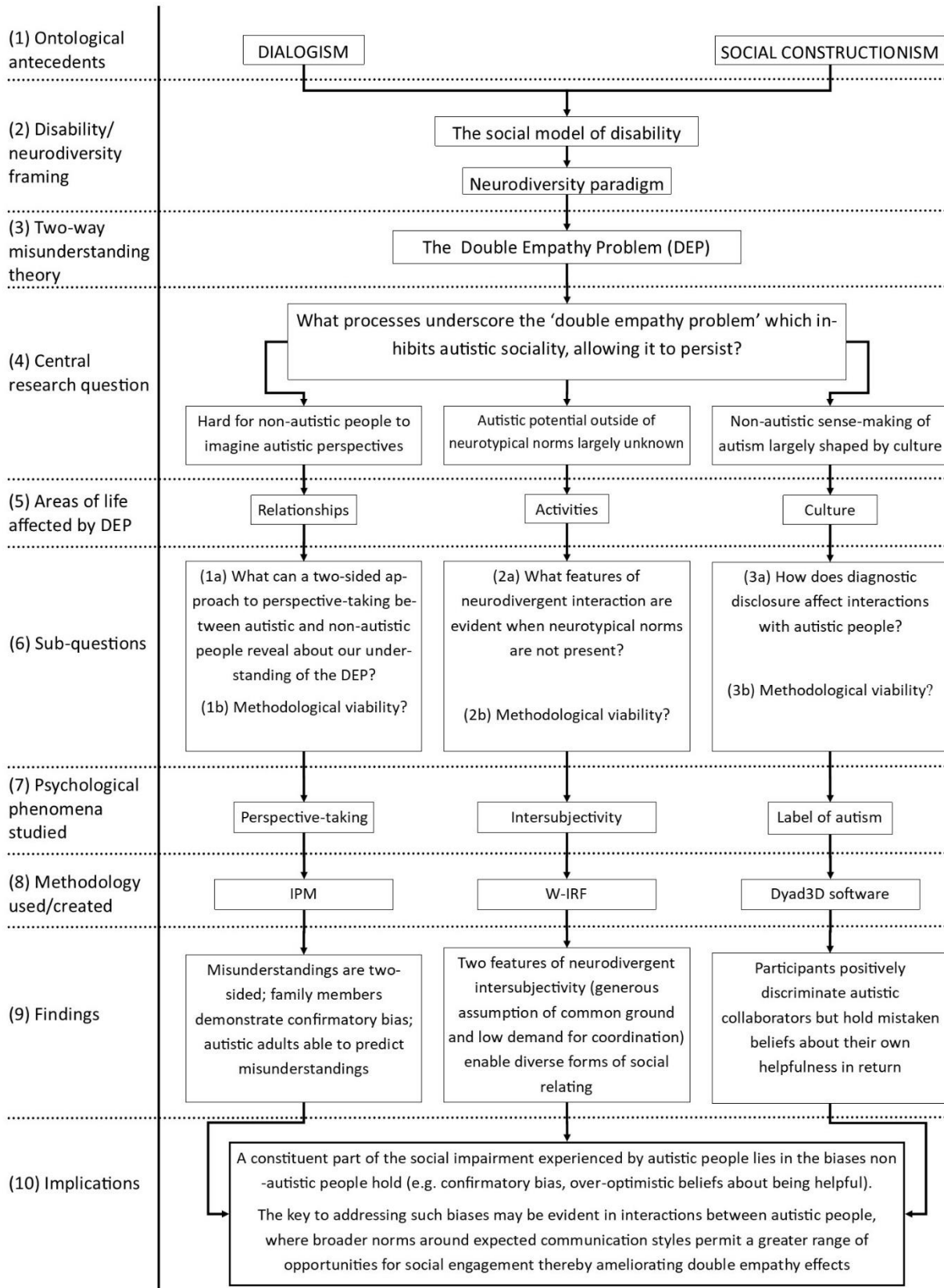
Important to note is that the conceptual map should not be confused with a structural map of the thesis. The conceptual map illustrates a top-down view of how different ideas in the thesis inherit from each other. Consequently, it begins with super-ordinate ontological theories of

dialogism and social constructionism before moving to the more specific context of autism. The structure of this thesis however, takes as its starting point the phenomena autism and the two-way misunderstandings that exist between autistic and non-autistic people, since this was the origin of the research questions explored.

The points on the map may be explained thus: (1) presents dialogism and social constructionism (discussed in Chapter 3), the ontological antecedents from which the social model of disability inherits key concepts. Although both dialogism and social constructionism overlap conceptually in terms of explaining how mind comes to know reality, they are differentiated here because dialogism specifically views minds as interdependent (Linell, 2009). This is relevant to understanding neurologically divergent interactions which this thesis explores, whereas social constructionism has a broader focus, explaining how some constructions create ontological meaning (e.g. social reality), whereas other constructions shape epistemology surrounding meaning (e.g. the *idea* of quarks, not quarks themselves (Hacking, 1999)). Social constructionism is suited to understanding phenomena such as how representations of autism circulate in culture and come to shape autistic identity (Hacking, 2009); (2) presents the subject-specific conceptual framing of the thesis around disability, and more specifically neurodiversity, which draw upon ideas of social constructionism and dialogism; (3) depicts the double empathy problem, a specific theory about two-way misunderstandings that this thesis empirically explores and which has grown from the neurodiversity paradigm; (4) identifies the central research question, and the three core issues it raises, which lead to three areas of social life to be explored, depicted in (5); (6) breaks down the central research question into three sub-questions which form the basis of the three empirical studies in the thesis; (7) highlights the psychological phenomena each study examined; (8) details the methodologies created for the purpose of exploring the sub-questions (methodological contribution); (9) details the main findings from each of the

three studies (empirical contribution), and (10) contains the main implications for the thesis as a whole (theoretical contribution).

FIGURE 1: CONCEPTUAL MAP OF THESIS



2) AUTISM AND THE DOUBLE EMPATHY PROBLEM

What is Autism?

Defining autism is a challenge because its meaning is contested. Autism is a term that is presently used in medical discourses to describe a lifelong developmental disability that affects communication and social interaction with others, and also one's sensory experience of the world around them (American Psychiatric Association, 2013; World Health Organization, 1992). Autism is conceptualised as a spectrum condition covering a vast range of abilities (i.e. includes IQs below 70 and above 130) and challenges (i.e. organising one's daily life to misinterpreting implicit meaning). Behavioural features include difficulties in emotional reciprocity, non-verbal communication, restrictive/repetitive behaviours, fixated interests and hyper-reactivity to sensory stimuli (American Psychiatric Association, 2013). In particular, research has associated autistic behaviours with cognitive difficulties in perspective-taking (i.e. the ability to infer mental states in others), executive functioning (i.e. difficulties in planning, inhibition, and flexible thinking) and weak central coherence (i.e. detailed-focussed processing). Autism prevalence rates are considered to be over 1 in every 100 people (Baird et al., 2006), with rates reported to be increasing over time (Matson & Kozlowski, 2011). Over 700,000 people are estimated to be autistic in the UK (National Autistic Society, 2018). Boys are more commonly diagnosed than girls at a ratio of around 5:1 (Taylor, Jick, & Maclaughlin, 2013), which may reflect a potential diagnostic bias towards detecting autism in boys as well as the reported ability for girls to camouflage their social difficulties better than boys (Dean, Harwood, & Kasari, 2017; Rynkiewicz et al., 2016). Comparatively little is known about autism in older populations compared with extensive research on children (Barnhill, 2007; Pellicano, Dinsmore, & Charman, 2014b), however mental health and economic outcomes are extremely poor with adults experiencing huge difficulty in finding employment and transitioning to independent life (Baldwin,

Costley, & Warren, 2014; Crane, Adams, Harper, Welch, & Pellicano, 2018; Howlin, Goode, Hutton, & Rutter, 2004; NAS, 2017; Ohl et al., 2017).

Rather strangely for a *social* impairment, diagnostic criteria omits social context in determining individual behaviour, functionality, and establishing accepted norms (Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013). Indeed, debates about diagnostic criteria, the politics of diagnosis (Liptak et al., 2008; Turowetz, 2015) and the political history associated with autism research (Czech, 2018; B. Evans, 2013) contribute to a complicated and sensitive socio-political terrain for both autistic people and researchers to navigate in terms of identity. There has been a proliferation of terminology used to describe autism, in particular the terms *neurodiversity*, *neurodivergence* and *neurotypical*. Nick Walker, an autistic author and teacher on the course *Critical Perspectives on Autism and Neurodiversity* at the California Institute of Integral Studies, has produced a useful and freely accessible glossary which examines and clarifies this terminology (Walker, 2014). Neurodiversity, according to Walker, describes the diversity of human brains and minds, but as such is a trait possessed by a group and cannot be possessed by any one individual. An individual whose brain functions in a way that diverges from the predominant socio-cultural norm should be more appropriately described as neurodivergent (Walker, 2014). Likewise the neurodiversity movement specifically relates to the politics of seeking rights, equality, respect, and inclusion for neurodivergent people, and is different from the neurodiversity paradigm, which relates to the principles of variation in mind being natural, ideas of normality being socially constructed, and neurodiversity, like other diversities, being a source of promise and creative potential (Walker, 2014).

Autism is thus more than purely a neurological configuration, the term autism has far reaching implications for identity and political rights which are a constituent part of the lived reality, and the social barriers, that autistic people navigate. The language used to describe

autism remains a key debate. Kenny et al. (2016) investigated what terms should be used to describe autism, the majority preference, from autistic perspectives, was for the term *autistic people* rather than person-first language *person with autism*; however this view differed from those of professionals who preferred person-first language and the term *on the autism spectrum* (Kenny et al., 2016). This highlights ongoing discussions about whether autism is a constituent part of people's identity (Brosnan & Mills, 2016), or whether it is separate. There are also concerns that existing definitions of autism ignore phenomenological accounts provided by autistic people themselves. For example, well documented cognitive differences in perspective-taking and executive function between autistic and neurotypical people may be explained as a difference in how attentional resources are used, with a distinction between monotropism, having few interests which are highly aroused, and polytropism, having many interests which are less aroused (Murray, Lesser, & Lawson, 2005). There is also a growing argument that neurotypical assumptions about what counts as reciprocal behaviour are embedded within the starting assumptions of scientists themselves (Jaswal & Akhtar, 2018). Certainly, the existing frameworks for both diagnosis and for researching autism must be critically evaluated, and are discussed in greater detail below.

Autism might be described as heterogeneous, in terms of the diverse people it covers, their unique experiences of the world, and the complex challenges faced in everyday life. This raises questions about how to conceptualise, define and communicate knowledge about autism. Autism is often described as a *spectrum*. A spectrum view has utility in terms of illustrating diversity, but is also conceptually problematic given the multi-dimensional factors associated with autism which cannot be represented by a linear scale (Fletcher-Watson, 2017). The idea that autism is one variable results in descriptions such as *high* and *low* functioning autism, which oversimplifies nuanced behaviour into dichotomous categories of functionality. This is problematic because functioning is the outcome of the fit between the

individual and the environment (Beardon, 2017), thus it underestimates the explanatory scope of social reality in which our social competence is formed and in which social barriers to interactions are encountered (McGeer, 2004). Likewise the view that somehow *all people are on the spectrum* is also unhelpful (Beardon, 2017) as it ameliorates the difficulties that autistic people experience and reduces the extent to which society takes seriously their needs.

Heterogeneity presents a challenge for diagnostic frameworks which, by nature, aim to establish rules which are consistently applied across a given population (Woodbury-Smith & Volkmar, 2009). Hans Asperger acknowledged that despite traits of autism being distinct, the individuals he had studied possessed strikingly varied personalities and interests (Asperger, 1991). This heterogeneity has remained a consistent challenge for the internal validity of diagnoses, for example, an impairment in communication could mean (a) an absence of any communication, (b) communicating only needs, to (c) repetitive questioning and lengthy monologues (Wing, 1991). In the absence of discovering any clear biomarker for autism (Happé, Ronald, & Plomin, 2006), clinicians rely on a combination of standardised tests, interviews with caregivers and observation for diagnosis (Turowetz, 2015). Examples of different assessments include the ADOS (Lord et al., 2000), ADI-R (Le Couteur, Lord, & Rutter, 2006), and AAA (Baron-Cohen, Wheelwright, Robinson, & Woodbury-Smith, 2005). However diagnostic frameworks have been criticised for focussing too much on the behavioural aspects and not the impairment which underlies such behaviours (Cashin & Barker, 2009), resulting in high diagnostic inconsistency between assessments which measure and interpret social impairments in different ways (Leekam, Libby, Wing, Gould, & Gillberg, 2000). Moreover, autism has high psychiatric comorbidity with other mental health problems, such as depression (Lugnegård, Hallerbäck, & Gillberg, 2011), bipolar disorder (Munesue et al., 2008) and anxiety (White, Oswald, Ollendick, & Scahill, 2009). Thus, the diagnostic

process of autism continues to struggle with definitions which are broad enough to include heterogeneity, and definitions narrow enough to ensure clinical consistency.

When attempting to describe autism it is also useful to state what it is not. Autism is often contrasted with the term neurotypical, however neurotypicality specifically refers to dominant social standards of normal and should not be used synonymously with non-autistic (Walker, 2014). Likewise, neurodivergent includes autistic people but equally could include anyone that diverges from societal norms, e.g. people with a diagnosis of schizophrenia. Autism is also not something which can be acquired, like a disease, however the cultural impact of the MMR controversy continues to shape societal perceptions of autism (Jones & Harwood, 2009; Provencher, 2007).

To summarise, the question of how to define autism encounters many of the ontological and discursive tensions that exist between different stakeholders involved in understanding autism, which the following sections will explore in more detail. Yet there are areas of commonality across different approaches to autism, and not all debates are as intractable as they might initially appear.

Approaches to understanding autism

The study of autism transcends research disciplines from neuroscience to sociology. Such discipline boundaries are characterised by different ontological assumptions which result in significant tensions when discussing how to support people on the spectrum. One polarity may be termed the *positivist paradigm*, characterised by research fields such as biomedicine, neuroscience, cognition and behavioural science, which broadly assume that phenomena have stable and knowable underlying causes which may be universally applied (Brown, 2003). The other polarity may be termed the *social constructionist paradigm*, and includes research fields of sociology, human geography, and societal psychology, and more specifically the

neurodiversity paradigm and the neurodiversity movement. Social constructionist approaches understand human meaning and behaviour as contextualised to the resources and circumstances in which people find themselves, and in the case of the neurodiversity paradigm, views autism as a difference rather than a deficit from the behavioural norm.

Different commentaries about approaches to autism have variously characterised polarities in different ways, e.g. as a tension between cognitive and phenomenological perspectives (McGeer, 2004); as a tension between biomedical science and identity politics (Ortega, 2009; Parsloe, 2015); as a tension between pathological and emancipatory research (Walker, 2016); as a tension between deficit-models and sociologically-situated models (Milton, 2014); and as a tension between behavioural deficit and cognitive processing style (Happé, 1999). For example, the biomedical paradigm views autism as having a neurological genesis as a disorder in normal brain functioning. Like other developmental disorders it is often described as a condition separate from one's identity, thus individuals may *have* autism rather than be autistic, and likewise their *condition* is something to be treated and potentially even *cured* as one might treat or cure a disease. In contrast the neurodiversity paradigm, originating from the perspective of autistic people themselves (Singer, 1999), sees autism as part of natural human variation in neurology, and should not be pathologised as a disease but rather seen as a constituent part of one's identity. The associated neurodiversity movement therefore places an emphasis on better cultural understanding and acceptance of autism (Kapp et al., 2013), because society is poorly placed to meet the needs of autistic people, and in many cases can actually exacerbate the challenges that autistic people face (Milton, 2012).

In discussing approaches to autism, it can be easy to unintentionally reinforce existing discourse boundaries by viewing such dualisms as purely rooted in ideological terms. For example, as will be discussed below, the medical model has significant limitations in its approach to understanding the lived reality of autism. While addressing these limitations

requires a fundamental reorientation of ontological assumptions, it should not exclude the possibility that many people in the medical field are already sociologically minded, or that future changes to remove the unnecessary stigmatisation of autism are unachievable from a medical viewpoint. Indeed, if future debate is to move towards a more unifying discourse about autism then discussions need to find a way to work across boundaries, as well as critically reflecting on the boundaries themselves (Runswick-Cole, 2014). For this reason, I think it is important to critically examine the factors that enable such positions to become embedded within research disciplines, resulting in theoretical and methodological decisions which serve to reinforce ontological tensions.

For example, a point of connect between positivist and social constructionist paradigms is the concept of neurodiversity. Both paradigms recognise that any population will be distributed over a range for a given property, such as one's ability to be social. Where the paradigms differ is the question of how that neurodiversity should be understood, addressed, and communicated. Within the positivist paradigm, biomedically oriented disciplines understands diversity as resulting from an underlying mechanism (e.g. neurological configuration), and investigating it involves stripping away complexity (e.g. focusing on specific brain regions / specific cognitive domains) in order to isolate variables (e.g. Theory of Mind / mirror neurons). Such variables form the basis for interventions which seek to reduce and eliminate individual divergence (Kapp et al., 2013), both improving weaknesses (e.g. controlling problematic behaviour: Lang, Regeher, Lauderdale, Ashbaugh, & Haring, 2010) and harnessing strengths (e.g. mapping and potentially transferring savant abilities: Remington, 2017; Remington & Fairnie, 2017). In terms of communicating knowledge about diversity, the main audience for the positivist paradigms are often other researchers and clinical practitioners. Within the social-constructionist paradigm, the neurodiversity movement recognises diversity as something to be embraced (Runswick-Cole, 2014). It argues, from a

social model perspective on disability, that many of the impairments people with disabilities experience result from societal barriers rather than their individual difference (Oliver, 1983, 2013), and thus such barriers should be removed through political activism. The audience for communicating the neurodiversity movement and research paradigm is potentially broad as it is communicated through a variety of media channels including blogs, as well as sociological academic journals.

These different approaches to neurodiversity have resulted in representations of each other that prevent cross-discipline dialogue. The biomedical view broadly claims that the neurodiversity paradigm is *anti-cure* (Ortega, 2009; Runswick-Cole, 2014), and that the more complex needs of those on the spectrum, particularly those who lack the communication resources, are not being adequately represented in neurodiverse debates (Jaarsma & Welin, 2012). On the other side of the debate, the neurodiversity paradigm claims that the biomedical view is unethical in its aims and values of labelling deficient bodies in need of cure (Smukler, 2005), and is disconnected from autistic interests (Pellicano et al., 2014b), largely excluding autistic voices from research (Bogdashina, 2005; Milton, 2014).

Recent years have seen a strong push towards a participatory model of research in order to bridge these differences and to produce higher quality and more ecologically valid research (Jivraj, Sacrey, Newton, Nicholas, & Zwaigenbaum, 2014). A participatory model is one in which the voices of autistic people play a central role in influencing and co-creating the research process, from setting research agenda to conducting research, to dissemination and engagement of research findings. Research on the perspectives of autistic people, family members, practitioners and researchers has revealed differing views about the extent to which research is inclusive of the voices of different stakeholders (Pellicano, Dinsmore, & Charman, 2014a). Key themes uncovered from investigating non-researcher views relate to scepticism about the motivation for invitations to participate in research and frustration with a

failure of researchers to make their findings accessible and to transform their research into something of tangible benefit to stakeholders (Fletcher-Watson, Larsen, & Salomone, 2017; Pellicano et al., 2014a). Thus, initiatives such as the Participatory Autism Research Collective (PARC, 2018b) and #Aut2Engage (CRAE, 2018) aim to establish a cross-discipline dialogue between autistic voices, with the important emphasis that agenda for research are autistic-led. Autistica, a UK based charity that funds research on autism, has also established a specific grant to support autistic researchers.

The participatory model, and its role in overcoming many of the limitations of existing approaches to autism will be further discussed in Chapter 4 below. However, the contrasting views of different stakeholders highlighted above reflect an overarching concern with the existing positivist approach used to understand and create knowledge about autism, which is relevant to contextualising the double empathy problem. The following section therefore critically reflects on the existing limitations associated with the way knowledge about autism has been produced.

Existing limitations associated with the way knowledge about autism is produced

A central challenge of the existing positivist approach to autism is understanding difference from societal norms as a deficit in functioning. This is known as the *deficit model* and is the main discourse through which researchers, professionals and clinicians have understood autism-related conditions (Robertson, 2010). The deficit model portrays autism as an illness/disease which ostensibly requires fixing (Smukler, 2005), while similarly portraying non-autistic people as neurologically and psychologically ideal (Robertson, 2010). Methodologically this is grounded in comparative research designs matching autistic participants with non-autistic individuals via IQ scores, gender and age. However, comparative designs lead easily towards pathologisation because they are oriented to

measuring deficits (in the form of relative deviations from the norm) at a group level, and not identifying strengths in social ability at an individual level. Consequently the deficit model results in a very arbitrary view as to what constitutes functional human cognition (Fenton & Krahn, 2007), and has been critiqued in other contexts as resulting in institutionalised forms of normativity which dehumanise bodies from their identity (Foucault, 1976). Cross-cultural psychology highlights how social interaction is normatively framed by cultural expectations which differ between cultures (Gillespie, Kadianaki, & O'Sullivan-Lago, 2012) and while many autistic people have extremely challenging behaviour, using a purely deficit lens risks overlooking the potential that many autistic people have for social interaction in light of their more obvious deficits (to the perspective of the neurotypical observer). To understand what makes environments enabling for autistic people one must take a broader approach to social interaction than that afforded by the deficit model.

The biomedical approach to autism, which has traditionally used a deficit model approach, has been critiqued for lacking reflexivity concerning how knowledge produced about autism affects the social construction of autism, circulating in our culture and influencing the way autistic people see themselves (Bagatell, 2007; McGeer, 2009). Additionally, it also affects how others interact with people on the spectrum (Hacking, 1999, 2009) because autism has been subject to various misrepresentations (McGeer, 2009; Smukler, 2005) and controversies (Jones & Harwood, 2009). As Study 1 of this thesis will show (Chapter 5), representations of autism produced from science, such as an impoverished ability to mentalise other minds, can adversely affect the way in which non-autistic interlocutors interpret and support interactions with autistic partners. Moreover, stigmatisation of autism can obscure the moments of social potential autistic people may deploy, albeit infrequently. Thus, a deficit model is not only methodologically partial at best, it is also socially pathologising at worst.

There are also concerns regarding the power relations inherent to the biomedical approach to autism. As Foucault explored in *The Birth of the Clinic*, medical perspectives (particularly *Western* medical science) have historically been reified over alternative forms of knowledge, and have become institutionally ingrained across many facets of society, from clinical practice, education, policy, the media, and law. What Foucault's work reveals is the political nature of who's knowledge and which methods of knowledge production are prioritised in considering the medicalised body, which in turn leads to the (re)production of specific behavioural and physiological norms from which certain bodies can be categorised as being divergent (Foucault, 1976). Thus a power asymmetry exists between the medical experts who define knowledge about autism, and the voices of autistic people themselves who have great difficulty penetrating such discussions and are effectively excluded from the process of producing knowledge about autism (Milton, 2014).

The biomedical aim of prevention and control of autism has little to offer the millions of autistic people existing (both diagnosed and undiagnosed) in older populations. Since the diagnostic category of autism has only been in clinical use since the late 70's, many people of older generations have never received a diagnosis (James, Mukaetova-Ladinska, Reichelt, Briel, & Scully, 2006). Progress in policy and practice reflects progress in science (Verhoeff, 2015), and research on older populations and societal issues accounts for only 1% of the funding landscape for research on autism leading to the feeling among autistic people that there exists a significant validity gap between science and their everyday needs (Pellicano et al., 2014b). The current dearth of research on older populations contributes to poor public understanding of autism, and perhaps explains why autistic adults have poor employment prospects (Redman et al. 2009) and are more likely to be unemployed (without a job), underemployed (in a job which fails to utilise their skills), and misemployed (in a job which is wholly unsuitable to their strengths) than the overall population (Baldwin, Costley, &

Warren, 2014). They are also highly likely to remain cohabiting with parents long into adulthood (Howlin et al., 2004). Thus the healthcare system and society in general are poorly placed to meet the psychological and social needs of autistic adults (Piven & Rabins, 2011). This thesis therefore addresses this validity gap by choosing to focus on understanding autism through examining autistic adolescents and adults.

The difficulty in treating autism as a purely biological phenomenon and ignoring its presence as a social construction is further complicated by the ever-shifting political context in which knowledge on autism has been framed. Autism has undergone many transformations from its original conceptualisation by Eugen Bleuler (Bleuler, 1950/1911) of an individual that fantasises excessively to someone who does not have any fantasising ability at all (Evans, 2013). The transformations in meaning in the UK were in large part brought about by the Mental Health Act 1959 which abolished the legal requirement for mentally “defective and insane” individuals to be institutionalised, leading to a need to distinguish the psychopathology of the new children being integrated into the majority population (Evans, 2013). This led to a huge rise in epidemiological studies and the employment of educational psychologists, which shaped discussion of autism around issues of statistical deviance from the norm. Consequently, the way autism has been documented over time has been largely shaped by the policy and diagnostic instruments used to measure it, and the societal and political needs of the local councils that have to document their population for central government (Evans, 2013). This ever-changing landscape continues: recently in 2013, Asperger’s syndrome, autism, childhood disintegrative disorder and pervasive developmental disorder not otherwise specified (PDD-NOS), were subsumed into one category of autism in the DSM-V.

Access to participants is also a challenge many researchers face. Given the nature of social impairment involved with autism, it can be hard to connect with potential participants and

build the necessary trust required to take part in research. Those that do participate in research therefore represent the proportion of autistic people that are accessible and willing to take part in research, which reflects a potential sampling bias. Arguably there are much larger sections of the autism population that remain unstudied because of their unwillingness to participate. Psychology already faces a replication crisis (Fanelli, 2009), however the sampling difficulties studies of autism specifically face, and the inherent heterogeneity of autism which by nature requires larger sample sizes, mean that the process of replication itself is almost impossible.

Consequently there is a growing argument that more exploratory studies of autism are required which make use of naturalistic data in order to reconcile the tension which exists between biomedical and cultural perspectives on autism (Verhoeff, 2015). Contextual and naturalistic data can reveal more about how the enabling and disabling aspects that can result from situational factors, improving the efficacy of diagnostic assessments, while similarly including the voices of autistic people in constructing future understanding about their neurodivergence. It can also reveal more about the experiences of people interacting with autistic adults, who co-determine interactional outcomes. Yet there remains a considerable methodological gap in terms of measuring diversity, and an empirical gap for understanding how diversity plays out in everyday contexts. This thesis seeks to address these gaps by developing new tools for measuring and understanding neurodiversity and the bi-directional nature of cross-neurological interactions.

The double empathy problem

The different approaches to autism, limitations with the existing research framework, and infrastructural issues associated with diagnosis and policy, result in a complicated socio-political terrain for different stakeholders (e.g. autistic people, family members, practitioners,

and researchers) to manage. Building shared understanding requires experiential overlap (Chapter 5) which is a challenge when differences in perspective cut across intellectual, social and political contexts. A theory which helps to explain the gap in mutual understanding that can result in social impairment that autistic people experience is known as the *double empathy problem*, and although primarily used to depict interpersonal relations, it can also be used to describe structural gaps in understanding between institutions and people (e.g. psychological science and autistic people) (Milton et al., 2018).

The double empathy problem is a term created by autistic scholar Milton which describes a “disjuncture in reciprocity between two differently disposed social actors” (Milton, 2012, p. 884). This disjuncture is fundamentally two-way, because it originates from the dispositional difference between social actors (e.g. autistic and non-autistic), leading to different norms and expectations of each other that can make mutual understanding difficult (Heasman, 2017a). Thus, the term “double” indicates that it is a problem distributed across social actors rather than attributable to any one individual. Yet despite this, in autistic-to-neurotypical interactions, “the disjuncture may be more severe for the non-autistic disposition as it is experienced as unusual, while for the ‘autistic person’ it is a common experience.” (Milton, 2012, p. 885).

The value of the double empathy perspective is that it avoids importing biases about social normativity into the interpretation of a lack in mutual understanding. The disjuncture is relational, resulting from a difference between actors, rather than originating from the deficit in social skill of any one individual. Moreover, the double empathy framework is a dynamic theory, because in principal the double empathy problem can have a “looping effect” (Hacking, 1996) whereby the misunderstanding which originated from a disjuncture in dispositions can feed back into the interpersonal dynamic and lead to further gaps in mutual understanding. Thus “as interactions unfold, an initial gap in mutual understanding due to a

dispositional difference can readily become a critical gap in mutual understanding which potentially terminates the interaction” (Milton et al., 2018, p. 1). In this respect the double empathy problem draws insight from a number of sociological and social psychological theories which understand the inter-dependency of human interaction including Mead (1934), Goffman (1958), Garfinkel (1964), Schegloff (1992) and Hacking (1999, 2009).

Applications of the double empathy problem are numerous, helping to shape insights about mental health, employment, relationships, the justice system and research itself (Milton et al., 2018). However, since it is a relatively new sociological theory there remains a paucity of empirical work on the double empathy problem. The main empirical and methodological contribution of this thesis is to explore different social contexts of the double empathy problem to understand the enabling and disabling features of autistic sociality, and to develop new tools that other researchers can use.

Research questions raised by the double empathy problem

In one respect the double empathy problem is not a new one. Social psychologists have for many years probed the question of why group differences lead to conflict (Allport, 1979; Sherif, Harvey, White, Hood, & Sherif, 1961; Tajfel & Turner, 1986). In a classic study using a minimal group paradigm, Sherif illustrated how introducing competition and rewards between two randomly allocated groups of young boys was sufficient to create hostility towards the outgroup (Sherif et al., 1961). Thus, it does not take much for differences in experience to result in a lack of understanding. Beyond the study of psychology, our history and news is populated with endless examples of a lack of empathy when humans differ, e.g. religion, class, ethnicity, politics, and gender are just some of the grounds upon which differences may be fiercely contested. So what is it about the double empathy problem that is particular to understanding autism? It could be argued that a difference in neurology is just

another type of difference, similar to other contexts which have been extensively researched in social psychology. In this respect, could we not just use theories such as the *Contact Hypothesis* (Allport, 1979) to ameliorate differences between autistic and non-autistic people?

There are at least three features that may help to explain what makes the double empathy problem in autism distinct and in need of further psychological investigation. The first reason is that, unlike other double empathy contexts, there is a significant barrier in terms of non-autistic people imagining what autistic perspectives entail because doing so requires addressing one's own taken-for-granted sensory configuration. The relationship between our senses and the way they are cognitively processed is established early in cognitive development (Johnson & Hannon, 2015). There are many examples in popular culture of the extent to which people struggle to understand other's sensory experience of the world. Take for instance debates about colour constancy, the subjective ability of humans to perceive the colour of objects constantly across different illumination settings (Logvinenko, Funt, Mirzaei, & Tokunaga, 2015). Visual scenes typically comprise a number of different wavelengths, both from a given object of focus (e.g. an apple) and the surrounding illumination (e.g. midday sun or dusk). Photoreceptors in the eye may thus detect a range of wavelengths and it is left to the visual system to subtract an approximate composition of illumination to maintain constant perception of the coloured object in question (McCann, 2005). Usually this results in insignificant differences in the colour perception of the object, however sometimes the perceived differences can be large, such as the colour of the dress identified in Figure 2, which remains the same under the shaded yellow and blue light.

FIGURE 2: "THE DRESS". SAME COLOURS UNDER YELLOW AND BLUE BOXES

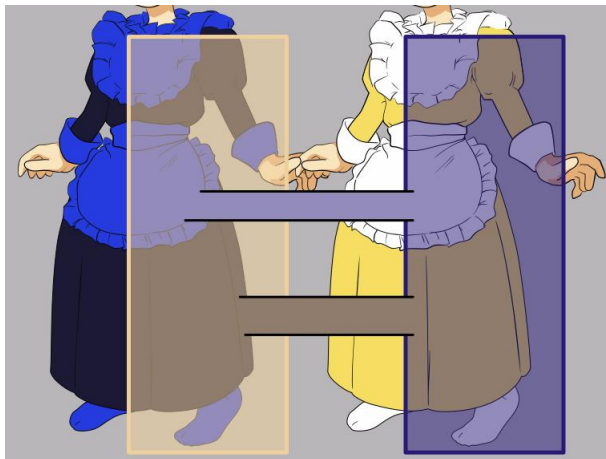


Figure design by Kasuga~jawiki;
vectorization by Editor at Large;
"The dress" modification by
Jahobr available at
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wiki/File:Wikipetan_wearing_The_Dress_reduced
.svg](https://commons.wikimedia.org/wiki/File:Wikipetan_wearing_The_Dress_reduced.svg). Licensed under CC BY-SA
3.0.

In 2015, a viral image of a dress similar to the one depicted above (in that it could be perceived either as black and blue or white and gold), produced intense public reaction with people unable to accept why others could perceive the colours differently from themselves (Winkler, Spillmann, Werner, & Webster, 2015). The debate reflects how people can have different paradigms of thought (Marková, 1982) and in particular the ongoing difficulty people have in imagining other people's sensory configurations, even when they have a plausible scientific explanation as to how such differences are possible. Thus, sensory differences represent a fundamental disjuncture within the double empathy problem which is unique to autistic-neurotypical interactions.

This raises an important question when considering autistic to non-autistic relations. With different sensory experiences, and with markedly different social histories from which to draw upon, how can each party adequately interpret and predict what the other is thinking? Perspective-taking, the ability to imagine other people's point of view, is considered a vital part of social life (Tager-Flusberg, 2007), yet although autistic difficulty in imagining neurotypical perspectives are well-documented, it is also true that neurotypical people struggle to understand autistic perspectives (Brewer et al., 2016; Sheppard, Pillai, Wong, Ropar, & Mitchell, 2016). Neurotypical people do not have the experiential resources from

which to fully understand and empathise with autistic ways of sense-making. Perspective-taking is thus an under-researched two-sided issue and addressing a critical feature of the double empathy problem involves understanding more about the two-sided nature of perspective-taking between autistic and non-autistic people. A provisional research question is therefore:

Sub question 1a: What can a two-sided approach to perspective-taking between autistic and non-autistic people reveal about our understanding of the double empathy problem?

This question is developed further in the literature review in Chapter 3 which focuses on perspective-taking research. It highlights how there is a methodological precedent for unidirectional approaches; that is, approaches which focus solely on characterising social deficits in the autistic individual. Consequently sub-question 1 has an associated methodological component:

Sub-question 1b: What is the methodological viability of exploring bi-directional approaches within autistic/non-autistic relationships?

Chapter 4 will address the methodological aspects of sub-question 1b, and explain the rationale for using and updating Laing et al.'s (1966) Interpersonal Perception Method. Together, these two questions form the basis of Study 1 (Chapter 5) which explores 22 relationships involving young autistic adults and their family members. Through exploring both sides of such social relations, it shows autistic adults were fairly accurate at predicting how they would be rated by their family members, but that family members often underestimated such abilities. Chapter 8 discusses the implications of these findings for understanding the double empathy problem.

A second challenge which is unique to the double empathy problem is that in order to understand its limiting effects on autistic sociality, we need to have some appreciation of what potential for social interaction that neurodivergence involves. However, most studies of autism have either focussed on the individual, divorced from meaningful social context, or they have explored autistic interactions in a cross-neurological situation, where the autistic individual is constantly encouraged to adhere to neurotypical norms of social relating (e.g. Kremer-Sadlik, 2004; Ochs & Solomon, 2004). We therefore know little about neurodivergent intersubjectivity outside of conventionlised forms of social interaction, and by extension we are unaware of the degree to which the double empathy problem is limiting autistic sociality.

Reports from autistic authors suggest that much autistic potential remains undiscovered, with autistic people “demonstrating significant introspection, imagination and awareness of minds outside of our own” (Yergeau & Huebner, 2017, p. 276). Understanding social potential of autistic people can shed light on how the double empathy problem restricts such potential being realised in cross-neurological settings. One way in which this can be achieved is through investigating interactions between autistic people to understand what features of neurodivergent communication exist when neurotypical norms are removed. Autistic authors have also long since reiterated the point that they feel it is easier to socially connect with other autistic people than it is neurotypical people (Nicholas Chown, 2014; Dekker, 1999). This frames the following sub-question:

Sub-question 2a: What features of neurodivergent interaction are evident when neurotypical norms are not present?

Chapter 3 examines literature related to bi-directional social studies of autistic relationships, highlighting the potential danger that neurotypical assumptions are not only embedded in the

social context, but also the research context which interprets autistic behaviour (Ridout, 2017). Thus sub-question 2 also gains an additional methodological component:

Sub-question 2b: Can viable methods be developed for understanding autistic interactions on their own terms?

Chapter 4 explores the methodological challenges of this question further and discusses the abductive process through which studying video-gaming between autistic participants emerged as an idea. Sub-question 2 thus forms the basis of Study 2 (Chapter 6) which examines the distinctive features of shared understanding in neurodivergent interactions. The study finds that although often fragmented, autistic-to-autistic interactions demonstrate very intense pockets of tight coordination, achieved through complimentary features of generously assuming common ground and having a low demand for tight social coordination. The impact in terms of understanding more about the double empathy problem is discussed further in Chapter 8.

A third challenge that is specific to the double empathy problem is the extent to which culture informs expectations of autism for both autistic and non-autistic people. In the absence of available information, people use representations from culture to create default expectations about the behaviour and thinking of others (Schutz, 1932). The social construction of autism (i.e. the label of autism and the meaning it is given through representations in culture) is therefore an important focus of critical analysis because it can “loop” back into interpersonal relationships, altering identity and behaviour (Hacking, 1996; McGeer, 2004).

However, studying the social construction of autism gains an even greater impetus when one considers the socio-political context of who shapes the narrative of autism in popular culture. Certainly, autistic voices have been largely excluded from the research process (Milton, 2014), which has contributed to a pathologising discourse that “privileges neurotypical

minds” while undermining and delegitimizing “autistic concepts of identity and community” (Yergeau & Huebner, 2017, p. 274). In popular culture too there are many examples of the stigmatising representations of autism being a burden (Huws & Jones, 2011), an unloved condition (Jones & Harwood, 2009), and as people “occupying a separate world” (Brownlow & O’Dell, 2009). In addition, controversies such as the MMR debate and the refrigerator theory of autism (i.e. emotionally cold mothering causes autism: Evans, 2013) have greatly increased stigma associated with the label. It is therefore of little surprise that such representations should impact interpersonal dynamics between autistic people and others. A recent study which examined autistic perspectives on the stereotypes used to describe autism revealed common perceptions that autistic people are perceived as “weird” and that negative stereotypes result in bullying and exclusion (Treweek, Wood, Martin, & Freeth, 2018). This therefore leads to the following Sub-question 3:

Sub-question 3a: How does the social construction of autism affect non-autistic interactions with autistic people?

Chapter 3 examines literature related to the social construction of autism and the resources people use to make sense of the label of autism. The literature is varied, highlighting both positive and negative consequences of disclosing a diagnosis. Indeed, the relationship between attitudes and behaviour is rarely linear (Glasman & Albarracín, 2006), thus it is important to understand the dynamic between self-reported perceptions of behaviour and one’s actual behaviour. While there have been many studies examining non-autistic perceptions of autistic people (e.g. Chambres et al., 2008), analysing how this plays out behaviourally presents more of a challenge because interactions are difficult to replicate, especially if one wishes to compare the effects of a label with a control group that has no label. Consequently, sub-question 3 was further developed to ask:

Sub-question 3b: Can a viable method be developed to explore: (i) the relationship between self-reported perception and actual behaviour within a simulated interaction, and (ii) the differences between groups where the identity of the online agent (autistic/non-autistic) is altered?

These questions resulted in the development of new research software called Dyad3D, which served as the basis for Study 3 (Chapter 7). Chapter 4 details the iterative development of this tool for the purposes of understanding the effects of the label of autism. Chapter 7 presents findings from Study 3 which show how the label of autism resulted in significantly higher perceptions of utility by participants compared with a control group where no diagnostic information was disclosed. Moreover, participants also felt that they were more helpful towards autistic collaborators, however this did not significantly predict whether participants actually were more helpful in the game itself. Thus, the findings both show positive discrimination, and a potential mistaken belief about how helpful participants actually were which could explain why autistic people might feel negatively discriminated against. Chapter 8 discusses how this informs our understanding of the effects of the label of autism on non-autistic attitudes and behaviour.

3) LITERATURE REVIEW

Theories about social impairment in autism

This chapter examines existing literature related to understanding the nature of social impairment that people on the autism spectrum experience. This body of research is broad, so for the purposes of understanding the double empathy problem it is divided into three subsections. The first section deals with what are termed *unidirectional* approaches. These are approaches which attempt to understand social impairment through only looking at the individual social competence of autistic people. From initial research on autism by Kanner (1943) and Asperger (Wing, 1981), this has been the traditional approach used by researchers. The review will focus specifically on perspective-taking, since this reflects a key social feature identified in the section on double empathy above, and, will evaluate the strengths and weaknesses of classic studies to understand how the present thesis should tackle such methodological challenges in Study 1.

The second section explores what are termed *bidirectional* approaches. These are approaches which consider the two-way interdependence between autistic people and non-autistic people, through studying the psychology of non-autistic attitudes and behaviour towards autistic people, or through studying interactions between autistic and non-autistic people. This body of literature relates to the second challenge regarding the double empathy problem, which is how we understand the social potential of autistic people in optimised settings. Again, the strength and limitations of these studies will feed into refining the research question for Study 2.

The third section will address what is termed *the social constructions of autism*, that is literature which explores the wider social-cultural context through which people make sense of the term autism. This relates to the third double empathy social feature identified in

Chapter 2 regarding the processes underscoring the way in which non-autistic people extend social opportunities towards autistic people. With a focus on the label of autism, this literature will help to refine the research question for Study 3.

Thus, each of the literatures reviewed will connect with the three features of the double empathy problem outlined in Chapter 2, and will refine the research sub-questions further for each of the three empirical studies in the following chapters.

