



# Infancy, autism, and the emergence of a socially disordered body<sup>☆</sup>



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## ABSTRACT

Twenty academic psychologists and neuroscientists, with an interest in autism and based within the United Kingdom, were interviewed between 2012 and 2013 on a variety of topics related to the condition. Within these qualitative interviews researchers often argued that there had been a ‘turn to infancy’ since the beginning of the 21st century with focus moving away from the high functioning adolescent and towards the pre-diagnostic infant deemed to be ‘at risk’ of autism. The archetypal research of this type is the ‘infant sibs’ study whereby infants with an elder sibling already diagnosed with autism are subjected to a range of tests, the results of which are examined only once it becomes apparent whether that infant has autism. It is claimed in this paper that the turn to infancy has been facilitated by two phenomena; the autism epidemic of the 1990s and the emergence of various methodological techniques, largely although not exclusively based within neuroscience, which seek to examine social disorder in the absence of comprehension or engagement on the part of the participant: these are experiments done *to* participants rather than *with* them. Interviewees claimed that these novel methods allowed researchers to see a ‘real’ autism that lay ‘behind’ methodology. That claim is disputed here and instead it is argued that these emerging methodologies other various phenomena, reorienting the social abnormality believed typical of autism away from language and meaning and towards the body. The paper concludes by suggesting that an attempt to draw comparisons between the symptoms of autism in infant populations and adults with the condition inevitably leads to a somatisation of autism.

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## 1. Introduction

Autism's diagnostic history began in 1943 (Kanner, 1943) and while there have certainly been significant changes in the perceived symptomology of autism since that time, autism has come to be characterised as featuring a triad of core features in “impaired social interaction, impaired verbal and non-verbal communication and the presence of repetitive and restricted patterns of behaviour” (White, 2013: 114). While autism is widely understood as a ‘neurodevelopmental’ condition (Norbury and Sparks, 2013), there is neither cause nor cure known for it.

As others have noted, autism is “... the condition of fascination of the moment, occupying a number of cultural locations that

reflect a spectrum of wonder and nervousness” (Murray, 2008: 5). Undoubtedly, the social science department has been one cultural location to express a particular wonder with autism. To this end, a number of recent pieces have considered autism in relation to affect (Fitzgerald, 2013; Silverman, 2012), gender (Cheslack-Postava and Jordan-Young, 2012), and socio-historical change (Evans, 2013; Eyal et al., 2010; Nadesan, 2005). With reference to this final topic in particular, Danziger's claim that methodology is not ontologically neutral (Danziger, 1988) has been repeatedly borne out.

Kanner borrowed the term ‘autism’ from Bleuler, who referred to a mode of thinking evident “... in dreams, pretend play and reveries, and in the fantasies and delusions of the schizophrenic” (Feinstein, 2010: 6). This notion of ‘autistic fantasy’ was of central importance for psychoanalysis. Autistic fantasy, however, was a phenomena hard to capture within a psychology that had become increasingly dependent upon statistics and randomisation by the middle of twentieth century (Danziger, 2000: 344). Thus, as autism research moved towards experimental psychology in the 1960s the notion of ‘autistic fantasy’, so amenable to the psychoanalytic case study and yet so elusive within the laboratory, was largely abandoned (Evans, 2013: 4). It appears to be the case, therefore, that changes in

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theory and methodology appear to have instigated significant changes in the constructions of autism, with the previously central phenomena of fantasy and hallucination becoming divorced from the disease construct and replaced with cognitive and behavioural symptoms more amenable to experimental cognitive psychology. It has also been claimed that these changing methods allowed the space for an examination of the modularisation of cognition, meaning that it became possible to think of specific cognitive deficits as causing autism outside of an interpersonal, contextualised environment (Hollin, 2014; Nadesan, 2005: 120).