Unidirectional approaches

In the preceding section it was discussed how a major feature of the double empathy problem is the difficulty people have in imagining other people's perspectives. The question of perspective-taking, in the form of Theory of Mind research (ToM), represents the most well-documented approach to researching social impairment in autism. ToM is the ability to impute mental states to oneself and others (Premack & Woodruff, 1978) and has often been cited as fundamental to navigating daily social life (Carruthers, 2009; Froese, Stanghellini, & Bertelli, 2013; Tager-Flusberg, 2007). Through inferring, predicting and explaining the intentions of others, humans exercise a uniquely social psychological ability to recognise, understand, and share knowledge about divergent perspectives (Tomasello et al., 2005). However, ToM research has traditionally focussed only on the individual with autism and characterising their perceived deficits in social functioning from the norm, with the question of who or what autistic people are interacting with rarely problematised (See Chapter 2). The development of the unidirectional approach arguably has a methodological basis which is why it is important to understand its development.

Early assessments of ToM in autism explored false-belief attributions. Wimmer and Perner (1983) showed that neurotypical children develop false-belief attribution at specific developmental stages between years six to nine. Adapting Wimmer and Perner's design,

Baron-Cohen et al. (1985) presented participants with two characters, Sally and Anne, and asked where Sally will look for her marble (which had been moved by Anne while Sally was temporarily absent from the room) (Baron-Cohen, 1985). The task examined first order theory of mind (knowing that Sally may have a mistaken belief about the location of the marble), and second order theory of mind (knowing the content of Sally's mistaken belief, in this case where she will look for the marble). Children with autism performed significantly worse than neurotypical children and children with Down's syndrome, leading Baron-Cohen et al. to conclude that autism involved a specific developmental delay in the acquisition of ToM skills (Baron-Cohen, 1985). However, while children with autism were significantly impaired in performance of the Sally-Anne test, the test proved less conclusive for people with a diagnosis of Asperger's syndrome, who could successfully execute second order ToM skills (Bowler, 1992). This result raised questions about the validity of the Sally-Anne task, which uses abstract targets (e.g. dolls not humans) and is decontextualized to real social situations (e.g. the participants share no prior history with either Sally or Anne).

The response to such challenges was methodological, not theoretical, as researchers aimed to build tests with greater discriminatory power and reflected much less on the unidirectional assumptions of ToM itself. To increase methodological complexity researchers aimed to integrate more contextual information into the presentation of perspective-taking stimuli in an effort to probe "a more sophisticated level of social cognition" (Baron-Cohen, 1989, p. 294). Happé's (1994) 'Strange stories task' (SST) presented participants with a series of vignettes about everyday situations where people say things they do not literally mean. Vignettes included 12 scenario types (lie, white lie, joke, pretend, misunderstanding, persuade, appearance/reality, figure of speech, sarcasm, forget, double bluff and contrary emotions), as well as six control stories that did not involve inferring mental states but instead depicted unforeseen mechanical situations (Happé, 1994, p. 133). Happé recorded the justification

given by participants to the “why was X said?” question as either correct/incorrect, and also whether a mental or physical reason was given. While all participants found the physical control stories easy, the participants with autism had a much higher tendency to provide incorrect mental states as a justification (mean = 4.6 answers) than the controls (mean = 1.9), or mentally handicapped participants (mean = 0.7). This finding supported the *specific developmental delay hypothesis*, the idea that autistic symptoms stem from a specific delay in ToM cognition.

The Strange Stories Task (and subsequent variations, e.g. Simon Baron-Cohen et al., 1999; Kaland & Møller-Nielsen, 2002) therefore highlighted the important role of context in perspective-taking. By diversifying the range of mental state attributions to be made across scenarios involving lying, joking etc., the test was able to discriminate more effectively between the three groups of autistic subjects with varying ToM ability, providing a more continuous measurement of their ToM than the false-belief tasks alone (Happé, 1994, p. 142). However, because these methods were still rooted in a unidirectional application, many facets of how perspective-taking unfolds in everyday life were not being accounted for in the literature. For example, although more ecologically valid, the Strange Stories Task, remains abstract because the mentalising of others’ mental states does not depend on the target in question. There is no perceiver-target relationship from which participants can infer an understanding of others; instead they must interpret abstract characters and situations which may potentially bear little resemblance to personal experiences. Moreover, everyday social interactions often encounter misunderstandings precisely because actors make assumptions about others and the knowledge they share. Social psychological research has long since shown how identity can lead to biases in perception of Self and Other (Jones & Nisbett, 1971), and can act as an important constraint in knowledge production between people (Gillespie & Cornish, 2010b).

Concerns about the validity of ToM as a theory and how it has been methodologically operationalised have grown significantly over the years. There now exist many critiques concerning what ToM is (e.g. folk theory, cognitive module, social problem solving, simulation: Rajendran & Mitchell, 2007), what it should measure (e.g. processes of cognition, developmental trajectory, conceptual knowledge depth: Apperly, 2012) and what causes it to be impaired (e.g. defective meta-representation, impaired reasoning, impaired inner language: Boucher, 2012). There are also concerns about the relationship between ToM and social understanding. While ToM may impact our ability to build and manage social relations (Caputi, Lecce, Pagnin, & Banerjee, 2012), our social experiences and social relations inform ToM (Perner, Kloo, & Gornik, 2007), contributing to its development throughout adolescence (Dumontheil, Apperly, & Blakemore, 2010). Yet the issue of whether ToM is the primary cause of impaired social understanding, or the secondary effect, has been rarely problematised (Rajendran & Mitchell, 2007; Froese, Stanghellini, & Bertelli, 2013).

There are also many contextual factors which shape our understanding of others but which are not accounted for in abstracted perspective-taking methods, such as the history of the perceiver-target relationship, the perceiver's desired future relationship with the target, and the possibility that perceivers may also be motivated to be inaccurate in their perceptions (Ickes, 1993, p. 587). For instance, informal caregivers of people with aphasia will often downplay their burden of caregiving, while care-receivers similarly underestimate burdens (Gillespie, Murphy, & Place, 2010). Such asymmetries, far from being accidental, are in fact deliberately maintained in order to protect the positive identity of the person with aphasia. However, such identity management is absent from research in relationships involving autistic people. This limitation of the abstracted unidirectional approach highlights why the present thesis examines autistic sociality as an interactionally achieved phenomenon rather than a property of individual minds alone.

Wider problems associated with unidirectional approaches include placing a disproportionate responsibility for misunderstandings experienced on the shoulders of autistic individuals. This is both unfair and inaccurate because it is often based on the assumption that neurotypical people deploy ToM consistently and successfully (Yergeau & Huebner, 2017). However, research has shown that neurotypical people are inaccurate in their assessments of others (Epley, 2014), and struggle particularly in understanding how they are uniquely viewed by specific others (Ickes, 1993; Kenny & Depaulo, 1993). Real life social competence involves degrees of accuracy (Apperly, 2012). Experimental evidence suggests people serially adjust from their own egocentric view to account for others' minds (Epley et al., 2004), more easily mentalising targets which are similar to the perceiver (Komeda, 2015). Within the dynamic flow of interaction, representations of others' beliefs are much harder to distinguish from one's own (Keysar, Lin, & Barr, 2003), and information about conflicting beliefs are much harder to hold in memory to inform subsequent judgements (Apperly et al., 2008). In short, the situational characteristics, (i.e. who are we perspective-taking with and what are we perspective-taking about?) matter when it comes to understanding how ToM is deployed in everyday life.

Therefore there is considerable theoretical support for more ecological measures of perspective-taking as such measures may be better suited to producing consistent research findings which are reflective of actual behaviour (Hill & Bird, 2006; Klin, 2000). There is also empirical support from studies such as Royers et al. (2001) and Spek et al. (2010) which used a variety of different cognitive assessments but found that ecologically based methods had the most discriminative power in identifying autistic individuals. In recent years research has diversified to consider several aspects of perspective-taking including mindreading (interpreting the mental states of others), first impressions (initial perception of others), metaperception (imagining how others perceive the world), and interactionally achieved

social understanding (e.g. intersubjectivity). Consequently, such diverse research interests have resulted in an expansion of methodological approaches. Methods such as thin slice judgements (brief exposure to stimuli such as video: Grossman, 2015), using autobiographical stimuli (e.g. Faso et al, 2015), and rich narrative stories (e.g. reading about autistic characters and not just neurotypical ones: Komeda et al., 2013) will be covered in the next section since they have been used bi-directionally, (i.e. they have been applied to understand both sides of the autistic/ non-autistic social dynamic). What the current literature review highlights in terms of the double empathy challenge of imagining other perspectives, is that there is both impetus to be more bidirectional (e.g. consider the perspectives of non-autistic in addition to focussing on autistic perspective-taking), but that there is a methodological gap in terms of operationalising bi-directional approaches, with unidirectional approaches having much more historical precedent. Consequently, research sub-question 1 necessitates a methodological component (b):

Sub question 1a: What can a two-sided approach to perspective-taking between autistic and non-autistic people reveal about our understanding of the double empathy problem?

Sub-question 1b: What is the methodological viability of exploring bi-directional approaches within autistic/non-autistic relationships?

Chapter 4 will discuss further how Study 1 will seek to bridge this methodological gap.

Bidirectional approaches

In recognition that social ability requires understanding more than one perspective, there is a growing body of research that has begun to look at how autistic people are perceived by non-autistic people, in addition to the well-documented research on autistic awareness of neurotypical others. These studies have embraced a variety of methods including studies of

expressions, first impressions, narratives, interactional tasks and ethnographic research, revealing that neurotypical perception and behaviour towards autistic people is shaped by biases and, moreover, neurotypical attitudes and behaviour should be considered a constituent part of the social barriers autistic people face.

Studies of expressions produced by autistic people have helped to reveal more about neurotypical interpretations, showing that autistic people are just as expressive, but that identifying the motivation for such expressions is difficult. Brewer et al. (2016) investigated how neurotypical and autistic participants compared in their emotional recognition of facial expressions produced by neurotypical and autistic posers. Their results showed that neurotypical facial expressions were recognised better than autistic facial expressions regardless of the diagnosis of the perceiver, yet autistic participants were better at recognising their own facial expressions compared to neurotypical facial expressions. These results are important because they highlight that difficulties in perceiving autistic people may be attributable to idiosyncratic facial expressions, rather than an absence of emotional awareness and comprehension as has previously been thought (Brewer et al., 2016, p. 9). Moreover, since autistic facial expressions are idiosyncratic, double empathy extends to more than a binary division between autistic and neurotypical dispositions, since autistic people may experience difficulty in interpreting each other.

Faso et al. (2014) examined posed and natural facial expressions produced by autistic people and typically developing adults which were rated by 38 female non-autistic participants in terms of intensity, naturalness and emotion displayed. Raters were blind to the diagnosis of the posers. Again, countering the idea that autistic people are unable to express emotions, their study showed that autistic facial expressions were rated as more intense and were identified with greater accuracy (although this effect was strongly influenced through angry expressions). However, naturalness of expressions was positively identified for the typically

developing posers but not the autistic posers. Thus, although there are differences in facial expressivity between typically developing adults and autistic adults, these differences are more related to style than a lack of expressivity altogether. Likewise Sheppard et al. (2016) covertly filmed autistic and typically developing participants reacting to four different scenarios from the researcher (e.g. telling a joke, providing a compliment) and showed the video reactions to naive neurotypical participants who had to identify the event that had triggered a reaction. Participants were more successful at interpreting neurotypical reactions than autistic reactions, however participants also rated autistic reactions as equally expressive to neurotypical reactions. There were, however, differences in the extent to which participants could explain the expressions they observed, with participants more likely to suggest possible mental states of autistic targets than neurotypical targets, perhaps because they were more uncertain about the motivation for the observed expression and were thus conjecturing with a greater range of possibilities than for neurotypical posers. Thus, research on autistic expressions has furthered understanding about the double empathy problem through highlighting difficulties in social understanding experienced by neurotypical people. Specifically, autistic people are very expressive, but neurotypical people may find such expressions ambiguous and consequently struggle to understand the social meaning of such behaviours.

Moving beyond the study of facial expressions, research has examined the social consequences of first impressions which can have a cascading effect on the outcomes of social interactions with autistic people, “inaccurate inferences about people with ASD may present social barriers that limit personal and professional opportunities” (Sasson, Morrison, Pinkham, Faso, & Chmielewski, 2018, p. 4). Sasson and Morrison (2017) explored whether first impressions of adults with autism improved with diagnostic disclosure for typically developing adults. The ecological basis of the stimulus was achieved through a ‘High Risk

Social Challenge Task' (Gibson et al. 2010) which is a performance-based measure of social skill involving a mock 60 second audition for a reality game show. Stimulus participants (40 adults, 20 autistic and 20 typically developing) matched on gender, age and IQ were filmed completing the task, and 215 participants rated the videos in 4 different conditions: (1) a no label condition where no additional information was supplied with the video, (2) an accurate label condition which supplied the correct diagnostic status of the target, (3) a mislabelled condition where the opposite diagnostic information was supplied, and (4) a schizophrenia label condition. Participants rated 10 items (e.g. awkwardness, attractiveness, likelihood of starting a conversation, willingness to live near). In general, first impressions of autistic adults were less favourable than typically developing adults. However, the impressions became more favourable when the correct diagnostic information was disclosed indicating that the diagnosis may provide an explanation for what was perceived to be social or stylistic differences. Yet even with a diagnosis, ratings lagged behind those of typically developing stimulus participants who were mislabelled as autistic. Interestingly autism knowledge on behalf of the raters, and not age, gender or IQ, was associated with more favourable first impressions of autistic adults. This study therefore highlights how disclosure of a diagnostic label intervenes in the standards used to evaluate autistic people, but that this is only broadly applicable because autistic adults are still rated more poorly.

Further studies from Sasson et al. (2017) examined the willingness of neurotypical peers to interact with autistic people based on thin slice judgements. Across three independent studies impressions of autistic people were found to be significantly less favourable in comparison to typically developing people. The impressions were consistent for both adults and children being rated, and did not differ between duration of stimulus or repeated exposure. Particular areas of negative perception involved non-verbal cues, such as body posture, prosody and facial expression. Moreover, the manner in which the stimulus was presented also affected

impressions. Negative first impressions of autistic adults were associated when audio and/or visual information was supplied, but not as present when only the transcript of speech was evaluated (Sasson et al., 2017, p. 7). Such negative impressions translated in a reduced intention to engage with autistic children being perceived. These findings therefore highlight how the label of autism, the medium in which the interaction is experienced, and knowledge of autism are all contextual factors which shape the perception of autistic adults by neurotypical people. Thus in terms of understanding the double empathy problem, this research highlights that negative biases are embedded in the situation and not wholly reflective of neurological differences, and that such biases can negatively impact the prospect of future social opportunities being extended towards autistic people by typically developing people.

Other studies have used narrative vignettes to explore attitudes towards autistic characters (Komeda, 2015; Komeda et al., 2013). Komeda et al. (2013; 2015) used stories involving characters with autism and typically developing characters which were based on the Social Responsiveness Scale (Constantino et al., 2003). Each story had an accompanying target sentence which summarised the message of the story in a way that Komeda et al. (2013) claim was congruent with an autistic perspective (e.g. “Yohei concentrates too much on parts of things rather than seeing the whole picture”) or incongruent (e.g. “Yohei concentrates too much on the whole picture rather than seeing the parts of things”). After reading the stories, participants were asked to identify the target sentence. Typically developing participants were more effective in retrieving stories about typically developing characters, and autistic participants were more effective at retrieving stories about autistic characters, suggesting that there is a similarity bias between perceiver and target which assists social understanding (Komeda, 2015), a finding which supports the dispositional differences argument of the double empathy problem. Brosnan and Mills (2016) also used narrative vignettes to explore

the attitudes of 120 college students who were either informed that the protagonist was a typical college student or one with a clinical diagnosis. In comparison between clinical labels (autism spectrum disorder, Asperger's syndrome, schizophrenia) they found no differences in terms of positive or negative affect. However, there were overall differences between clinical and typical conditions, with affective responses significantly more positive to participants believing the characters to belong to a clinical group than when they thought they were a typical student. This suggests an overarching positive discrimination bias associated with labels, but the specific effects of the label of autism are less clear cut.

Thus, studies of expressions, first impressions and vignettes have highlighted neurotypical people have difficulty and are often unfavourable in perceiving autistic perspectives. However, autism knowledge, perceiver-target similarity, the manner in which the interaction is experienced all shape the dynamics of understanding. Disclosing a diagnosis can improve perceptions, but this does not account for all negative perceptions, nor may it necessarily be distinct in effect from disclosing other types of diagnostic labels, suggesting a degree of ambiguity associated with the way people with different experiences interpret the label of autism. Certainly, the evidence presented strongly supports the double empathy argument that misunderstandings and misinterpretations are a two-way phenomenon in autistic-to-neurotypical encounters.

Given the evidence of neurotypical biases in social perception of autistic people, it is particularly important to consider bi-directional research that has explored interactions. Interactions hold the highest ecological validity for understanding aspects of the double empathy problem, and although they have less experimental control, their rich insights can help to reveal more about how biases play out in social relations. Usher et al. (2017) analysed impressions of dyads where one member was autistic and the other member non-autistic. Participants were matched on age and gender but did not know about anyone else's

diagnostic status. Participants were paired up and invited to talk for five minutes to familiarise themselves. Afterwards participants completed a questionnaire rating how they perceived their partner and how they thought they would be perceived by their partner. The methodology is a reformulation of Laing et al.'s (1966) Interpersonal Perception Method (although it is labelled "Perception and Metaperception Questionnaire") where participants orientate to a series of questions which probe direct and meta-perspectives on the interaction experienced. The findings highlighted that autistic participants were more accurate in assessing whether they were liked by non-autistic partners than vice-versa. Moreover, adolescents in general based their metaperception of others on their own direct perception of others (Usher et al., 2017). The tendency to like one's peers was associated with traits of social reciprocity and initiative, which the study claims to be trainable skills. A limitation of the study however is that it did not qualitatively explore the rationale behind ratings so it is hard to make sense of the processes involved in constructing perceptions, or how potential differences in neurotypical and autistic sense-making unfold interactionally. Moreover, participants were unfamiliar with each other, thus it would have been particularly useful to know what interactional aspects participants used to inform their ratings. As discussed above, a key component of interpersonal relations is the history of the perceiver-target relationship (Ickes, 1993), thus using a five minute interaction as a stimulus to understand metaperception raises questions of ecological and construct validity.

Ethnographic research on autistic sociality in everyday social life, most notably through the Ethnography of Autism Project at UCLA, has helped to illustrate real-life agency of autistic people and the processes through which autistic and neurotypical people navigate each other's sense-making. The Ethnography of Autism Project examined autistic sociality across a variety of social domains (e.g. dinnertime conversations), recording over 600 hours of hours of video data involving autistic children (Ochs & Solomon, 2010). Findings showed that

family members played a critical role in facilitating autistic socio-cultural perspective-taking through question and answer sequences (adjacency pairs), which *scaffolded* appropriate context for the autistic children observed (Kremer-Sadlik, 2004). In turn this enabled autistic children to more accurately identify communicative intentions of their conversational partners. However, in other situations such as those which depend on more implicit inferences about meaning, autistic children struggled, highlighting how autistic sociality consists of a range of possible co-ordinations, which in different circumstances may either open up or close off opportunities for intersubjectivity. Describing an “algorithm” for understanding this process, Ochs and Solomon (2010) state that: “the sociality of persons with ASD and the neurotypical population are not categorically distinct. Rather, autistic sociality waxes and wanes in relation to societal and interactional conditions” (Ochs & Solomon, 2010, p. 86). A key principal to emerge from ethnographic research is recognising perspective-taking and language as an interactional accomplishment, yet at the same time, language for autistic people may not always be pragmatically orientated as some communication may be purely experiential (e.g. echolalic speech) (Sterponi, de Kirby, & Shankey, 2014; Sterponi & Shankey, 2014). Far from lacking a desire for social motivation (Chevallier, Kohls, Troiani, Brodtkin, & Schultz, 2012) ethnographic research shows autistic people are very much driven towards interactions of any form, whether it is with inanimate objects (White & Remington, 2018) or other animal species (Solomon, 2015). Therefore, a constituent barrier within the double empathy problem is the question of how neurotypical people can adequately work with autistic people to build shared understanding, while at the same time not imposing a more restrictive idea of social normativity onto the broader phenomenon of autistic interactional behaviour.

However, an additional consideration of using interactional methods is whether neurotypical assumptions about autistic behaviour are embedded in the research process itself. Jaswal and

Akhtar (Jaswal & Akhtar, 2018) identify at least four classic behavioural traits (including eye contact, pointing, motor stereotypies and echolalia) that scientists have interpreted as signifying diminished social motivation. However, testimonies from autistic people highlight alternative explanations which are indicative of a desire to engage, for example many autistic people do not maintain eye gaze in order to manage cognitive load and stay focussed on the interaction (e.g. what is being discussed). Moreover, cultures differ in their levels of what is appropriate eye contact during conversation, and many non-autistic people may demonstrate repetitive behaviours as a coping mechanism for anxiety and stress (Jaswal & Akhtar, 2018, p. 12). Indeed, a deficit in social motivation is a hypothesis that “fits squarely within an entrenched paradigm” of considering autism as a social disorder (Jaswal & Akhtar, 2018, p. 46). Analysing interactions between autistic people would provide valuable insight into the social possibilities for autistic people when neurotypical norms are not imposed, but this raises questions about how to mitigate neurotypical assumptions embedded within the research process itself in order to interpret neurodivergent interactions on their own terms. These challenges are addressed in Chapters 4 and 6 below.

Consequently, the literature on bi-directional approaches highlights two sub-questions to serve as the basis of Study 2. First, ethnographic research has highlighted how autistic people have greater social ability than observed in abstract tasks, an ability which remains largely unexplored in interactions between autistic people. The similarity hypothesis which underscores the basis of the double empathy problem (namely that differences in neurological disposition result in two-way difficulties in understanding) shows that perceiver-target similarity improves understanding, thus studying interactions between autistic people can provide new insights into autistic sociality, particularly when neurotypical assumptions may withhold such sociality. This question forms the basis of sub-question 2a:

Sub-question 2a: What features of neurodivergent interaction are evident when neurotypical norms are not present?

However, there remains an outstanding methodological challenge in terms of how it is possible to identify neurodivergent interactions on their own terms. Consequently sub-question 2 requires a methodological component (2b):

Sub-question 2b: Can viable methods be developed for understanding autistic interactions on their own terms?

These questions will be explored further in Chapter 4, and form the basis for studying neurodivergent interactions in Study 2 (Chapter 6).

Social construction of autism

Building on bi-directional approaches outlined above, research has also explored the wider socio-cultural context which underpins how autism is understood. This research understands autism as more than a diagnostic status, it also operates as a social construction, with people drawing on popular representations in culture and science to inform their everyday behaviour, identification and attitudes towards autism (Hacking, 1996, 1999; McGeer, 2009; Ortega, 2009). However, this distinction of autism as a social construction has taken time to be recognised. According to Hacking, “there is a constant drive in the social and psychological sciences to emulate the natural sciences, and to produce true natural kinds of people” (Hacking 1999, p.104), whereby Hacking refers to “natural kinds” as a form of essentialism, where entities are composed of stable and identifiable properties like elements in a periodic table. Research on autism has traditionally grown out of a clinical biomedical view which aligns with such essentialism principles, thus the lived reality of autism (i.e. the developmental, phenomenological and social dimensions of autism) has typically been viewed as mere “downstream” effects of a biological origin. Yet analysing the socio-cultural

context in which autism is understood reveals important insights about the barriers autistic people face in their sociality, and the role other people have in shaping them. Since people are self-conscious and self-aware, the way in which they act is by no means independent of the descriptions society gives to them. Representations of autism shape autistic self-identity (McGeer, 2004) and how others identify with themselves and behave (e.g. parents: Robinson, York, Rothenberg, & Bissell, 2015), which in turn can reinforce the original description (Hacking, 1999).

Hacking's ideas about the reciprocal relationship that exists between representations and behaviour (which he terms "the looping effect") has been more extensively explored within the field of social representations research (Moscovici & Hewstone, 1983; Moscovici, 1984). Although not specific to autism, Moscovici elucidated many of the processes through which modern society establishes, contests and transforms knowledge (Jovchelovitch, 2002; Serge Moscovici, 2000). Knowledge is more than just content, it is values, beliefs and ideas (e.g. the intertwining of neurodiversity movements with neurodiversity research paradigm), while society is not homogenous, but comprised of many different groups with different identities and politics (e.g. autistic people, family members, carers, pro-cure groups). Processes of human interaction shape and reproduce meaning and critically these processes are "grounded within situated social networks" (Jovchelovitch, 2002, p. 121), such as institutions (Foucault, 1976). This is especially true for understanding autism when one considers the struggle for autistic voice to reclaim their own narrative from institutional framings (Bagatell, 2007). For example, the classification of autism focuses on behavioural abnormalities and omits advantageous behaviours and the role of society in shaping behaviours (Kapp et al., 2013). Deficit-focussed terminology such as describing autism as a "disorder" or as minds that have "faulty circuits" that require "fixing" increases the negative stigma around autism (Kenny et al., 2016; Smukler, 2005). Controversies such as the false link between the MMR vaccine and

autism continue to divide opinions both within science (Dixon & Clarke, 2013) and the wider public (Provencher, 2007).

The media are another institution which have rarely presented a balanced view of autism, which inevitably feeds into peoples' expectations. Research on media coverage has shown that autism is associated with a number of negative stereotypes, being variously represented as occupying a separate world (Brownlow & Dell, 2009), as a burden or tragedy that "breaks" parents (Clarke, 2011; Huws & Jones, 2011), as dangerous, uncontrolled and broken individuals (Jones & Harwood, 2009; Sarrett, 2011; Smukler, 2005), and as being "weird" individuals (Treweek et al., 2018). Different media outlets have different interests: for example general interest magazines tend to view autism in terms of genetic, neurological and statistical arguments, whereas magazines whose target audience are women tend to describe autism from the perspective of mothers who are in a battle to achieve normality (Clarke, 2011).

Therefore, it is important to research further the effects of the social construction of autism on interpersonal perception and behaviour by non-autistic people. A key window into understanding this process is studying the effects of disclosing the label of autism. For example, Gernsbacher et al. (2017) examined the effect of specifying context (e.g. social identity and reference group) when assessing autistic traits in autistic and non-autistic participants. Both autistic and non-autistic participants completed self-report questionnaires about autism. They demonstrated that when the term "people" in question items is manipulated to the respondents' in-group (i.e. match the way in which the perceiver identifies as autistic or non-autistic) it resulted in decreased self-reported difficulty in interacting and communicating. Likewise, when "people" was specified to an out-group it resulted in significantly more difficulty in interacting and communicating (Gernsbacher et al., 2017).

Labels can also be used to highlight further contextual factors which affect social perception of autistic people. Chambres et al. (2008) presented 88 adults with video clips of autistic children behaving in a “problematic” or “non-problematic” way. Although there is a lack of discussion about what constitutes “problematic” behaviour from a neurotypical or autistic standpoint, their study showed evidence of positive discrimination. When participants were informed about the diagnosis of the child they were perceived more positively than participants naive to the diagnosis. However, this finding is sensitive to context. First, women judged the children less severely than men; however when the diagnosis was revealed their scores were comparable. This suggests that disclosure of a diagnosis has more effect when the evaluator is a man, because male baseline evaluations are much lower. Second, perception depended on the type of evaluative dimension used. For social ability, irrespective of the type of behaviour produced, children were rated more positively when their diagnosis was made salient. However, for the cognitive dimension, it only improved perception about non-problematic behaviours (such as working on a computer). Finally, disclosing a diagnosis actually had a negative effect on emotional abilities of the children rated. Thus the effects of disclosing a diagnosis on social perception is subject to additional situational dynamics (i.e. the type of behaviour, the evaluative dimension used and the gender of the perceiver).

A study by Grossman et al. (2015) examined the effect of different media (still images, audio-visual, video-only or audio-only information) on judging children with high functioning autism. The stimulus comprised of 1 to 3 second exposure to clips/images of the children and typically developing adults were asked to judge the social awkwardness. Findings showed that if the diagnostic status of the children was not disclosed participants judged the children with high-functioning autism to be significantly more socially awkward. The findings were consistent across modalities examined and highlight that there is a negative bias towards the way autistic people are perceived socially, which knowledge of the

diagnosis can partially correct. In another study (as discussed above), Sasson et al. (2017) filmed 20 autistic participants and 20 typically developing participants take part in a mock interview for a reality TV show. Segments of the interaction were presented to college students in five different modalities: (1) audio-only, (2) visual-only, (3) audio-visual, (4) static image, and (5) transcript of speech content. Importantly the “transcript-only” modality had not been studied in Grossman et al’s (2015) study, which Sasson et al. found to be the only modality where autism stimulus participants were not rated significantly worse than typically developing participants. Moreover, the audio-visual modality produced less favourable ratings for awkwardness than the audio or transcript modality. These findings suggest that the way participants presented themselves, rather than the content of what they said, defined negative impressions of autistic people. Moreover, across further experiments first impressions of autistic participants were shown to be less favourable than typically developing participants and consistent across short and longer glimpses of social interaction. This evidence supports the idea that many of the non-verbal cues including prosody, facial expression and body posture, that may be idiosyncratic for autistic people, are associated with negative social characteristics. Moreover, in another study of first impressions (Sasson and Morrison, 2017), autism knowledge on behalf of the speakers was associated with more favourable impressions of autistic adults. Thus the evaluative baseline people use when a diagnosis of autism is disclosed may involve degrees of favourability based on personal understanding, highlighting a potential opportunity to further improve the attitudes of those who are already positively inclined towards autistic people.

Labels can also impact identity. In an analysis of the effects of discovering their diagnosis, Powell and Acker (2016) explored the reactions of 74 adults diagnosed with Asperger’s syndrome. The majority of people who received a diagnosis had positive responses, claiming that it provided “an alternative to self-blame” but also that it triggered regrets about what

could have been possible if they had received a diagnosis earlier (Powell & Acker, 2016, p. 79). Many autistic people feel that being autistic results in widespread bullying and exclusion (Treweek et al., 2018). For parents, however, a diagnosis can have the effect of isolation and stigma, because the disability of their children has no physical signs to others (Chell, 2006; Gray, 2002). Robinson et al. (2015) investigated parents' experiences of getting their child diagnosed. Analysing interviews with parents, they discovered that diagnosis of a child affected parents' own sense of identity, allowing parents to "regain" control of their role as a parent as they are better positioned to understand their children. Yet at the same time parents can also feel stigma that isolated them from their family and wider community (Gill & Liamputtong, 2013).

The literature reviewed has therefore highlighted contextual factors that shape non-autistic perception of autistic people, such as the type of behaviour being observed, the gender of the perceiver, and the medium in which the interaction is experienced. The label of autism is an important window for all stakeholders (autistic people, parents, non-autistic people) to re-orientate to social situations involving autistic people and use a more favourable evaluative baseline. However, although disclosing a diagnosis can result in more positive impressions, it does not appear to completely eradicate the tendency to still view autistic people negatively compared with typically developing people. Moreover, autistic people commonly report having faced negative attitudes and behaviours as a result of their autism, which reflects a potential disconnect between self-reported positive attitudes and negative behaviour in the psychology of non-autistic people. However, to investigate this disconnect requires methods which probe further the interactions shared between autistic and non-autistic people, since the studies reviewed have focussed mainly on experimental data and brief psychological encounters. Methodologically this presents a challenge of how to create interactions with autistic people where both self-report and behavioural data can be captured.

One technique which has been used previously to analyse the psychology of interactions is through virtual games (Blascovich et al., 2002; Gillespie, Corti, Evans, & Heasman, 2018). *Cyberball* (Williams, Cheung, & Choi, 2000) is a virtual ball tossing game used to examine social ostracism, whereby participants are led to believe they are playing with others online, when in truth they play with a virtual agent that is programmed to deliberately exclude the participant from the game. This minimalist format has the advantage of providing a gradable way to manipulate the independent variable of levels of ostracism, although its task simplicity means that behavioural responses to ostracism are not measured. Games such as these are advantageous because (1) interactional tasks have reasonable ecological validity, even in a laboratory setting, since everyday professional life is comprised of collaborations with unknown others; and (2) since interactions are simulated (i.e. the participants believe they are interacting with someone when actually they are not), the process is fully replicable, and interactions across different experimental groups can be compared (Blascovich et al., 2002). This method is particularly useful for research on autism where, due to heterogeneity of autistic behaviours and social aversion to interactions with unfamiliar others, it is very difficult to obtain large participant samples for a cross-neurological study. A computer-mediated interaction can potentially copy the behavioural aspects of one autistic person for many non-autistic collaborators, or even deceive non-autistic collaborators into psychologically believing they are interacting with an autistic person.

Thus, the research sub-question 3 is further refined around a methodological focus (b):

Sub-question 3b: Can a viable method be developed to explore: (i) the relationship between self-reported perception and actual behaviour within a simulated interaction, and (ii) the differences between groups where the identity of the online agent (autistic/non-autistic) is altered?

These questions will be explored further in Chapter 4, and form the basis for studying the effects of the label of autism using Dyad3D software (Chapter 7).

4) METHODOLOGY

This chapter outlines the methodological approach of the thesis. Before discussing the methodological challenges identified in Chapter 3 for each respective study, it is important to acknowledge a wider methodological challenge concerning the validity gap between research conducted on autism and the research interests of autistic people themselves (Nick Chown & Beardon, 2017; Jaswal & Akhtar, 2018; Pellicano et al., 2014b; Verhoeff, 2015). This chapter first sets the context for this issue and outlines the motivation for taking an abductive approach to research, which “provides a way to think about research, methods and theories that nurtures theory construction without locking it into predefined boxes” (Tavory & Timmermans, 2014, p. 4). This approach aligns with the exploratory nature of the thesis, especially since it is through experiences of working with autistic people that I initially conceived ideas for researching the double empathy problem, and was able to continually draw insight regarding the methodological process for each of my three empirical studies.

Yet abductive reasoning is more than an approach for addressing concerns about validity. It also touches upon a wider move within the field to adopt a more participatory model of research on autism out of moral and ethical concern for its impacts (Fletcher-Watson et al., 2018). There is a growing impetus to engage in participatory research in studies of autism as a response to concerns that autistic voices are excluded from the research process (Milton, 2014). I discuss this debate and document the steps I have taken as a researcher to be participatory, particularly given my positionality as a non-autistic researcher. In the final section, I consider the methodological choices made for the empirical chapters of this thesis, including limitations and why they were chosen over other approaches.

Abductive analysis

Abductive analysis is a creative inferential process which prioritises the surprising phenomena observed over a given hypothesis itself (Zittoun, 2017) in order to develop a hypothesis with the best explanatory scope (Tavory & Timmermans, 2014). The pragmatist philosopher Charles Sanders Peirce (1839–1914) developed abduction into an explicit theory of inference in comparison to the more established inductive and deductive inferencing. According to Peirce, abduction is distinct from other forms of reasoning (i.e. induction and deduction) in its ability to generate new ideas because its starting point for inquiry remains the surprising phenomenon observed and not the hypothesis itself (Peirce, 1998). In contrast, induction begins with a specific hypothesis and merely generalises it, whereas deduction “evolves the necessary consequences” (Peirce, 1998) of a specific hypothesis. Thus induction and deduction are rules about how to generalise preconceived theories into larger theories, whereas abduction is a process of constructing new theories on the basis of the surprising phenomena observed (Lahlou, 2011; Timmermans & Tavory, 2012).

Abductive analysis has the following structure:

The surprising fact, C, is observed;

But if A were true, C would be a matter of course,

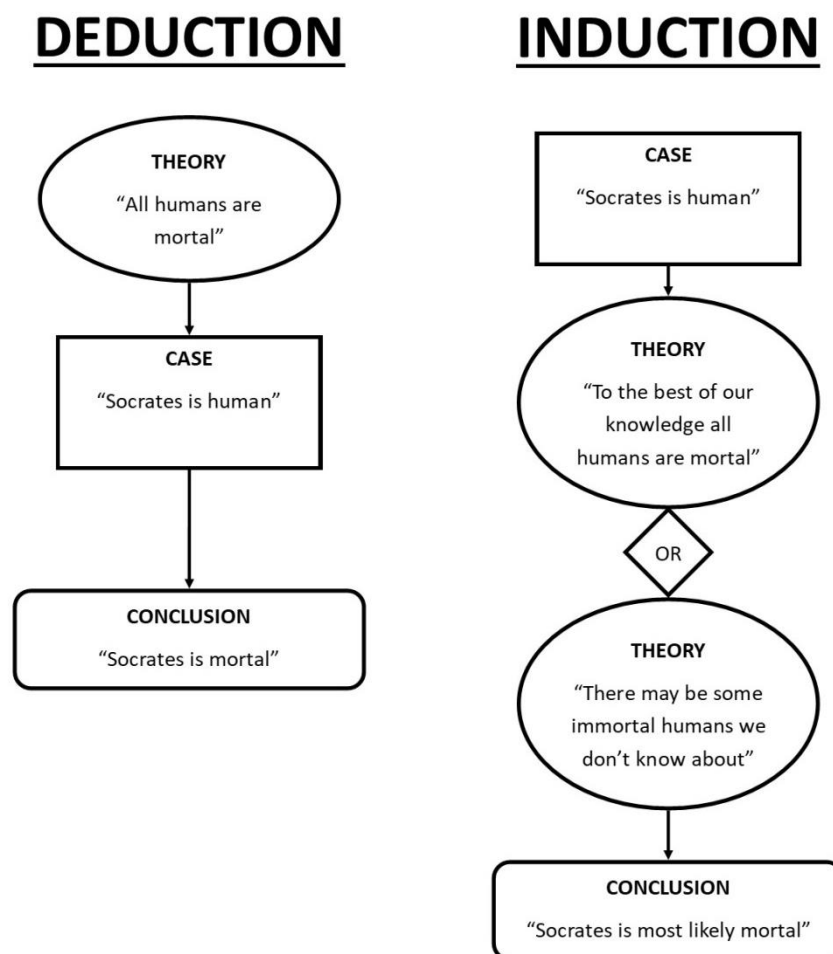
Hence, there is reason to suspect that A is true.” (Peirce, 1998, p. 151)

This structure differs from other logical models in its freedom to correct its initial premise (A) in light of new or surprising evidence. Abduction may be considered as a “creative synthesis – a new unique creation based on the recombination of past and present semiotic resources” (Zittoun, 2017, p. 189). This process means the researcher remains open to changing or updating their investigation based on the phenomena they observe, which makes

it suited to navigating some of the theoretical pitfalls within the field identified in Chapter 3 (e.g. such as thinking of social perspective-taking only through the lens of theory of mind and neglecting presence and relevance of autistic testimony as a result).

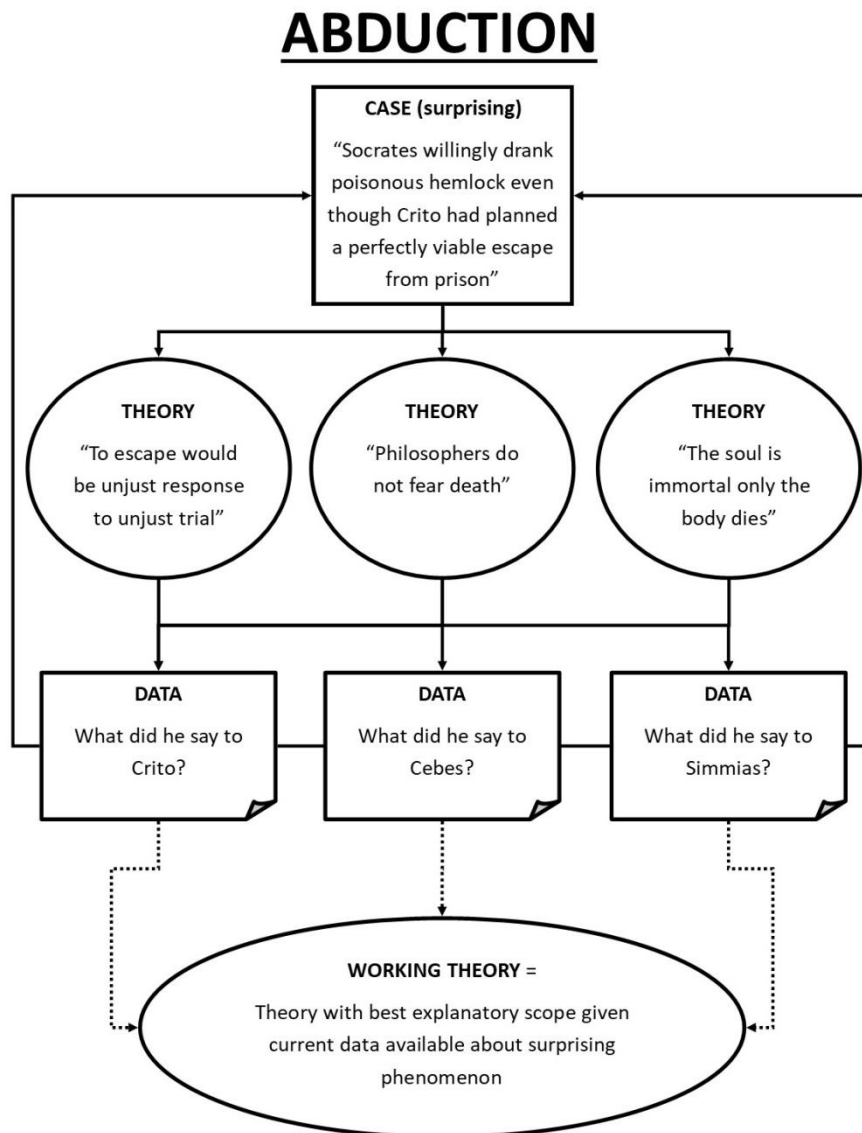
Figures 3 and 4 below illustrate the differences between deduction, induction and abduction. Deduction draws a conclusion about the case which is forced by the theory, with a tendency to move from general to specific observations. Induction, on the other hand, theorises about a possible conclusion on the basis of a given case, with a tendency to move from specific to general observations. In Figure 3, the classic syllogistic reasoning of Socrates being mortal is made inductive by making the theory component falsifiable (i.e. there may be some immortal humans that are unknown to us).