This article contributes to this growing body of social scientific knowledge concerning autism by considering two recent, related, changes of focus within the psychological investigation of the condition. Firstly, a turn to neuroscience; and, secondly, a turn to infancy which has seen research increasingly focus upon children that have not been, and may never be, diagnosed as autistic. Through an analysis of interviews conducted with neuroscientists and psychologists it is argued here that this turn to infancy has been facilitated by particular neuroscientific techniques which are performed on, rather than with, these children. Moreover, this consideration of the infant is, once more, reconstructing autism with focus shifting away from explicit communicative acts (e.g. language) and towards non-conscious bodily expression.

## 2. Methods

The analyses within this paper rely upon data obtained through qualitative interview and a critical reading of the published literature. The decision to utilise interviews was believed to be justified in this case because the field of autism research is of note, at least in part, because of the plethora of viewpoints and competing claims surrounding the condition; it was believed to be important that such competing claims were investigated. Thus, the use of a method that facilitated the sampling of a wide range of sites, and potential viewpoints, was deemed to be the most appropriate.

The questions driving the project from which this paper arises concerned the construction of autism within cognitive psychology and social neuroscience, and an interview schedule of around 20 questions were drawn up with those themes in mind. It was decided that pre-determined questions, formalised in interview schedules, would be kept to a small number and that questions and topics that arose during the course of the interviews would, to a significant degree, guide the discussion. The resultant interviews are therefore best described as semi-structured.

The attempt made to keep interview questions/prompts as general as possible was a deliberate strategy for this project, in order to avoid “a piece of interview research [that] is chasing its own tail, offering up its own agendas and categories and getting those same agendas and categories back in a refined or filtered or inverted form” (Potter and Hepburn, 2005: 293). Broadly, these interview questions covered five areas; (i) how the participant came to be interested in their research topic, (ii) the nature of autism, (iii) the nature of the participant's current research, (iv) the impact of social neuroscience, and (v) the role of advocacy groups in research. A great deal of flexibility was included however and topics of discussion were allowed to digress to a quite significant degree, within the time constraints that existed. Interviews that were conducted lasted between 38 and 73 min, with a mean length of 55 min. Approximately one-half of the interviews reached a natural close while the other half were ended at a scheduled time, usually an hour.

### 2.1. Sampling

The intent of this project was to interview researchers with interests in psychology, neuroscience, and autism and who were

based in the United Kingdom. In addition to existing knowledge of the field, potential participants suitable for interviewing were sought through a variety of means; an internet search, discussion with psychologists at the authors' own academic institution, and finally by asking interviewees for further contacts. Potential interviewees were contacted by e-mail with a brief explanation of the project. It was made clear to participants that both individual and institutional identities disclosed within interviews would be removed in the act of transcription, that data would be securely stored, and that the project had passed the School of Sociology and Social Policy at The University of Nottingham's internal ethics procedures. Though first author's first and Masters degree were obtained in psychology, the project presented here was designed as sociological in nature, and so the researcher presented himself to interviewees as a sociologist interested in autism. Nonetheless, the interviewer's background was never withheld from participants and the first author's background and current supervisory relationship with an autism neuroscientist was discussed on occasion. Participants were given the opportunity to ask any outstanding questions and, once satisfied, signed a consent form. If participants had any further questions they were answered informally, again by e-mail.

Twenty research interviews were undertaken for this project, taking place between August 2012 and February 2013, all of which were conducted in person by the first author. This sample consisted of 13 women and 7 men or, alternatively, 7 Professors, 2 Readers, 1 Senior Lecturer, 1 Associate Professor, 2 Lecturers, and 7 Post-doctoral Researchers of various kinds. Eighteen researchers were interviewed at their place of work, 1 was interviewed at a restaurant, and 1 was interviewed at their home. Twelve researchers declined to take part in the project for a variety of reasons and an additional 12 researchers were contacted but did not respond.

### 2.2. Analyses

All interviews were recorded verbatim and transcribed in full. The extracts presented here have been anonymised and conclude with a note of both the interviewee's academic position and the interview number (e.g. Professor, interview 9). Some extracts also include dialogue from the interviewer and those sections are preceded by an “I:”. The interviewee's response during these interactional extracts is preceded by a two letter acronym based upon their academic position (e.g. PD for Postdoctoral Researcher). Transcripts were interrogated by hand in order to explore reoccurring themes. While the broad themes identified in the sections above were of *a priori* interest, the specific topics presented here arose within interviews and where not of pre-existing concern. Once specific themes had been established within interview there was a critical reading of published literature in order to provide a socio-historical context to this primary data. As the following section is intended to demonstrate, it is through this contrast with historical readings that the changing narratives within autism research become most readily apparent.

### 2.3. A turn to infancy

#### 2.3.1. A changing picture

It is the central argument of this paper that, within autism studies, there has been a recent orientation towards infancy and the body and that this shift has produced a significantly altered disease construction of autism. In order to expand upon this point, it is worth considering experiments from both the 1980s and today which are ostensibly concerned with the same phenomenon; an examination of the social disorder believed to be at the core of autism. The first passage for consideration comes from the methods

section of Baron-Cohen et al. (1985), perhaps the most famous experiment conducted into autism. This study utilises an experimental set-up known as the ‘Sally-Anne Test’ (SAT) (Wimmer and Perner, 1983). The SAT test is conducted upon a table-top and on that table top are two dolls (Sally and Anne), a covered basket, a covered box, and a marble. The experimenter proceeds as follows:

“First, we checked that the children knew which doll was which (Naming Question). Sally first placed a marble in her basket. Then she left the scene, and the marble was transferred by Anne and hidden in her box. Then, when Sally returned, the experimenter asked the critical Belief Question: “Where will Sally look for her marble?”. If the children point to the previous location of the marble, then they pass the Belief Question by appreciating the doll’s now false belief. These conclusions are warranted if two control questions are answered correctly: “Where is the marble really?” (Reality Questions); “Where was the marble in the beginning?” (Memory Question).”

(Baron-Cohen et al., 1985: 41)

The SAT has several interesting features which are worthy of greater consideration. Firstly, and like other experimental scenarios typical of the 1980s, completion of the SAT requires a significant amount of understanding on the part of the participant. The capacity to follow verbal instruction, for example, is an obvious prerequisite in Baron-Cohen et al.’s experiment. Perhaps more significant, however, is that for Baron-Cohen et al. what is important in the elucidation of perceived social impairment in autism is an examination of a *mental state* entitled *belief*; an explicit understanding of other agents and their intentions that can be articulated via verbal report and which requires some form of internal monologue based upon rumination, contemplation, conscious understanding and so forth. This theoretic-methodological position has profound consequences for the study of autism. Children might be expected to pass the SAT from around the (chronological) age of four but during the 1980s experiments were usually only feasible for individuals with autism aged upwards of 11 or 12 years (Baron-Cohen et al., 1985: 40). This discrepancy in ‘chronological’ and ‘mental’ ages was necessary for experimentation because high functioning individuals with autism and Intelligence Quotient (IQ) scores of around 100 were still largely unheard of in the 1980s (Baron-Cohen et al., 2005: 628). Why there has been an increase in the mean IQ of the population of individuals diagnosed with autism remains a hotly debated topic (see; Hoekstra et al., 2009: 534; Skuse, 2007: 534. From a social science perspective see Hollin (2013: 153–160)). Despite already being understood as a neuro-developmental disorder (e.g.; Baron-Cohen, 1989: 113), therefore, the study of infant development has historically been missing from experimental psychological research into autism.