FIGURE 3: EXAMPLES OF DEDUCTIVE AND INDUCTIVE REASONING



Where deductive and inductive reasoning attempt to conclude something about the case on the basis of a theory, abduction takes as its starting point a surprising case. It is supposed to be surprising because it stands out against the backdrop of assumed knowledge and understanding. It is an idea that does not fit neatly into existing knowledge and therefore requires further exploration. Moreover, the process remains open to the possibility that other explanations and other data are yet to be discovered, thus instead of attempting to conclude something about the surprising phenomenon observed, abduction aims to develop a theory with the best explanatory scope currently possible.

FIGURE 4: EXAMPLE OF ABDUCTIVE PROCESS



Although psychological science is often modelled on a hypothetico-deductive form of reasoning, which blends deductive and inductive models together into a cautious, step-wise process of accepting or rejecting the null hypothesis (Hacking, 1999), abduction more accurately describes the more intangible creative processes which enable hypotheses to be generated in the first place. Yet while the hypothetico-deductive model of investigation functions in a similar way to the abductive process (in that both involve exploring different theories and encountering different data), in my opinion, it remains more vulnerable to losing

investigative “fidelity” precisely because researchers believe so strongly in the syllogistic power of the method and lose sight of the real-world phenomena that started the inquiry. Abduction, on the other hand, holds the surprising phenomena as a primary focal point against which any method developed, or data gathered, is compared and handled. In Figure 4 above, although simplistic, through treating the surprising case as the baseline against which everything is compared and interpreted, all subsequent reasoning remains tightly anchored, helping to preserve investigative fidelity.

Thus, with regards to research on autism we are at a turning point in the field, where researchers are now critically evaluating their taken-for-granted assumptions about what constitutes social behaviour, a move driven by the well-documented obsession with validating methods in light of theory (e.g. developing more accurate tests of theory of mind) rather than validating theory according to real-world phenomena (e.g. validating theory of mind against accounts from autistic people). It is thus moving from a hypothetico-deductive model to an abductive model, not only to reduce validity gaps between methods and real-world phenomena, but also because the inherent openness of the abductive process (i.e. being receptive to encountering new data) is a means through which a more participatory model of research can be achieved in terms of autistic involvement in the research process. More specifically to the structure of this thesis, abduction is how the investigative journey started, because it was through the surprising observation of how other people misunderstood Cambell, and the extent to which this inhibited his independence, that I became interested in researching the double empathy dynamic between autistic and non-autistic people.

Abduction provides the foundation for participatory research to be possible, and it is through several participatory activities that I have been able to refine my research ideas. Before I describe my own abductive process behind each of my three empirical studies, it is necessary

to reflect first on what participatory research is, what issues it raises itself, and how I navigated them in the course of my own engagement activities.

Participatory research

Within research on autism, there is currently a great drive towards a participatory model of research (Jivraj et al., 2014; Pellicano et al., 2014a). This drive has been brought about, in part by a need to reflect the priorities of the communities studied (Crane, Adams, et al., 2018; Pellicano et al., 2014a) but also because researchers want “to increase the relevance and broaden the implementation of health research by involving those affected by the outcomes of health studies” (Jivraj et al., 2014, p. 782). Participatory research in studies of autism however, extends beyond issues of research validity and equitable relationships; it also requires emotional sensitivity (Milton, 2016) in working with vulnerable, marginalised populations who are disempowered by current societal structures, especially when part of that disempowerment originates from the stigma produced by research itself. Habermas’ (1984) concept of communicative action provides a theoretical foundation for understanding the nature of these moral and ethical concerns. In his *Theory of Communicative Action*, Habermas critically evaluates how people justify themselves to others (Okshevsky, 2016), observing that all communicative actions involve inherent claims about validity that extend beyond the propositional content of the utterance alone (Jovchelovitch, 2011). Language is not merely a representational system of the world around us, it is performative, creating social actions, social contracts, and ultimately societies itself, and critically examining the rationality of how mutual understanding is achieved is central to resisting coercive and strategic manipulation. The types of in-built claims that are associated with speech acts include claims about “the validity of our ways of cognitively stating a situation in the world, its rightness in a given context and our own positioning and behaviour as speakers” (Jovchelovitch, 2011, p. 134). To enable ideal and equitable speech between interlocutors

requires certain conditions to be met so that both parties can fairly question such claims being made. For example, both parties should at least ensure that: there is the same chance to speak, the same chance to listen, access to the same information, relevant implicit knowledge is made explicit, there is no deception (i.e. no hidden or ulterior motive for engaging that is not made explicit), and all those who are affected by decisions must have an equal opportunity to participate (Brown & Goodman, 2001; Duckett et al., 2017; Habermas, 1984).

Bringing this theoretical insight back to the question of participatory research on autism, we can observe the dangers associated with researchers who treat participatory research as a type of methodology, (i.e. as a tool that can bolster a particular study in terms of meeting ethical review board criteria and ecological validity critiques). It violates the principle that both parties have equal access to shaping decision-making, because the opportunity for dialogue is confined by the time boundaries of the study in question, which is set by the researcher. Participatory research as a methodological tool means the researcher is free to step in and out of the participatory framework according to their strategic aims whereas, by contrast those they study, i.e. autistic people, experience an ongoing challenge of having their voices heard and recognised which only happens when researchers, institutions and funding bodies decide to create a platform for such voices to be heard. Thus participatory research, although theoretically aimed at creating equitable partnerships between different stakeholders, is often used as an *instrument* for research rather than a *philosophy* about research (Heasman, 2018). Under these conditions the researcher's power is reinforced rather than redistributed. This may help to explain the concern that autistic people are often spoken *for* rather than being allowed to *speak up* about their concerns (Fletcher-Watson et al., 2018). It is for this reason that participatory research needs to be seen as an ongoing abductive process of generating holistic knowledge throughout one's intellectual life-journey, rather than a specific time-point where autistic voices are permitted to enter. Participatory research is ultimately a

fundamental philosophical position concerning how you build knowledge about and with the people who are stakeholders in that knowledge.

Habermas' framework also highlights the need to make explicit one's aims in interacting. Not all aims may be possible to divulge before research for various reasons (See section on Ethics below). Yet even if researchers seek to be honest, they may still fail to reflect on the social and cultural capital personally gained by their involvement in participatory research because it is rarely discussed. The framework which surrounds researchers, including the institutional pressures to publish in high impact journals, to be frequently cited by other studies, and to publish frequently and consistently in order for career progression, all create pressure on a participatory activity to be successful. Thus for participatory research to represent an opportunity to readdress the power gap between researchers and participants (Nelson & Wright, 1995), there needs to be critical reflection about the researcher's positionality within the process and an attempt to make salient, and where ethically reasonable, redistribute one's social and cultural capital and create more enabling institutional contexts (Aveling & Jovchelovitch, 2014).

Issues of positionality and the more implicit social and cultural benefits of engaging in participatory research have been highlighted in other fields, perhaps most noticeably in cross-cultural contexts where educated, western and economically-secure social scientists attempt to understand cultures that have a very different socio-cultural structure (Aveling & Jovchelovitch, 2014; Campbell, Nair, Maimane, & Nicholson, 2007; Gillespie, Reader, Cornish, & Campbell, 2014). After all, no view can claim to be "from nowhere" (Haraway, 1991; Nagel, 1986), and all knowledge is arguably a product of the context in which it is developed (Bourdieu, 1977).

To summarise Chapter 4 so far, I have considered different methodological framing issues that shape the reasoning, morals and ethics of research on autism, highlighting that an abductive, creative participatory approach is a necessary response to some of the systemic challenges facing research on autism. The following section will now detail how these processes have fed into the current thesis (and thus illustrate abduction in action), describing the effect of participatory activities, positionality, socio-cultural capital and ethical concerns on the intellectual trajectory of the three empirical studies.

Abductive development of thesis methods

The abductive origin of the thesis (i.e. the surprising case observed) has already been documented in Chapter 1, namely the experience of seeing how the attitudes and behaviours of other people shape Cambell's opportunities and levels of comfort. The experience was surprising because of the extent to which autism is understood to be a problem of individual functioning, yet difficulty in daily living is also connected to the socio-cultural context. I became interested in the two-way effects observed in interactions between autistic and non-autistic people. Yet I was also acutely aware that Cambell was only one autistic person, as through conversations with his mother Sally I learned about the adage "if you've met one person with autism then you have met one person with autism". If I was to pursue research in the area I needed to broaden my own experiences especially given that I am not autistic myself. Yet a central challenge for research on autism is recruiting participants who are dispersed throughout the population, with research projects restricted by location access and communication reach (Warnell et al., 2015), which can result in biased sample sizes and a reduced ability to replicate studies (Bàrbara et al., 2016).

Fortunately, the commencement of my doctorate coincided with the opening of Matthew's Hub, a charity based in East Yorkshire which supports young autistic adults. This represented

a great opportunity to both build my participant network, but more importantly to spend considerable time learning and getting to know members so that my research could be directed by their interests and concerns. More holistic engagement which extends beyond the confines and specific research studies has since been identified by autistic people as a key priority for participatory research (Fletcher-Watson et al., 2018). The conversations I had with members of Matthew's Hub helped to set directions for my first two empirical studies. It emerged very quickly that many members had difficult relationships with family members, and sparse relationships with people outside of the charity. Members also felt strongly that society did not understand their complex and specific needs, yet other autistic people did. Thus not only did members demonstrate nuanced psychological awareness of Self in relation to Others, which literature on autism often overgeneralises in terms of deficit (Nicolaidis et al., 2011), but their observations clearly indicated that a constituent part of their social impairment was associated with neurotypical expectations and assumptions of behaviour. These insights helped to set the context for studying family relationships involving autistic people.

Likewise, the research question for Study 2 emerged from spending time at Matthew's Hub where I observed members partaking in video-gaming, during which they were able to successfully coordinate with each other and demonstrate very complex forms of intersubjectivity. For example, members were able to integrate multiple perspectives such as their virtual location in the game relative to their partner, as well as perspectives of characters in the game in relation to each other, and cultural references that the narrative of the game may touch upon. Clearly in the naturally occurring activity of video-gaming, members of Matthew's Hub were demonstrating a level of social coordination which in other domains of social life were not so consistently deployed. This observation tied in to research on autistic sociality (Ochs & Solomon, 2010) (discussed in Chapter 3), highlighting how some domains

of social life afford better opportunities for maximising social opportunities than compared with unfamiliar domains involving shifting events, disrupted plans and unexpected social encounters (e.g. a late bus) (Ochs & Solomon, 2010, p. 70).

Thus, at Matthew's Hub I had discovered a particular social domain in which social interactions between autistic people appeared to flourish, namely video-gaming, which was socioculturally organised by autistic members themselves. By virtue of both dissolving into the community and maintaining my academic participation, I was able to recognise the value of researching a context where the imposition of neurotypical norms had been minimised. It connects with a vital part of the double empathy question that had yet to be explored, namely better understanding the social potential of autistic people that is compromised in cross-neurological encounters. Given the double empathy principle that the wider disjuncture between the dispositional outlooks of social actors, the more likely there will be a wider gap in two-way empathy, it follows that autistic-to-autistic interactions are improved precisely because both actors are autistic and share more common ground. This view has significant support from the perspectives of autistic people themselves, who claim that it is easier to relate to other autistic individuals because of an absence of social protocol (Chown, 2014; Dekker, 1999). Thus, participation at Matthew's Hub gave rise to the research question of Study 2, which seeks to understand what the enabling intersubjective features are of autistic-to-autistic interactions.

The inspiration for Study 3 was more indirect. Through participation at Matthew's Hub I became aware of the gap in socio-cultural capital. I am a funded researcher who has institutional status and the power to receive recognition for producing empirical knowledge about autism, when at the same time the people I was studying were struggling to find employment despite being intellectually able. Conversations about why employment was so difficult included the feeling that society was poorly placed to understand autistic people or

meet their complex needs in the workplace. Disclosure did not always improve things, since members felt public understanding about autism was weak and misguided at best. These reports compare with research on the perspectives of autistic people which have highlighted that autistic people feel they are perceived as “weird” and that there are many negative stereotypes in popular culture (Treweek et al., 2018). I therefore began to question whether there was more I could be doing as a researcher to empower the autistic voices encountered in my research.

This resulted in launching a public exhibition, *Open Minds*, which drew on my institutional connections with the London School of Economics to create a public platform that could empower autistic voices and cultivate informed dialogue around autism (See Figure 5). In December 2016 I applied to the LSE Knowledge Exchange and Impact fund to host a public exhibition at the LSE which would feature people in the community I had researched. Over two months I worked with Lydia Meredith, a professional photographer, building a visual and auditory portfolio of autistic adults, carers and parents, and Becky Lyddon from *Sensory Spectacle* who very kindly donated her installations for distorting sensory experiences to provide a window into what it would be like for visitors to have hypersensory needs. In addition I also made an animated video, *Walking with Cambell*, (Heasman, 2017b) based on my experiences of being a carer, which illustrated the complex ways in which Cambell is connected to the world around him. The exhibition ran for three weeks from 27th March to 21st April 2017 and reached over 1,500 visitors.

A post-exhibition questionnaire surveyed the reactions of 51 visitors. 98% claimed that the exhibition had helped improve their empathy and understanding of autistic experiences. Qualitative feedback included “I didn’t realise that autistic people have so many constraints. It’s an eye opener”, and “I thought the interactive setup was very powerful, particularly the audio that allowed the voices of the portrait subjects to share their experiences”, and “A

wonderful exhibition with great social impact. I hope the LSE supports ventures like this in the future too – it’s so crucial to situate research in the real world”. The *Walking with Cambell* video was particularly effective in encouraging lay people to question their taken-for-granted assumptions about autism, and is now used by a number of local councils and charities as part of their autism awareness training with over 1,800 views on YouTube (as of 28/08/2018).

FIGURE 5: VISITORS TO THE OPEN MINDS EXHIBITION



Open Minds enabled me to readdress some of the power imbalances that exist between the researcher and those they study by providing new opportunities to build and bridge social capital. It allowed me to connect staff at Matthew’s Hub to other charities, such as *Project Aspie*, to discuss new possibilities for employment for people on the spectrum. It led to two national awards from the Economic and Social Research Council, UK, as a finalist for *Outstanding Early Career Impact* and a winner for *Future Career Promise*, which allowed me to bring issues of autism inclusion, acceptance and understanding to policy makers and research funders. It also brought me into more contact with more researchers, including in particular Dr Laura Crane who invited me to share my experiences of the project with early-career researchers through an event called #Aut2Engage in February 2018. This further

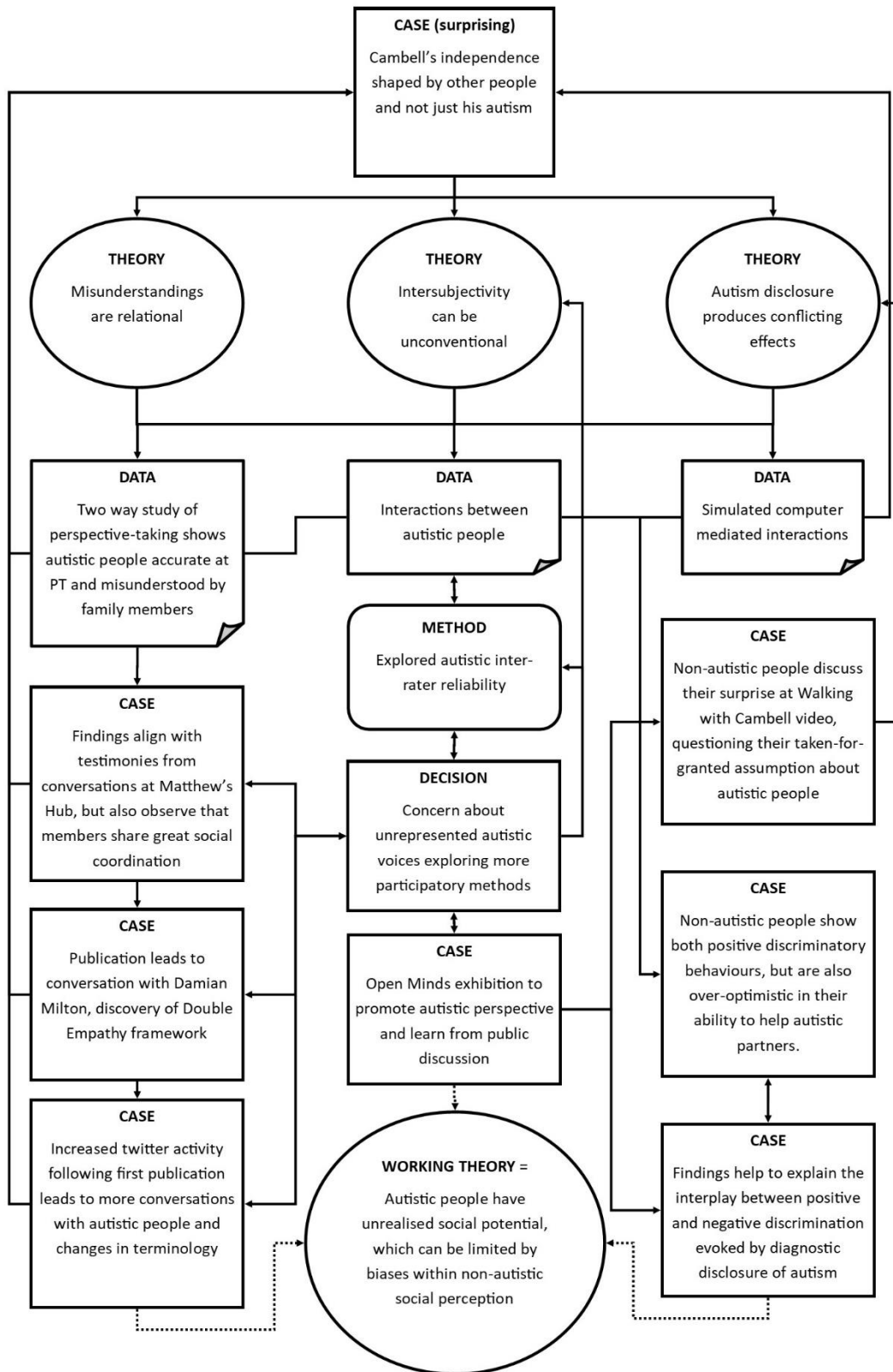
enabled me to reiterate the importance of addressing gaps in social and cultural capital and building longer, more holistic, participation that extends beyond the strategic purpose of research papers alone (Heasman, 2018)). Around this time another researcher I was able to connect with was Dr Damian Milton, at which point I discovered the ontological framework the double empathy problem that helped to explain the bi-directional nature of social interaction that I was interested in. This provided an opportunity to sharpen my theoretical focus for Study 2 and 3 around the double empathy framework (discussed above Chapter 2), and to interact more with autistic academics (e.g. through PARC organised events) which helped to advance aspects of my research. For example, when presenting Study 2 at Nottingham University to PARC, I was asked why I had not used a neurotypical control group in order to compare the intersubjective dynamic between neurodivergent and neurotypical interactions. After answering by saying that it was important to study neurodivergence on its own terms and avoid a comparative design, because this inevitably reinforces a deficit view of autism, I was asked to make a point of this rationale in my published paper, which I subsequently did so. Thus through dialogue with autistic people I have sharpened my theoretical approach (focussing on the double empathy problem), improved my use of language in alignment with the majority preference of autistic people (i.e. changing from “people with Asperger’s” used in Study 1 to “autistic people” thenceforth), and integrated autistic perspectives into my analysis (e.g. autistic inter-rater reliability in Study 2).

Through public engagement activities I gained wider exposure to the societal issues facing autism, particularly its poor understanding in the public domain. The influence of culture on understanding and supporting autism echoes findings of Study 1 where family members would see their autistic relatives in terms of the label, an act which could affect their ability to probe further about the causes of misunderstanding in their relationships. I was thus attracted

to the research question of understanding the double empathy problem at a societal level, and was motivated to design a method to systematically examine the effects of the label of autism on the social perception of autistic people. This took shape in the form of developing a computer-mediated interaction that could deceive participants into thinking they were interacting with others and thus facilitate an exploration of how different labels produce different psychological effects. In doing so the study helped to connect to disparate themes emerging from conversations with autistic people, who report negative discrimination associated with diagnostic disclosure of autism, and research data which suggests diagnostic disclosure results in positive discrimination. To illustrate the organic and abductive unfolding of the thesis research trajectory, I have included a simplified abductive map below:

FIGURE 6: ABDUCTION MAP OF THE THESIS

ABDUCTION IN THESIS



Methodological considerations of the empirical studies

Study 1

As discussed in Chapter 3, there is a discrepancy between everyday perspective-taking and the abstract measures used in research. Through conversations with Dr Alex Gillespie, we began to explore the viability of a method from psychiatry called the ‘Interpersonal Perception Method’ (IPM), which takes as its starting point a relational view where misunderstandings are understood to be the result of the difference between perspectives rather than the fault of any one individual (Laing, Phillipson, & Lee, 1966).

The theory behind the IPM reasons that our self-identity is not a construct distinct from our meta-identity, but rather interwoven. For example, one’s sense of identity is formed by “my looking at me with my view of other’s view of me [...] even if a view by another of me is rejected it still becomes incorporated in its rejected form as part of my self-identity” (Laing et al., 1966, p. 5). This thought echoes the earlier intellectualism of figures such as Mead who identified the Other as a constituent part of forming one’s sense of Self, both through real interactions (i.e. co-present interactions where you may come to learn how you are perceived by others) and imagined interactions (i.e. our regulation of behaviour according to our perceptions of what a generalised other may think) (Mead, 1934). The way in which we mediate each other’s experiences and behaviour therefore calls for a method which takes the dyad as its basic unit of analysis, rather than attempting to understand interactions as the sum of individual psychological properties alone. Moreover, since perspectives are reciprocal, in the sense that we typically respond to the last thing that we think someone else is thinking (which in turn serves as the stimulus for the next response), misunderstandings are common in relationships, since a misalignment of perspectives can “spiral” new meanings (Laing et al., 1966, p. 29). The project of teasing apart the basis of misunderstandings therefore

involves mapping perspectives, both direct on one's sense of Self and Other, and also meta-perspectives, to examine the relational differences between perspectives.

The IPM has scope for different forms of deployment in research. Laing et al. (1966) originally used the method to understand marriages and rather ambitiously attempted to map all of the possible configurations that exist between people using a 720 question survey which took over an hour to complete. The survey probed direct perceptions, meta-perceptions and meta-meta-perceptions, triangulating differences and similarities to explore seven constructs of agreement, disagreement, understanding, misunderstanding, realization, failure of realization and the feeling of being misunderstood. This method is extremely convoluted and obfuscates what are potentially much simpler concepts of agreement, misunderstanding and perceived misunderstanding.

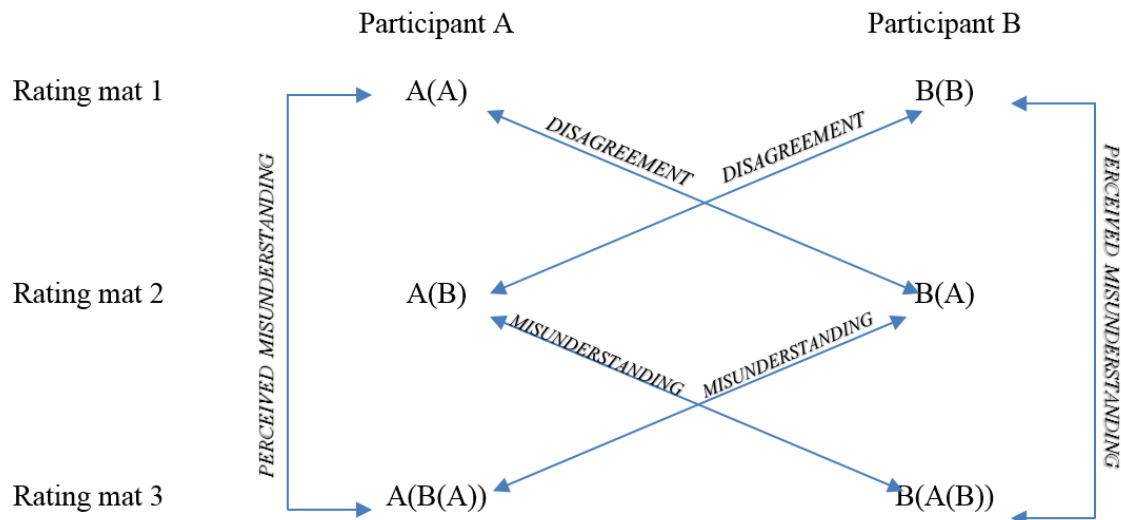
Subsequent attempts to use Laing et al.'s method have resulted in deployments which have expanded its use from purely personal relationships and simplified some of its complexity. Assa-Eley and Kimberlin (2005) used an adapted version of the IPM to explore relationships between pharmacists and patients. They developed a seven-item questionnaire which focussed on key aspects of the pharmacy-patient relationship such as benefits associated with discussing how to use medication and drug side-effects (Assa-Eley & Kimberlin, 2005, p. 47). Since it was relatively short, questions were administered through telephone interviews. Analysis focussed on two constructs: agreement, which was defined in terms of the alignment of scores between direct perspectives on the questionnaire; and understanding, which was defined in terms of alignment between the pharmacist's predicted rating by the patient, and the patient's actual rating. Similarly, Kenny et al. (2010) examined doctor-patient communication using a 19-point questionnaire administered to both parties after consultations. Their interest was to compare perspectives both within-dyads and between

dyads using multi-level modelling and reflects how the method can be deployed across large populations to benchmark institutional trends in service provision.

However, even with the simplified questionnaires used above, people with disabilities may struggle to fulfil the requirements of traditional survey tasks. Autistic people, for example, can be easily overwhelmed by excess information (Van Hees, Moyson, & Roeyers, 2015), while discussing social topics may increase anxiety. Talking Mats™ are a communicative system developed by Joan Murphy for helping people with communicative difficulties (Murphy, 2000). Talking Mats™ involve picture cards for different communicative items (e.g. topics such as “what do you want to do today?”) which the user can place under different headings arranged on a large mat to indicate their response. Talking Mats™ have successfully been used to research people with communicative difficulties such as stroke patients, people with acquired brain injury and dementia, showing that it has helped improve communication (Pettit, Tönsing, & Dada, 2017). The advantage as a system for communicating include its visual simplicity which keep topics being discussed in focus due to their physical presence in front of users. This system has been successfully combined with elements of the IPM to explore interpersonal relationships between people with aphasia and their caregivers (Moore & Gillespie, 2014).

In our study we used an adapted version of Talking Mats™ to simplify the presentation of rating conditions to participants. Thus, three different rating mats were presented which explored (1) rating of Self, (2) rating of Other, and (3) predicted rating of Self by Other. Through triangulating these three rating dimensions it is possible to analyse levels of disagreement in the relationship, which is the difference in perspective between members of a dyad, as well as the extent to which members in a dyad adjust from their own view of Self to consider the perspectives of Others (e.g. the difference between their view of Self and their predicted view of Self by Others). Figure 7 below outlines the constructs explored:

FIGURE 7: CONSTRUCTS EXPLORED BY THE IPM



This framework was particularly beneficial for analysing misunderstandings in autistic family relationships because of the potential for multiple origins of misunderstandings. First, it may be the case that since perspective-taking involves serial adjustment from one's own worldview (Epley, Keysar, Van Boven, & Gilovich, 2004) a misunderstanding occurs because one fails to adequately decentre from their own perspective to take into consideration the perspectives of others. Autistic people have been characterised as egocentrically anchored in their own perspective (Frith & De Vignemont, 2005), which can be explored through comparing ratings of Self with perceived ratings by Other. Second, misunderstandings may arise from inaccurate perceptions of others, perhaps due to different biases in perception such as stereotypes. Again, the IPM can explore this possibility by comparing one's predicted rating by Other with their actual rating by Other.

A limitation of the IPM method is that it has potentially less control compared with vignettes. The differences in perspective observed will be particular to the relationship and not necessarily indicative of broader autistic sociality. Additionally, there is also the challenge of what topics to rate given that each relationship is idiosyncratic. To address these concerns, I provided a context guide to help participants understand how to situate the topics being rated.

For example, the ability to do “everyday activities” included examples such as washing up and taking the bus.

FIGURE 8: EXAMPLE RATING MAT FROM STUDY 1



Pilots were also conducted involving open-ended interviews to generate key topics, and then a refinement of using actual topics themselves. An additional consideration in terms of selecting topics was the number of topics to rate. Given there were three different rating conditions for each participant to complete, there was a danger that too many topics would result in saturation of attention and focus. Through piloting I experimented with 17 topics (as in the study by Moore and Gillespie) but I found this was exhausting for participants. I thus reduced to 12 topics which seemed to be much more manageable by participants. There were also some topics that were hard to contextualise and thus abandoned. For example, we had a category for “likes” (e.g. “how much does (person) like to go to the cinema?”) which we abandoned, since preferences vary so much between people we could not develop a broadly representative selection of topics without significantly increasing the number of topics rated.

A further challenge was how to navigate a within-dyad analysis (i.e. how members of a relationship compare) and a between-dyad analysis (i.e. how autistic people compare against family members). For the within-dyad analysis I used a non-parametric Wilcoxon matched-pairs signed-rank test, because it could not be assumed that the data were normatively distributed between autistic and family member perspectives, and the matched-ranking overcame challenges of idiosyncrasies within dyads. This statistic was performed to examine which topics experienced the greatest misalignment in perspective. Additionally, I also examined the mean scores provided by autistic participants compared with their family members to understand broader trends in rating behaviour between autistic participants and their family members. To further support this data I asked participants to explain their motivations for rating by giving examples where possible. This qualitative insight was essential for understanding the causes of misunderstanding in addition to numerical misalignment.

Study 2

A central challenge of understanding intersubjectivity is that so much meaning is intrinsic to the interaction since utterances take place against the backdrop of assumed shared understanding (Garfinkel 1964). This challenge is amplified due to the potential for cross-neurological misunderstanding between myself as a researcher and the autistic people whose interactions I aimed to interpret. Methodological considerations for Study 2 can therefore be broken down into four key parts: (1) how is intersubjective data selected and captured; (2) how is intersubjectivity operationalised as an analytical concept; (3) how does one overcome the challenge of analysing intersubjectivity from “outside” of the social action; and (4) how does one avoid implicitly imposing neurotypical norms into the interpretation and analysis of neurodivergent interactions?

My method for eliciting data on intersubjectivity was participant observation in the form of video recording the naturally occurring video-gaming sessions at Matthew's Hub. I chose video recording for a number of reasons. Video-gaming is an object-mediated activity in which multiple perspectives are apparent in any given moment. Not only are players responding to each other, they are also responding to characters in the game as well as events and rules of the game. For this reason, I video-recorded interactions so that I could better understand who was speaking and who it was directed to when transcribing, features which audio recording on its own would have obscured. In addition, video recording is a standard method used in conversation analysis, both within research on autism specifically (e.g. Ochs & Solomon, 2010) and in the social sciences more broadly (Pink, 2013). However, there are limitations to this method. First, participants can have a heightened degree of self-awareness due to the presence of recording equipment in the room (Pink, 2013). During the study, many participants were curious about the recording equipment and would ask questions while the game was loading. This could potentially result in altered behaviour during game-play. As it turned out, once the participants began engaging with the game their attention did not return to the recording equipment, as evidenced by the absence of any verbal or visual interaction with the equipment, thus it was not a significant problem. Another consideration was my need to be in the room in case there were any technical difficulties associated with the equipment, which meant I was part of the social field being researched. Again, as with the recording equipment, participants' focus remained fixed on the game and each other with less attention on me. Exceptions to this practice were instances such as swearing at the game when participants would then become aware of my identity in terms of my academic purpose, and then laugh; however, in such cases I would reassure participants that it is not a problem and the action would quickly resume once again. In any case, for the purposes of analysis, all researcher turns were removed from the data.

The second challenge I faced was the question of how to operationalise intersubjectivity, which has been used to describe a variety of phenomena in the social sciences, from automatic orientation to others, to building shared understanding (Fuchs & de Jaegher, 2009; García-Pérez, Lee, & Hobson, 2007; Gillespie & Cornish, 2010b; Schegloff, 1992). My goal was to understand the features that allowed neurodivergent participants to build shared understanding; however, because such features could be idiosyncratic and hard to recognise from the outside, I was limited in what my unit of analysis would be. For this reason, I decided to focus only on explicit forms of intersubjectivity (i.e. what was said between interlocutors during the interaction). The limitation of this approach is that I could not account for the full variety of the unconventional ways in which social coordination may be achieved between neurodivergent participants. I did consider the possibility of using reconstructive interviews, where participants could provide commentary on their own video recordings in a method similar to subjective evidence-based ethnography (Lahlou, 2011). This would allow participants to relive their own experiences of the interaction without interfering with it in real time, providing insight into their internal processes and potential implicit communication, as well as what is explicitly communicated via language. However, I did not pursue this option in this particular study design because my goal was to understand common features of neurodivergent intersubjectivity across a number of interactions rather than a micro-analysis of specific moments. A reconstructive-interview method would require an additional stage of triangulation, similar to a qualitative version of the IPM, in order to detect similarity across the potentially thousands of micro-moments which are described from multiple viewpoints of the participants. Such a project would be valuable, but not within the logistical possibilities of a one-person research project.

An advantage of the decision to focus on intersubjectivity through explicit forms of language also had methodological precedence in the form of Conversation Analysis (CA). CA

examines the dynamics of everyday talk-in-interaction and seeks to describe the structures which enable social action to be organised and developed (Wooffitt, 2005). Everyday social encounters have an interactional order because “once individuals – for whatever reason – come into one another’s immediate presence, a fundamental condition of social life becomes enormously pronounced, namely, its promissory, evidential character” (Goffman, 1982, p. 3). These orders are produced routinely and are in many cases automated (Schegloff, 1986), but can draw upon and have consequences for, social structures including relationships and identity (Goffman, 1982). CA’s main focus therefore, is not on the semantics of language use but rather the function of language as a constituent and observable part of organising social activity (Seedhouse, 2004). Turn-by-turn analysis can help to reveal patterns of intersubjectivity that enable interlocutors to build shared understanding and coordinate action (Seedhouse, 2004), which was ideally suited to the research question of Study 2. However, it is also important to note that not all of the CA principles, and indeed the ethnomethodological principles CA inherits from (Garfinkel, 1964), are adopted for the study. For example, in exploring neurodivergent features of intersubjectivity, Study 2 aligns with the ethnomethodological goal of attempting to know the methodical basis underpinning the way in which actions are produced and recognised (Heritage, 2009), yet it differs in its understanding of the extent to which intersubjectivity is contingent on mutually agreed social norms. CA in particular has the concept of preference organization – the way in which initiative and response sequences of interaction are characterised as socially affiliative (Robinson & Bolden, 2010). Although CA aims to be descriptive, preference organisation inevitably exerts normative pressure onto the interpretation of moments such as silences, hesitations and disclaimers as representing a threat to an interlocutors ‘face’ and as damaging the progressivity of intersubjective effort. However, to understand neurodivergent intersubjectivity one must consider a broader approach to intersubjectivity than that proposed

by the tight social rules explored through micro-analysis in CA. Indeed, research on other disabilities which involve communicative impairment, e.g. aphasia, has shown how intersubjective processes may be embodied and distributed in ways which are initially not apparent to a neurotypical observer (Goodwin, 2004). Thus Study 2 does not aim to prescribe and value which interactional moments count as being intersubjective, but rather seeks to describe the distinctive features of interactions between autistic participants.

A third methodological consideration of Study 2 was how to develop a framework and process for analysing intersubjectivity. For this purpose I reviewed existing frameworks used to analyse intersubjectivity. Initiative-response analysis (Linell, Gustavsson, & Juvonen, 1988) is a framework designed to examine dominance and coherence in an interaction between speakers. It treats each turn in a conversation as a unit of meaning and analyses qualities such as whether the turn initiates a response from a partner, whether it responds to a turn from a partner, how dominant or submissive the turn is in length and assertiveness, and how distal the turn is in terms of relevance to what has just been said. The framework, although complicated, makes key contributions towards Study 2, highlighting the possibility of (a) systematically analysing turns of dialogue as part of a co-produced sequentially organised action, and (b) building a profile of the dyad as a whole rather than focussing on individual speakers. Both of these factors are constituent elements of intersubjectivity, and are built into the coding framework used in Study 2. Each turn is rated relatively in terms of how it connects to the prior turn, thus the analytical unit being larger than 1-turn is preserved.

Other interaction frameworks have adopted similar principles, focussing on logical coherence between utterances (e.g. Roter & Larson, 2002), affect (e.g. Bales, 1999; Nelson, Grahe, & Ramseyer, 2016) and dominance (e.g. Angus, Watson, Smith, Gallois, & Wiles, 2012). There are also more automated measures of intersubjectivity (Nelson et al., 2016; Ramseyer & Tschacher, 2014). I decided not to use automated frameworks since they apply normative

criteria to interactions (e.g. in Ramseyer & Tschacher, 2014, a lack of interaction synchrony is operationalised in terms of unreciprocated body movements, which would not suit an exploratory analysis of neurodivergent forms of interactions where behaviours may be more idiosyncratic). I also aimed to describe intersubjective moments rather than validate good and bad forms of intersubjectivity. This connects to the double empathy principle where differences in interactional style are understood relationally rather than as deviations from an idealised form. Thus, the operationalisation of intersubjectivity focussed on the most common descriptive aspects of existing interaction frameworks: coherence, affect and symmetry.

Finally, in taking these measures to be descriptive rather than prescriptive, I was also aiming to mitigate the potential for imposing neurotypical criteria on the interpretation of neurodivergent data. A further measure employed to manage this issue was to explore the possibility of training an autistic coder to conduct cross-neurological inter-rater reliability. Two potential candidates were sourced from Matthew's Hub, and an initial training session involved showing how to apply the coding framework to 100 lines of dialogue. One coder quickly became bored with the activity and decided to discontinue; the second coder however enjoyed the activity and was able to code 10% of the transcripts over two sessions taking a total of 4 hours to complete. Through discussing how to apply the framework, further clarifications were made. For example, "OK" could be scored as coherent if following an instruction (e.g. "we will restart"), or it could be ambiguous if following an open-ended question, (which track should we race on?") therefore the coding framework was updated to include information about what kind of response is precipitated by the prior turn (e.g. yes/no answers to closed questions = high coherence, whereas yes/no answers to open questions = ambiguous). Advantages of the framework were its simplicity in scoring (-1 = fragmented from prior turn, 0 = ambiguous to prior turn, +1 contiguous to prior turn) which was

understood easily, with positive moments (e.g. laughter) and negative moments (e.g. criticism) easy to identify.

Study 3

The origin of Study 3 emerged through multiple public engagement activities (e.g. Open Minds) as well as first-hand reports from members of Matthew's Hub, who claimed that they faced a lot of stigma due to their diagnosis of autism. The decision to focus on diagnostic disclosure aligned with methodological and theoretical developments. Studies 1 and 2 had explored the micro-aspects of social interaction, yet it was becoming increasingly clear that the double empathy problem draws on a cultural context and I wanted to understand more about this superstructure. Designing Study 3 faced a number of methodological challenges. The first was how to operationalise a study of culture, which is more than just an "explanatory device" of human behaviour (Moscovici, 2000, p. 30), it is a dynamic system which produces interactions that are meaningful to various different groups in society, which in turn shapes culture itself (Zittoun & Glaveanu, 2017). The heterogenous nature of modern society means that culture reflects a plurality of systems for meaning-making (Gillespie, 2008), as evidenced by the possibility for different cognitive outlooks to co-exist within the same individual or group (Jovchelovitch, 2002). Studies of culture may broadly be categorised into either micro-level ethnographic methods of data collection and analysis, such as participant observation and focus groups which produce very rich and detailed observations about mind, relationships and interactions vis-à-vis culture (e.g. Goffman, 1958), or they examine macro-level symbolic structures through media analysis or large vignette-based studies to draw insight about general attitudes and trends over time (e.g. Foucault, 1971). Study 2 already constituted a micro-level analysis of real-world interactions between autistic people, and although it would have been interesting to extend this study to examine, by comparison, cross-neurological intersubjective contexts such as domestic

interactions, this was not viable within the scope of the thesis given the resource limitations and access difficulties I had experienced in conducting Study 1. I was also inclined to develop a broader insight about autism and culture given that Study 1 and Study 2 focussed so heavily on the specific community of Hull. For these reasons I decided to operationalise a study of culture that was at the macro-level.

An area of psychological research which connects the phenomenon of marginalised groups to cultural norms is the study of labels (Thompson, 2014). Previous studies on autism have focussed on the effect of labels both in terms of self-identification (Brosnan & Mills, 2016) and the effects on non-autistic social actors' perceptions of autistic people (Aspy & Grossman, 2013; Faso et al., 2014). Labels are important for autistic people, a) because they are achieved through a diagnostic process which then makes accessible a variety of support and services (Robinson et al., 2015), and b) as per Hacking's work noted above, they have a potentially transformative effect on social behaviour, and more specifically on perspective-taking (See Chapter 5). Therefore there was theoretical precedence in support of my own abductive interest in developing a study of the culture which supports or hinders autistic sociality through exploring the effect of labels.

The second challenge was how to operationalise the systematic study of the effect of labels. Traditionally, labels have been studied through self-report data, where participants provide a report about their identification with a particular label (Thompson, 2014), and through vignette-based design whereby participants are presented with a stimulus such as a short story or a picture about a character that has a particular label (Hughes & Huby, 2004). Both of these methods have limitations. Self-report data can be unreliable because of researcher bias whereby participants produce answers that they think the researcher wants to hear, rather than those that are reflective of their internal state (Bortolotti & Mameli, 2006). Any experimental situation is fundamentally a social situation, in which it is difficult to disentangle the

psychology of identity management of the researcher-participant relationship, from the manipulation of an independent variable to explore participant-stimulus relationships. Vignette-based design on the other hand, is limited by the passive way in which participants process a stimulus while they are outside the field of social interaction. This reflects a longstanding criticism of labelling theory in general, which is very rarely focussed on labelling in everyday interactions (Thompson, 2014). The intersubjective context is important because it is only in extreme cases that individuals would chose not to interact with someone purely on the basis of a label; rather what is more common is that people commit to an interaction and the label has a more diffuse longitudinal effect on the way in which interlocutors support and scaffold each other's opportunities for further coordination.

I therefore wanted to design a new methodology which would address this perception-behaviour gap. I thus needed a method which could a) triangulate self-report data with behavioural insights in response to a label, and b) create a systematic interaction where participants are part of the field of action in which the label could be rendered meaningful. To achieve this aim I adopted Heider and Simmel's (1944) attribution paradigm, whereby participants are shown a video in which three two-dimensional shapes move around a scene. This procedure was effective in creating a simulated interaction between the shapes which participants perceived to be reflective of a social power relation. Thus, even when using a minimalist paradigm of two-dimensional shapes, it is possible to create a standardised interaction which minimises the influence of contextual variables, and could be used potentially to understand the more specific effects of a given label (i.e. if one of the shapes was labelled as "autistic"). However, this paradigm still has the limitation that the participant is separate from the field of action. Thus we do not get insight about how someone thinks they are seen by someone else in relation to a label, nor do we understand behaviourally how that interpersonal dynamic plays out.

To address this issue, I programmed a computer game-version of Heider and Simmel's paradigm. Computer-mediated interactions are beneficial in psychological research because they can provide experimental control without sacrificing a large degree of ecological validity. This has been termed the "control-mundane trade-off" (Blascovich et al., 2002, p. 104). In the developed game, Dyad3D, participants must navigate through a series of mazes as a red ball. In order to be successful they must collaborate with a silver ball, which they perceive to be another online player but is actually an intelligent virtual agent (IVA), to open a series of doors and collect their respective gold bricks to complete the level. Before participants began navigating through the mazes, they were superficially able to communicate with the IVA through sending a ballistic message about their reflections on handling the tutorial phase of the game. This message acted as the independent variable. It was manipulated to form three conditions: (1) a no diagnosis condition where the IVA expresses difficulty with balancing multiple tasks but skill in navigating; (2) a dyslexia condition where a diagnosis of dyslexia is inserted into the aforementioned information; and (3) an autism condition, where a diagnosis of autism is inserted into the aforementioned information. In every experiment, the IVA was programmed to behave the same way throughout the mazes.

Specifically, to create a focal point for the study, I programmed the IVA to deliberately take an incorrect path during the game which would purposefully frustrate the participant. The reason for creating such a misunderstanding was to examine how participants would draw on the partial knowledge they have of the IVA to make sense of the sudden breakdown in interaction (i.e. potentially bringing the label into focus). To make the misunderstanding salient, each level of the game was scored, with faster completion times achieving a higher score. Scores were presented on a superficial leaderboard after each level to indicate a relative ranking, (e.g. position 4th out of the last ten dyads to complete the level). Following the misunderstanding participants were ranked last and finished the game ranked last, thus the

misunderstanding is observed to have a detrimental effect on performance in the game. In the post-game questionnaire, participants were asked to explain their experience of the game, with all participants making reference to the misunderstanding. Further questions probed how they interpreted the information supplied by the IVA. Behaviourally, I also recorded actions in response to the misunderstanding to compare with self-report questions on levels of frustration and coordination. For example, the number of times participants pressed a button while the misunderstanding was taking place, and the mean duration of each button pressed, could give an indication of levels of frustration. I also measured the mean distance between the player and the IVA for each level of the game, and the time difference between collecting their respective gold cubes, to understand levels of coordination in the game. Combined with a post-game questionnaire, this interactive design allowed me to, a) create a simulated interaction which is the same for all participants; b) vary the information provided to participants about the identity of their online partner so that I could conduct group comparisons between conditions to examine the effect of disclosing diagnosis; and c) triangulate self-reported measures with behavioural measures observed in the game. This design allowed me to examine the discrepancy in the literature regarding positive discrimination observed in self-report studies, and negative discrimination in reports from autistic people about everyday social life.

Ethics

To conduct psychological research, principal investigators and institutional review boards must evaluate whether the proposed study raises any ethical concerns (Corti, 2015). The BPS (British Psychological Society, 2018) and the APA (American Psychological Association, 2016) both detail criteria for ensuring the highest standards of professional conduct and ethical responsibility while undertaking research. The BPS identifies four ethical principles while the APA identifies five ethical principles. They are in alignment on issues of: (1)

respect/people's rights and dignity (which relates to respecting the dignity and worth of all people, their individual and cultural differences, as well as taking appropriate measures to safeguard vulnerable people who may be impaired in their decision-making); (2) Responsibility/Fidelity and Responsibility (which relates to being aware of the professional and scientific responsibilities to participants or animals and to society as a whole, as well as using one's knowledge and skills appropriately); (3) Integrity (which relates to "being honest, truthful, accurate and consistent in one's actions, words decisions, methods and outcomes" (British Psychological Society, 2018, p. 7), as well as avoiding conflicts of interest and maintaining professional boundaries); and (4) Competence/Justice (which relates to possessing the appropriate skills and understanding the boundaries of one's competence, as well as allowing all people to access and benefit to the contributions of psychology). Where they differ is that the APA has an additional consideration of "beneficence and nonmaleficence", which states that the motivation of psychologists is to benefit those with whom they work, and in order to achieve this the researcher must critically reflect at all times about their "personal, financial, social, organizational, or political factors that might lead to misuse of their influence" (American Psychological Association, 2016), as well as the potential for their judgements to impact the lives of others.

In alignment with the principle of respect (1), this thesis has taken several measures. Its abductive approach described in Chapter 4 has ensured that research has been directed through interactions and discussions with autistic people. The language used to refer and discuss autism is in accordance with the majority preference of autistic people (Kenny et al., 2016), and when presenting about research, I have always acknowledged the responsibility that comes with speaking publicly about autism which is a key responsibility recently highlighted by the Participatory Autism Research Collective (PARC, 2018a). Moreover, it has critically reflected on the prevalence of the deficit-model of disability, which is focussed

on characterising and predicting the limitations of autistic people, finding this approach to be ontologically and epistemologically flawed, undermining the integrity and rights of autistic people in the process. In response this thesis has sought to be descriptive rather than prescriptive, and in doing so has focussed on capturing the psychological factors that enable social interaction for autistic people, highlighting unrealised potential for perspective-taking and social interaction. It has also consulted carefully throughout with autistic academics to gain feedback about the validity of methods used.

In alignment with the principle of responsibility (2), I worked very closely with autistic people to build strong relationships which extend beyond the timeframe of the thesis. In doing so I have looked to bring new opportunities to the autistic people I have worked with and the charity Matthew's Hub, including creating platforms for their voices to be heard in public (discussed in Chapter 4), and exploring the possibility of integrating autistic people into the research design through cross-neurological inter-rater reliability. In addition, I have remained conscious about the potential impact of my research on society through making research outputs accessible and learning from dialogue through social media from users of my research. The potential for my research findings to impact society is discussed further below.

In accordance with the principle of integrity (3) I have followed the BPS and APA guidelines carefully throughout my research, providing all participants with the opportunity to withdraw at any point and to question the nature of the research and my personal goals for completing my PhD. Study 3, in using deception, presents a potential challenge to integrity as it is a situation where the experimental design is purposely not fully disclosed to participants at the beginning of the study. Many steps were taken to ensure integrity which were reviewed through three different ethics committees and which are documented in greater detail below.

In alignment with the principle of competence and justice (4) I have undertaken training in skills relevant to the successful completion of the thesis including qualitative and quantitative analysis, teaching, and public engagement skills. In addition I have undertaken personal training in programming, graphic design, and video-editing. I have recognised the limits of my own ability and knowledge through seeking advice from my supervisor where appropriate and consulting experts in the field of autism research.

Finally, in alignment with the APA principal of “beneficence and nonmaleficence” I have investigated different options for translating my research into more accessible forms, such as videos, animations and graphically simple power-point slides. This not only allows autistic people to understand some of the more abstract theoretical constructs I explore, but equally it broadens the reach on my outputs to practitioners, carers and family members who are all an integral part of the support structure that may surround autistic people. This is particularly important given the empirical contribution from Study 1, that it is very easy to misread autistic people.

In addition to the general standards of ethical practice, research on autism has a number of prerequisite ethical considerations. Moreover, the way in which I have operationalised my research questions (i.e. investigating real interpersonal relationships autistic people share with family members, investigating lived social interactions between autistic people, and deceiving participants into thinking they are interacting with autistic people), carries with it further considerations which will be relevant to future researchers who may wish to deploy these methods.

Working with autistic people

Researching with autistic adults requires a number of additional considerations (Lory, 2018). Unfamiliar people, changes in routines, and questions regarding their own sociability may all

potentially increase levels of stress and discomfort, yet these features form the bedrock of any study working with autistic people. In writing about her experiences of being an autistic participant in research, Becca Lory (2018) highlights how researchers often only think about participants in terms of the moments in which data is elicited and omit important logistical challenges of planning, traveling, and adjusting to new routines which can have a detrimental effect on finite energy reserves (Lory, 2018). Simple considerations could drastically ameliorate the difficulty of participation and improve “the precarious relationship between autistic person living on the spectrum and the researchers focused on understanding it” (Lory, 2018, p. 2).

For these reasons, an essential step in working with autistic people for Study 1 and Study 2 was spending time at Matthew’s Hub, which allowed me to familiarise myself with their members, getting to know the general concerns and more specifically their concerns about partaking in research. All my research with autistic people either took place at Matthew’s Hub at a convenient time for the participant, or it involved home visits where participants were once again in a familiar and comfortable environment. I made sure to wear clothes without patterns in case it should be distracting for my participants. Participants were informed well in advance about the opportunity to participate and were free to withdraw at any moment, so that participants could get used to the idea of participating in research. In addition all participants were provided with a debrief sheet that included details of support services available to autistic adults in the event that they felt upset either during or after data collection in any of the studies.

All my participants were above the age of consent and were intellectually able. Additional steps were taken due to the possibility that their autism might impact their decision-making with regards to participation. Thus, all participants were provided with participant information sheets and the opportunity to raise and discuss any questions with myself or staff

at Matthew's Hub. In all cases I sought further guidance from Matthew's Hub about the suitability of participation for members. The main concerns raised by autistic participants centred on anonymity and the relevance of the research to everyday life. Confidentiality was maintained throughout with individual participant data not circulated back to participants and all personally identifying information removed from data. Moreover, all data was stored on an encrypted USB drive. This process was discussed in advance with all participants in each of the studies in accordance with APA guidelines (American Psychological Association, 2016, sec. 4.02). Concern about the relevance of research reflects a more widespread issue in research in general, where "the evaluation of the research is no longer focused solely on the usual scientific criteria [...] rather the question of the usefulness of the research and its results for the participant becomes a main criterion" (Flick, 2011, p. 7). By nature, this thesis is applied since it empirically investigates the phenomena of double empathy and it does so by focussing on the most pertinent ways in which it affects the social life of autistic people.

Investigating misunderstandings in real relationships

Since Study 1 involved collecting sensitive data, particularly about divergences of perspective in family relationships, all data remained confidential and anonymised, with dyad-level data not circulated back to participants. This is in accordance with other studies which have used the IPM procedure (Moore & Gillespie, 2014) because doing research with families presents the risk that they are confronted with aspects of their situation through questions from the researcher (Flick, 2009). More specifically to the IPM, discovering the presence of previously unknown misunderstandings could have a transformative effect on such family relationships. As per all studies, interactions with the researcher were informal and relaxed, and included a number of breaks since rating multiple items could be exhausting for participants. During the course of the IPM, participants used the topics to draw upon their own life experiences, many of which could be challenging. To reduce the potential negative

impact of such recollections, I reminded participants before the study that they were not obliged to talk about anything which made them feel uncomfortable or which could have a residual effect on their mental health. During the IPM I further reminded participants of their freedom to discuss only what they felt comfortable disclosing. A debrief sheet was provided to all participants which provided contact details in case there were any follow up questions (none received) as well as detailing a list of supports available to participants should they wish to speak to someone about their concerns.

Investigating everyday interactions between autistic people

Participant observation reduces the distance between the researcher and the situation they observe through an extended period of participation in the field. This becomes an “essential instrument of data collection” but at the same time can potentially result in less standardised data (Flick, 2011, p. 121). Participant observation involves two primary processes, first the researchers must find access to the social field and become participants in order to be part of the action (Flick, 2011, p. 121). This was initiated prior to the thesis in the summer of 2014 when I approached Matthew’s Hub about the possibility of learning more about their members and conducting research. This allowed me to build participant trust which is an essential ethical consideration of working with autistic people. A second process related to participant observation is how the observation becomes anchored to a specific research question. To achieve this aim it is important the researcher remains open at all times (Flick, 2009). In this respect, Study 2 would be more accurately described as a *focussed observation* since it centred on a specific activity of video-gaming, which emerged as a topic of interest through a wider abductive process detailed in Chapter 4. Further ethical considerations of using participant observation as a method centre on the extent to which the researcher is directly active in the field. Although I was studying a naturally occurring activity, I was still part of the field of action through my presence in the room and my role in setting up and

managing the recording equipment. For example, sometimes participants would ask me questions about the recording equipment, or questions about a game they were playing. In some cases we also had a situation where one player had to leave (e.g. catching a bus) and no other player could be found. In such moments I played on the Xbox with the participants so that they were not denied the opportunity to continue playing games. All conversational turns involving me, and any situations which did not involve autistic-to-autistic interactions, were removed from the analysis.

Using deception in a simulated interaction design

The main ethical considerations of Study 3 related to the use of deception. Deception is often used in psychological research to avoid the Hawthorne effect, the tendency for participants to behave according to their beliefs about the researcher's aims and expectations (Bortolotti & Mameli, 2006). The APA identifies three criteria governing the use of deception, including (a) that it "has significant prospective scientific, educational or applied value" and that there are no non-deceptive alternative procedures feasible; (b) that such deception results in no harm; and (c) that the deception is revealed as soon as possible and no later than at the conclusion of data collection (American Psychological Association, 2016, sec. 8.07).

In response to (a), our systematic investigation of the effects of the label of autism on social perception and interaction could not have been achieved unless participants believed they were interacting with another person. The only methodological alternative would have been to source actual autistic participants to be paired with non-autistic participants. However, this was logistically impossible considering the very large sample sizes required from power analysis (60+) and resource constraints (i.e. one researcher). It would also reduce experimental control as participant's experiences would vary between interactions reducing comparative insight between groups. Finally, it would still require an element of deception given that non-autistic participants would not be aware that half the participant pool was

comprised of autistic participants. A simulated interaction through a video-game was therefore justified as an appropriate method for exploring the research question which contributes to understanding discrimination towards autistic people in society.

In response to (b), extensive piloting and three focus groups were conducted to examine the potential for the study to result in harm. Beyond frustration with the misunderstanding experienced, participants did not report any negative consequences of taking part in the research and were happy for other participants to be involved in the same study. Feedback from ethical committees also assessed risk of harm to be no greater than might be reasonably expected of any situation in life where people are asked to collaborate. As noted below it was explained to participants in the debrief the scientific rationale for using deception, with many participants amused at finding an explanation for why they experienced a misunderstanding in the game. In addition, there was frequent positive feedback from participants claiming that they had found the game fun to complete.

In response to (c) participants were informed about the deception immediately after completing the study and were offered the opportunity to ask questions of the researcher about the nature of the deception and the aim of the study in general. Moreover, in conversations during the debrief, a number of participants mentioned that they enjoyed playing the game. One participant even offered to design future maps for the game. This feedback indicates that the game not only has minimal risk, but also has the potential to create a positive effect for the participants.

In addition to the measures above, there are also considerations about the violation of participants' autonomy in that deception results in participants being studied in a way that they may not have consented to (Bortolotti & Mameli, 2006). However, alternative approaches to informed consent involve disclosing to the participant, in advance of the study,

the possibility that not all the correct information will be supplied. We chose not to pursue this method because the validity of the study was contingent on the belief that participants were interacting with another person online, thus doubts about experimental design would critically impact how participants make sense of the misunderstanding they experience in the game. Another option for informed consent is informed consent by proxy, where a participant can nominate a person they trust who is given all the information about the experiment, and this proxy can judge whether the research participant should take part (Bortolotti & Mamei, 2006). We opted for an amended version of this approach since it was not feasible, given the online means by which the study was administered, to recruit proxies in addition to participants. Instead, we asked all participants whether they would be happy for other participants to go through the same experimental procedure. This method is advantageous since it provides feedback both about the participants' autonomy in relation to being deceived as well as acting as a proxy for future participants.

Three IRB approvals for research were granted from the department, research lab and university where the study was conducted. A condition of approval focussed on monitoring the deception closely, both in terms of the impact of the deception study on the wider participant pool and the impact of the deception on the participant and whether they would object to another person being subject to the same deception. To monitor impact on the study we asked participants if they had participated in any other deception studies at the research lab, and whether they had suspicions during the study of being deceived. We also examined the detailed descriptions provided by participants to see if they voiced concerns about deception in the study. In the debrief we also asked participants if they would be happy for other participants to go through the same process. This protocol was similar to that observed in Corti's (2015) doctoral thesis which also used deception to create simulated interactions. If at any time a participant voiced ethical concerns regarding participation or the participation

of others, all trials would cease and the protocol be re-evaluated. In addition, extensive piloting involving 183 participants and three focus groups, helped to provide feedback about the game and ensure its development and protocol was in-line with ethical considerations of participants as well as guidelines provided by the APA and BPS.

5) TWO-SIDED PERSPECTIVE-TAKING

Perspective-taking is two-sided: Misunderstandings between people with Asperger's syndrome and their family members

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Brett Heasman and Alex Gillespie

Abstract

Misunderstandings are social in nature, always having two sides. Yet the misunderstandings experienced by people with Asperger's syndrome are usually studied in terms of the individual with a diagnosis, with less emphasis on social relations. We use a two-sided methodology to map out misunderstandings within 22 dyads ($n=44$) consisting of people with Asperger's syndrome and their family members. Both sides of the relationship were asked about 12 topics in terms of one's rating of Self, one's rating of Other and one's predicted rating by Other. The findings show that people with Asperger's are able to predict lower scores from family members, despite disagreeing with their view, and that family members often over-estimate the extent to which their relatives with Asperger's syndrome are egocentrically anchored in their own perspective. The research demonstrates that a two-sided methodology is viable, and it uses it to identify how representations of Asperger's syndrome can both support and hinder social understanding within relationships affected by Asperger's.

Keywords

Asperger's syndrome, family relationships, methodology, misunderstanding, mixed methods, perspective-taking

Introduction

Although people diagnosed with Asperger's syndrome (AS) report difficulty in understanding what other people are thinking (Hochhauser et al., 2015; Locke et al., 2010; Muller et al., 2008), research has also shown that in social relations this phenomenon is two-sided, because close friends and family also have difficulty in understanding people with Asperger's syndrome (PwAS; Brewer et al., 2016; Froese et al., 2013; Kremer-Sadlik, 2004). Misunderstandings (when one party attributes an incorrect belief to another party) are therefore experienced by both people with AS and their relations, and as such, it is important to develop methods for investigating the two-sided nature of these misunderstandings. While ethnography has been productively used to explore the two-sided nature of these relationships (Maynard, 2005; Ochs, 2010; Solomon, 2010), there is currently a lack of methods used in research on AS that systematically compares the perspectives of each side within real social relationships.

We report research based on the Interpersonal Perception Method (IPM), a two-sided methodology for

identifying how members of a given social relation understand or misunderstand each other. Through a rating exercise and open-ended discussion, the IPM methodology systematically compares direct perspectives (one's view of Self and one's view of Other) and meta-perspectives (how one thinks one is seen by Other), and provides a basis for interpreting the origins of misunderstanding. We used the IPM methodology to examine relationships involving participants from a charity supporting PwAS and their family members (FMs). The IPM was used to examine: what misunderstandings occur in PwAS–FM relationships? And what reasons do participants give for such misunderstandings?

The London School of Economics and Political Science, UK

Corresponding author:

Brett Heasman, Department of Psychological and Behavioural Science,
The London School of Economics and Political Science, Houghton
Street, London WC2A 2AE, UK.
Email: b.l.heasman@lse.ac.uk

Misunderstandings in relationships with people with Asperger's

Misunderstandings in PwAS–FM relationships may be two-sided (i.e. evident for both people with AS and their relatives) for cognitive, social and cultural reasons. Cognitive reasons for misunderstanding are well documented, highlighting how the individuals with AS may struggle to make themselves appropriately 'readable' to others because of limitations in theory of mind (Bowler, 1992; Spek et al., 2010), executive control (Ozonoff et al., 1991; Pellicano et al., 2006), emotion perception and regulation (Montgomery et al., 2013; Samson et al., 2012), and pragmatic language (Capps et al., 1998; Volden, 1997). From the perspective of the 'neurotypical' perceiver, the individual with AS can be difficult to read, appearing idiosyncratic (Brewer et al., 2016; Froese et al., 2013) and disconnected from socio-cultural norms (Paul et al., 2009; Woodbury-Smith and Volkmar, 2009).

Social reasons emphasise how misunderstandings may originate through intersubjective processes (Kremer-Sadlik, 2004; Linell, 2009; Schegloff, 1992). Divergences of information and limited experiential overlap can make perspective-taking difficult (Gillespie and Martin, 2014; Jones and Nisbett, 1972). In order to avoid misunderstandings, both parties in a given relationship must work together to continually display their own understanding and probe the understanding of the other (Ichheiser, 1943; Schegloff, 1992). Thus, it is not only people with AS who need to explore the perspectives of FMs but also FMs who need to explore the perspectives of the person with AS. This need is furthered when one considers reports from people with autism who are able to articulate their perspectives, revealing how strongly they feel they are misunderstood because others do not know what it is like to be autistic (McGeer, 2004). The gap in mutual understanding is two-sided; however, there is a danger that FMs may not see the validity of such claims from PwAS because of their diagnosis, which, in turn, might exacerbate such misunderstandings. FMs, who scaffold perspective-taking in daily discourse for PwAS (Kremer-Sadlik, 2004), therefore play an important role in creating and addressing misunderstandings in PwAS–FM relationships.

Cultural reasons for misunderstandings highlight how Self–Other awareness is framed by normative expectations on what others ought to do given the circumstances (McGeer, 2001). What is distinct about PwAS–FM relationships is that both parties are aware of the diagnosis of AS, and the social construction of what that diagnosis means (i.e. the ways in which it is represented in culture) can 'loop' back into the very phenomena it seeks to describe (Hacking, 1996, 1999). Representations provide pre-packaged images and ideas about groups that are used by people to create default expectations about the behaviour and thinking of others (Schutz, 1932), and are

significant for research on AS because of the divergent accounts of autism provided by science, the media and people with autism themselves (Kenny et al., 2016; Pellicano et al., 2014; Sarrett, 2011). For example, people with AS feel misrepresented by negative discourses associated with autism and disability (Bagatell, 2007), shaping how people with AS view themselves and others in relation to themselves (Parsloe, 2015). Such representations also impact those with whom they are intimately connected; for example, the 'refrigerator parent' theory of autism in the 1950s led to increased stigmatisation and guilt experienced by parents (Evans, 2013; Sousa, 2011). The looping effect therefore has a significant impact on self-identity in such relationships, as knowledge about the classification of autism changes the way those who are classified behave (Hacking, 1999, 2009; Sarrett, 2011) and leads neurotypical individuals to regulate behaviour in accordance with perceived norms (McGeer, 2009).

Representations can also affect how others are perceived. Research has shown that perspective-taking is 'egocentrically anchored', in the sense that perspective-taking begins with the assumption that Other has the same perspective as Self. Perspective-taking proceeds through serially adjusting from one's own perspective, and such adjustments terminate when a plausible estimate is reached (Epley et al., 2004), reducing the ability to correct for additional biases in one's immediate experience of others (Nickerson, 1998). Misunderstandings may therefore persist and remain unaddressed, because individuals seek explanations that conform to their own expectations, and will cease to probe beyond such explanations to discover its limitations.

To study empirically how representations of AS are differentially used by both people with AS and their FMs, we need a method that can study both sides of the social relationship.

How can misunderstandings in relationships be identified?

The IPM (Laing et al., 1966) was developed to explore disagreements, perceived misunderstandings and actual misunderstandings in close personal relationships. According to this approach, social relationships are conceptualised as comprising direct perspectives (what Self and Other think about X) and meta-perspectives (each party's estimation of what the Other thinks about X). Comparing these perspectives can reveal three dimensions: disagreements (i.e. comparing what Self and Other think about a given topic/person, for example, two people holding differing views about their relationship), actual misunderstandings (i.e. comparing what Self thinks about X with what Other thinks Self thinks about X, for example, a difference between one person's perception of another's view on the relationship, and the Other's actual

view on the relationship) and perceived misunderstanding (i.e. comparing what Self thinks about X with what Self thinks Other thinks about X, for example, one person anticipating that the Other holds a view about the relationship which differs from their own view).

This research builds upon the IPM methodology and focusses on perceived misunderstanding and actual misunderstanding. The ability to perceive the different perspectives of others enables actual misunderstandings to be addressed. These constructs are relevant to PwAS–FM relations because research suggests that PwAS will be limited in their ability to perceive differences in perspective from their own view (Frith and De Vignemont, 2005), leading to high levels of actual misunderstanding (as potential discrepancies in perspective between Self and Other remain unaddressed).

The IPM is therefore used to ask: (*RQ1*) what misunderstanding occurs in PwAS–FM relationships? And (*RQ2*), what reasons do participants give for perceived misunderstandings? *RQ1* is addressed by comparing numerical ratings of participants' rating of Self and their predicted rating by Other (perceived misunderstanding), and participants' predicted rating of Self by Other, and the rating they actually receive by Other (actual misunderstanding). *RQ2* is addressed by examining the reasons that PwAS and their FMs gave for particular ratings.

Materials and methods

Participants

Twenty-two PwAS and their chosen FMs were recruited from a charity supporting PwAS ($n=44$; 22 dyads). Our inclusion criteria for the category of PwAS were broad given the challenges associated with diagnosis (Kaland, 2011; Leekam et al., 2000). Our criteria included (1) diagnosis for AS confirmed via contemporaneous reports (e.g. clinical records), or participants currently on the diagnostic pathway for AS having been referred for assessment by a medical professional, and (2) perceptual reasoning and verbal comprehension intelligence quotient (IQ) within the normal range (i.e. 70+; see supplementary file, section A). Our sample included a gender bias towards males (19:3), consistent with current rates of diagnoses for autism spectrum conditions (Taylor et al., 2013).

The main inclusion criteria for FMs were that they were responsible for the informal care needs of PwAS and did not have a formal diagnosis of an autism spectrum condition themselves. All of our dyads, except one (adult-cousin), involved adolescent/adult–parent relationships. (See Table 1 for details of participants.)

Materials

Contemporaneous reports. Reports including clinical reports, school reports and oral reports from staff at the

Table 1. Participant details.

PwAS		
Diagnosis	AS	18
	AS pathway	4
Age (range)		21.09 (16–41)
Gender M:F		19:3
IQ (range)		102.05 (72–128)
Living status	Independent	1
	Cohabiting	17
	Supported housing	2
	Unknown	2
Employment status	Full-time	1
	Part-time	2
	Apprenticeship	2
	Student (university)	2
	College (school/sixth form)	6
	Unemployed	9
Relative of PwAS		
Relationship to PwAS	Parent	21
	Cousin	1
Age (range)		53.27 (25–65)
Gender M:F		2:20

AS: Asperger's syndrome; PwAS: People with Asperger's syndrome; IQ: intelligence quotient.

charity, members and their parents were used to identify potential participants for the study.

The IPM topics and rating mats. A topic list was iteratively refined through five pilots using a combination of theory-driven concepts from the ADI-R (Le Couteur et al., 2006) and literature on AS. Topics reflected attested difficulties in communication including 'small talk' (e.g. difficulties starting interaction), 'body language' (e.g. reading non-verbal cues) and 'managing discussion' (e.g. dialogue and turn-taking). Narrow interests and systemised routines led to topics on adaptability, including 'handling criticism', 'adapting routines' and 'sympathising'. Difficulties with future orientation (Howlin et al., 2004; Terrett et al., 2013) led to topics of 'consequences of actions', 'organisation' and 'five-year view'. Finally, research on people with other communicative disabilities highlighted disagreements in perceptions of independence (Gillespie et al., 2010), leading to topics of 'handle everyday tasks', 'make decisions (on own)' and 'visiting new places (on own)'. A context guide provided common examples (e.g. 'everyday activities' included washing up, food shopping and catching the bus) to help participants situate the meaning of the IPM items.

To complete the rating, participants used a six-point Likert scale from 0 to 5 (see supplementary file, section B). Topics were rated using an adapted version of 'Talking Mats' (Murphy, 2000) where participants were presented with items to be placed on the scale (an A3 mat divided

Table 2. Number of participants who provided an explanation for their rating when meta-representing their partner.

Group (N)	No explanation	Explanation < 6 topics	Explanation ≥ 6 topics
AS (21)	11 (52%)	7 (33%)	3 (14%)
FM (20)	5 (25%)	9 (45%)	6 (30%)

AS: Asperger's syndrome; FM: family member.

into six scoring columns) from 'is not at all good/often/easy' (0) to 'is very good/often/easy' (5). This format was deemed preferable given its success in assessing people with aphasia, learning difficulties, dementia and brain injury, and the tendency for participants to adjust ratings as they evaluate questions (Moore and Gillespie, 2014).

Procedure

Dyads were briefed together about the nature of the study before standard procedures concerning informed consent and a demographics questionnaire were completed. Participants were studied individually, with the sessions audio-recorded. Twelve topics were presented in a random order and rated using three different mats: (1) Self (e.g. rating themselves), (2) Other (e.g. rating their partner) and (3) Meta (e.g. rating how they perceive their partner will rate them).

The researcher made explicit the rating procedure for participants, saying 'how good do you think you are at handling criticism?' (rating mat 1), 'How good do you think your relative is at handling criticism?' (rating mat 2) and 'How do you think your relative rated you for handling criticism?' (rating mat 3). At the end of each rating, mat participants were offered the chance to adjust any ratings and to discuss any reflections. Debrief procedures completed the session. Ethical approval was granted by the researcher's university and the charity where the research was conducted. Results were not returned to participants due to the potential for causing interpersonal issues associated with the discovery of misunderstandings.

Analysis

To identify the misunderstandings that occur in PwAS–FM relationships (RQ1), we used numerical ratings to compare perceived misunderstandings and actual misunderstandings. Since the data rated were ordinal with non-normal distributions, the non-parametric Wilcoxon matched-pairs signed-ranked test was used.

To identify the reasons participants gave for misunderstandings (RQ2), we used transcribed audio recordings of the IPM interview using NVivo 10 (PwAS=21; FM=20; 3 participants declined to be recorded). Analysis focussed specifically on the explanations participants provided for perceived misunderstanding. A systematic approach of iterative categorisation was used (Neale, 2016), involving (1) open coding of participant explanations, (2) inductive

sorting of codes into categories based on links between codes and (3) moving iteratively between data and coding framework to refine definitions into consistent and discrete categories. The unit of analysis included any meaningful segment of an utterance. FMs provided explanations for their ratings more frequently than PwAS (see Table 2), and thus, analysis focussed on the instances where participants did provide explanations and used the IPM scores to understand the magnitude of misunderstanding.

Results

RQ1: What misunderstandings occur in PwAS–FM relationships?

Table 3 presents average ratings from participants across all IPM topics. Wilcoxon matched-pairs signed-ranked tests with two-tailed significance were used to test for levels of significant perceived misunderstanding and actual misunderstandings. Results show that PwAS and FM perceived significant misunderstanding (PwAS: $Z=-5.770$, $p<0.001$; FM: $Z=-3.448$, $p=0.001$). The results also indicate that both PwAS and FM did not experience significant actual misunderstanding (PwAS: $Z=-0.378$, $p=0.706$; FM: $Z=-1.018$, $p=0.309$).

Table 4 reports Wilcoxon matched-pairs signed-ranked tests to examine in further detail the perceived misunderstanding and actual misunderstanding of participants according to IPM topics (see supplementary file, section C, for median scores). Table 4 shows significant perceived misunderstanding, with PwAS expecting lower scores for 'handling criticism' (Mdn. 2 vs 2), 'adapting routines' (Mdn. 1 vs 2), 'managing discussions' (Mdn. 2 vs 3), 'handling everyday tasks' (Mdn. 3 vs 3) and 'making decisions' (Mdn. 2 vs 3). This result shows that PwAS are able to predict ratings about themselves that disagree with their own self-ratings. Accordingly, PwAS actually misunderstand FM on only one topic, 'adapt routines' (Mdn. 1 vs 3).

Significant perceived misunderstanding across five topics is also shown by FM, although both high and low ratings were recorded. For 'sympathy' (Mdn. 4 vs 4), 'body language' (Mdn. 4 vs 5) and 'consequences of actions' (Mdn. 3 vs 4), FM perceived that they would be rated lower by PwAS than they had rated themselves. However, for 'small talk' (Mdn. 4 vs 4) and 'organisation' (Mdn. 4 vs 4), FM perceived that they would be rated higher by PwAS than they had rated for themselves.

Table 3. Do participants experience significant perceived misunderstanding and actual misunderstanding?

Group (N)	Average scores for rating target			Do participants perceive significant misunderstanding? ^a		Do participants experience significant actual misunderstanding? ^b	
	Self	Other	Meta	Z	Sig.	Z	Sig.
PwAS (21)	2.75	3.87	2.30	-5.770	< 0.001	-0.378	0.706
FM (20)	4.06	2.29	3.80	-3.448	0.001	-1.018	0.309

PwAS: People with Asperger's syndrome; FM: family member.

^aCalculated by comparing difference between rating of Self and predicted rating of Self by Other.

^bCalculated by comparing difference between predicted rating of Self by Other and actual rating by Other.

Table 4. Perceived misunderstanding and actual misunderstandings.

	Do PwAS perceive misunderstanding with FM about rating of PwAS?		Do FM perceive misunderstanding with PwAS about rating of FM?		Do PwAS misunderstand what FM thinks of PwAS?		Do FM misunderstand what PwAS thinks of FM?	
	Z	Sig.	Z	Sig.	Z	Sig.	Z	Sig.
Handle criticism	-2.266	0.023*	-1.687	0.092	-1.058	0.29	-2.854	0.004*
Adapt routines	-2.294	0.022*	-1.781	0.075	-2.459	0.014*	-0.992	0.321
Sympathy	-1.252	0.21	-2.215	0.027*	-0.884	0.377	-1.308	0.191
Small talk	-0.855	0.392	-2.047	0.041*	-0.912	0.362	-1.267	0.205
Body language	-1.299	0.194	-3.337	0.001*	-1.661	0.097	-1.356	0.175
Manage discussion	-2.623	0.009*	-1.895	0.058	-0.079	0.937	-1.175	0.24
Handle everyday tasks	-2.230	0.026*	-1.000	0.317	-0.022	0.982	-1.730	0.084
Make decisions (on own)	-2.430	0.015*	-0.758	0.448	-1.001	0.317	-0.263	0.793
Visit new places	-1.107	0.268	-0.265	0.791	-1.132	0.257	-1.713	0.087
Consequences of actions	-1.604	0.109	-2.273	0.023*	-1.767	0.077	-2.048	0.041*
Organisation	-1.363	0.173	-2.179	0.029*	-1.059	0.289	-0.254	0.799
Five-year view	-0.486	0.627	-0.032	0.974	-1.221	0.222	-0.497	0.619

PwAS: People with Asperger's syndrome; FM: family member.

Asterisk (*) indicates statistically significant disagreement ($p < 0.05$).

Overall, these data show that misunderstandings occur on both sides of the relationship, and that perceived misunderstanding is more widespread than actual misunderstanding. PwAS correctly anticipated that their FMs would rate them lower in many regards, despite disagreeing with such views (i.e. rating themselves higher). This provides evidence of sophisticated perspective-taking, which researchers and FMs often assume is significantly compromised in individuals with AS (Sofronoff et al., 2014; Turowetz, 2015). PwAS represent themselves from the viewpoint of FM more negatively, which aligns with reports from people with autism about being misunderstood by others (Cederlund et al., 2010; McGeer, 2004). FM also perceived misunderstanding and rated PwAS lower than PwAS rated themselves, which is consistent with parent rating behaviour in other studies (Cederlund et al., 2010; Koning and Magill-Evans, 2001).

RQ2: What reasons do participants give for perceived misunderstanding?

Systematic coding of transcripts revealed perceived misunderstanding due to reasons associated with Other (two

subcategories) and Self. Table 5 provides definitions of the categories with accompanying examples, and Table 6 shows the coverage of categories across the participant sample.

The diagnosis of AS was rarely mentioned by participants, perhaps to protect the positive identity of those diagnosed, or perhaps because it was so central to the relationships studied and the purpose for taking part in research it was deemed superfluous. However, representations do not need to be explicitly named in order to be used; rather, their use is evident in their effects (Moscovici, 2007). In this case, the differences in perceiving misunderstanding because of Self and Other evident in Table 6 show the representation of Asperger's in use.

Table 6 highlights two ways of representing the Other. The first, 'partial impairment in perspective-taking', is two-sided as both PwAS and FM use this representation. The tendency to view others as biased in their social inferences is a common feature of interpersonal perception (Kruger and Gilovich, 1999; Pronin et al., 2002). In the PwAS-FM relationships studied, it was more frequently used by FM (95%) than PwAS (48%) which reflects the view of people with autism being impaired in the

Table 5. Categorisation of reasons provided by participants for perceived misunderstanding in the IPM.

Category	Subcategory	Definition	Illustrative Excerpts
The belief that the Other causes misunderstandings	Partial impairment in perspective-taking	Explanations which focus on narrow/restricted social understanding and perception.	FM7: He's quite confident talking to new people. But then it does go to him talking at people. because that's Asperger's that's what they are like. FM13: [...] If I'm crying then he knows he has upset me but he doesn't feel the connection. AS18 [...] but she'll just think 'well you're doing it in a different way than I would do it, so you're doing it wrong, and I've got to sort that out'. AS14: I guess I think she sees me as being more attached to comfort zones than I necessarily am.
	Extreme impairment in perspective-taking	Explanations which focus on a complete barrier in introspection or perspective-taking with others.	FM12: He is totally dominated by himself really. FM8: I don't think it will enter his head that I particularly think about the future. FM20: [...] if he is having one of his meltdowns he doesn't even think about the consequences of his actions. It's just the here and now for that. FM19: I don't think he has any idea what body language is so it probably doesn't mean anything. AS: No Cases
The belief that the Self causes misunderstandings		Explanations where participants claim it is hard to read or imagine Others' thoughts, or that the Self obscures being easily read by Others.	FM21: [...] there are some scenarios where I don't understand why she gets in a flap about things. FM2: Well, I don't think he thinks I get him. And I possibly don't get him. But I'm trying to. AS4: It's hard to think. She doesn't [...] it's very difficult rating her. AS9: I'm trying to remember back over times when she does. I would say she does but sometimes I am just unreadable to her apparently.

IPM: Interpersonal Perception Method.

Table 6. Perceived causes of misunderstanding.

	PwAS (n = 21)		FM (n = 20)	
	No. of references	Percentage of participants	No. of references	Percentage of participants
1. Other a cause of misunderstanding	23	48	90	95
1.1 Partial impairment in perspective-taking	23	48	65	95
1.2 Extreme impairment in perspective-taking	0	0	25	75
2. Self a cause of misunderstanding	20	62	14	40

intersubjective understanding of others (Smukler, 2005; Solomon, 2015). However, it should be noted that PwAS perceived that they would not be fully understood by FM, which compares with reports from PwAS who feel their condition masks their true feelings towards FMs (Carrington and Graham, 2001).

Cases where participants perceived the Other to have an 'extreme impairment in perspective-taking' (i.e. claims that the Other is unable to introspect or imagine other minds) were one-sided as they were only used by FM to describe PwAS.

This reveals how the representation of Asperger's, in use by FM, licensed a more extreme dismissing of the perspective-taking abilities of the participants with AS. However, the data show that although participants with AS were less likely to provide reasons for perceived misunderstandings, most were able to reflect on Self and Other in the IPM.

Example 1 illustrates how the tendency for FM to use an 'extreme impairment' explanation, coupled with more nuanced social awareness of PwAS, sets up an actual misunderstanding:

Example 1: Rating 'consequences of actions'.

FM9, estimating Other's rating. (FM9 predicts AS9 will rate her = 1; AS9 rates FM9 = 4).

- 103 BH: [How often] does he think you think about the consequences of your actions?
 104 FM9: To be honest I don't think he has thought about his own consequences.
 105 I'll go for one on that because I don't think he will have ever thought about it to
 106 be honest.
 107 BH: So he won't=
 108 FM9: =He won't think about me he only thinks about himself really.

FM9 answers the IPM question (line 103) by representing AS9 as someone who experiences a complete absence of meta-representation (line 104/108). FM9 expects to receive a low rating from AS9 (= 1), because his difficulty in appropriately perceiving Self will result in an absent ability to perceive Other (lines 104–106). Yet FM9 overestimates the extent of impairment of AS9, given the rating actually provided by AS9 (=4) and his subsequent explanation:

Example 2: Rating 'consequences of actions'.

AS9, rating Self.

- 9 BH: Ok. How often do you think about the consequences of your actions?
 10 AS9: I think in the middle of the road. Sometimes I do things without thinking
 11 and a lot of times there has been trouble. [participant rates 3]

AS9, rating FM9.

- 96 BH: How often does she [FM9] think about the consequences of her actions?
 97 AS9: I think she knows that she is really good at thinking what will happen if
 98 something is taken out of context. She makes sure people understand her in
 99 the way that she wants to be understood. If there was something wrong she
 100 probably wouldn't say it out [a]loud to their face. [participant rates 4]

Although AS9 confirms FM9's expectation that 'consequences of actions' are a source of difficulty for him (line 11), it is not to the extent that it prevents him from appreciating the same skill in other people. AS9 articulates a clear difference between experiencing the challenges of 'consequences of actions' and observing 'consequences of actions' in FM9. He is not anchored egocentrically in the way FM9 predicts but rather shows a much more nuanced and detailed understanding of how 'consequences of

actions' apply differently to Self and Other, coupled with an awareness of how FM9's thoughts and intentions are shaped by different situations (line 97–100).