It is noticeable that this dearth of experimental research into the infant has begun to be addressed within the early twenty-first century, and with reportedly significant consequences. Within interview, for example, one Professor mused upon what they saw as the field’s misplaced emphasis upon cognitive capacities, broadly believed to be innate, during the 1980s and early 1990s. This emphasis upon innate ability manifested itself in the assertion that the capacity to pass tests such as the SAT depended upon innate cognitive modules (a theory of mind module, in the current instance), which simply came ‘online’ at a particular point in child development (Leslie, 1987). Considering the importance of those errors within the field, the Professor concludes that:

In fact, what’s happened, as far as I can see, (.) is that, er::, empirical changes have somewhat ((coughs)) modified the

whole field anyway so it hasn’t been a great disadvantage, er, and in particular as people have looked at, er, studies of younger and younger and their siblings really you get into a realm where it’s clearly an issue of non-verbal communication that’s, that’s, er, at stake, and so things like joint-attention, which was kind of assimilated to a theory of mind picture, actually itself needs to be understood, erm, not in terms of what follows from it but in terms of its, what, its own standing, its own importance, and indeed what it derives from. (Professor, interview 10)

According to the Professor, ‘empirical changes’ have ‘modified the whole field’ of autism research since the 1980s. The most significant of these empirical changes has been the tendency for research to focus upon participants who are ‘younger and younger’, a change which has shifted attention towards ‘non-verbal communication’. Such a shift towards the non-verbal is apparent even with ‘a theory of mind picture’ (outlined above in the work of Baron-Cohen et al.) which has now ‘assimilated’ ‘joint-attention’; the ability of two individuals to share an interest in a particular referent (for example, a child may point at a passing car in order to draw the attention of a parent to it).

This focus upon non-verbal behaviours is again apparent in the following interview extract where a Postdoctoral Researcher muses upon the problems of conceptualising, and then experimenting upon, the ‘social brain’. In this extract, the Postdoctoral Researcher is concerned with finding a suitable non-social control stimulus (examples offered are a ‘house’, a ‘toy’, and an ‘object’) with which to contrast a social stimulus, a ‘face’, in experimental work:

I mean do you control a face to a house or a face to an object or a face to a toy and all of those decisions impact how specialised the social brain looks to, whatever age you’re looking at. But there are certainly regions that, you know, process biological motion versus non-biological motion as far as we can tell that kind of thing. (Postdoctoral Researcher, interview 14)

Just as Baron-Cohen was, this researcher is interested in teasing out specific social impairments; they are interested in knowing how the responses, which may be eye movements or the activation of particular brain regions, of individuals of ‘whatever age’ with autism differ when they observe a face (social stimulus) compared to when they observe, say, a house (non-social stimulus).

Despite this shared search for social impairment, however, there are significant differences between the accounts of the Postdoctoral Researcher and Baron-Cohen. Whereas Baron-Cohen was concerned with belief, for the Postdoctoral Researcher, the archetypal social stimulus of concern to the ‘social brain’ is the ‘face’ or, perhaps, ‘biological motion’. In focussing upon these phenomena – comprehension of the body and its movement – the interviewee is absolutely typical of the field as it presently stands (e.g. Klin et al., 2009). As will be discussed in greater detail below, when contemporary autism research with infants seeks to present social stimuli, those stimuli are invariably based upon eyes, faces, or whole bodies presented in the absence of speech, for it is these bodily responses that can be measured in infants and turned into data within the bounds of the research practices deemed suitable for this population. Similarly, when one wishes to examine a social response what is examined is one’s bodily responses, either external movements (e.g. eye movement), or internal changes (e.g. particular activations of the social brain network measured through various neuro-imaging techniques). What the juxtaposition of these two research strands seeks to demonstrate is that, within contemporary autism research, there has been a turn away from intentionality, belief, language, meaning, and the abstract symbolic world and towards automatic and unconscious bodily states. There has been, in short, a somaticisation of autism.

The argument that is presented here is not based upon either methodological or theoretical primacy. It is not being argued that theory precedes method, that the use of the SAT in the 1980s is a mere symptom of a particular underlying theoretical framework. Nor is it being argued that method determines theory, that the 'social brain' discussed in interview, above, is formed entirely in the image of the neuroscientific methodologies taken to it. Instead, and as has been argued both generally (Hacking, 1988: 507) and, as discussed in the introduction, in relation to autism specifically (Evans, 2013; Hollin, 2014) it is argued that method and theory are in a sense mutually constitutive, forming a theoretico-methodological regime which shapes the object under consideration. The remainder of this article will consider the autism which emerges from a theoretico-methodological regime in which research into infancy is given increased importance.