Examples 1 and 2 therefore highlight an actual misunderstanding where FM9 overestimates the social impairments of AS9. The origins of overestimation may be both interpersonal and cultural. Parents of children with AS report levels of elevated stress (Epstein et al., 2008) and are more likely to underestimate the social skills of adolescents with autism compared with neurotypical parents (Kuo et al., 2011). Frustration with past misunderstandings may explain why FM over-estimate the extent of impairment in perspective-taking of PwAS. However, other FM who used an extreme view of impairment to describe PwAS connected it explicitly to the expectations the diagnosis of AS sets up:

Example 3: Rating 'Managing discussions'.

FM14, rating AS14 (FM14 predicts AS14 will rate her = 3; AS14 rates FM14 = 4).

- 83 FM14: [...] Like the small talk thing he probably wouldn't notice because
 84 he's not that good at it himself so he wouldn't see that in somebody else.
 85 Whereas I know I am actually not that good.
 86 BH: So you're anticipating a sort of misunderstanding about that in a way?
 87 FM14 Yea because of his autism [...] yea.

Example 3 highlights how FM14 perceives misunderstanding based on normative expectations about an autism diagnosis involving an inability to understand others (line 87). Such expectations may adversely affect interpersonal perspective-taking because it prevents FMs from seeking out further explanations for why misunderstandings occur, leading to the nuanced social ability of PwAS being overlooked. Although one FM claimed 'the more I learn about Asperger's the more I can understand AS17' which she reported led to increased patience and the ability to 'respond differently', Example 3 shows that the diagnosis can also have negative effects, reinforcing low expectations about PwAS.

FM under-estimating PwAS was acknowledged by FM4 as a problem, 'He came to me the other day and said "You've been doing really well mum", and I thought "Oh God"'. So sometimes there is a lot more going on than you think there is'. In the absence of normative social feedback, FM may have to resort to using culturally based assumptions about PwAS to interpret their behaviour. This perhaps explains why so many FMs used representations of perspective-taking impairment to describe PwAS (see Table 5). Perceptions of extreme perspective-taking impairment may be a simplification of the cognitive view on autism (McGeer, 2004; Sarrett, 2011), which theorises that perspective-taking difficulties originate from a

defective capacity to represent other minds (Boucher, 2012). Here, we are not dealing with whether some approaches to autism and Asperger's over-emphasise immutable cognitive variables (see McGeer, 2004; Sarrett, 2011), but rather with the way in which these cognitive theories become popular representations, used by PwAS and their FM. These representations loop back into perspective-taking by potentially cutting short peoples' efforts to serially adjust from their own perspective to more adequately approximate the perspectives of PwAS.

Overall, the explanations for misunderstanding provided by participants showed a strong tendency to focus on the limitations of PwAS, with many FMs perceiving an extreme impairment in social understanding. While this is congruent with the characterisation of people with autism as having a lack of self-awareness and a complete inability to understand others (Sarrett, 2011), such beliefs prevent FM from considering the more nuanced aspects of PwAS behaviour. Evidence for this is shown by some of the detailed explanations provided by PwAS, which demonstrate the capability to imagine the subjectivity of others across different contexts, despite FM broadly claiming that this would not be possible. PwAS also showed a greater propensity to reflect on Self as the possible cause of misunderstanding much more than FM (62% vs 40%). Thus, although, PwAS provided less detailed and less frequent explanations of misunderstandings, comparing with findings from other interview data (Capps et al., 1998), they are not as limited as FM assume in their ratings and explanations.

General discussion

We used an adapted version of the IPM (Laing et al., 1966) designed for exploring interpersonal relations, to examine two-sided misunderstandings in PwAS-FM relations. This research makes empirical and methodological contributions.

The quantitative finding showed that PwAS correctly anticipated that their FMs would rate them lower in many regards, despite the fact that they disagree with their view (i.e. rating themselves higher). This was further supported by the qualitative finding where, in some cases, PwAS were able to imagine that FM would rate PwAS poorly, often overgeneralising the extent of their social limitations. The finding extends research showing that PwAS are able to recognise and see the problems inherent in their own diagnosis of AS (Cederlund et al., 2010) by highlighting the unrealised potential for PwAS to also take the perspective of others.

The finding also furthers the discussion about theory of mind in people with Asperger's (Peterson et al., 2009), because PwAS were able to accurately predict FM ratings but showed a much lower tendency to articulate the reasons for such scores to the researcher (i.e. there is perspective-taking but less perspective-sharing). Clearly, PwAS

have theories about the minds of their FMs, but articulating this to a researcher outside of the family context presents more of a challenge. This highlights why there may be a validity gap between laboratory and naturalistic assessments of the ability to take perspective (Verhoeff, 2015), namely, because theory of mind experiments focus on imputing mental states (i.e. perspective-taking) not on communicating and displaying one's own perspective (i.e. perspective-sharing).

The IPM also shows that making oneself readable to others may not be straightforward for PwAS. Perceptions of extreme perspective-taking impairment used by FM act as a confirmatory bias (Nickerson, 1998), preventing FM from probing further about the causes of interpersonal misunderstanding as evidence is interpreted in a way that is partial to their existing beliefs. Thus, these representations loop back (Hacking, 2009) into the phenomena they purport to describe, potentially leading to the more nuanced behaviour of PwAS being overlooked.

The two-sided nature of misunderstandings evident in PwAS-FM relationships highlights the importance of how we design concepts and apply them to people. Parent interviews and questionnaires play an integral role in evaluating whether or not their children have sufficient problems to warrant a diagnosis of AS, and previous studies have shown a disparity between the perspectives of PwAS and parents (Cederlund et al., 2010). Our data highlight the need to place such perspectives on equal footing because misunderstandings can be two-sided, and reports from people with AS have social validity, despite their diagnosis. In addition, diagnoses extend beyond improving access to support and services (Kite et al., 2013), to impact identity in both positive (Chell, 2006; Parsloe, 2015) and negative ways (Broderick and Ne'eman, 2008; Sarrett, 2011; Smukler, 2005) within social relationships (Powell and Acker, 2016). Our study provides evidence about how the representation of AS loops back to operate at the interpersonal level, shaping how relations are perceived and managed by framing normative expectations about perspective-taking, specifically for FM. Knowledge about diagnoses can act as a turning point in the parents' journey of understanding their children (Robinson et al., 2015). It therefore follows that the findings of this article, specifically that FMs over-estimate the impairment of PwAS and that this is supported by their representations of AS, can itself be relayed back to parents at the point of diagnosis to mitigate the impact of confirmatory biases.

In addition to empirical contributions, the two-sided IPM methodology contributes to the methodological toolkit for understanding PwAS for three reasons. First, it situates social understanding within significant and familiar social relations, enabling researchers to overcome the validity gap between abstract assessments and real-world phenomena (Verhoeff, 2015) and to study the production and circulation of knowledge about autism in family

settings (Solomon, 2010). Second, it places PwAS and FM on an equal footing, avoiding the risk of reinforcing expectation about misunderstandings originating from PwAS (Turowetz, 2015). Finally, this two-sided methodology is a form of targeted ethnography that allows the origins of misunderstandings to be identified and to be potentially used to develop interventions.

Limitations

Most relationships involved mother–son relationships, and thus the findings may not account for gender differences when parenting children with autism (Jones et al., 2013), such as daughters who are sometimes perceived to have greater impairments as a result of higher parental expectations (Holtmann et al., 2007; McLennan et al., 1993). Likewise, girls with AS have a different behavioural phenotype to boys (Rivet and Matson, 2011) with greater language and social skills (Kopp and Gillberg, 1992) which can mask their condition and impact the ratings provided in the IPM. Participants were also recruited via a charity, and thus, the sample reflects the population of PwAS who were willing to take part in research and also had FMs who were accessible. Not captured within the data are PwAS–FM relationships where misunderstandings have become so severe that the relationships have broken down. Also, FM could possess traits of AS (Nydén et al., 2011) which would potentially impact their ability to perceive misunderstanding. Resource constraints prevented assessments of FM, although any potential traits were not significant enough to prevent parents from living independent lives and finding employment.

The study assessed topics related to social skill; however, interpersonal relations involve perspective-taking about other phenomena, such as likes/dislikes and political views. PwAS also exhibit better social skills when social cues are made explicit (Senju et al., 2009), and thus, the semi-structured interview style of the IPM may not capture the full complexity of everyday misunderstandings that PwAS experience. Since misunderstandings are interactionally achieved, rather than purely cognitive mistakes, analysing real-life interactions between PwAS and FM would yield important further insights about how misunderstandings are negotiated and integrated into shared understanding.

The two-sided methodology used here has potential to be used, and adapted, alongside existing measures of AS in order to develop a more holistic understanding of (1) the origins of misunderstanding in relationships involving PwAS and (2) how an AS diagnosis impacts misunderstandings within these social relations.

Conclusion

The empirical contribution of the study has shown that people with Asperger's are able to predict lower scores

from FMs, despite disagreeing with their view, and that FMs often over-estimate the extent to which relatives with AS are egocentrically anchored in their own perspective. The methodological contribution of the study demonstrates that a two-sided methodology is viable and can be used to identify social processes that both support and hinder social understanding within relationships affected by a diagnosis of AS.

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6) NEURODIVERGENT INTERSUBJECTIVITY

Neurodivergent intersubjectivity: Distinctive features of how autistic people create shared understanding

Brett Heasman  and Alex Gillespie

Autism
1–12
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Abstract

Autistic people are neurologically divergent, yet approaches to studying autism are framed by neurotypical definitions of being social. Using the concept of intersubjectivity, which conceptualises a variety of ways of socially relating, we investigate distinctive features of how autistic people build social understanding. A total of 30 members of a charity supporting adults with autism were video-recorded during a social activity they enjoyed, namely collaborative video gaming. Mapping the coherence, affect and symmetry of each conversational turn revealed shifting patterns of intersubjectivity within each interaction. Focussing on clusters of consistent and fragmented turns led us to identify two features of neurodivergent intersubjectivity: a generous assumption of common ground that, when understood, led to rapid rapport, and, when not understood, resulted in potentially disruptive utterances; and a low demand for coordination that ameliorated many challenges associated with disruptive turns. Our findings suggest that neurodivergent intersubjectivity reveals potential for unconventional forms of social relating and that a within-interaction analysis is a viable methodology for exploring neurodivergent communication. Future research should examine the varieties of neurodivergent intersubjectivity, with associated problems and potentials, and how those forms of intersubjectivity can be enabled to flourish, particularly in autistic-to-neurotypical encounters.

Keywords

double empathy, friendships, intersubjectivity, neurodivergence, neurodiversity, norms, qualitative research, social interaction, video gaming, within-interaction variation

Introduction

Autistic people are neurologically divergent, yet methods for investigating autistic sociality tend to assume neurotypical definitions of being social. Comparative design often results in autistic behaviour being interpreted as a deficit, rather than a difference, from neurotypical benchmarks (Kapp et al., 2013). Likewise, ethnographic research focuses heavily on autistic-to-neurotypical interactions which take place against the cultural backdrop of neurotypical norms and expectations (Heasman and Gillespie, 2017; Kremer-Sadlik, 2004; Ochs, 2015). Thus a methodological and empirical gap exists in understanding how autistic people relate to one another socially outside of conventionalised norms, which is important given reports from autistic people on how it is easier to relate to other autistic individuals precisely because of an absence of social protocol (Chown, 2014; Dekker, 1999).

We investigate interactions between 30 members of a charity supporting young autistic adults to identify the

features of neurodivergent intersubjectivity evident in naturally occurring activities. Intersubjectivity was selected as an analytical framework, since it is suited to investigating diverse forms of socially relating, as evident in how autistic people relate to each other (Dant, 2015; De Jaegher et al., 2017; Samaritter and Payne, 2013). Using a systematic framework for identifying the shifting patterns of intersubjectivity in each interaction, we sought to map within-interaction variability and examine the features of such interactions.

Department of Psychological and Behavioural Science, London School of Economics and Political Science, London, UK

Corresponding author:

Brett Heasman, Department of Psychological and Behavioural Science, London School of Economics and Political Science, Queens House, Houghton Street, London WC2A 2AE, UK.
Email: b.l.heasman@lse.ac.uk

Intersubjectivity, neurodivergence and autism

Intersubjectivity is the process whereby people come together to create understanding (Gillespie and Cornish, 2010). Building intersubjectivity depends on the social situations, groups, norms and cultures encountered and the creative ways in which people play with imagined perspectives and cultural resources in their everyday sense-making (Gillespie and Zittoun, 2010). Intersubjectivity differs from coordination, in that coordination focuses on consensus, whereas intersubjectivity characterises the diversity of ways people create shared understanding. For example, an interlocutor may share information that is not reciprocated or acknowledged by another interlocutor in the next conversational turn. This may be deemed a failure to coordinate but equally count as a moment of intersubjectivity because it is an attempt to bridge ‘subjectivities’, an act which may be reciprocated, or become useful, at a later stage of the interaction. Thus when examining interactions, it is important to explore how interlocutors create possibilities for coordination, even if it is not consistently reciprocated immediately or if the process by which it is achieved is non-conventional.

Studies of intersubjectivity in autism have been primarily based on autistic-to-neurotypical interactions. These have highlighted difficulties such as shared intentionality (Tomasello et al., 2005) and reciprocating non-verbal cues (García-Pérez et al., 2007; Hobson and Lee, 1998). However, autistic divergence from the neurotypical norm for interacting (i.e. neurodivergent behaviour) can result in a gap in mutual understanding which makes empathy (Milton, 2012), perspective-taking (Heasman and Gillespie, 2017; Sheppard et al., 2016), and social perception (Sasson et al., 2017; Sasson and Morrison, 2017) difficult for both parties. This two-way misunderstanding has been termed the ‘double empathy problem’ (Milton, 2012), and it highlights the dangers of interpreting neurodivergent behaviour on neurotypical terms. Moreover, autistic interactions may be optimised differently across situations and groups (Bottema-Beutel, 2017; Ochs et al., 2004; Ochs and Solomon, 2010). Thus, although autistic people experience lifelong difficulties in social interaction, different contextual features of interactions can help to extend or limit possibilities for intersubjectivity, and such features need to be understood on their own terms outside of the application of normative criteria.

Autism and video games

The aim of our study is to understand the features of neurodivergent intersubjectivity that sustain autistic-to-autistic interactions when shared experience, background knowledge and norms are arguably optimal. Accordingly, we recorded video game interactions between co-present autistic members of a charity supporting autistic adults

because this was the most popular social activity in the charity and was thus suited to studying neurodivergent intersubjectivity on its own terms. Our overarching question is: what are the features of neurodivergent intersubjectivity observed in autistic-to-autistic interactions during collaborative video gaming?

Video games are popular among autistic people in general (Kuo et al., 2014; Mazurek et al., 2015) and among our participants specifically. Video games encourage active participation in the achievement of goals, and can be played across a variety of devices including dedicated consoles, computers and mobile phones. Video games, like all games, have a social basis (Gillespie et al., 2018); with sociality varying according to game format (e.g. single player versus multiplayer), game content (abstract puzzles versus virtual characters/terrains) and the context in which the games take place (solitary gaming versus collaborative public gaming) (Gentile, 2011). Our study involved players collaborating together on predominantly multiplayer games involving virtual social worlds and characters and thus entailed a highly social environment.

Approach of the study

Intersubjectivity covers the variety of ways of socially relating to another. For example, it could take place across minds through language (Schegloff, 1992) and bodies through action (Hobson and Lee, 1998); it can also be contextually shaped by the types of activity undertaken (Linell, 2009) and occur across different timescales (De Jaegher et al., 2013). For the purposes of this study, we operationalised intersubjectivity by focussing on observable coordination in language. We reviewed existing interactional frameworks to identify the observable properties of intersubjectivity. Since such frameworks have been based on neurotypical interactions, our challenge was to mitigate the impact of applying normative criteria to our data. To achieve this, we avoided prescriptive categories (e.g. good or bad behaviour) in favour of descriptive categories which described a within-interaction change in dynamic. For example, our review identified three core aspects of intersubjectivity: (1) coherence (Linell et al., 1988; Roter and Larson, 2002) which describes the logical alignment from one conversational turn to the next, (2) affect (Bales, 1999; Nelson et al., 2016; Roter and Larson, 2002) which describes the emotional harmony between turns and (3) symmetry, which describes the alignment of conversational turns in terms of assertiveness/submissiveness (Angus et al., 2012; Bales, 1999; Linell et al., 1988).

Our study proceeded systematically through two steps. First, we mapped out the temporal shifts in intersubjectivity within each interaction to identify sequences that are either consistent or fragmented in terms of coherence, reciprocation of affect and symmetry. Second, we analysed these sequences qualitatively to explore how social

coordination is achieved, which led us to identify two features of neurodivergent intersubjectivity.

Method

Participants

Observation took place at a charity supporting adults with autism. Available activities included music, strategy games, art, pool, Lego and, the most popular, video games. All 30 participants were members of the charity, had either a confirmed diagnosis of autism ($n = 24$) or had been referred for assessment by a medical professional ($n = 6$) and had no history of significant verbal comprehension or intellectual challenges. Inclusion criteria was broad due to challenges associated with consistent diagnosis (Liptak et al., 2008; Turowetz, 2015) and extensive delay in assessment (+2 years in local area), thus participants referred for assessment by a medical professional, but still awaiting diagnosis, were included. Our sample included a gender bias towards males (25:5) with a mean age of 23.6 (range: 16–34) years.

Materials

The study used a dedicated room with an Xbox One games console, two controllers and a large LCD TV screen. Current popular games in the UK chart were made available to the participants: *Assassin's Creed: Syndicate* (1-player), *Call of Duty: Advanced Warfare* (2-player), *Halo* (2-player), *FIFA 14* (2-player), *Forza Motorsport 5* (2-player), *GTA V* (1-player) and *Lego Batman 2* (2-player). For single-player games, two participants took it in turns to control the avatar, the decision of which occurred naturally without intervention from the researcher. In such cases the other player provided advice and commentary in periods without the controller. Two cameras captured (1) the participants' activity and (2) the video screen. All interactions were fully transcribed (see Supplementary file 1 for transcription notation).

Procedure

Ethical approval was granted by the researchers' university and the charity where the research was conducted. Participants were made aware of the nature of the observation, why it was taking place and how the data would be stored, anonymised and analysed. Details of the observation were sign-posted at the entrance to the room with charity staff and the researcher available to answer questions. Prior to each video-recorded interaction, the researcher ensured participants understood the video-recording and consent criteria and made their right to withdraw at any time clear. Initially some participants were curious during the explanation of the study 'about social

interactions', and discussed the recording equipment while games were loading, which could potentially result in altered behaviour through increased self-consciousness. However, all participants quickly became absorbed by the activity of gaming, and their attention very rarely returned to the recording equipment, shown by their lack of verbal reference or visual attention (i.e. looking at the equipment).

In total, 20 sessions were recorded involving 30 participants, with 10 participants taking part in more than one session (Table 1). No session involved a duplicated set of participants. The researcher was present in the interactions to assist with any equipment issues and contributed to the conversation at the beginning (during set-up) and at the end (concluding the session). The researcher was available to answer questions when prompted by participants and was seated adjacent to both the gamers and the TV screen out of the gamers' line of sight.

Process of analysis

To analyse the transcript, we operationalised a conversational turn as the period from which a speaker initiates an utterance to when the utterance concludes and another speaker assumes control (Sandvik et al., 2002). To understand broad patterns of within-interaction variability, each turn was scored, on the three dimensions of intersubjectivity, on a scale of -1 showing fragmentation with prior turn, to $+1$ showing alignment (in cases of affect, harmony) with prior turn. A score of 0 represented turns that were ambiguous, unclear, or failed to meet any explicit criteria for coherence, affect or symmetry (see Supplementary file 2).

We operationalised the three dimensions in the following way to understand within-interaction variability. Coherence focussed on topicality and was scored in terms of how a turn is part of the sequential organisation of interaction. For example, question and answer sequences (known as adjacency pairs) would have the answer turn scored as $+1$ (thus showing it is in alignment with the prior turn), whereas interrupting to change topic would result in a turn scored as -1 (in misalignment with the prior turn).

Affect focussed on emotion displayed. Since we were examining only observable displays of affect, many turns were ambiguous to rate (resulting in a 0 score), thus computing alignment between turns would result in a disproportionately high score, (i.e. consecutive zeros would count as strong alignment). We therefore operationalised affect in terms of emotional harmony to understand within-interaction variability. Criteria for scoring affect was very conservative, including only clearly positive and clearly negative turns (e.g. laughing, complimenting = positive (+) 1 scores; criticising, complaining = negative (-1) scores).

Table 1. Summary of interactions and games played.

Interaction	Players	Game format	Game content	Duration (min)	Words	Words per minute	Turns
1	4	2-player	Lego Batman	26	3043	117.04	302
2	2	1-player	Assassin's Creed	58	4790	82.59	454
3	2	2-player	Halo	58	5665	97.67	704
4	4	2-player	Call of Duty/Forza	48	5350	111.46	427
5	3	1-player	GTA	27	3783	140.11	348
6	2	1/2-player	GTA/Call of Duty	57	6545	114.82	797
7	3	2-player	Forza	34	1911	56.21	205
8	2	2-player	Forza/Lego Batman	18	659	36.61	68
9	2	2-player	Call of Duty	35	4392	125.49	300
10	2	2-player	FIFA	51	3327	65.24	342
11	2	2-player	Forza	54	1997	36.98	231
12	2	2-player	Call of Duty	35	3429	97.97	301
13	4	2-player	FIFA	38	1735	45.66	193
14	4	2-player	Call of Duty	33	3018	91.45	286
15	2	2-player	Call of Duty	30	2207	73.57	110
16	2	2-player	FIFA	26	1402	53.92	135
17	5	1-player	Assassin's Creed	32	3460	108.13	258
18	2	1-player	Assassin's Creed	33	4465	135.30	315
19	2	1-player	Assassin's Creed	54	4544	84.15	255
20	4	2-player	Lego Batman	20	3098	154.90	335
Total				767	68,820		6366
Average				38.35	3441	91.46	318.3

Finally, symmetry focussed on how assertive/submissive a turn was relative to the prior turn. Since evident in every turn, symmetry was operationalised similarly to coherence, thus if both speakers were quiet, or both ebullient, there was symmetry in terms of +1 scores.

Inter-rater tests were conducted with an autistic adult with a confirmed diagnosis of Asperger's syndrome. Two raters (who were not participants) were first shown the application of the rating framework to a transcript, with the researcher answering questions. One rater discontinued because they stated they were bored with the task and did not provide any feedback about the framework. A second rater enjoyed the task and provided feedback about the framework. The main discussion points were how to rate very short turns which may be shaped by the prior context. For example, "OK", could be scored high for coherence (+1) if the prior turn is an instruction (e.g. "we will restart") or scored as ambiguous (0) if the prior turn is an open question (e.g. "What track should we race on?") or scored as fragmented (-1) if spoken to interrupt the prior speaker and change topic. In two separate sessions, the rater randomly selected two transcripts to rate, completing 316 turns.

To make the interactions of comparable length, we analysed all interactions up to the 300th turn and, after rating all turns, researcher turns were removed from the analysis, thus capturing how autistic participants responded to any interactions with the researcher but preventing the researcher from influencing scores.

To build an overview of the data sample and understand how interactions compared with each other, turns were categorised as consistent (involving +1 with no -1 scores), fragmented (involving -1 with no +1 scores) and mixed (involving +1 and -1 scores, as well as ambiguous turns involving only 0 scores). Clusters of three consecutive turn types highlighted areas for in-depth analysis, since three turns is the minimum unit for co-constructing knowledge (Schegloff, 1992).

To understand within-interaction variability, we mapped interactions longitudinally using line graphs and the ratings given for each intersubjective dimension. Initially, this results in a noisy graph; therefore, to smooth out noise and identify the trends, we took a moving average of each intersubjective score. Averages of ratings for conversational turns have been used in interaction frameworks before to benchmark performance between interactions (Linell et al., 1988). We used a moving average to facilitate our goal of understanding within-interaction variability. Through trial and error, we found that a 20-turn moving average provided an optimal resolution for identifying overarching peaks and troughs in intersubjectivity.

Qualitative analysis proceeded by comparing consistent and fragmented clusters of dialogue with intersubjective scores to identify 'enabling' moments, (i.e. an observable increase in subsequent turns of one of the three dimensions of intersubjectivity (coherence, affect or symmetry)). An abductive process (Tavory and Timmermans, 2014) involved iteratively exploring (Neale, 2016) the intersubjective features

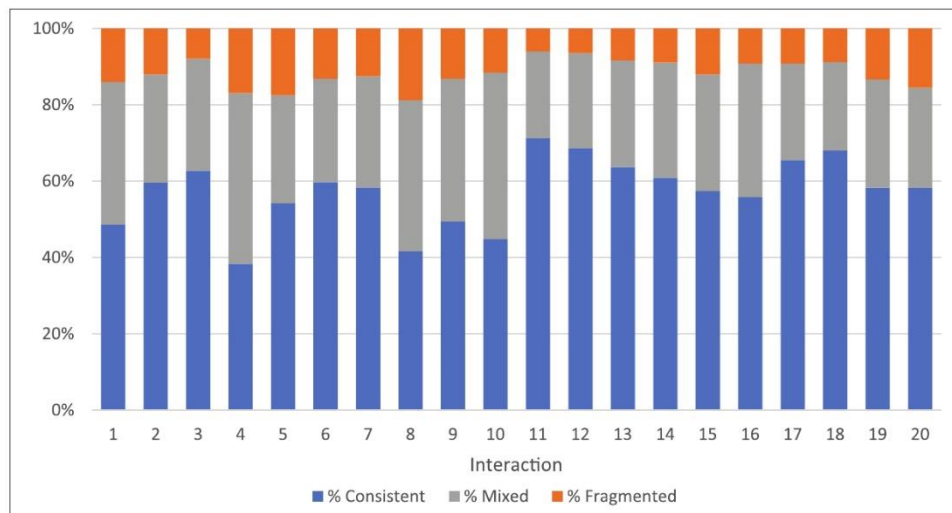


Figure 1. Percentage of interaction involving consistent and fragmented coordination turns.

that could help to explain within-interaction variability, with clusters expanded to include relevant context. Abductive processes involve an interpretive step guided by the surprising phenomenon observed and the explanatory scope of subsequent hypotheses generated about the data.

Results

Mapping dimensions of intersubjectivity

Inter-rater reliability analysis using Cohen's Kappa for each intersubjective dimension yielded moderate to high levels of reliability (coherence = 0.592 ($p < 0.001$), 95% confidence interval (CI) = 0.512–0.672; affect = 0.786 ($p < 0.001$), 95% CI = 0.708–0.864; symmetry = 0.583 ($p < 0.001$), 95% CI = 0.497–0.669). Across interactions, there was a relatively stable pattern in terms of overall percentage of turns that were either consistent (mean = 57%) or fragmented (mean = 12%) with the prior turn (See Figure 1). All dyads successfully coordinated during gameplay; but one dyad had an argument (interaction 4) and another had a lack of communicative responsiveness (interaction 8).

Mean scores of dimensions of intersubjectivity showed variation within interactions (see Table 3 standard deviations, in Supplementary file 3). Scores were based on 20-turn moving averages, thus a mean score of +1 would indicate that dyads were in perfect alignment, and a mean score of -1 would indicate that they were in complete misalignment, over 20 turns. All dyads had 20 turns in which there was at least +0.4 alignment across intersubjective dimensions, and also 20 turns in which there was at most only +0.1 alignment across dimensions (see Table 4, in Supplementary file 3).

Autistic interactions have been characterised as overtly logical (Hermelin and O'Connor, 1985), but we also found displays of positive affect to be common (mean across interactions = +0.24, SD = 0.54), with laughter, encouragement and joking widespread (e.g. interaction 15). It was also possible for coordination to involve high symmetry (mean = +0.34, SD = 0.62) despite low coherence and affect (e.g. interaction 10), such as when players vented their frustration at their virtual avatars.

Sequential mapping of interactions (Figure 2) highlighted two key phenomena: (1) rapid shifting between consistent and fragmented moments and (2) divergence between intersubjective dimensions. For instance, in Figure 2, rapid changes in consistency reflected shifting interactional trajectories, for example prior to turn 60 symmetry is low as one player dominates dialogue but switches to being high when two new players enter the room and introduce themselves (turns 50–100), leading to tighter turn-taking (increasing coherence and symmetry) and politeness scripts (increasing affect). Likewise, turns 160–185 have high affect and symmetry but low coherence because both players are sharing stock phrases of characters from the *DC comics* universe, while turns 205–220 have high coherence and symmetry because players have mutually identified a cooperative in-game task but are criticising each other's efforts (hence low affect).

Mapping the dimensions of intersubjectivity raised questions, namely how do the interactions lead to rapid shifting between consistent and fragmented intersubjectivity and how is it that the three dimensions of intersubjectivity can diverge so sharply, such as when coherence is low, but affect and symmetry are high?

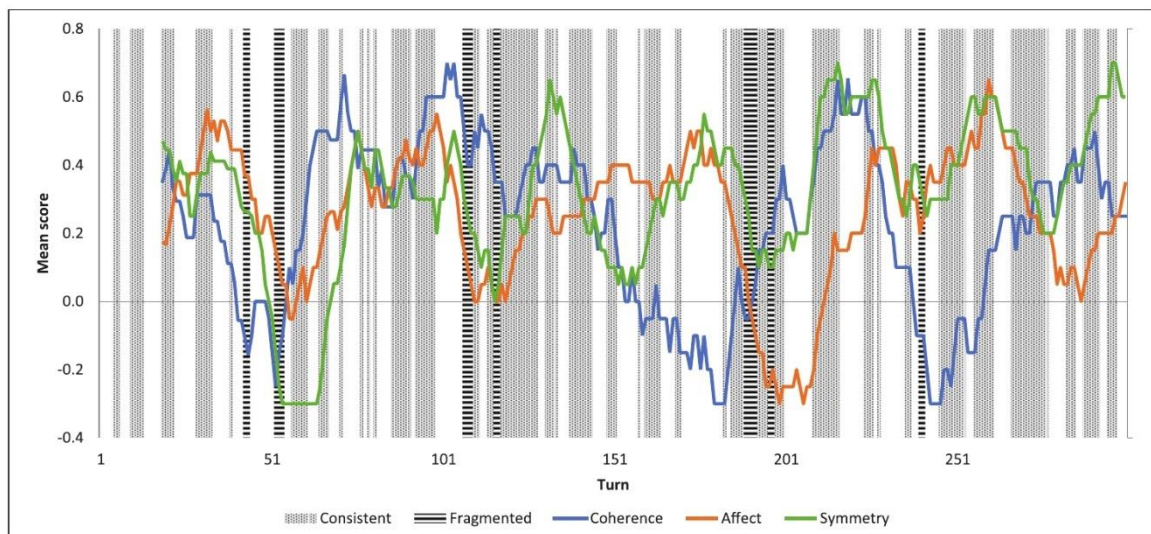


Figure 2. Example interaction, with 20-turn moving average of intersubjective dimensions and 3-turn clusters of consistent and fragmented moments.

Identifying features of neurodivergent intersubjectivity

To address questions of within-interaction variability, we analysed clusters of consistent and fragmented dialogue. An abductive process (Tavory and Timmermans, 2014) of comparing and contrasting different clusters explored features that explained patterns apparent in the data. Features explored included spontaneous voicing, self-directed speech, invitations for further speech and adjacency pairs responded/ignored. However, two features emerged as both potentially pervasive and consequential in explaining the patterns identified: (1) a generous assumption of common ground and (2) a low demand for coordination.

Generous assumption of common ground

The rapid shifting between consistent and fragmented turns across interactions was associated with moments where participants made generous assumptions of common ground. Autistic difficulties in maintaining interactional trajectory are well documented, including low use of cooperative signals (Capps et al., 1998) and seemingly egocentric orientated speech (Frith and De Vignemont, 2005). In our data, we had many comparable cases of sudden and specific topic shifts. This often manifested in moments where one player spontaneously adopted the voices of fictional characters without signalling their origin to the other player or following up to ensure mutual understanding (see Supplementary file 4). Such instances may result from the potential for language to be experiential, that is, the act of speaking and hearing words is a constituent part of experiencing an object (Sterponi et al.,

2014). Yet vocalising such perspectives assumes to some degree a level of common ground; when the voices related to characters in the game, they were more likely to be reciprocated (70%) than when they related to fictional characters beyond the immediate context (52%). In our data, sometimes, these generous assumptions of common ground could fragment coherence, but other times it could spark creative, productive and affective passages of dialogue:

Example 1.

Voicing leading to humour, interaction 02. Both participants with confirmed diagnosis. Change in 20-turn average score between turns 93–97, coherence = -0.15 , affect = $+0.20$ and symmetry = -0.15 .

- 93 Daniel: I need more knives because they are not knives ‘this is a kni:fe’ ((*Australian accent*))
- 94 Max: Ha ‘no that’s a spoon’ ‘Oh you’ve played knifey spoony before?’ ((*Australian accent*)) ←
- 95 Daniel: Yea I love that show ←
- 96 Max: ‘I like the choo choo’ ((*possible parody of a train spotter*))
- 97 Daniel: (5.0) Right I’ve got to get in here

In Example 1, Daniel and Max are playing *Assassin’s Creed*, and Daniel is trying to select an optimal weapon from his arsenal. He observes his current knife is inadequate, leading him to voice “this is a knife” (93), a cultural reference to the film *Crocodile Dundee* (Cornell, 1986), where the protagonist produces a large knife in response to

being robbed. Max recognises the reference shown by his laughter and then responds with two further voices 'no that's a spoon' 'Oh you've played knifey spoony before?' (94) which is dialogue from *The Simpsons* cartoon series (Oakley et al., 1995), where Bart goes to Australia and encounters a character parodying Crocodile Dundee. Max assumes Daniel will understand the nested cultural reference, which he does (95) by referring to a "show" and not a film. Thus, in this instance, the generous assumption of common ground produces highly coherent, affective and symmetric coordination – but without knowing the cultural references, it might appear fragmented. In the following line however, Max continues with another voice (96). Daniel ignores this turn, and instead refocuses their attention on the task in hand, highlighting the varied nature of coordinating through voices in the dialogue.

In Example 2, James and Bruce are playing *Call of Duty* when a new enemy appears, a spaceship with a powerful laser.

Example 2.

Shared language, interaction 09. Both participants with confirmed diagnosis. Change in 20-turn average score between turns 92–105, coherence = +0.30, affect = +0.35 and symmetry = 0.

- 92 James: Who the fuck is this?
 93 Bruce: ah ((*laughs*)) jumped into it
 94 James: 'THEY HAVE SUMMONED THE RED ←
 CIRCLE OF DOOM'
 95 Bruce: It's Tron (.) 'All hail Tron (.) A:h' ←
 96 James: 'Hail!'
 97 Bruce: You got to lay down and worship Tron (.)
 'A:h worship Tron'
 ...
 103 Bruce: Where the fuck are ya? oh you are there
 (1.0) fucking hell I think just being near
you was hurting me there (.) Oh no
 there's a =
 104 James: = It's Tron! ←
 105 Bruce: <Yea you wanna be back> (4.0) I was
 going to say it's probably best if you just
 come (.) down here and stand by this
 entrance down here since you are that big
 guy (.) 'cause you really need to (.) you
 need an open area to be fighting in

Example 2 highlights how James and Bruce create new shared language to index the ambiguous spaceship laser and the corresponding action to take. James' initial problematisation (92) is not responded to, as Bruce is distracted by damage to his avatar's health from jumping into the laser (93). James nonetheless adopts a dramatic narrator's voice in a second attempt to make sense of the threat (94). Bruce reciprocates, not coherently, but stylistically through a voice which indexes the *Tron* (Kushner and Lisberger, 1982) film franchise (95).

Turns 96 and 97 reciprocate understanding of the *Tron* reference as players parody worshipping *Tron* as a god. When the spaceship appears later (103), James identifies it using Bruce's original *Tron* reference, which prompts Bruce to provide advice based on his prior experience (105). Thus in playing with voices, players are able to develop shared language on the basis of their shared cultural resources which allows them to creatively index and orientate to novel problems.

Examples 1 and 2 illustrate how a generous assumption of common ground, such as by sharing very specific voices, can lead to rapid rapport, with very closely aligned intersubjectivity. However, in moments when a generous assumption of common ground does not work, it can create discoordination and appear egocentric.

Low demand for coordination

Research on autistic interactions has highlighted disconnect in terms of coherence (Tager-Flusberg and Anderson, 1991), pragmatics (Baltaxe, 1977; Volden, 1997) and detecting sociocultural cues (Kremer-Sadlik, 2004). In our data, there were many instances of small-scale misunderstandings resulting from ignored turns, parallel dialogue (independent conversation threads maintained over several turns) and misinterpretations (misreading the pragmatic/emotional context of the prior turn). However, these were not always problematic precisely because participants demonstrated a low coordination threshold and were able to move on quickly from disconnected and disruptive turns.

Example 3 illustrates an interaction between Billy (who is experienced at first-person shooter games) and Susan (who is less experienced) as they play *Call of Duty*. Billy is showing Susan the controls:

Example 3.

Misinterpreting prior turn, interaction 04. One participant with confirmed diagnosis, one participant awaiting assessment. Change in 20-turn average score between turns 37–49, coherence = +0.25, affect = +0.50, symmetry = +0.15.

- 37 Billy: So that's to shoot (.) e:r that's to: like
 jump (.) <you know like> ((*moves hand*
upwards)) (.) if you click that forward like
 (2.0) like that you go forward you click it
 side (.) jump you click it side you go (.)
 (*moves hand left and right and makes air*
movement sound) <swift swift swift>
 38 Susan: Oh right that sounds fair enough (.) easy. ←
 39 Billy: <all right> what was 'D'? What was to
 swap the gun? You see I have stopped
 playing these games (.) I think it's 'X'
 40 Susan: We will work it out
 41 Billy: Oh I guess so (.) Oh yea I was going ←
 to lie to you (.) 'THAT one's to shoot'
 ((*indicates an incorrect shooting button*
on the controller and smiles))

- 42 Susan: ((turns to look at Billy's controller and is suddenly confused)) Which one's to shoot? ←
- 43 Billy: ((suddenly confused)) Like if so (.) show me again? ((points to button on Susan's controller. Game announces: 'Bad guys heading your way. Help will not be arriving soon')) OK so (4.0) right I'm coming to you ←
- 44 Susan: Where are you? ←
- 45 Billy: Oh you are on my team apparently
- 46 Susan: Good
- 47 Billy: Yay (.) all right so I am right here (.) 'Hello? Hello?' (.) right ((Susan shoots Billy)) Hey (.) fuck off ←
- 48 Susan: Ha ha sorry
- 49 Billy: What the hell's wrong with you? ((smiling))
- 124 Mark: (4.0) I wouldn't even spend my time playing the game I would just be walking around (.) admiring the view
- 125 David: (2.0) Yea I was on Assassin's Creed three and I just got so bored with the stealth I just wanted to blast through the story as quick as I could =
- 126 Mark: = Look at that! That Westminster Church is amazin
- 127 David: grappling hook (.) god I am really Batman now
- 128 Mark: (3.0) That is so: co:ol ((in response to the scenery)) (22.0) yea gotta see what it looks like (19.0) I was just admiring the detailing on the Westminster building
- 129 David: (4.0) the controls are a bit annoying sometimes you can't exactly tell it what to do (19.0) Oh god I really want to see if I can just grapple over to there
- 130 Mark: Oh my god it makes me feel queasy (.) OH GOD
- 131 David: I never experience that with games I don't think I get vertigo ←
- 132 Mark: no don't jump (.) can you imagine this on VR? You are up there but you actually feel as if you are up there?
- 133 David: (3.0) I know I would like =
- 134 Mark: = look at my hands (.) look at my hands sweat
- 135 David: have you ever watched 'Jack Septic Eye'?
- 136 Mark: no
- 137 David: right he plays a lot of video VR games (.) and he has this fear of heights (.) like a proper fear of heights (.) but I have seen him play Spider Man Homecoming or like this little taster for it (.) and it was like really fun but he was terrified of the swinging
- 138 Mark: was he was he genuinely?
- 139 David: yea he was genuinely terrified from it

Example 3 illustrates a misinterpretation of pragmatics by both players. In turn 38, knowledge about how to shoot is agreed upon, but Billy later reveals his plans to misdirect Susan (41). Susan initiates a 'repair' (Schegloff, 1992) because she does not recognise that Billy's prior turn was said in jest (42). Billy then responds to the literal request from Susan, not recognising that she herself has misinterpreted his joke (43). Coordinating tightly seems to be a low priority, as illustrated in the ignored question in turn 44. Although coherence is low, affect and symmetry are high, thus the misunderstanding leads to greater certainty about the functions of the game controller during gameplay, as evidenced by Susan's first action in the game, which is to shoot Billy (turn 47).

Example 4 involves David (who has the controller) and Mark who are working together to play *Assassin's Creed*. To begin with, David, who is more familiar with the game, is interested in how the game has developed new features in comparison to previous games. Mark, being new to the game, is marvelling at the graphics:

Example 4.

Parallel dialogue, interaction 17. Both participants with confirmed diagnosis. Change in 20-turn average score between turns 119–139, coherence = -0.55, affect = +0.50 and symmetry = +0.30.

- 119 David: yea there are going to be shops
- 120 Mark: (2.0) I like really (.) yea they have put a lot of effort into this game
- 121 David: vehicle attacks =
- 122 Mark: = I look at the buildings and I think 'my god'
- 123 David: (2.0) I know something that was like a big deal was vehicle (.) vehicle attacking (.) like you could pull up to an enemy stage coach jump across beat them up (.) I think that was a thing

Example 4 shows David and Mark cooperatively turn-taking about two separate topics (119–130). Mark is focussed on his embodied reaction to the game, his admiration (122) turning to nausea (130), while David's focus on relating the game to past games (e.g. 125) develops into a concern about game controls (129). What is striking is how there is minimal coherence up until turn 131, yet both players are affectively engaged in expressing emotions of curiosity and excitement (high affect and symmetry). Eventually, their intersubjectivity becomes coherently orientated in turn 131 as David directly responds to Mark's observation about feeling queasy, perhaps because their dialogue has converged around the topic of height. This initiates a sequence of reciprocated turns (131–133, 135–139) during which new knowledge about the relationship

between vertigo and graphically intense games is established allowing the players to build rapport. Previous studies have observed the tendency for autistic children to drift between topics leading to ‘irrelevant’ responses (Loukusa et al., 2007). However, Example 4 highlights how this tendency is made unproblematic by the low demand for coordination; indeed, it allows the players to build rapport and knowledge, since they are free to drift between individual and cooperative ways of verbalising their relationships to the situation, even if to the neurotypical observer this process may appear disjointed to begin with.

Complimentary intersubjective features

The examples analysed here have shown how a generous assumption of common ground and a low demand for coordination can have enabling outcomes as evidenced by their reciprocation and development in proceeding turns. In Example 5, Daniel and Max are interrupted by two new visitors, Graham and Alice. Graham introduces Alice who has never met Max or Daniel before. Following the introductions, Graham begins to initiate their exit from the room:

Example 5.

Complimentary neurodivergent intersubjectivity. All participants with confirmed diagnosis. Change in 20-turn average score between turns 74–98, coherence = +0.75, affect = +0.30 and symmetry = +0.35.

- 74 Graham: Well well thank you I hope we weren't really disturbing?
- 75 Max: Na its ok don't worry about it
- 76 Graham: Yea >I mean I mean< Alice are you thinking of hanging around or do you want to go out now that you =
- 77 Alice: = Erm I don't mind
- 78 Daniel: [Yea show her around
- 79 Max: [Yea show her the music room
- 80 Graham: I have pretty much just done that. But (.) I know you used to play the violin but I (.) I mean I am not sure if you will enjoy anything else, but =
- 81 Alice: = Not really no
- 82 Max: >GET HER A VIOLIN AND PLAY THE< HALO THEME ←
- 83 Graham: °Yea well°
- 84 Max: I'm not sure it's the violin (.) or is it a cello?
- 85 Alice: I c'n (.) I can do the Skyrim theme
- 86 Daniel: Oh nice one!
- 87 Max: Nice!
- 88 Daniel: ((laughter)) Very nice
- 89 Max: You have earned my respect
- 90 Alice: You guys are playing DC (.) as a Marvel fan I must leave ←

- 91 Max: Yea this ain't our choice I wanted to play Halo MasterChief collection of something (.) but that would take too long to install
- 92 Alice: I would like to point out that Batman is basically Tony Stark who wasn't clever enough to build himself a suit ←
- 93 Daniel: ((Daniel laughs)) that sounds actually (.) viable
- 94 Max: That's actually true (.) although you know on Batman's behalf (.) I mean (.) come on he's been around longer (.) has accomplished more (.) of course let's face it Iron Man does look cooler
- 95 Alice: Very much cooler (.) Batman is a panzy
- 96 Max: Iron Man is just, it's an >it's an< awesome suit
- 97 Alice: Iron Man is here to chew bubble gum and kick ass and he's all out of bubble gum ←
- 98 Max: Yes (.) ((nods))

In line 82, Max shouts loudly across the room at Alice (82). His instruction to Alice disrupts the script of exiting that Graham had initiated in turn 74. Graham's unsure response (83) shows that he is not familiar with Max's reference to music within a specific game. However, Alice connects with the cultural reference because she plays *Skyrim* and is thus part of the symbolic world of console gaming (85). Revealing this, 'I c'n do the Skyrim theme', creates mutually recognised common ground leading to rapport-building as Alice takes control with a series of epigrams (90, 92 and 97) that are familiar and appropriate within this sub-culture. Thus, the complimentary nature between the generous assumption of common ground (i.e. Max's very specific sub-culture reference) and the low demand for coordination (i.e. Graham not picking up on the common ground and neither Graham nor Alice perturbed by being shouted at) unearths new intersubjective potential to engage socially, which otherwise would have been undiscovered.

Discussion

This study explores autistic interactions through assessing within-interaction variability, but before discussing its implications, we give consideration to its methodology and limitations. We operationalised intersubjectivity in terms of coherence, affect and symmetry; however, alternative ways of operationalising intersubjectivity (e.g. different criteria, moving averages and interpretation of qualitative extracts) may lead to different results. For example, explicit features of language are only a partial window into how people relate to one another (e.g. silences and non-verbal communication have not been considered).

Undoubtedly more features of neurodivergent intersubjectivity will be identified when studies include additional communicative features and contexts. The methodological contribution of this study is to show the utility of studying interactions in terms of within-interaction variation.

A challenge faced was how to interpret neurodivergent interactions outside of normative criteria, particularly when previous interaction frameworks are based on neurotypical data (e.g. doctor-patient interactions). To mitigate this, we selected only broad features of intersubjectivity, but further analyses may wish to consider more specific criteria, such as examining the structure and quality of 'repair sequences' in dialogue (Schegloff, 1992). We also conducted inter-rater reliability with an autistic rater. The authors recommend that future studies of autistic social interaction use autistic inter-rater reliability as a means of questioning neurotypical assumptions that may be embedded within the research.

Our sample is not representative of the diversity of people on the spectrum, given its gender bias, age range and focus on verbal competence, thus the findings are not indicative of all examples of neurodivergence. Future studies should examine neurodivergent intersubjectivity within different activities and cultures, given the extent to which interactions are shaped by context (Gernsbacher et al., 2017). Additional contexts will help to expand and refine the current rating framework and improve inter-rater reliability. Moreover, research is needed to systematically compare neurodivergent intersubjectivity with a neurotypical control group and other neurodivergent groups to understand whether the features of neurodivergent intersubjectivity observed here are generalisable to other contexts where neurotypical norms for interacting are not observed.

Mapping dimensions of intersubjectivity in interactions involving neurodivergent participants raised two questions, namely how do the observed interactions facilitate the rapid shifting between consistent and fragmented intersubjectivity, and how is it that the three dimensions of intersubjectivity can diverge so sharply? (e.g. low coherence, but high affect and symmetry). We observed two features of intersubjectivity that help to explain these phenomena.

First, a low demand for coordination could lead to fragmentation (e.g. players not coherently aligned), but it could also ameliorate many of the challenges associated with fragmented or potentially disruptive turns allowing players to swiftly move on from small-scale social misunderstandings (e.g. accidental other-initiated repair in Example 3; ignoring shouted turn in Example 5). Second, abrupt topic shifts, particularly through perspective-playing with characters from films, TV, music and imagined perspectives, could create new rich dialogue despite potentially fragmenting coherence. Everyday social exchanges take place upon a foundation of assumed common ground (Garfinkel, 1964). Indeed, intersubjectivity can never be

known at the outset; it needs to be assumed to be achieved (Rommetveit, 1976). Accordingly, the generous assumptions of common ground made by neurodivergent participants allowed underlying sub-cultures to be identified, leading to the rapid construction of shared understanding, rapport and humour. When generous assumptions of common ground fail to result in reciprocated turns, it may appear egocentric to the outside observer, but when reciprocated, it can lead to increased affect, symmetry and coherence, creating a rich intersubjective space for shared understanding.

The generous assumption of common ground and the low demand for coordination are more than two isolated features; they potentially fit together into a functional system that allows rich forms of social relating which can explain how rapid changes in interaction dynamic are possible. It allows autistic participants to continually experiment with ways of relating to their situation incurring minimal detrimental impact to their social identity when references are not shared. It is the way that these two features fit together to allow distinctive ways of building shared meaning that we describe as a feature of neurodivergent intersubjectivity.

Our findings support previous research on the under-recognised ability of autistic peers to be motivated and able to manage interactions with one another (Brownlow et al., 2015; Ryan and Räisänen, 2008) and highlight the need to examine other contexts for autistic social interactions, particularly given the potential for the activity of gaming to support the features observed. For example, facing the screen and not each other circumvents the challenges of face-to-face communication that many autistic people experience (Parsons and Cobb, 2011). Affect scores may be improved through the motivating (Granic et al., 2014) and captivating (Ash, 2013) aspects of video games, while repetitive gaming can enhance learning and establish context (Squire, 2006), making assumptions of common ground easier to manage. Gaming also involved the integration of first-person (direct experience), second-person (talking to each other) and third-person (shared object of the screen) perspectives with frequent position-exchange of social roles (i.e. helper-receiver, attacker-defender and teacher-learner) allowing autistic participants to explore and play with perspectives that they might not otherwise have exposure to in other domains of social life (Wijnhoven et al., 2015). This shared focus may account for some of the flexibility participants demonstrated in changing topic and following implicit references, thus studying other contexts without an object of shared focus will help to illuminate more about the situational resources which support neurodivergent intersubjectivity.

Further studies may also explore neurodivergent intersubjectivity in cross-neurological contexts (e.g. job interviews) to understand the nature of the 'double empathy problem' (Heasman, 2017; Milton et al., 2018). Our

findings reveal that neurodivergent interactions provide opportunities for rich intersubjectivity even when faced with severe fragmentation and raise questions as to whether neurotypical norms potentially limit this possibility because they interpret such fragmentation as failures needing to be addressed – thus limiting the potential of the conversation to move on. For example, the difficulties autistic people experience in indexing sociocultural meaning (Ochs and Solomon, 2010) are not so problematic when sociocultural conventions are relaxed because some autistic adults are able to delve into their own repositories of symbolic resources to generate localised meanings and develop mutual understanding. Likewise, fragmentation of the interaction coherence by attending to different aspects of the interactional context (Bottema-Beutel, 2017) is less of a problem when norms permit the spontaneous interchange of private and social speech. Thus our findings highlight how neurodivergent intersubjectivity can potentially create rich social interactions. Certainly, a first step to allowing neurodivergent intersubjectivity to flourish (or at least not be undermined) is to recognise it as having distinctive features that can be enabling.

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ORCID iD

Brett Heasman  <https://orcid.org/0000-0002-3621-3863>

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7) DIAGNOSTIC DISCLOSURE OF AUTISM

Non-autistic collaborators over-estimate how helpful they are towards online partners that disclose a diagnosis of autism

Abstract

Research on how autistic people are perceived by neurotypical people indicates that disclosing a diagnosis leads to a positive discriminatory bias; however, autistic testimonies indicate that diagnostic disclosure often results in negative discriminatory behaviour. We report on an exploratory study to compare people's self-reported helping behaviour with their actual helping behaviour towards an assumed autistic collaborator. We led 256 participants to believe that they were interacting online with a real person to play Dyad3D, a maze navigation game where players must work together to open doors and complete the levels. However, participants were actually playing with an intelligent virtual agent (IVA) that is programmed to behave the same way across all interactions. This design enabled us to manipulate the diagnostic status of the IVA that participants received prior to collaboration across three conditions: no disclosure, dyslexia disclosure and autism disclosure. We use this method to explore two research questions: (1) is Dyad3D viable in creating a simulated interaction that could deceive participants into believing they were collaborating with another human player online? and (2) what are the effects of disclosing an autism diagnosis on social perception and collaboration? Combined with a post-game questionnaire, we compared differences between diagnostic conditions and differences between self-reported behaviour and actual behaviour in the game. Our findings show that Dyad3D proved to be an efficient and viable method for creating a believable interaction (deception success rate >96%). Moreover, diagnostic disclosure of autism results in the IVA being perceived as more intelligent and useful, but participants also perceived themselves to be more helpful towards the IVA than they actually were. We evaluate the strengths and limitations of the current

method and provide recommendations for future research. The source code for Dyad3D is freely available (CC-BY-NC 4.0) so that the study is reproducible and open to future adaptation.

Introduction

There is a growing interest in the role non-autistic people play in shaping social opportunities for autistic people (Milton et al., 2018). While the abilities of autistic people to understand the perspectives of neurotypical others has been well documented, typically developing people have been shown to experience difficulties in interpreting autistic perspectives (Heasman & Gillespie, 2018b; Jaswal & Akhtar, 2018; Sheppard et al., 2016), which can potentially have longer-term consequences for social opportunities for autistic people (Sasson et al., 2017). To date a number of studies have explored how autistic expressions and behaviour are perceived by non-autistic people through vignettes and thin-slice judgements (e.g. utilising video, image and audio), showing that disclosing a diagnosis of autism significantly improves evaluations (e.g. Brosnan & Mills, 2016; Chambres, Auxiette, Vansingle, & Gil, 2008; Faso, Sasson, & Pinkham, 2014). However, reports from autistic people indicate that disclosure of a diagnosis can also result in stigma and negative discrimination (Davidson & Henderson, 2010; Powell & Acker, 2016; Treweek et al., 2018), resulting in a gap in the literature in connecting self-reported perceptions with actual behaviour.

We examined the effect of the label ‘autism’ on social perception and behaviour on 256 participants through an online collaborative video-game, where the participants believed they were interacting with a human partner to navigate through a maze, when in fact they were interacting with an intelligent virtual agent (IVA), programmed to behave the same way for all participants. We examined social perception and behaviour of participants in three

conditions, (1) a no disclosure condition, (2) a dyslexia disclosure condition, and (3) an autism disclosure condition.

Studies of how autistic people are perceived by non-autistic people

Research on how autistic people are perceived by non-autistic people has found evidence of both positive and negative discrimination when a diagnosis of autism is disclosed. Using a variety of stimuli (still images, audio, video), evidence suggests that when no diagnostic information is provided, autistic people are perceived as more socially awkward (Grossman, 2015), idiosyncratic (Brewer et al., 2016), less attractive and less likeable resulting in reduced intention to pursue social interactions (Sasson & Morrison, 2017). These judgements can form very quickly (e.g. based on brief exposure to video: Grossman, 2015) and show little change with increased exposure to stimulus (Sasson et al., 2017). Studies which have manipulated the diagnostic status of stimuli presented to participants have shown that knowing someone has a diagnosis of autism can result in significantly more positive social evaluations (Chambres et al., 2008) and improved affective attitudes (Brosnan & Mills, 2016). However, such effects are shaped by a number of contextual factors, such as the gender (Chambres et al., 2008) and the identity of the perceiver (Gernsbacher et al., 2017), in addition to the medium in which the stimulus is presented (e.g. audio-visual stimulus versus a speech transcript: Sasson & Morrison, 2017). Moreover, even with knowledge of a diagnosis, ratings have been shown to lag behind those of typically developing targets who were mislabelled as autistic (Sasson & Morrison, 2017). Thus knowledge of a diagnosis only partially corrects for negative interpretations of autistic behaviour and, moreover, positive effects are not always consistently observed.

Autistic testimonies also indicate that autistic people are misunderstood by non-autistic others resulting in stigma (Chell, 2006; Nick Chown & Beardon, 2017; Dekker, 1999; Treweek et al., 2018). Moreover, media representations have largely focussed on autism as an illness that

is a burden to others (Brownlow, Bertilsdotter Rosqvist, & O'Dell, 2015; Clarke, 2011; Huws & Jones, 2011; Sarrett, 2011), framing autism in terms of a *deficit* rather than a *difference* from a neurotypical majority norm (Kapp et al., 2013; Ortega, 2009; Ridout, 2017; Smukler, 2005). In turn, this has contributed to stigma experienced by autistic people in interpersonal relationships (Hacking, 1999; Heasman & Gillespie, 2018b). There is therefore a gap in terms of connecting the self-reported positive discriminatory behaviours observed in research using vignettes, and the actual behaviour of non-autistic people towards autistic people. Yet exploring this perception-behaviour gap presents a methodological challenge in terms of establishing a standardised interaction so that comparisons across groups can be observed.

Methods for simulating interactions

Studies of how autistic people are perceived have traditionally used vignettes. Vignettes are passages of text, images, or other types of stimuli (e.g. video) which present a hypothetical situation to participants to elicit a response, either observed or self-reported (Grbich, 2013; Hughes & Huby, 2004). They are a common technique used in social research to elicit data and can be used to incorporate a variety of detail about social situations; from abstract pictures and short text which impose low cognitive demand, to more elaborate immersive video and audio which draw upon participants' own experiences (Kinicki, Hom, Trost, & Wade, 1995). Vignettes can be used to explore automated and intuitive psychological processes, for example Heider and Simmel's (1944) classic attribution paradigm, where participants observe shapes moving around a scene, explores how participants impute human social behaviour to abstract entities.

Although vignettes provide a controlled way to present context to participants, they remain limited by the extent to which participants interpret them in a way which is divorced from the pressures of real social life (Hughes & Huby, 2004). One limitation of studies which use vignettes is that they lack a key social psychological feature involved in human behaviour:

understanding Self from the social position of Others (Mead, 1934). In vignette studies, participants are not active in the social field they evaluate; rather they evaluate psychological targets knowing that the targets themselves do not perceive them in return. Moreover, while participants passively observe vignettes presented to them, they remain active social agents in the research setting, behaving in response to instructions and expectations of the researcher, a phenomenon known as response bias or the Hawthorne effect (Furnham, 1986; McCarney et al., 2007).

Confederate-based studies aim to situate the participant in a controlled social setting where they are interacting with a confederate (i.e. a participant who is actually working for the researcher). This type of design has been classically illustrated, for example through Asch's study of conformity, where participants were led by the majority of confederates to report an incorrect answer in judging the lengths of a line (Asch, 1956), and Milgram's study of obedience (1963), where participants were led to believe that they were causing harm to a participant (the confederate) in another room. The advantage of confederate-based studies is that they minimise the impact of potential response biases by focussing more on observed behaviour than self-reported data. However, confederate studies require additional methodological considerations, including formalised procedures for interaction and extensive training to ensure consistency of behaviour participants are exposed to (Corti & Gillespie, 2015).

An alternative approach to simulating interactions is through virtual environments, which enable interactions to be replicated while immersing the participant within a social world or scenario (Blascovich et al., 2002; Gillespie et al., 2018). Instead of using the actual presence of others, virtual environments use computer-generated avatars to represent human interactants (Bailenson, Beall, Loomis, Blascovich, & Turk, 2004; Blascovich et al., 2002). Virtual environments allow researchers to decouple rendered behaviour from actual

behaviour through controlling audio-visual perceptual channels (Bailenson et al., 2004; Yee, Bailenson, & Ducheneaut, 2009). Moreover, they are adaptable, facilitating research into abstract or more socially complex scenarios. For example, *Cyberball* (Williams et al., 2000) is a virtual ball tossing game used to examine social ostracism, whereby participants are led to believe they are playing with others online, when in truth they play with a virtual agent that is programmed to deliberately exclude the participant from the game. This minimalist format has the advantage of providing a gradable way to manipulate the independent variable of levels of ostracism. Alternatively, virtual environments can encompass a high degree of social complexity (Gillespie et al., 2018), both in terms of the identity that avatars portray and the communication systems used between avatars (Evans, 2012). “Second Life” is an example of a massively multiplayer online role-playing game (MMORPG) used in psychological research, where users have no task-specific focus other than their own interest in exploring and socialising (Boelstorff, 2008; Evans, 2012). Building on such ideas, we developed *Dyad3D* as a tool that could be used to simulate interactions with participants while controlling an independent variable of diagnostic disclosure.

Dyad3D design

To explore how disclosing a diagnosis of autism affects social perception and behaviour of non-autistic people, we adapted Heider and Simmel’s (1944) social attribution paradigm, which involves two-dimensional geometric shapes moving around a box, into a three-dimensional ostensibly computer-mediated game. The participant plays as a sphere which moves around a maze and must work with another sphere-shaped avatar, an intelligent virtual agent (IVA), that participants believe to be human. Since the IVA follows the same path regardless of participants’ actions, it is possible to create the illusion of a collaborative computer-mediated task and thus create a standardised experience of interacting which is the same for all participants.

Combined with a questionnaire administered after the game, this format allows us to examine (1) variation between self-report perception and actual in-game behaviour; and (2) variation between groups of participants who have received different labels for the IVA. Since we were interested in understanding the effects of disclosing a diagnosis of autism prior to the task, we accordingly grouped participants into an “autism” condition (i.e. where participants are led to believe they are playing with an autistic participant) and a control condition (i.e. where no information about a diagnosis is disclosed). We also included an additional group with another diagnosis, dyslexia, to observe whether differences in comparison to the control condition were specific to the label of autism or a diagnostic label in general. Dyslexia was chosen since it is a well-known label to describe difficulties in processing information, there are no associated physical indicators, and like autism it can involve difficulties in planning and organisation (Gooch, Snowling, & Hulme, 2011) which are relevant to the nature of the game in which participants must handle multiple tasks (exploring, navigating, coordinating action).

While advances in graphics and immersive virtual environments provide the opportunity for replicating detailed social situations, we based our study on the minimalist paradigm of Heider and Simmel which uses basic geometric shapes, because it provides control (e.g. there are no non-verbal interpersonal cues) and we were curious to see if disclosing a diagnosis of autism, which is defined as a social disability, would affect participants’ perceptions and behaviours in a predominantly logical game task. In addition, for practical reasons a minimalist abstract design provides a baseline for the game to be iteratively expanded in terms of ecological complexity by researchers for further use, with the source code freely available at: <https://bitbucket.org/enghoff/dyad3d>.

The design process for Dyad3D was iterative over 18 months involving 183 participants, with interviews and focus groups after pilot sessions feeding into further developments of the

game. The structure of the game (described with associated pictures below) involves navigating through a maze with an IVA that behaves the same way for every participant. Dyad3D ostensibly requires collaboration (hence the name “Dyad”), because some doors in the maze can only be opened by the player, and other doors can only be opened by the IVA. However, the game is configured so that the participant progresses successfully in the initial levels before a misunderstanding occurs where the IVA deliberately goes the wrong way in the maze and leaves the participant trapped in a prison which severely reduces the participant’s overall score. This perceived “misunderstanding” provides a reference point for participants to discuss and evaluate what went wrong given the partial information they have about their partner. Every participant has the same experience of the interaction unfolding because the IVA is programmed to follow a specific path.

Manipulation of the independent variable (i.e. the diagnostic disclosure) is achieved through an option at the start of the game where participants are invited to reflect on their performance in the tutorial of the game through typing a message that is sent to the “online partner”. Diagnostic disclosure is contained in the message participants receive from the IVA, with participants randomly assigned to one of three conditions: a no diagnostic disclosure condition, a dyslexia disclosure condition, and an autism disclosure condition. Behaviour in the game was recorded and a post-game questionnaire examined self-reported perception of the collaboration. The research aims were thus as follows: (1) to examine whether Dyad3D was viable in creating a simulated interaction that could deceive participants into believing they were collaborating with another player online, and (2) to examine the effects of disclosing an autism diagnosis, both in terms of (2a) comparing self-reported social perception scores with actual behaviour in the game, and (2b) examining the qualitative explanations provided by participants about their experience of participation.

Method

Ethics

BPS and APA procedures regarding informed consent and ethical guidelines were followed, with ethical approval granted by the researcher's university ethics committee (ref: 000674). Participants were briefed about the nature of the study (i.e. they were informed that they would be navigating through a series of mazes with an online collaborator) and were informed of their right to withdraw at any time. All participants stated after participation that they were happy for people like them to go through the study.

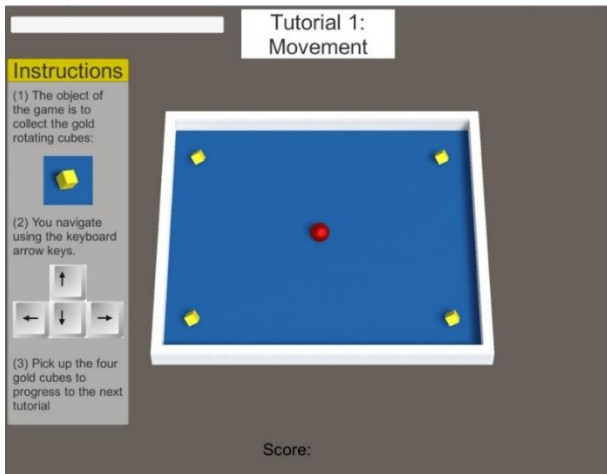
Materials and measures

Dyad3D game

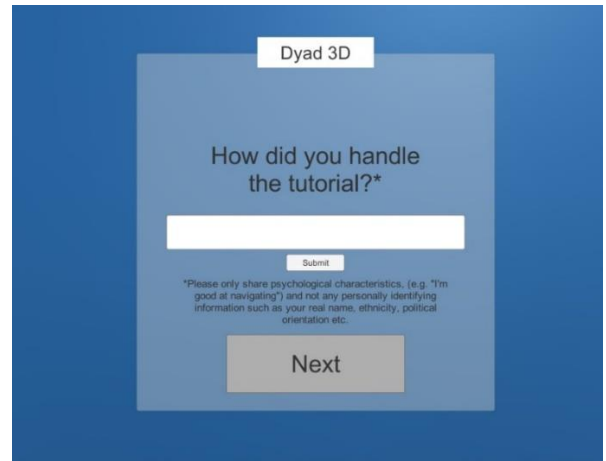
Dyad3D involves navigating through four mazes of increasing complexity by opening doors to reach a rotating gold cube at the end of each level. The participant plays as a 3-dimensional virtual ball and navigates by using arrow keys on the keyboard. To successfully complete the mazes the participant must work with another ball, the IVA, to open a series of doors, and to free each other from a prison at the start of each level. Some doors can be unlocked by the player, and some can be unlocked by the IVA.

The game is structured into three parts. In Part 1 the participants completed a tutorial where they were systematically introduced to different elements required to complete a level (e.g. Figure 1a). The tutorial lessons included: (1) navigating to move and 'collect' gold cubes by colliding with them; (2) learning how to search for hidden buttons to open doors and collect the gold cubes; (3) learning that some doors can be opened by the red player (participant), and some opened by the silver player (IVA), thus collaboration is required; (4) learning how to free the other player from a prison (same process as unlocking doors); and (5) familiarising with a full game scenario including receiving a score based on time remaining in the level.

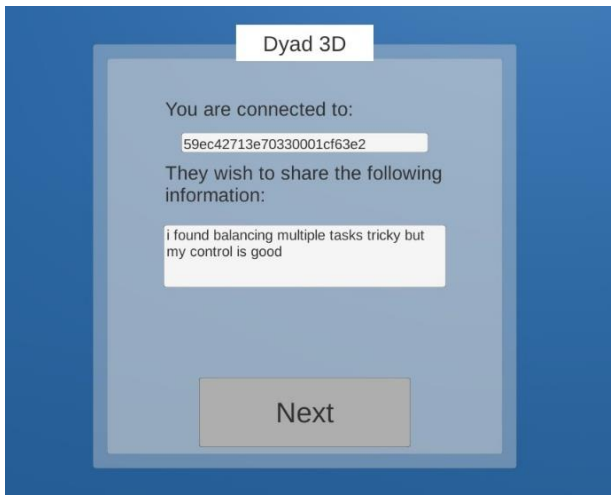
1a)



1b)



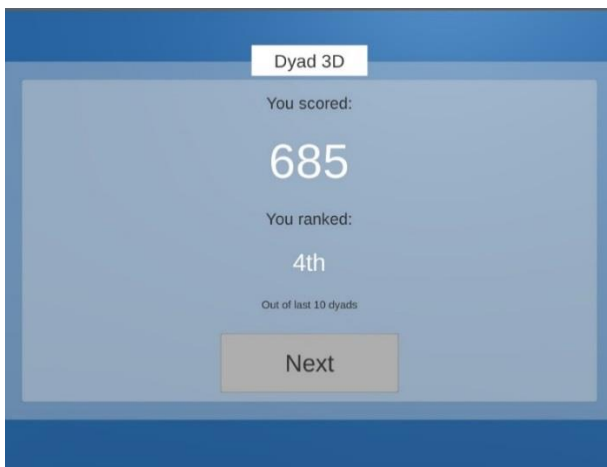
1c)



1d)



1e)



1f)



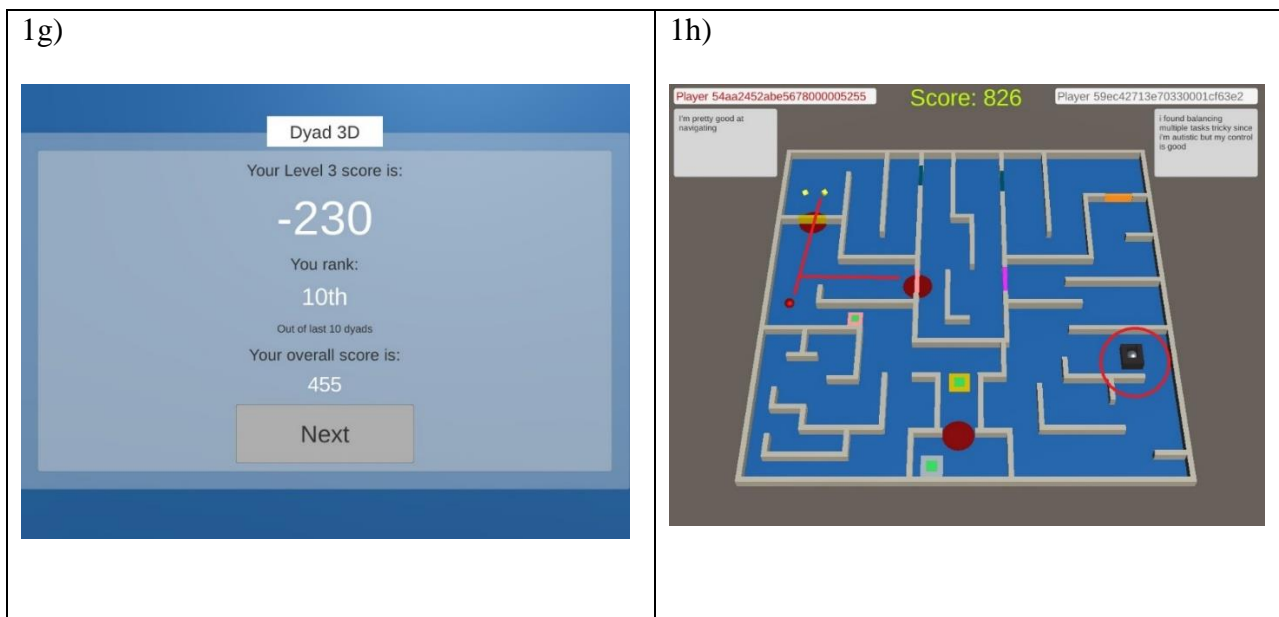


Figure 1: 1a) starting Part 1, involving tutorial training for movement; 1b) starting Part 2, where participants are invited to reflect on the tutorial and send this information to their online partner (the IVA); 1c) the information received from the IVA in the control condition; 1d) starting Part 3, where the participant must navigate through the maze. The IVA is the silver ball and the human participant is the red ball; 1e) a leaderboard providing a score and ostensible ranking which is shown after every level; 1f) Level 3 misunderstanding where the IVA, despite immediately unlocking the participant from the prison, chooses instead to take an incorrect route through the maze wasting valuable time; 1g) the leaderboard after Level 3 which reflects a sharp drop in ranking to last position, 10th; 1h) Level 4 where the participant is faced with the option of collecting a gold cube before helping the IVA, or freeing the IVA first.

In Part 2, participants had the opportunity to reflect on their progress in the tutorial and send a message to their online partner (Figure 1b). Ostensibly, this aimed to aid collaboration by sharing information about strengths and weaknesses. After sharing information, participants were taken to an artificial loading screen and waited for 14 seconds to be “paired” with another available partner online (in truth, the IVA). This was designed to further the illusion that participants were playing with other humans (and thus need to be temporally coordinated) and not directly with an IVA. In the next window, participants were told they had been successfully paired with a “partner” (Figure 1c). They then received a message from the IVA, in which information about the diagnostic status of the IVA is contained. We chose a statement that offered both positive and negative feedback, indicating difficulty with organisational skills but a strength in navigational ability. For participants in the autism

condition, the information received was: “I found balancing multiple tasks tricky since I am autistic but my control is good”. For participants in the dyslexia condition, the information had the words “since I am dyslexic” substituted. Participants in the control condition received: “I found balancing multiple tasks tricky but my control is good”. To further the strength of the deception, fake 24-digit identification numbers were created which matched the style of the participants own anonymous ID (as administered by Prolific). These IDs were displayed at the top of all subsequent screens in the game along with the information shared by the player and IVA (Figure 1d).

Part 3 involved playing the game, where participants progressed through four levels of mazes (Figure 1d). At the start of each level the dyad had 1000 points which decreased by eight points a second, with the time stopping when both players picked up their respective gold cubes. In addition, the player and IVA alternated in terms of who started the level in a prison and required support from the other to be freed.

The game was designed so that the first two levels were completed very easily and the IVA appears cooperative in terms of efficiently moving and opening doors, freeing the player from the prison and picking up the gold cube at the end of the level. A fake leaderboard was provided after each level which provided a ranking for performance, ostensibly based on the last ten dyads to complete the game (Figure 1e). In the third level, however, the IVA deliberately took the wrong path through the maze and ignored the participant waiting to be freed from the prison (Figure 1f). This negatively impacted the score for the level resulting in a low ranking (Figure 1g).

In the final level of the game, participants were presented with a choice between collecting their own gold cube before freeing their partner from prison (thus reciprocating the experience of themselves being trapped and ignored by the IVA in the previous level), or

freeing their partner from the prison and then proceeding to collect the gold cube (Figure 1h). This choice was designed to understand behaviourally how participants responded to the misunderstanding that occurred in the prior level.

Since the scores in the game were aggregated for the levels, participants continued to be ranked last (e.g. 10th) after the fourth level despite their efforts. The leaderboard thus provided a benchmark about the severity of the misunderstanding experienced in the third level. Each participant therefore experienced the same ranking of performance: after level 1 = they were ranked 4th out of the last ten dyads to register a score; level 2 = 3rd, level 3 = 10th, and level 4 = 10th.

Behavioural measures

Dyad3D records 11 variables of user input (Table 1). It records the score; calculates mean distance between the player and IVA for each level (spatial proximity); mean time difference between the player and IVA collecting their respective gold cubes at the end of the level (cube coordination); and mean keystrokes by the user for each level. In addition, it also calculates the number of keystrokes made by the user when they are trapped in the prison on the third level and ignored by the IVA (measure of frustration), and the mean duration of each keystroke in time. In the fourth level, it records whether participants free their partner from prison before collecting their own gold cube (termed altruistic behaviour), or whether they collect the gold cube before freeing their partner from prison (termed selfish behaviour).

Table 1

List of behavioural measures from the Dyad3D game

Measure	Levels	Description
Points score	1-4	A score calculated for the tutorial and for each level in the game. 8 points = 1 second. Each level starts with 1000 points and reduces continually into minus figures.
Mean distance (spatial proximity)	1-4	The average distance between the Player and the IVA for each level. Measured after the Player or IVA are freed from prison and thus working together to complete the level. Unit measurement based on Player diameter.
Cube coordination	1-4	Calculates the time difference between the Player and the IVA collecting their respective gold cubes.
Leadership	1-4	Identifies who picks up the gold cube first, the Player or the IVA.
Keystroke count	1-4	Counts the number of times the Player hits an arrow button during the levels of the game.
Mean keystroke duration	1-4	Calculates the mean duration a key is held down during the game.
Bump count	1-4	Counts the number of times the Player and the IVA make contact for each level.
Prison keystroke count	3	Calculates the number of times the Player presses a keyboard button when trapped in the prison during the 3 rd level misunderstanding.
Mean prison keystroke duration	3	Calculates the mean duration a key is held down while the payer is trapped in the prison during the 3 rd level misunderstanding.
Priorities (prosocial or selfish)	4	Identifies whether the Player chooses to free the IVA from prison first before collecting a gold cube (prosocial behaviour) or whether they choose to collect their own gold cube before freeing the Player.
Response time	4	Measures the time between the Player unlocking the IVA from prison to when they actually free the IVA from prison.

Questionnaire

Qualtrics was used to administer a post-game questionnaire for participants. Given the priority of first impressions in forming judgements about autistic people (Sasson & Morrison, 2017), we asked participants if they found the information supplied by their partner as useful through a closed-ended question. We further invited participants to explain why they found the information useful or not useful. We also asked participants whether they believed the information provided by their partner affected their own behaviour in the game to understand participants' perceptions about the relationship between diagnostic disclosure and its impact on their behaviour in the game.

Additionally, we wanted to understand if there were differences in how participants explained the interaction, thus an open-ended question invited comments on the following points: (1) what worked well in your collaboration? (e.g. useful information shared, hunting for hidden buttons, freeing from prisons, opening doors, deciding which route to take, dividing up search areas); (2) What could have been improved in your collaboration? (3) Is there anything you could have done differently to support your partner? (4) Is there anything your partner could have done differently to support you? (5) What impressions do you think your partner has of you through their experience of playing the game?

The Interpersonal Perception Method

In addition to exploring the effects of diagnostic disclosure, we included rating scales to explore additional perspectives on the task, since social interactions typically comprise multiple perspectives on Self, perspectives on Other, and perspectives on how one is being perceived by others (Heasman & Gillespie, 2018b; Ichheiser, 1943; Mead, 1934). The Interpersonal Perception Method is a way of systematically analysing the relations between these perspectives (Laing et al., 1966) and has most typically been methodologically

operationalised into rating scales (Gillespie et al., 2010; Kenny, 1988; Moore & Gillespie, 2014).

When identifying items to rate we considered criteria from previous studies of social perception of autism. However, we were also limited by the nature of the interaction through the video-game where there is no facial or auditory dimension of engagement. Chambres et al. (2008) used three evaluative dimensions of cognitive, social and emotional items for assessing vignettes of a six-year-old autistic child's behaviour that participants were either informed or uninformed about their diagnosis. We accordingly included items of 'intelligence' (cognitive), 'helpfulness' (social) and 'frustration' (emotional). We also included 'skill', since the game is dependent on the ability to interact with the computer which participants may feel was a critical factor in the collaboration.

Participants

A total of 183 participants took part in the pilot study phase to help iteratively develop the game. Participants for the pilots were sourced from the participant pool of the research lab belonging to the researchers' university. Since the pilot phase exhausted available participants, the full study sourced participants online through a paid participant service provided by Prolific.

345 participants took part in the full study online, to which all results and findings relate. To ensure sample validity through the online recruitment process, we used multiple inclusion/exclusion criteria. First, a demographic restriction was applied given the cross-cultural variation in identifying and understanding autism (Mandy, Charman, Puura, & Skuse, 2014; Obeid et al., 2015). We therefore recruited participants who had English as a first language. Following recruitment, additional inclusion/exclusion criteria were applied. We included an attention check by embedding a closed-ended question within the post-game

rating scales that had to be false (“were you unable to finish the game with your partner?”). Participants who failed the attention check were removed from the sample (n = 39). A manipulation check was also included to see if participants were aware of the information provided. Those that claimed they did not receive any information or that they did not remember the information shared (n = 23) were removed from the analysis. We conducted a deception check through analysing the free text provided by participants in response to a question which asked them to explain their experience of the study. Participants who mentioned the belief that they were playing with a computer and not a human were excluded (n = 9).

Additional criteria for exclusion included participants who: (1) did not complete the game or the questionnaire (n = 5), (2) who copied and pasted unintelligible text for open-ended questions (n = 3), (3) rated artificially (e.g. the same score for all items in the questionnaire) (n = 5), (4) had technical problems during the study (n = 5), and (5) took the study more than once (n = 2).

Table 2
Participant details

	Control (n = 80)	Dyslexia (n = 83)	Autism (n = 93)	χ^2	<i>p</i>
Gender				0.7286	0.948
<i>Female</i>	45	45	47		
<i>Male</i>	34	36	43		
<i>Unspecified</i>	1	2	2		
Nationality				0.776	0.941
<i>UK</i>	50	52	58		
<i>US</i>	25	23	27		
<i>Other</i>	5	8	8		
Diagnoses disclosed by participants ¹				2.27	0.321
<i>Depression</i>	4	3	1		
<i>Anxiety</i>	4	6	2		
<i>Autism</i>		1	1		
<i>OCD</i>			1		
<i>Epilepsy</i>		1			
<i>PTSD</i>			1		
<i>Borderline personality disorder</i>			1		
<i>Chronic fatigue syndrome</i>		1			
Gaming experience				6.085	0.193
<i>Experienced</i>	30	41	32		
<i>Intermediate</i>	36	34	49		
<i>Novice</i>	14	8	11		

¹Significance measured in terms of comparing across conditions the proportion of participants with a diagnosis versus those without a diagnosis.

Participants were randomly assigned through the survey software Qualtrics to one of three conditions: (1) a control condition (where no diagnostic information was disclosed); (2) a dyslexia condition (where a dyslexia diagnosis was disclosed); and (3) an autism condition (where an autism diagnosis was disclosed). In the debrief, participants reported that they were happy for other participants to go through the same process, while two participants voluntarily contacted the researchers after the study to express their enjoyment of playing the game and their surprise that they were playing with an IVA and not a human.

Method of analysis

To explore RQ1 (how viable is Dyad3D in creating a simulated interaction that could deceive participants into believing they were collaborating with another player online?), we asked participants in the post-game questionnaire to rate the quality of the deception on a six-point

scale, from not believable at all (= 0) to very believable (= 5). Additional checks included: (1) the qualitative responses provided by participants were examined to see if any reference was made to the IVA which questioned whether it was actually human; (2) we examined whether attributions of intentionality to the IVA were made by participants; (3) participants were asked in the debrief whether they would consent to other participants taking part in the study; and (4) we categorised feedback volunteered by participants who contacted the lead researcher after the study was complete.

To address RQ2a (comparing self-reported social perception scores with actual behaviour in the game) one-way ANOVAs were run to explore the effect of condition (no disclosure vs dyslexia disclosure vs autism disclosure) on survey responses and behavioural data from the game. For ordinal data, non-parametric Kruskal-Wallis one-way ANOVAs were used. Where significant effects were observed, post hoc tests with Bonferroni correction examined specific differences between conditions.

To address RQ2b (examining the qualitative explanations provided by participants to understand the role of diagnostic disclosure on their experience of participation) we analysed participants' text responses. Specifically, we analysed participants' statements about why the information supplied by the IVA was useful or not useful with a process of iterative coding (Neale, 2016). Iterative coding involves open-coding participants' responses, before sorting codes into categories based on the links between codes (Heasman & Gillespie, 2018b). Four main categories resulted from this process, e.g. the category of "tolerance" was formed from statements where participants said the IVA information led to lower expectations, higher confidence, greater patience, and increased empathy. The category of "redundant" emerged from statements about the shortcomings of the IVA, since some participants deemed the information shared as superfluous, inaccurate, unhelpful, and misleading. The category of "explained misunderstanding" covered statements that specifically linked the IVA

information to the misunderstanding experienced in the third level of the game (thus no iteration required). Finally, the category of “ambiguous” included statements that were merely descriptive (e.g. “he said how he did the tutorial”), provided tangential information (e.g. “we couldn’t pick the colour”) and statements which did not provide meaningful context, (e.g. “yes it did”).

Results

There were no statistically significant associations between gender and experimental condition $\chi(2) = 0.409$, $p = 0.815$, with a male to female ratio between 0.76, 0.80 and 0.91 across conditions. There were no statistically significant differences between experimental conditions in the time taken to complete the tutorial, ($F(2,254) = 0.310$, $p = 0.734$) suggesting participants were of comparable ability to play the game.

RQ1: How viable is Dyad3D in creating a believable interaction?

Ratings of the quality of the deception were strong with a mean score of 3.83 out of a maximum of 5.00 across conditions. There were no significant differences between experimental conditions in rating deception quality as determined by one-way ANOVA ($F(2,253) = 0.062$, $p = 0.940$). Nine participants mentioned the belief that they were playing with a computer and not a human, which represented 3.4% of participants when added to the 256 participants who had passed all of the other inclusion/exclusion criteria. Moreover, all participants surveyed made attributions of intentionality to the IVA, as shown by references to the IVA’s mental states, emotions and skill/experience. All participants also indicated that they would consent to others taking part in the study, showing that the nature of the deception did not result in significant discomfort for participants. Taken together, these data indicate that Dyad3D was successful in creating a believable interaction.

RQ2a: Differences between self-reported and behavioural measures

Kruskal-Wallis H tests showed a statistically significant difference between conditions regarding the extent to which information provided by the collaborator was perceived as useful, $H(2) = 12.74$, $p < 0.002$, with a mean rank score higher for the autism ($\text{autism}_{\text{usefulness_of_info}} = 140.81$) and dyslexia ($\text{dyslexia}_{\text{usefulness_of_info}} = 133.38$) conditions than for the control ($\text{control}_{\text{usefulness_of_info}} = 107.69$) condition. Post hoc pairwise comparisons showed a significant difference between the control and autism conditions ($p = 0.002$) and the control and dyslexia conditions ($p = 0.028$). The results suggest disclosing a diagnosis significantly increased the extent to which participants found the information supplied by the IVA as useful.

There was a statistically significant difference between conditions in the extent to which participants reported that information provided by the IVA affected their helpfulness in the game, $H(2) = 8.02$, $p = 0.018$, with a mean rank score higher for the autism ($\text{autism}_{\text{info_affected_helpfulness}} = 135.96$) and dyslexia ($\text{dyslexia}_{\text{info_affected_helpfulness}} = 131.36$) conditions than for the control ($\text{control}_{\text{info_affected_helpfulness}} = 113.81$) condition. Post hoc pairwise comparison with Bonferroni correction showed a significant difference between the control and autism conditions ($p = 0.020$) but not the control and dyslexia conditions ($p = 0.109$). The results suggest disclosing a diagnosis increased the extent to which participants perceived they acted more helpfully during the game, but only significantly for the autism disclosure and not the dyslexia disclosure condition.

However, although participants in the autism condition showed a greater tendency to prioritise their partner's interest (freeing their partner from prison before collecting their own gold cube) than prioritising their own interests (picking up the gold cube before releasing their partner from prison) compared with the control and dyslexia condition (mean ranks: $\text{control}_{\text{priorities}} = 138.59$; $\text{autism}_{\text{priorities}} = 117.88$; $\text{dyslexia}_{\text{priorities}} = 129.01$), this difference was not significant $H(2) = 5.13$, $p = 0.077$. Further Chi-square comparisons showed no significant

association between perceiving oneself to be helpful with actual helping behaviour $\chi(1) = 0.185$, $p = 0.667$. These findings compare with parametric one-way ANOVAs which found no significant differences between conditions for mean time to complete levels ($F(2,254) = 0.811$, $p = 0.446$), mean spatial proximity between the participant and their other player across the levels ($F(2,254) = 0.654$, $p = 0.521$), or mean frustration (measured as the mean time participants hold down a keyboard key while trapped in the prison), ($F(2,245) = 2.770$, $p = 0.65$). These results suggest that despite participants in the autism condition believing they were more helpful compared with participants in the control condition, they did not significantly differ from the control group when it came to actual helping behaviour in the game.

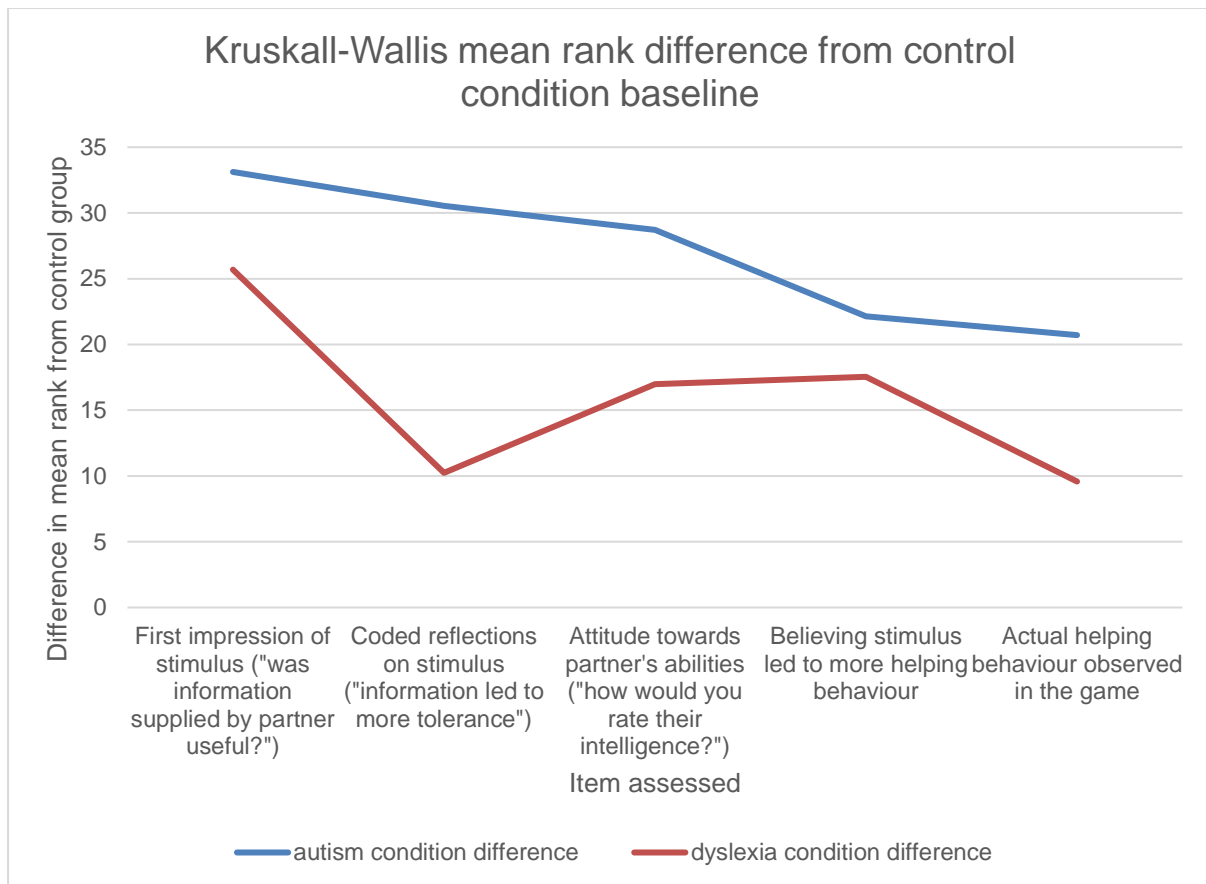
There was a significant difference between conditions in participants rating their partner's intelligence, ($H(2) = 7.452$, $p = 0.024$) with participants in the autism condition rating their partners higher than the control or dyslexia condition (mean rank scores: $\text{autism}_{\text{intelligence_other}} = 155.67$ $\text{control}_{\text{intelligence_other}} = 124.12$ $\text{dyslexia}_{\text{intelligence_other}} = 141.40$). Post hoc pairwise comparison with Bonferroni correction showed a significant difference between the control and autism conditions ($p = 0.019$), but no significant difference between the control and dyslexia conditions ($p = 0.788$). This result was consistent when analysing the differences between rating one's own intelligence and rating their partner's intelligence ($H(2) = 8.327$, $p = 0.016$), with post hoc pairwise comparison showing significant differences between the autism and control condition ($p = 0.023$). The results suggest a difference in effect between diagnostic labels, with a disclosure of autism leading to significantly higher perceptions of intelligence than a disclosure of dyslexia when compared with the control group.

Criteria where no significant differences between conditions were observed include: participants rating the IVA's skill ($H(2) = 1.080$, $p = 0.583$), helpfulness ($H(2) = 0.097$, $p = 0.953$), frustration ($H(2) = 0.475$, $p = 0.789$); perceived ratings by the IVA in terms of

intelligence ($H(2) = 5.605, p = 0.61$), skill ($H(2) = 0.407, p = 0.816$), helpfulness ($H(2) = 1.151, p = 0.563$) and frustration ($H(2) = 0.568, p = 0.753$); perceptions of teamwork in terms of spatial proximity ($H(2) = 0.877, p = 0.645$), calmness ($H(2) = 1.363, p = 0.506$), efficiency ($H(2) = 0.845, p = 0.655$), or understanding ($H(2) = 0.285, p = 0.867$); desire to collaborate again with the IVA ($H(2) = 3.12, p = 0.210$); and participants rating their own intelligence ($H(2) = 2.002, p = 0.368$), skill ($H(2) = 0.406, p = 0.816$), helpfulness ($H(2) = 4.584, p = 0.101$) or frustration ($H(2) = 0.705, p = 0.703$). Taken together, these results indicate that disclosing a diagnosis results in positive discrimination in terms of higher perceptions of intelligence, finding information provided by the IVA as more useful and resulting in greater tolerance, and more positive perceptions of being helpful towards the IVA. However, in each case these effects were significant for the autism condition in comparison to the control condition, but not so for the dyslexia condition (where participants were only significantly different from the control condition in terms of finding the information provided by the IVA as more useful). This suggests that positive discrimination observed due to the disclosure of an autism diagnosis is specific to autism and not the wider presence of a label in general.

The findings also highlight a potential “decline” in effectiveness of disclosing a diagnosis, from initial positive perceptions of its utility, to reduced helping behaviours. Figure 2 shows the mean rank difference for the autism and dyslexia condition compared to the control baseline. It highlights how the distribution of responses become more similar to the control condition as the questions move from initial first impressions, to attitude towards partner, to belief about helping in the game, to actually helping in the game. This convergence towards the control distribution for both diagnostic groups suggests a potential *diluting effect* of the labels, where people initially respond positively to the label but are either unsure about how it impacts their behaviour or are mistaken in the extent to which it actually does so, which results in a reduced tendency to actually help more.

FIGURE 2: COMPARISON OF MEAN RANK DIFFERENCES FOR EXPERIMENTAL CONDITIONS



RQ2b: Explanations provided by participants about their perception and behaviour towards the IVA

Explanations provided by participants about the utility of the IVA information was categorised into three types (See Table 3), which accounted for 80% of all participants. These categories included: (1) participants who felt that the information supplied was redundant or inaccurate and of no use to facilitating the game collaboration (termed “information redundant”); (2) participants who claimed that the information provided helped them to make sense of why they were left in prison by their partner (termed “information explained misunderstanding”); and (3) participants who claimed that the information provided led to greater tolerance, either because it led to greater confidence in themselves, prepared them to be more patient, or incentivised them to help more (“information led to greater tolerance”). The remaining comments (20% of participants) were ambiguous, either

because they did not provide an explanation, made tangential comments not related to the question, or ignored the question altogether.

Table 3 below summarises the frequency and distributions of the coded statements. It highlights a trend in which participants in the autism condition were less likely to see the information they received from the IVA as redundant and significantly more likely to claim that it led to greater tolerance in comparison with the control condition (autism condition = 48%, control condition =18%). The dyslexia condition showed a similar trend but it was not significant compared with the control condition.

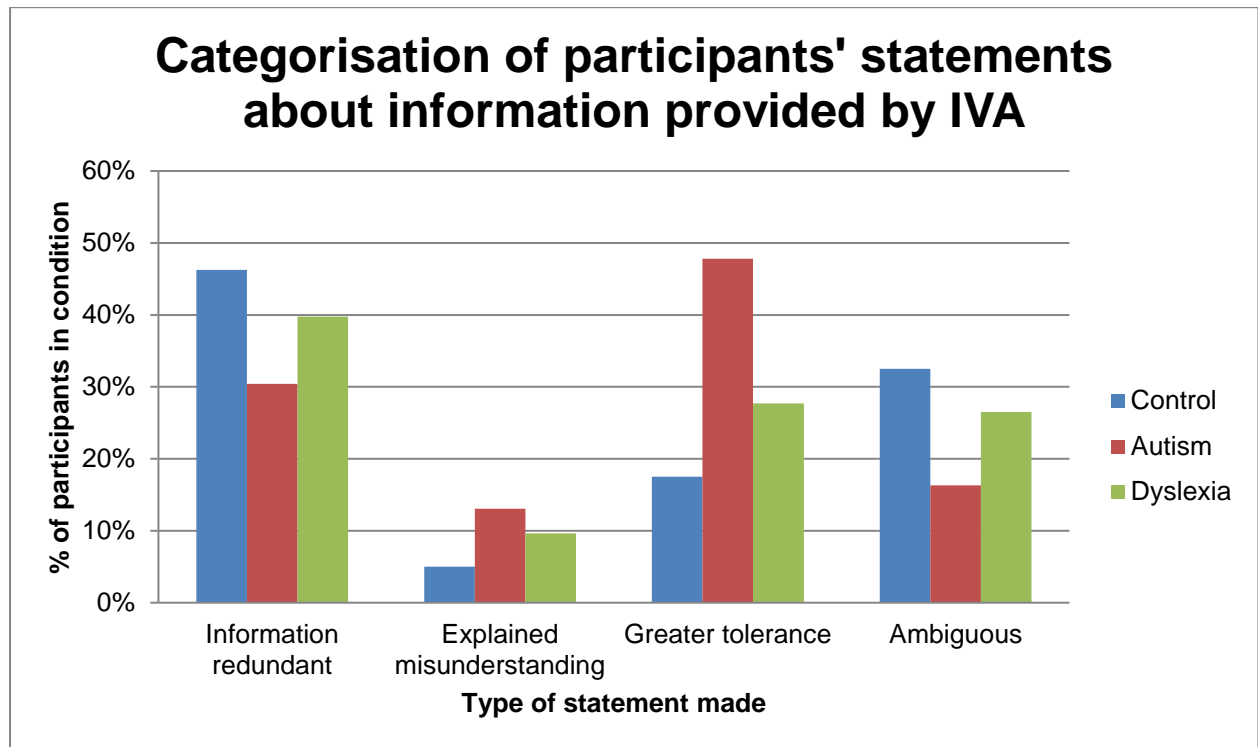
Table 3

Frequency and distribution of coded statements from participants about the information received from the IVA

	No. of coded statements (% of participants)			Kruskall-Wallis H
	Control (n = 80)	Dyslexia (n = 83)	Autism (n = 93)	
Information redundant	37 (46%)	33 (40%)	28 (30%)	3.456
Information explained misunderstanding	4 (5%)	8 (10%)	12 (13%)	3.137
Information led to greater tolerance	14 (18%)	23 (28%)	44 (48%)	12.169*
Ambiguous statements	26 (33%)	22 (27%)	15 (16%)	1.642

* p-value < 0.05. Post hoc pairwise comparisons with Bonferroni correction showed a significant difference only between participants in the autism condition and the control condition (p = 0.002).

FIGURE 3: COMPARISON OF PARTICIPANTS' STATEMENTS ABOUT INFORMATION PROVIDED BY THE IVA



The finding that participants in the autism condition are significantly more likely to report that the IVA information led to greater tolerance compares with increased perceptions of behaving in a more helpful way (reported above). It is also noticeable that diagnostic disclosure aids interpretations about the misunderstanding experienced, with 13% of participants in the autism condition linking the diagnosis to the misunderstanding compared with only 5% of participants in the control condition, although this is not significant at $\alpha < 0.05$. Thus diagnostic disclosure of autism leads to increased perceptions of tolerance and increased likelihood that it will help to explain the misunderstanding experienced in the game. However, we also found that the same disclosure of a diagnosis can potentially have the opposite effects, being perceived as redundant information. Table 4 illustrates the range of statements provided by participants.

Table 4

Illustrative examples of reasons provided by participants for finding the information useful

Category	Illustrative example		
	Control	Dyslexia	Autism
Information redundant	The information was so generic as to be useless in trying to formulate a strategy.	They stated they were dyslexic, but I didn't find that to be particularly useful information. It tells me nothing of their ability to perform the task.	They just said they were autistic, which wasn't really relevant.
	While I understood what they was trying to share it was not useful to me	I guess it was useful but I'm not sure what being dyslexic has to do with rolling a ball through a maze.	I did not know how to alter my playstyle through the information they shared with me, such as them being autistic.
Information explained misunderstanding	They said they were not good at multitasking, which may explain why they did not notice my gate could have been unlocked.	My partner shared they were dyslexic and had trouble with multiple tasks, and that might have explained why during one game they navigated through half the maze but failed to rescue me from the prison?	My partner explained that he was autistic which made it difficult for him to multi-task which explained why perhaps he forgot to do things in one of the games.
	A little, he said he wasn't good at multi-tasking (probably why he forgot to let me out as soon as he was able to) but he was good at manoeuvring the ball.	It tempered my frustration when my partner forgot to let me out of prison in one of the games.	It was useful because I can somewhat understand how they performed the way that they did.
Information led to greater tolerance	They told me they were good at steering, which they were, and they told me they weren't great at multitasking which I had in mind when they forgot to free me until the end.	It allowed me to be more empathic to the person controlling the other ball, and told me I didn't need to worry about their control of the ball	He said as he was autistic he was not very good at focusing on multiple tasks at once, which made me more patient when I was locked in prison and only he could move.
	I think I had left him confident and calm, so that we could play this game at our best	they said they were dyslexic but still good at following orders , I was ready to give them a bit more help of needed but they navigated just fine	They mentioned that they struggled to juggle multiple tasks at once due to suffering with autism. This was useful to know and was evident in some of the games that we played. As a result I tried to work as quickly as I could to complete my sections of the games, in order to compensate for times where my partner may have struggled to cope with multiple scenarios in the game.

Thus, although disclosing a diagnosis of autism generally results in more positive views (seeing disclosure from the IVA as useful, perceiving oneself to be more helpful) it can also lead to negative views (seeing the disclosure as redundant and useless). These differing reactions help to explain why disclosing a diagnosis may arouse anxiety for autistic people, because it is a cost-benefit decision which autistic people in particular may find especially hard to evaluate given that it would require a nuanced social reading of others. Moreover, the lack of an association between participants perceiving themselves to be helpful and helpful behaviour suggests a bias in overestimating one's own prosocial behaviour towards autistic people.

Discussion

The first research aim (RQ1) was to create a simulated interaction for exploring the psychological effects of labels exposed to different groups of participants. Dyad3D, combined with a post-game questionnaire, proved to be a very efficient means of gathering simulated interactional data. Participants found the interaction highly believable, with an average quality of deception rating of 3.83 out of 5, with only 9 participants (3.4% of participants passing all other inclusion/exclusion criteria) explicitly expressing doubt about whether the IVA was human. All sampled participants also made attributions of intentionality, including mental/emotional states when describing the behaviour of the IVA showing that participants were psychologically orientated to the IVA as another human player. The nature of the deception was also unproblematic, with all participants providing feedback that it was efficient, believable and enjoyable. Thus Dyad3D was successful and efficient in creating a believable controlled interaction that could be used to generate insights about the differential effects labels produce on social perception and collaboration. A contribution of the study is therefore to make the source code for the game freely available at: <https://bitbucket.org/enghoff/dyad3d>.

The second research aim examined the effects of disclosing a diagnosis and was split into two parts. RQ2a compared self-reported data in the post-game questionnaire with behaviour recorded in the game. Our findings concur with existing reports that the label of autism has a broad positive effect on social perception (Sasson et al., 2017), resulting in higher perceptions of intelligence of the IVA, and perceiving information communicated by the IVA as having more utility. However, there is also evidence to suggest that there is a diluting effect on the positive discrimination the label initially establishes. Although participants find diagnostic disclosure about autism useful, they are less likely to believe it impacts their own ability to provide help in the task. In addition, there was no significant association between participants who believed that the IVA diagnostic disclosure made them more helpful compared to whether they were actually helpful during the game. These findings help to explain why diagnostic disclosure, despite enhancing social perceptions by others, can still result in negative discrimination in terms of behaviour as reported by autistic people themselves (Davidson & Henderson, 2010; Powell & Acker, 2016; Treweek et al., 2018).

RQ2b further highlighted why diagnostic disclosure is not straightforward, since there were varied reactions towards the information supplied by the IVA. Although most participants found the information to be useful, they were less likely to articulate why. Many participants felt that the diagnosis of autism explained the misunderstanding experienced in the game, yet a smaller number of participants also felt that the diagnostic disclosure was redundant information. These varied reactions highlight why diagnostic disclosure is a risky decision for autistic people. The label of autism can ameliorate confusion associated with a misunderstanding, but it can also potentially exasperate underlying frustrations depending on the cognitive frame of the perceiver.

These findings contribute to understanding the *double empathy problem*, a term used to describe the differences in mutual understanding which arise between autistic and non-

autistic people on account of their different neurological dispositions (Milton, 2012; Milton et al., 2018). While interactions between autistic people have been shown to exhibit complimentary features (Heasman & Gillespie, 2018a), interactions between autistic and non-autistic people have been shown to be subject to a number of biases (Heasman & Gillespie, 2018b; Sasson et al., 2017), with the label of autism playing a central role in sense-making processes. The findings here highlight how non-autistic people may over-estimate their own helpfulness towards autistic people, which in turn, would mean they are less likely to see validity in the claims made by autistic people that they are not helpful; or, due to the paradoxical effects of helping (or even perceiving that one is being helpful: Gillespie & Hald, 2017), this bias may even lead to expectations that autistic people should be grateful.

There are many situations in social life where this can have a pivotal effect on quality of life, such as employment situations (Heasman, 2017a) and judicial processes (Crane, Wilcock, et al., 2018). Understanding that the label of autism can lead to improved social perceptions, helping to explain the nature of misunderstandings, but that this may also result in a mistaken belief about how helpful one actually is, highlights that diagnostic disclosure remains a risky decision. This raises a further question concerning how diagnostic disclosure can lead to more consistent and sustained positive effects on social perception and behaviour. Studies have begun to explore the relationship between autism knowledge and the psychological effects of disclosing a diagnosis of autism (Crane, Wilcock, et al., 2018; Gillespie-Lynch et al., 2015; Sasson & Morrison, 2017). It is possible that such effects may be associated with increased self-awareness of one's own taken-for-granted assumptions towards others with a diagnosis. For instance, testimonies from primary caregivers and parents often bring such reflections into focus through the adage "If you've met one person with autism then you have met one person with autism" (Shore, 2009). Consequently, a potential avenue for improving the positive effects associated with a diagnostic disclosure of autism could be through making

people aware of a bias in the extent to which they are helpful towards autistic people. In many ways this bias is understandable, since it protects the positive identity of the perceiver and brings their self-perception into line with their ideal Self as presented in the research. Beyond this, however, there is also the challenge of how to improve understanding about the appropriate considerations a diagnostic disclosure of autism should raise, since some participants did not feel that it was relevant information for the collaboration.

In summary, this study has helped to illustrate both positive and negative discrimination resulting from a diagnostic disclosure of autism, with social perception more favourable than actual social behaviour. Future research using simulated interactions can further differentiate the factors affecting social perception and behaviour of non-autistic people towards autistic people, and in doing so potentially evolve the current design into an intervention for correcting biases that contribute to the double empathy problem. A central contribution of the study is therefore to make the source code for Dyad3D freely available. The study is reproducible and opens up the possibility for future studies to implement more ecological features into the game (e.g. varying the form in which the stimulus is presented which has been shown to shape social perceptions: Sasson et al., 2017)), and to improve the sensitivity and diversity of behavioural measures.

Limitations

There were limitations in our approach to each research question. Limitations pertaining to RQ1, the viability of the deception, stem from the use of a computer-mediated task which is contingent on people's ability to interact with others via a computer interface. While this provides a means for replicating the experience of an interaction efficiently, it also raises questions about the validity of the interaction, because the identity of the IVA is not open for questioning. The internet, and the development of networked virtual worlds, have created

multiple opportunities for the same individual to present their identity in different ways (Gillespie et al., 2018) and consequently people are aware that virtual interactions may be risky and not authentic (Evans, 2012). Thus there may be levels of doubt associated with the authenticity of the interaction studied even if it is not explicitly mentioned or reported by participants when asked to rate the quality of deception. Moreover, such doubts may be furthered because of a lack of ability to see, hear or verbally interact with the IVA which means such concerns about validity cannot be questioned. Enhancing the strengths of the deception may be achieved in a number of ways, for example through incorporating the ability to send messages in the game (which has been added as a configurable option to the current game setup), or by changing aspects of the game structure itself (perhaps the player and IVA could share resources or empower each other's abilities), or by changing the way in which the stimulus is presented (e.g. a pre-recorded webcam of the "online" player).

Limitations pertaining to RQ2a, which compares self-report and behavioural data, highlight concerns about the social aspects of the game and what it reveals about interpersonal dynamics. In the present study we deliberately presented a minimalist situation to see what knowledge participants would import to the disclosure of a diagnosis, particularly since in real life discovering someone's diagnosis may not always be associated with adequate auxiliary information about the diagnosis. Thus it was interesting to find that even in a predominantly cognitive task with minimal information about the diagnosis, disclosure resulted in positive evaluations of the IVAs' intelligence and utility of information shared. However, in this context there is no reason not to be generous in social perceptions. Perceptions might change if the consequences were higher (e.g. job hiring) where there was a major investment in the outcome of the interaction.

Another challenge of the present design is that Dyad3D is a primarily goal-orientated activity which may supersede the social obligation to help one's partner. Although a social

component exists in the game in terms of freeing the other player from prison and having to share responsibility for opening different doors in the game between player and IVA, it is still possible to play the game in a primarily strategic way. Revising structural aspects of the game and associated behavioural measures should therefore be explored to build a more ecologically valid understanding of social interaction. For example, there could be individual scores for each player which are then aggregated to form an overall score for the dyad. This could help boost an understanding of teamwork and collective identity. Likewise, there could be a reward system which benefits the dyad if close spatial proximity is maintained. No significant differences were observed in mean distance between players, mean time to complete levels, mean time between collecting gold cubes, mean keystrokes or mean keystroke duration. These null results indicate that the significant behavioural differences observed should be interpreted with a degree of caution and highlight room for improving the way behavioural measures operationalised in the game detect meaningful action.

Limitations pertaining to RQ2b, understanding the explanations provided by participants, highlight a potential bias in terms of memory retrieval. In-game activity may deplete attentional resources required to accurately report on one's interaction. Moreover, Dyad3D used deliberately simple and intuitive input controls of the arrow keys, yet even this can place a demand on users not familiar with computers or navigation via keyboard inputs, which represents another potential distraction from accurate reporting. The ability to ostensibly exchange messages (i.e. a chatbot interface) could represent more valuable qualitative data, as instead of asking participants to report on the interaction in hindsight, one can observe their actual attempts at communication to build a social understanding of the situation. To help address this challenge, a configurable chat interface option has already been included in the existing source for the game.

8) DISCUSSION

The central aim of this thesis has been to understand the processes that underscore the double empathy problem which inhibits autistic sociality. This chapter will first discuss the limitations raised by the novel methodologies developed before evaluating the contributions of the thesis towards the central aim and potential directions for future research.

Limitations

Beyond the limitations already discussed in the chapters for each of the three empirical studies, it is important to note that there are additional limitations associated with the sample and access to participants. Studies 1 and 2 sourced participants from one local community which may not be representative of the wider diversity of people on the spectrum. For example, Hull, where data collection took place, has a predominantly Caucasian lower socio-economic status demographic. The prevalence of autism diagnosis has been shown to be associated with socio-economic status (Durkin et al., 2010), while misconceptions about autism differs across cultures (Obeid et al., 2015). Moreover, there is also a sampling bias, since those participating reflect those who are willing to take part in the research, who are intellectually able and do not have significant language deficits. Thus the sample is not representative of the spectrum of autistic people. These challenges are not unique to this particular research project, but are challenges facing autism research in general and wider psychological science (Henrich, Heine, & Norenzayan, 2010; Kapp et al., 2013). Sampling issues are particularly relevant given the dynamic model of sociality this thesis outlines, where context, such as one's background knowledge, plays an important part in bridging understandings. If, as the double empathy problem suggests, dispositional differences in neurology contribute to two-way breakdowns in understanding between neurotypical and autistic actors, then would we observe increased difficulties when additional divergences are involved? For example, would the neurodivergent intersubjectivity observed in Study 2

between autistic people be applicable when actors come from different cultures or ethnic backgrounds? If social disability arises from a mismatch between the individual and their environment, is it possible that such disabling effects can be *amplified* where there is an intersection between neurodivergence and other socio-cultural factors? Certainly, if, as the evidence in this thesis presents, it is possible to identify factors which would potentially ameliorate disabling aspects of the double empathy problem, then it is also possible that disabling aspects can be amplified when factors contribute to increased differences. It is not possible within the scope of this thesis to explore all possibilities of how dispositional differences affect social interaction. The contribution of this thesis is to at least provide new indicators about previously unexplored factors that affect the double empathy problem.

Another limitation, not addressed within the specific studies themselves, is the potential for knowledge created within the thesis to “loop back” and affect the way autistic people see themselves and each other. Looping (See Chapter 3, p. 61-63) refers to the process whereby knowledge created about autism affects the social construction of autism (i.e. the way people make sense of autism and communicate with each other). Throughout the course of the thesis there were many engagement activities with autistic people (e.g. Open Minds outlined in Chapter 4, p. 81) resulting in dialogue, both verbal and through social media platforms such as Twitter, where autistic people have expressed a feeling of liberation and validation in response to my research outputs (e.g. Tweet received on 05/08/2018: “All of this [referencing findings of Study 2] is how I prefer to communicate. Just observe my son and I together. Thank you for your useful research and for your respectful interpretation of results”). However, in terms of a looping effect on data gathered, I do not think that there was sufficient time for my initial research outputs to affect the way autistic people presented themselves in Study 2, nor non-autistic participants in Study 3, thus it is unlikely that my data were impacted as a result of my research activities.

A final limitation relates to the investigative angle of the thesis. As mentioned in Chapter 2 (p. 16-19), the framing of the three studies has been governed by the assumption that autistic sociality is not solely determined by individual abilities but is also shaped by socio-cultural factors. This assumption has directed research interests away from the traditional and salient social difficulties autistic people may demonstrate as individuals, with my attention instead focussed on the psychology of non-autistic social actors, and the possibilities (not limitations) for shared understanding between neurodivergent people. This is thus a positive framing which is no doubt influenced by my own positionality through my personal connection to Cambell and autism in general. Yet this positive framing raises questions about the extent to which my expectation and experience shaped the findings, particularly since I have used an abductive methodological approach, wherein one's position within the field of action is part of the process of generating ideas. However, an advantage of detailing the abductive logic used is that it provides greater transparency about how my positionality and experience has influenced the direction of investigation. Certainly, it has been advantageous to remain open and positively orientated towards autistic people since this has provided a level of sensitivity in inquiry (e.g. discovering that interactions during video-gaming showed sophisticated social coordination) which a hypothetico-deductive model could not achieve (since it proceeds in small incremental and theoretically governed steps, whereas Study 2 was an intuitive leap based on a surprising observation). Thus, my positionality within the field of action meant that previously unrecognised unconventional social forms of relating could be empirically observed and analysed. Moreover, each of the three studies documented has been systematic. Study 1 used numerical ratings to drill down into qualitative explanations provided by participants. Study 2 developed a systematic rating framework for mapping neurodivergent interactions, with analysis directed by consistent and fragmented clusters of dialogue. Study 3 provided no associated context with the disclosure of an autism diagnosis, and the

comparative design with a no disclosure condition and a dyslexia condition provided a controlled systematic way for quantitatively analysing self-report and behavioural data. Studies 1 and 2 also involved inter-rater reliability adding rigour to the process. These systematic approaches aimed to largely mitigate the potential for positive bias in the construction and interpretation of the research undertaken.

Contributions of empirical studies

Previous research on autistic sociality has often been (a) framed by a deficit model of cognition, (b) studied in predominantly cross-neurological situations, and (c) analysed in terms of the individual with a diagnosis with much less critical reflection on the role of others in perceiving and responding to autistic people. Consequently, although the social challenges are widely recognised and reasoned to be two-way (Milton, 2012), there is a paucity of research for understanding how the social potential of autistic people is manifested interactionally that considers both autistic and non-autistic perspectives.

To facilitate a two-sided exploration of autistic sociality, the central research question about the processes which underscore the double empathy problem was distilled in terms of three areas of social life for investigation: the relationships autistic people share with others, the activities that autistic people are naturally motivated to engage in, and cultural effect of the label of autism on non-autistic social perception and behaviour (these areas of social life were different foci of interest for each study, although as a phenomenon social life is not so divisible and indeed their features were present in each study).

A central feature of relationships is that they comprise multiple perspectives on Self and Other (Ichheiser, 1943; Laing et al., 1966), yet in addition to the well documented difficulties of autistic people imagining neurotypical perspectives, difficulties in imagining autistic perspectives may also contribute to gaps in mutual understanding (Sheppard et al., 2016).

Study 1 examined perspective-taking from both sides of real relationships involving autistic adults and their family members; Study 2 examined interactions between autistic people and their neurodivergent ways of creating shared understanding; and Study 3 examined assumed interactions with an autistic online collaborator and the effects of diagnostic disclosure on non-autistic social perception and behaviour.

RQ1: What is the bi-directional nature of perspective-taking between autistic and non-autistic people?

Study 1 implemented the IPM methodology, resulting in three significant findings. First, within relationships misunderstandings were shown to be two-sided, experienced by both autistic adults and their family members in terms of making inaccurate predictions about how they would be rated by their partner. This finding is significant because it provides empirical evidence in support of existing reports from autistic people about how a constituent part of their social impairment is being misunderstood by non-autistic others (Milton, 2014; Ridout, 2017). A second finding was to show that at a group level, autistic participants correctly predicted that they would be negatively rated by their family members on a number of topics related to social life, despite themselves disagreeing with such views. They were also able to articulate, in some cases, the thought processes behind their family members' rating. This finding is significant because previous research has theorised that autistic people struggle to take other people's perspectives because they are unable to decentre from their own worldview (Frith & De Vignemont, 2005). A third finding was to show that family members inaccurately predicted poor perspective-taking by their autistic relations, attributing such difficulty to the label of autism. This confirmatory bias which negatively affects the evaluation of autistic social potential by their family members illustrates the process of "looping effects" of the social construction of autism (Hacking, 1996) and provides evidence in support of autistic claims of being misrepresented or misunderstood by non-autistic others (Chown, 2014; Milton, 2017; Yergeau & Huebner, 2017).

Together, these findings reveal a two-sided perspective-taking dynamic which results in under-recognised autistic social potential and suggests the need for further research on the contextual factors surrounding real life-autistic relationships. For example, the finding that autistic participants could successfully differentiate their own perspectives from that of their family members suggests that there could be a significant difference between abstract measures of perspective-taking, and real-life perspective-taking with familiar others. Unlike abstract scenarios, interpersonal relationships involve a shared history between perceiver and target which acts as a vital resource to make inferences about other people's dispositions (Ickes, 1993). One can imagine that autistic participants in Study 1 had significant experience about being informed of their poor perspective-taking or unconventional social behaviour by their family members, which would have led them to predict negative ratings. Likewise, family members may have drawn on the frustration of such interpersonal experiences in their over-generalisation of autistic egocentrism. Abstract and real-life perspective-taking involve markedly different processes and resources, thus in comparison to the well-documented implicit theory of mind tasks where autistic participants have performed poorly (Baron-Cohen, Leslie, & Frith, 1985; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), Study 1 highlights that perspective-taking is not purely a universally deployed cognitive ability, but rather an interactional achievement sensitive to contextual resources.

Study 1 also has limitations. It focusses on explicit perspective-taking, where participants are presented with topics and asked to explain their thoughts about specific others, whereas studies of autism have largely focussed on implicit theory of mind (Rajendran & Mitchell, 2007). The differences between more intuitive perspective-taking and consciously effortful perspective-taking have been researched in terms of a dual-system approach to cognition (Frith & Frith, 2008), with autistic participants struggling more in the former than the latter (Schuwerk, Vuori, & Sodian, 2015), although some studies find that autistic adults are poor at

both (Hutchins et al., 2016). Indeed, the observed ability of autistic adults to “hack out” through using effortful processes the correct answers to more intuitive perspective-taking questions has been interpreted as a problem in experimental design rather than an asset of social ability (Happé, 1994), since there is the concern that autistic participants are able to arrive at correct answers without truly understanding the underlying concepts (Hadwin, Baron-Cohen, Howlin, & Hill, 1996). Certainly in Study 1 autistic participants were less forthcoming than their family members in providing explanations for the ratings, but it is unclear whether this was due to a lack of deeper understanding or a difficulty in articulating such thoughts to the researcher. It could also be argued, on theoretical grounds, that “hacking out” inferences about other people’s dispositions is not an anomaly but rather a common process in relationships, since we never truly know other people’s minds but rather make approximations based on the partial knowledge we have. For instance, Perner et al. (2007) has examined the relationship between episodic memory and theory of mind, showing a strong link between theory of mind and the ability to re-experience past events (Perner et al., 2007). While successful perspective-taking is likely to involve a combination of implicit and explicit perspective-taking skills, the first step in developing such skill is the ability to recognise that there are differences in perspective, which the participants in Study 1 were able to identify. A second step is whether the socio-cultural environment supports the development of perspective-taking beyond initial recognition, which Study 1 suggests may not be optimised, because autistic participants do not communicate the reasoning for their ratings as often as family members, while family members themselves may be negatively influenced by the label of autism.

From the perspective of family members, there could be several explanations as to why they may fail to detect the perspective-taking potential autistic participants demonstrated. As mentioned above, there may be problems with verbal feedback, with autistic participants not

making their thought processes salient to others on a regular basis. Rather than reflecting a deficit in perspective-taking, this may highlight difficulty in articulating and negotiating perspectives interactionally, which appears from the non-autistic viewpoint as a mentalising issue rather than communication problem. Low verbal feedback may have a cascading influence on processes of intersubjectivity, since other non-autistic interlocutors are not optimally placed to support and build on shared understanding, but must rather make their own assumptions, which could amplify any underlying bias associated with the label of autism. There may also be a memory bias, because autistic perspective-taking abilities may not be consistently deployed but rather sporadically occur in social interactions, with failures to perspective-take remaining more salient in memory than successes. This is because successful perspective-taking meets normative expectation and thus could remain undetected in terms of neurotypical awareness. Another explanation for failing to detect autistic perspective-taking is ability may be associated with an overgeneralisation of egocentrism because other autistic traits have typically been interpreted from the viewpoint of the neurotypical perceiver. For example, autistic traits such as repetitive and fixated interests may amplify perceptions of egocentrism, because they are behaviours which appear to not seek the involvement of others (Jaswal & Akhtar, 2018). Thus difficulties in perspective-taking combined with other apparently egocentric difficulties in social behaviour could lead to an overgeneralisation by family members of social limitations and restricted adaptability. Further research which compares perspectives between family members and autistic relatives can help shed further light on these possibilities. The two-sided dynamic of Study 1 at least highlights that a pathway to reducing misunderstandings in autistic-family member relationships could be interventions designed for family members, as well as autistic people. For example, it remains to be seen whether knowledge about confirmatory bias can be used to

correct such biases and reduce the potential double empathy effects resulting from the label of autism.

The findings of Study 1 also have wider implications in terms of current debates about mental health and employment in autism. The finding that autistic participants are aware of being perceived negatively by others, but are less forthcoming in articulating with others the rationale for this perception, indicates a potential state of negative self-esteem and self-awareness that compares with reports on high psychiatric comorbidity with depression and anxiety (Lugnegård et al., 2011). Indeed, a recent study about depression in autism identified “acceptance from others” as a significant predictor of depression and stress (Cage, Di Monaco, & Newell, 2017). Autistic people may thus have the dual challenge of being both aware that they are could be unfavourably viewed in social terms by others, and similarly because of their communication difficulties are unable to address or articulate their concerns to ameliorate the perceptions others may have. But while autistic self-awareness may potentially lead to depression, it certainly demonstrates an under-recognised strength in introspection, and as such it is important to recognise that the detailed accounts provided by autistic people have social validity (McGeer, 2004).

Moreover, the findings also raise questions about whether autistic people are adept at knowing how others perceive and value their strengths, since in Study 1 autistic participants were anticipating predominantly negative misunderstandings. This could have important implications in employment settings, where autistic employees may be unsure about the positive aspects they bring to a job role (Heasman, 2017a), which could have a cascading effect on the ability of employers to reinforce such aspects. To some extent this could explain why autistic people typically demonstrate a very fragmented work history with many changes in job roles and periods of unemployment (Ohl et al., 2017).

In summary, the contribution of Study 1 is to further knowledge about the two-sided nature of misunderstandings experienced in family relationships involving autistic adults, with important implications for other domains of social life.

RQ2: What are the features of neurodivergent interaction when neurotypical norms are removed?

Beyond the ability to take perspectives, social interaction also involves sharing and negotiating perspectives in everyday activities. Study 2 aimed to build on existing ethnographic research about autism and intersubjectivity (Bagatell, 2007; Kremer-Sadlik, 2004; Ochs, 2015; Ochs, Kremer-Sadlik, Sirota, & Solomon, 2004; Sirota, 2004; Solomon, 2015; Sterponi et al., 2014) to examine specifically neurodivergent forms of intersubjectivity that occur between autistic people. Through a mixed methods approach involving the systematic rating of conversational turns and follow-up qualitative analysis of peaks and troughs in coordination, Study 2 was able to identify two forms of neurodivergent intersubjectivity. Both of these forms were common across interactions and are significant because they highlight unconventional ways in which autistic people are able to achieve social coordination outside of neurotypical norms.

First, participants demonstrated a low demand for social coordination, in the sense that, over multiple turns, participants would be disconnected from each other in terms of coherence, affect or symmetry (i.e. assertiveness). However, although this often resulted in tangential monologues, it had beneficial effects as it allowed players to externalise the process of their own individual sensemaking, and in doing so present a cue for another player to reciprocate understanding (e.g. in Example 4, Study 2 where participants separately articulated embodied reactions to the game and the structure of past games, converging on the topic of how games are designed to create the experience of vertigo). It also had the additional advantage of ameliorating many of the challenges associated with fragmented or potentially disruptive

turns (e.g. players shouting at each other). Second, participants made very generous assumptions of common ground, often sharing specific references which could result in the rapid construction of rapport and humour as it allowed underlying sub-cultures to be identified. However, when assumptions of common ground failed to be reciprocated, it was not problematic as autistic participants moved on to the next topic. In this respect, the two features of neurodivergent intersubjectivity identified are more than isolated features, they complement each other forming a functional system that can facilitate shared understanding without being disrupted by unexpected and tangential turns.

The forms of neurodivergent intersubjectivity identified in Study 2 further our understanding of autistic sociality, because they show how in a setting between autistic participants, where neurotypical conventions are not reinforced, social coordination can be achieved in unconventional ways. The extent to which neurotypical norms would be an obstacle to such forms of neurodivergent intersubjectivity cannot be assessed purely on the basis of Study 2, which chose to focus on describing autistic interactions without benchmarking against neurotypical interactions. However, we can speculate on the basis of existing literature that such forms of intersubjectivity are not only likely to be unrecognised, but also stigmatised in neurotypical settings. From a neurotypical viewpoint, loose social coordination is undesirable since it contravenes the cooperative principles of Grice's maxims, in particular the maxim of quantity (to not make the contribution more than is required) and the maxim of relevance (Grice, 1989). This view is more than a sociocultural norm, it may also have a universal basis in terms of the economy of effort required to make communication efficient. Dingemanse et al. (2015) have examined repair sequences across languages and cultures identifying a common principle of "specificity", where speakers choose the most specific type of repair initiator possible (an example of an open other-initiated repair is "huh?", whereas a more specific repair is one that seeks confirmation about a part of a preceding utterance, e.g. "she

had a boy?") (Dingemanse et al., 2015, p. 5). Specificity serves a dual purpose in minimising the effort for the speaker being asked to address a problem and for the dyad as a whole in terms of minimising the number of turns required to complete the repair sequences. Thus, the interactive achievement of mutual understanding across languages and cultures is strongly governed by a conservation of labour required to "fix" misunderstandings. From this viewpoint neurodivergent intersubjectivity may be deemed inefficient since reciprocated coordination can require multiple turns, and missed turns, to come to fruition. Despite this, I believe there is an argument that it is not as inefficient as may first appear from a purely external view of the interaction, because the communicative effort required to make neurodivergent intersubjectivity functional is offset by the freedom with which autistic interlocutors can continue or discontinue with a particular conversational topic. To use an analogy of running a race, neurotypical communication may be likened to maintaining a constant efficient speed by plotting a path over the flattest terrain. Neurodivergent communication on the other hand explores a hilly terrain with recovery aided by the freedom to stop or start progress at one's own pace, instead of maintaining the pace of the group. To explore aspects of effort required, further research would benefit from reconstructive interviews with participants who could perhaps review and rate their own video recordings of interactions. This could facilitate a subjective analysis of how the principles of specificity and conservation operate within a neurodivergent interaction.

Further research could also potentially explore the link between neurodivergent intersubjectivity and productivity to understand how alternative and unconventional ways of achieving coordination affect collaboration performance. This research could be relevant to understanding how to optimise employment for autistic people. In terms of the specific activity of video-gaming, participants were able to effectively coordinate and complete in-game tasks, in some cases to a very advanced level of game progression (e.g. Call of Duty

where players were able to progress to Level 10 on a survival mode). How this may translate into a different domain of social interaction which is not contingent of prior experience remains to be explored. A potential insight in literature about the relationship between intersubjectivity and productivity might be gained by a recent study by Hawlina, Gillespie and Zittoun (2017). They explored the “diversity hypothesis”, which suggests that “disparate perspectives are beneficial to organizational creativity and innovation” (Hawlina et al., 2017, p. 1). Interestingly, although perspective-taking was strongly associated with greater creativity, they found that interactional perspective-taking behaviours, such as questioning, signalling understanding or repairing, were associated with lesser creativity. This is because some dyads could become side-tracked from the task in question as they attempt to elaborate and justify their ideas more to one another, whereas other dyads which were less focussed on tight coordination were able to stay closer to the task objective of generating more ideas. However, critical to the success of moving on was the recognition that other’s ideas were valuable. Thus, in one respect (e.g. loose coordination) we may find that neurodivergent intersubjectivity is suited towards creative tasks, but in another respect (e.g. signalling recognition of others’ values) we may find that it requires a degree of social strategy in order to be successfully deployed. Understanding how to maximise opportunities for intersubjectivity between autistic and non-autistic people requires further evidence about the optimal trade-off between different communication styles and the factors which enable them to flourish.

Study 2 also raises a question about the incompatibility of neurodivergent intersubjectivity with more standardised forms of efficient communication, and whether this leads to a potential neurotypical bias in the established interpretation of autistic sociality. For instance, the same features that support neurodivergent intersubjectivity observed in Study 2 have been traditionally understood as undesirable features of autistic-to-neurotypical interaction. A

generous assumption of common ground may feed into perceptions of egocentrism because from the neurotypical viewpoint it looks as though the autistic individual is prioritising their interests over the interests of others. However, interactions between autistic people are not necessarily egocentric if both parties are sharing their own thoughts and interests and reciprocate each other's turns when a significant shared common ground is identified. Likewise, having a low demand for social coordination could contribute to perceptions of lacking empathy, because autistic people may suddenly change topic without warning which looks as if it is discarding the value of another speaker's thoughts. Yet, if both parties do not seek tight coordination the risk to losing face is minimised, as shown by the presence of disruptive turns followed quickly by pockets of tight coordination. This has important implications for understanding the nature of the double empathy problem, specifically the question of what is lost when there is incompatibility between norms and expectations of different actors with different neurological dispositions. Study 2 highlights that when broadening norms around expected communication styles, more forms of coordination and shared understanding are possible for neurodivergent people. Thus, autistic people certainly have unrealised social potential, and recognising such potential represented a way to ameliorating the double empathy problem, not only to improve cross-neurological relations, but also to potentially maximise the sociality of autistic people beyond what has previously been observed.

RQ3: How does diagnostic disclosure affect social perception and behaviour towards autistic people?

Study 3 examined how diagnostic disclosure of autism affected the social perception and behaviour towards an assumed human collaborator, through an online video-game, Dyad3D. It aimed to make sense of the conflicting evidence regarding positive and negative discrimination that studies of vignettes and reports from autistic people have highlighted respectively. Study 3 used an online computer-mediated game, Dyad3D, to simulate

interactions and control the independent variable of diagnostic disclosure. In doing so it was able to (a) demonstrate that Dyad3D is a viable method for successfully deceiving participants and efficiently gathering behavioural data for comparison with self-report data; (b) identify positive self-report discrimination in the form of higher ratings of intelligence and usefulness for information shared when a diagnosis of autism was disclosed, but also potential negative discrimination in that participants perceived themselves to be more helpful than they actually were; and (c) illustrate that the way people make sense of a diagnosis can vary from using the diagnosis to explain misunderstandings to perceiving it to be redundant information.

These findings have a number of implications. First, they help to provide a window into understanding the discrepancy between positive and negative discrimination associated with diagnostic disclosure of autism. Existing studies have highlighted that increased levels of autism knowledge are associated with more positive social ratings and lower stigma (Gillespie-Lynch et al., 2015; Gillespie-Lynch, Kapp, Brooks, Pickens, & Schwartzman, 2017; Obeid et al., 2015; Sasson & Morrison, 2017). This suggests that there is an experiential gap which underscores whether diagnostic disclosure results in positive or negative discrimination. Study 3 makes the contribution that non-autistic people may also be unintentionally inaccurate about the extent to which they are helpful towards autistic people, in addition to lacking prerequisite knowledge about the diagnosis. This could explain why non-autistic people rate themselves and others favourably, because they rate in line with their own positive sense of identity, yet a lack of corresponding helpful behaviour will only be noticed by autistic people in the form of negative discrimination. If non-autistic people are unaware of a gap between their own perceptions of helping and their actual behaviour of helping, they would be less predisposed to listening to autistic people should they attempt to point out any shortfall. Thus, the “helping bias” could potentially explain why in daily social

life autistic people often encounter negative discrimination (Treweek et al., 2018), while non-autistic people remain unaware and broadly positive in their outlook. Interactionally, such a bias could have a cascading effect in terms of reinforcing a double empathy disjuncture rather than ameliorating it, since it would feed frustrations on both sides of relationships. Autistic people may feel their concerns are not being addressed or listened to, while neurotypical people would feel that their efforts towards helping are not being fairly recognised. Such a finding aligns with evidence from other interpersonal contexts involving people with and without disabilities. For example, in relationships between caregivers and people with aphasia, caregivers have been shown to demonstrate a variety of helping behaviours which, paradoxically, reinforce the assumption of disability and potentially restrict the agency of people with aphasia to direct conversational action (Gillespie & Hald, 2017).

A second insight provided by Study 3 is that explanations provided by participants about how the disclosure of autism affected the collaboration are both varied and not very detailed. For many participants the diagnostic disclosure explained why there was a misunderstanding in the third level of the game, with the IVA not being aware of the participant remaining trapped in a prison. In this respect the diagnostic disclosure worked as part of people's sense-making about the collaboration. However, some participants felt that the information was totally redundant, thus depending on the collaborator, diagnostic disclosure could potentially frustrate others rather than improving understanding. In Study 3 no extra context was provided about the diagnosis in order to see what information people import into the experience, with the varied explanations highlighting that autism experience and knowledge is partial at best. Providing more contextual information about the diagnosis and its possible impact on the collaboration would perhaps help to fill a void in understanding about the diagnosis and stabilise its positive effects. Yet, given that some participants were so dismissive of the diagnosis, I do not think that further context would totally remove the

potential for stigma. Clearly there are dispositional characteristics associated with the perceiver that may impact how diagnostic disclosure is rendered meaningful. Certainly it would be interesting to see the responses of autistic people to playing the Dyad3D game, particularly since research has shown that in-group identification facilitates more favourable perceptions (Gernsbacher et al., 2017). Study 3 therefore highlights the need for further research about the social construction of autism and how people draw on its aspects when making sense of a social situation.

Since the aim of Study 3 was to test the viability of using a computer-mediated experience to simulate social interactions, aspects of the design were deliberately simple and abstract. We therefore did not explore the effect of different modalities of stimulus (e.g. auditory, visual) on social perception and behaviour, which in other studies have been shown to shape social perceptions towards autistic people (Sasson et al., 2017). For example, audio-visual data can provide a rich source of information about speech prosody and eye-gaze which influence social perceptions of autistic people (Brewer et al., 2016; Faso et al., 2014; Paul, Orlovski, Marcinko, & Volkmar, 2009). Study 3 highlights that even at a very abstracted level of virtual spheres navigating through a maze, diagnostic disclosure of autism has profound social effects. Further studies could explore the effect of different modalities to see how this impacts collaboration.

Another potential variable to explore is whether changing the nature of the collaboration would result in different outcomes. The current task involves a misunderstanding which negatively impacts scores. This choice was made in order to provide participants with a key moment in the interaction to talk about and problematise, in doing so drawing on their underlying knowledge and representations of autism. However, the game could equally be configured so that everything goes perfectly and the participant believes they score the highest out of all the dyads. Would participants mention the diagnosis as often in such

circumstances compared to when the outcome is sub-optimal? If participants have a predisposition to perceiving their pairing with an autistic person as a hinderance, would participants have an elevated sense of positive identity if an optimal outcome is achieved, because it is done so *despite* constraints? These are interesting questions which further iterations of Dyad3D could explore.

Study 3 raises important questions about the many domains in social life where autistic people may need to disclose their diagnosis. For example, eye-witness testimony in court remains a precarious situation for autistic people who may be poorly supported or even misled by untrained legal professionals (George, Remington, Crane, Pophale, & Bingham, 2018; Maras & Bowler, 2014). Study 3 highlights why diagnostic disclosure is a risk-reward decision, and one which would be potentially hard to make for autistic people since it requires a fine attunement to the politics of the social situation.

Towards an extended model of Double Empathy

In understanding autistic sociality as being a relational, two-way process wherein one's social opportunities are co-determined by actors, this thesis moves away from a traditional view of autism being an impairment of the individual and moves towards a more social model of disability. The findings of this thesis have helped to provide indicators about the dynamic of the double empathy problem between autistic and non-autistic actors, as well as between familiar and unfamiliar relations. Figure 9 below illustrates how we might conceptualise the combined contribution of the findings presented in this thesis in terms of understanding the double empathy problem:

FIGURE 9: EXTENDED MODEL OF DOUBLE EMPATHY

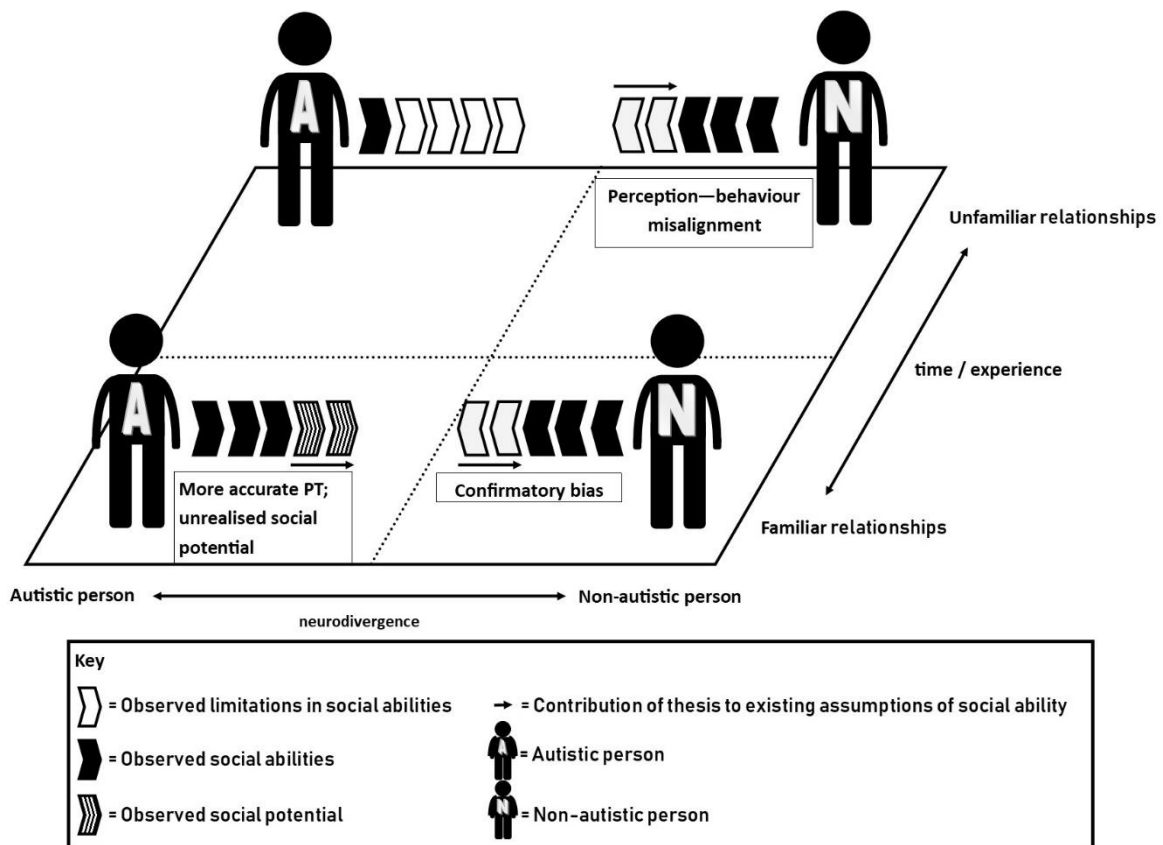


Figure 9 delineates two dimensions of the double empathy situation the empirical studies have explored. First, there is neurodivergence between actors, represented on the x-axis by autistic people (marked with an “A”) on the left side and neurotypical people (marked with an “N”) on the right side. A second dimension is whether the relationship is familiar or unfamiliar, represented on the y-axis. The chevrons between actors are used to indicate the direction and quantity of observed social ability. For example existing research on autism has explored in depth how autistic people understand unfamiliar neurotypical others, with studies highlighting difficulties in theory of mind, executive functioning, non-verbal behaviour (See Chapter 3, p. 46-51). On the basis of this literature, in Figure 9 only one filled chevron points from an autistic person to an unfamiliar neurotypical person, to indicate observed limitations in social ability. The contribution of this thesis is to reveal more about the double empathy dynamics across different actors and situations, depicted in the rest of Figure 9. For example,

Study 1 and 2 take as its starting point the idea that everyday social perspective-taking is an interactional achievement drawing heavily on interpersonal expertise, thus to understand autistic sociality requires an examination of how familiar relationships operate in addition to the well-documented abstracted perspective-taking ability. Study 1 finds that autistic people are fairly accurate at imagining the perspectives of familiar others, an increase in observed social ability shown in Figure 9 via three filled chevrons (in comparison to the one filled chevron in an unfamiliar relationship). Moreover, the non-autistic family members were not as accurate as they believed themselves to be, demonstrating a confirmatory bias where they underestimated the social perspective-taking of autistic relatives in light of their diagnosis. Figure 9 thus depicts a reduction in assumed social ability of neurotypical people in familiar relationships with autistic people, with only three chevrons filled instead of what might have been considered the ceiling performance of a neurotypical as a maximum of five chevrons.

Study 2 makes the contribution that in familiar relationships between autistic people, there are neurodivergent ways of building shared understanding which are contingent on norms associated with a loose communication style. Study 2 thus highlights that autistic people may have unrealised social potential, indicated in Figure 9 by the partially filled chevrons. Examining the dynamic of familiar relationships therefore indicates the potential for there to be more equitability between actors with different neurological dispositions, because autistic people are not solely the cause of misunderstandings, with their social potential under-recognised, while similarly neurotypical people are not immune to their own biases in social perception. This thesis therefore suggests that the double empathy dynamic is very different in familiar relationships compared to the previously well-documented unfamiliar relationships.

Moreover, Study 3 helps to reveal more about the double empathy effects in terms of how neurotypical people perceive unfamiliar autistic others. The study highlights a potential

mismatch between social perception and social behaviour, resulting in a bias in perceiving the extent to which one is actually helpful. Thus, once again the presence of such a bias could limit the social possibilities of neurotypical people towards autistic people, indicated via a reduction of filled-in chevrons for neurotypical people perceiving unfamiliar autistic people in Figure 9.

Taken as a whole this extended model of double empathy illustrates a more fluid understanding of autistic sociality, with familiar relationships potentially opening up social potential for autistic people. Similarly, neurotypical people may struggle with biases in the perception of Self and Other in such relationships, which persist even if relationships are familiar. Such a model builds upon ideas about an algorithm for autistic sociality presented by Ochs and Solomon (2010). Their model focussed more on the mode of communication (e.g. corporeal alignment, tempo of speech) as variables affecting the range of social coordinations available to autistic people, rather than the dispositional characteristics of actors. Yet the key similarity is the observation that sociality fluctuates across different domains of social life, and to understand what constitutes an enabling environment for autistic people requires sensitivity to such variations. Further research could build on a fluid understanding of autistic sociality and examine more social dimensions, for example social interaction across different activities (e.g. workplace, domestic life, social life), communication across different media (e.g. face-to-face communication, computer-mediated communication), and mappings across different actor divergences (e.g. ethnic minorities, gender, age).

A more fluid model of double empathy would be advantageous for reducing the potential for unintentionally amplifying social disability. For example, a new autistic employee may rapidly find themselves in a workplace scenario where there are many implicit expectations about behaviour which are not articulated by the employer (e.g. thus an unfamiliar autistic-to-

neurotypical relationship with high pressure in an unfamiliar workplace setting). It is easy to imagine that the employer may have an idea of productivity based on neurotypical modes of operating, and would not instinctively recognise the potential for optimising productivity through addressing implicit neurotypical biases, modes of communicating, the sensory environment, and investing in shared background understanding, as has been reported in personal conversations (Heasman, 2017a). Indeed, a more fluid model of autistic sociality can already be observed as underpinning trends in managerial thinking towards autistic employees, whereby a number of high-profile companies such as Microsoft and SAP are investing autism-specific programmes designed to maximise the opportunities for autistic employees by taking a holistic approach (e.g. optimising the physical environment, the communication channels, the support networks) (Austin & Pisano, 2017). It remains to be seen whether such corporate initiatives will help to draw research of autism towards a more dynamic and interactional approach to research on autism.

While differences between people (e.g. cultural, ethnic, political) give rise to difficulties in mutual understanding, through three empirical studies this thesis identifies aspects of the double empathy problem that makes it particularly salient and persistent for bridging autistic-to-neurotypical relationships, namely imagining autistic perspectives, recognising unconventional social opportunities, and overcoming biases associated with diagnostic disclosure of autism. Recognising the more distributed and fluid nature of autistic sociality as an interactional achievement could result in a more nuanced understanding of neurodiversity, with society better placed to support the abilities of autistic people. This could lead to a macro-level two-way effect: better societal understanding can enable autistic people to flourish, which will in turn, enrich society.

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APPENDIX

Supplementary files: Chapter 5

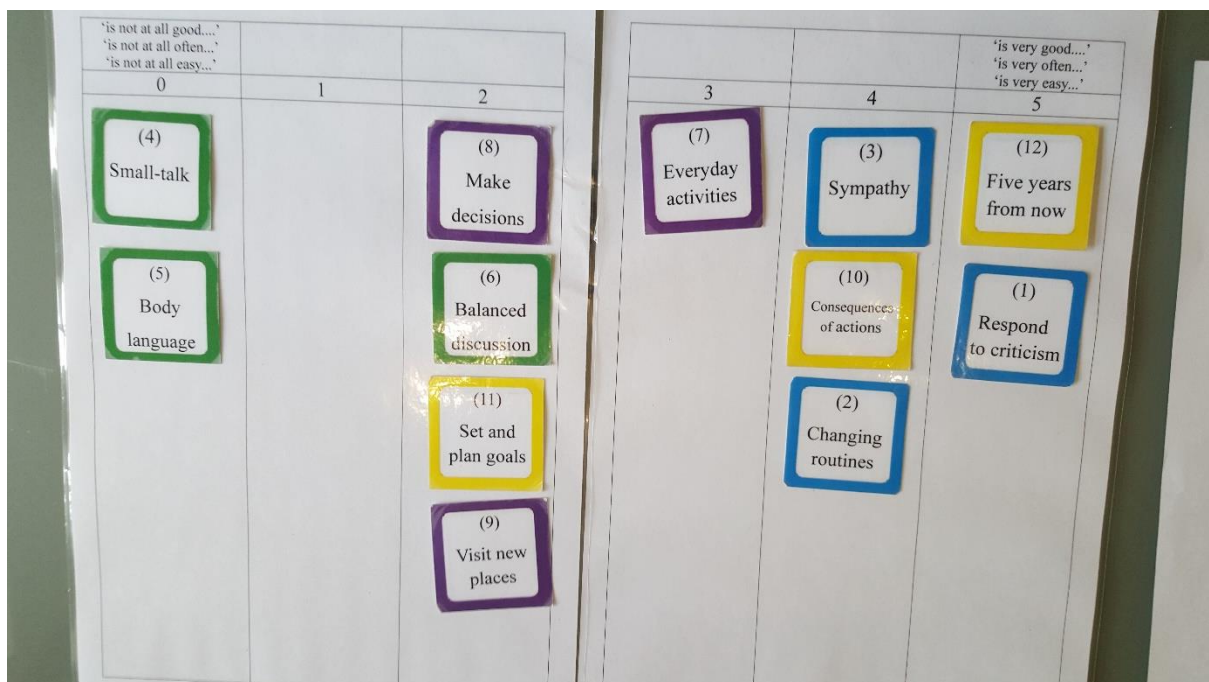
Wechsler Scale of Intelligence (WASI-II).

The Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II) was administered to participants with Asperger's syndrome to ensure there was no underlying learning difficulty. The Wechsler scale uses four sub-tests (Vocabulary, Similarities, Block Design, and Matrix Reasoning) to provide a brief and reliable measure of cognitive ability.

Talking Mats Example

An example of rating mat 2 (FM rating PwAS). Before each mat the researcher explained the perspective being captured (e.g. Self, Other or Meta) and adjusted the questions accordingly (e.g. “how would you rate yourself on topic X?”, “how would you rate your partner on topic X?”, “how do you think your partner will rate you on topics X?”).

Materials were laminated to make it easy to slide the topics around. Topics were also colour coded into groups of three: Blue = adaptability; Green = communication; purple = independence; yellow = future orientation. Colour coding the topics made the task more visually interesting for participants, and made it easy for the researcher to spot missing topics. Finally, all topics were numbered in order to assist the researcher in documenting the results in a systematic way.



IPM ratings produced by people with Asperger's (PwAS) and family members (FM)

	Rating Self (e.g. "How good are you at X?")		Rating Other (e.g. "How good is your partner at X?")		Rating Meta* (e.g. How do you think your partner will rate you for X?)	
	Median (range)		Median (range)		Median (range)	
	PwAS	FM	PwAS	FM	PwAS	FM
Handling criticism	2 (0-5)	3 (0-5)	3 (1-5)	1 (0-4)	2 (0-4)	2 (0-4)
Adapting routines	2 (0-4)	5 (3-5)	4 (1-5)	3 (0-5)	1 (0-3)	4 (1-5)
Sympathy	3 (1-5)	4 (3-5)	4 (2-5)	2 (1-4)	3 (0-5)	4 (1-5)
Small talk	3 (0-5)	4 (1-5)	4 (1-5)	2 (0-5)	3 (0-5)	4 (2-5)
Body language	3 (0-5)	5 (2-5)	4 (2-5)	2 (0-4)	2 (0-4)	4 (1-5)
Managing discussions	3 (0-5)	4 (2-5)	4 (1-5)	2 (0-5)	2 (0-4)	4 (1-5)
Handling everyday tasks	3 (1-5)	5 (4-5)	5 (3-5)	3 (0-5)	3 (1-5)	5 (4-5)
Making own decisions	3 (0-5)	5 (3-5)	4 (2-5)	2 (0-5)	2 (0-5)	4 (3-5)
Organisation	3 (0-5)	4 (2-5)	4 (0-5)	2 (0-5)	3 (0-5)	4 (3-5)
Visit new places	3 (1-5)	5 (2-5)	4 (3-5)	3 (0-5)	3 (0-5)	5 (3-5)
Consequences of actions	3 (0-5)	4 (2-5)	4 (2-5)	2 (0-5)	2 (0-5)	3 (1-5)
Five year view	3 (0-5)	4 (1-5)	4 (1-5)	3 (0-5)	2 (0-5)	3 (1-5)

* Meta = what person A thinks person B thinks of person A

Supplementary files: Chapter 6

Transcription Conventions adapted from (Markee, 2015)

.	Period indicates a falling, or final, intonation contour, not necessarily the end of a sentence.
?	Question mark indicates rising intonation, not necessarily a question.
,	Comma indicates “continuing” intonation, not necessarily a clause boundary.
↑↓	Upward and downward pointing arrows indicate marked rising and falling shifts in intonation
:::	Colons indicate stretching of the preceding sound, proportional to the number of colons
-	A hyphen after a word or a part of a word indicates a cut-off or self-interruption with level pitch
<u>word</u>	Underlining indicates stress or emphasis.
WOrd	Upper case indicates loudness.
°word°	Degree signs enclose whispered speech
=	Equal sign indicate no break or delay between the words thereby connected.
<word>	Indicates slowed down delivery relative to surrounding talk
>word<	Indicates speeded up delivery relative to surrounding talk
(())	Double parentheses enclose descriptions of conduct.
(word)	When all or part of an utterance is in parentheses, this indicates uncertainty on the transcriber’s part.
()	Empty parentheses indicate that something is being said, but no hearing can be achieved.
(1.2)	Numbers in parentheses indicate silence in tenths of a second.
(.)	A dot in parentheses indicated a “micropause,” hearable but not readily measurable.
[Separate left square brackets, one above the other on two successive lines with utterances by different speakers, indicates a point of overlap onset.
]	Separate right square brackets, one above the other on two successive lines with utterances by different speakers, indicates a point of overlap ending.
...	Ellipsis
(-)	Indicates unintelligible speech, each dash pertains to a syllable.

Within-interaction rating framework (W-IRF)

Category	Rating definitions and indicators		
Rating Values	-1	0	1
<p>Coherence</p> <p>Does the turn respond to the topic of the previous turn?</p>	<p>Definition: Fragmented from prior turn.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Ignores previous turn (2) Sudden topic shift (3) Interruptions (4) Refusing to interact 	<p>Definition: Partial and ambiguous responses.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Any turn that is not clearly 'consistent' or 'fragmented' (2) Unintelligible speech (3) Yes/no answers to open questions (4) Statements addressed to self (5) Statement addressed to characters in the game 	<p>Definition: Consistent with prior turn.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Answering questions comprehensively, yes/no answers to closed questions (2) "OK" to affirm action (3) Continuing topic of discussion (4) Etiquette greetings/goodbye (5) Repetition of phrases or sounds made by partner
<p>Affect</p> <p>What type of emotion is displayed?</p>	<p>Definition: Negative affect.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Extreme negative comments (2) Criticism (3) Frustration (4) Anger / Complaining 	<p>Definition: Affect ambiguous or not displayed.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Any turn that is not clearly 'negative or 'positive' affect 	<p>Definition: Positive affect.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Laughter (2) Complimenting (3) Encouraging (4) Supporting
<p>Symmetry</p> <p>How assertive/submissive is the turn relative to prior turn?</p>	<p>Definition: Submissive.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Hesitation (2) Turn interrupted (3) Short turns in comparison to partner 	<p>Definition: Assertive/submissiveness ambiguous or not displayed.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Any turn that is not clearly 'assertive' or 'submissive' 	<p>Definition: Assertive.</p> <p>Key indicators:</p> <ol style="list-style-type: none"> (1) Shouting (2) Interrupting (3) Imperatives (4) Very long turns in comparison to partner
<p>Note. Our goal was to understand within-interaction variability, and the constructs of coherence and symmetry examine alignment with respect to the prior turn. However, affect is operationalised in terms of harmony, because using alignment would result in an inflated affect score, because interpreting affect is dependent on observable features which may not always be possible to determine in each turn, thus leading to many 0 scores.</p>			

Table 3

Mean and standard deviations of intersubjective dimensions

Interaction	Coherence Mean (S.D.)	Affect Mean (S.D.)	Symmetry Mean (S.D.)
1	0.23 (0.91)	0.25 (0.64)	0.33 (0.67)
2	0.18 (0.90)	0.41 (0.60)	0.48 (0.55)
3	0.49 (0.79)	0.16 (0.54)	0.35 (0.63)
4	0.36 (0.85)	-0.14 (0.65)	0.11 (0.75)
5	0.31 (0.88)	0.09 (0.61)	0.25 (0.65)
6	0.34 (0.87)	0.08 (0.47)	0.44 (0.65)
7	0.31 (0.93)	0.24 (0.51)	0.35 (0.66)
8	0.19 (0.83)	0.04 (0.58)	0.13 (0.67)
9	0.22 (0.93)	0.15 (0.60)	0.26 (0.68)
10	0.13 (0.90)	0.09 (0.67)	0.48 (0.60)
11	0.48 (0.82)	0.36 (0.56)	0.53 (0.57)
12	0.44 (0.82)	0.25 (0.49)	0.46 (0.63)
13	0.44 (0.68)	0.33 (0.47)	0.35 (0.60)
14	0.33 (0.85)	0.41 (0.60)	0.36 (0.59)
15	0.34 (0.51)	0.50 (0.43)	0.18 (0.57)
16	0.39 (0.60)	0.38 (0.46)	0.39 (0.55)
17	0.45 (0.81)	0.16 (0.45)	0.39 (0.62)
18	0.41 (0.87)	0.37 (0.51)	0.42 (0.58)
19	0.41 (0.79)	0.23 (0.50)	0.21 (0.70)
20	0.24 (0.86)	0.36 (0.60)	0.25 (0.66)

Table 4

20-turn average highs and lows

Interaction	Coherence		Affect		Symmetry	
	Min	Max	Min	Max	Min	Max
1	-0.30	0.70	-0.30	0.65	-0.30	0.70
2	-0.45	0.72	-0.46	0.70	0.05	1.00
3	-0.20	1.00	-0.28	0.55	0.05	0.85
4	-0.38	0.94	-0.39	0.45	-0.45	0.56
5	-0.40	0.75	-0.39	0.60	-0.16	0.70
6	-0.16	0.90	-0.23	0.40	0.00	0.80
7	-0.17	1.00	-0.05	0.59	0.10	0.91
8	-0.18	0.64	-0.58	0.47	-0.13	0.47
9	-0.50	0.80	-0.26	0.80	-0.20	0.80
10	-0.55	1.00	-0.78	0.63	0.00	0.79
11	-0.21	1.00	0.00	0.76	0.00	0.81
12	-0.15	1.00	0.00	0.60	0.05	0.88
13	-0.11	1.00	0.00	0.68	-0.26	0.78
14	-0.27	0.87	-0.21	0.78	0.00	0.63
15	-0.10	0.75	-0.05	0.74	-0.20	0.55
16	-0.39	0.75	0.05	0.60	-0.35	0.80
17	-0.15	1.00	-0.13	0.60	0.05	0.80
18	-0.20	0.85	0.00	0.75	-0.08	0.65
19	-0.10	0.80	-0.05	0.50	-0.75	0.80
20	-0.54	0.94	-0.25	0.77	-0.41	0.82

Note. Across all interactions, all dimensions had 20 turns with a max score greater than +0.4 and a min score lower than +0.1.

Figure 3
 Mean scores for coordination dimensions (with standard deviation bars around the mean)

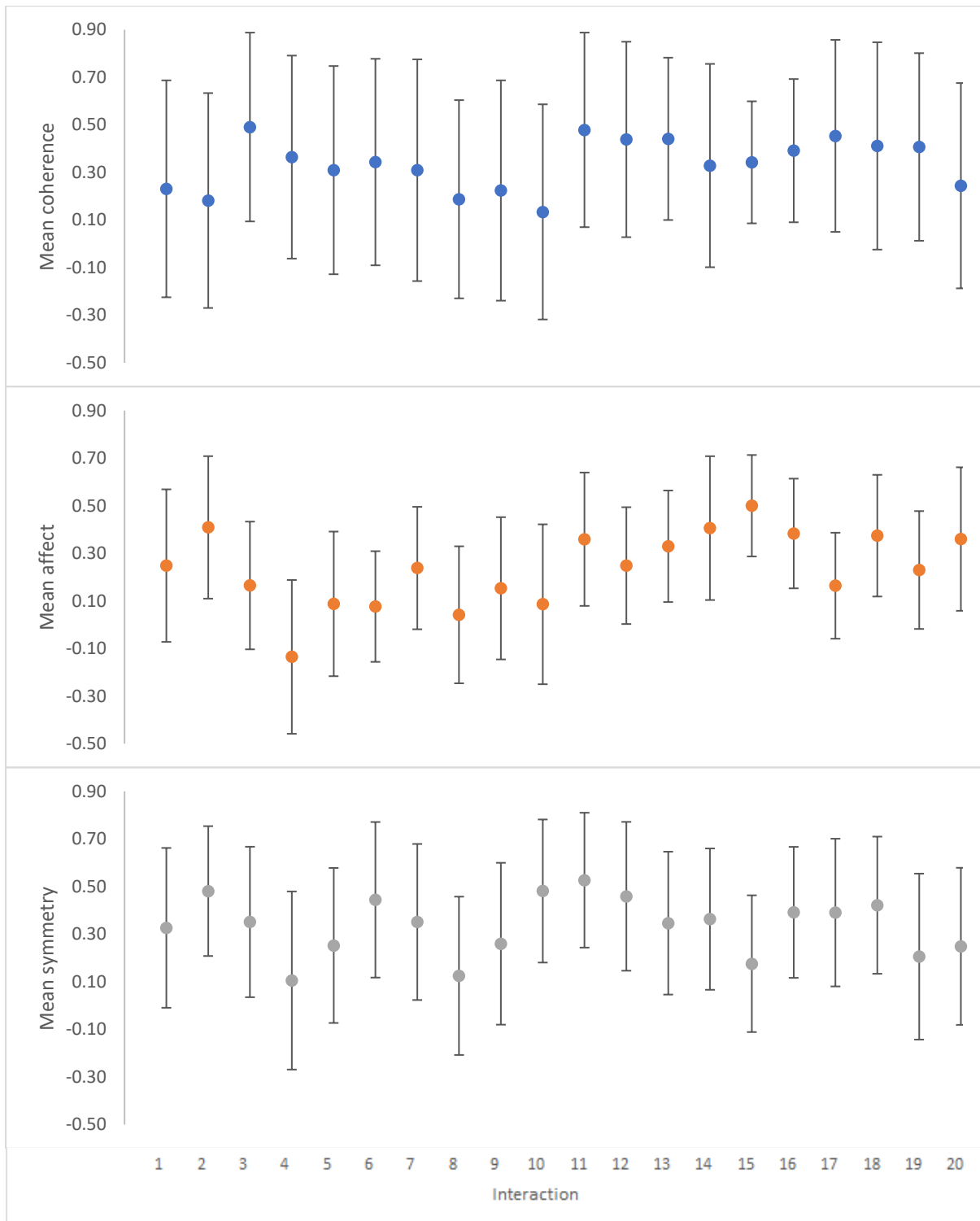


Table 5

Frequency of different voices (i.e. when the players assume a voice markedly different from their own) in the data sampled.

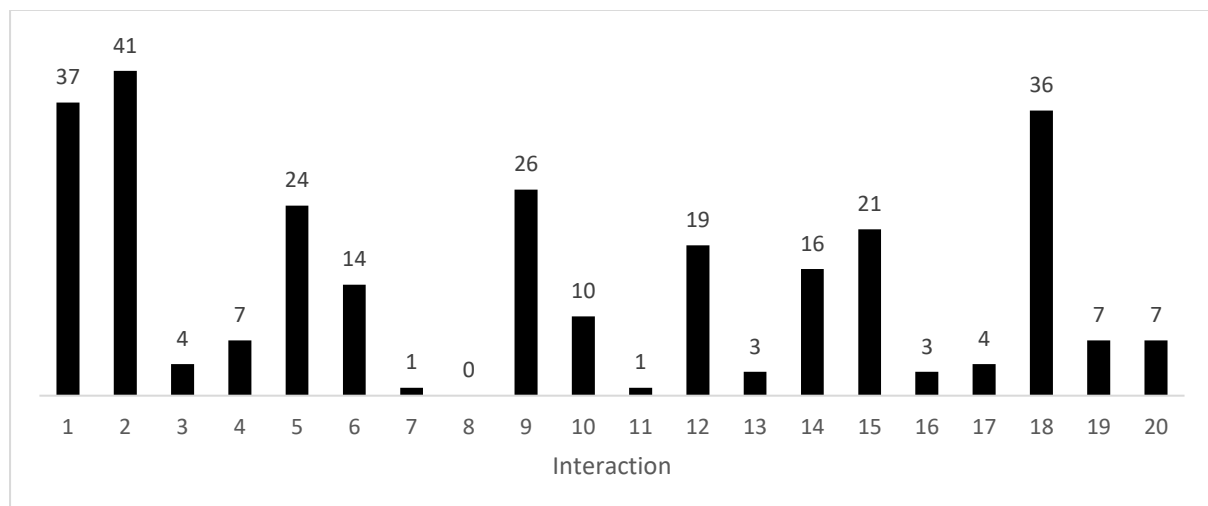
Voice type	Frequency	Reciprocated*	% Reciprocated
Player's avatar	115	81	70%
Fictional voices (TV/film/comics)	50	26	52%
Accents/dialects	33	13	39%
Game AI	24	15	63%
unknown voice	24	13	54%
Narrator	19	12	63%
Miscellaneous**	19	14	73%
Social voices (other players/family)	12	10	83%
Music lyric	12	4	33%
Total	308	188	

*Reciprocated = instances where voices, in the next turn, are responded to in terms of coherence, affect or symmetry.

**Miscellaneous = Instances of voices that were very infrequent and did not belong to any other categories. These included idioms, anthropomorphising the voice of the Xbox console itself, sound effects and musical jingles.

Figure 4

Distribution of voicing across interactions*



*This figure shows the distribution of voicing frequency (i.e. when the players assume a voice markedly different from their own) across all interactions.

Supplementary files: Chapter 7

To access a version of Study 3:

https://lse.eu.qualtrics.com/jfe/form/SV_9NUdJ5PfUbSoEOV

To access the source code of Study 3: <https://bitbucket.org/enghoff/dyad3d>

To access the server code and instructions for Study 3: <https://bitbucket.org/enghoff/dyad3d-server>

Interactive target

The image below has been included for the purposes of creating an interactive target for augmented reality technology that I have been developing. It functions like a QR code, in that it can be easily tracked by digital cameras with audio-visual content super-imposed onto the target. I have used a version of this target in a conference poster where a digital interactive virtual version of myself presents the key themes of research I have undertaken. The advantage of including such a target in the present document is that I can continue to update the associated software in light of intellectual developments related to the thesis. The interactive target is thus a means by which to make the thesis accessible and to keep its discussion up to date. I would like to especially thank Alexandra Sexton for her creativity in designing the target.

FIGURE 10: INTERACTIVE TARGET FOR AUGMENTED REALITY SOFTWARE