### 2.3.2. *Infant sibling research*

Autism is rarely diagnosed before the age of two (Elsabbagh et al., 2012: 338) meaning that, unless retrospective methods such as video analyses or questionnaires are deployed, all research into autism conducted with infants younger than that age is invariably performed with those deemed to be somehow 'at risk' of the condition. As stated by one of the interviewees for this project, two groups of infants are identified as being at particular risk of developing autism "... [the] at risk sibling or ... kids born prematurely, erm, because they've compromised development not just for autism but for a whole bunch of other neurodevelopmental outcomes" (Professor, interview 17).

The study of those born pre- or im-maturely has a long, nuanced, and variable history within medicine (Armstrong, 1986: 223–226) and consideration of this group has only increased in recent years. However, this group did not feature significantly in the interviews conducted here. Instead it was the younger siblings of children already diagnosed with autism, or so called 'infant sibs', who came under discussion most frequently within in interview. The following extract captures the essence of this infant sibling research:

PD: So we'll be recruiting infant siblings when they're four to six months, siblings who have older siblings with autism, erm, and then testing them at ten months, fourteen months, twenty four months and thirty six months. Er:: (.) and at thirty six months they'll have this full diagnostic battery so I'll be able to tell which infants meet criteria for a diagnosis of autism and which infants don't.

I: Mm hm.

PD: Erm, and so then we'll look back at data from those early time points, er, to try and figure out if there's anything that predicts which infant's going to go on to develop au' autism or not, erm, and if there's anything that predicts kind of g::, gradations of severity or language levels or some more continuous prediction. (Postdoctoral Researcher, interview 14)

Within this research programme, families with an elder child who has already been diagnosed with autism are recruited by researchers seeking to identify individuals who are perceived to be at particularly high risk of developing the condition. If a subset of these children are later diagnosed as having autism, researchers will be able to retrospectively investigate those children's behaviours during infancy in an attempt to discover unrecognised early differences. Such studies are becoming increasingly prevalent; within the United Kingdom, for example, The British Autism Study of Infant Siblings (BASIS) network is a multi-million pound collaboration between twelve universities with affiliations to

hundreds of scientists all over the world. Similar networks exist in the United States (e.g. Baby Siblings Research Consortium) and a European wide group (Enhancing the Scientific Study of Early Autism) has recently been established (see Bølte et al. (2013) for details).

By recruiting infant siblings, researchers are able to conduct experiments longitudinally (from four to 36 months in the above researcher's study) with children prior to the apparent emergence of behavioural symptoms. In fact, it is important to remember that the majority of these children will not go on to develop autism. A sufficient number of infants will procure a subsequent diagnosis, however, to make studies of this sort feasible. As a Postdoctoral Researcher states:

Well so our sample are at high risk for autism which means they have an older sibling with autism and which means about thirty percent of them will also develop autism. But the only reason we choose this sample is because we want to have more children with autism at the end because otherwise (.) we'd have to test hundreds ((laughs)). (Postdoctoral Researcher, interview 8)

The possibility that 'about thirty percent' of those infants tested will go on to develop autism means that, even considering the significant attrition rates, prospective studies become possible. Despite requiring a significant amount of both finance and patience, infant sibs studies were frequently described by autism researchers as being amongst the most important in the field because they have the capacity to "tell us something about, erm, the development of autism" (Reader, interview 3), a loci of attention which, as described in the previous section, has been broadly absent from research in previous decades.

### 2.3.3. *Facilitating infant sibling research*

It has been widely claimed that the emergence of populations claimed to be 'at risk' of various medical conditions is closely linked to forms of biotechnological enterprise, most notably molecular genetics (Rose, 2010; Shostak, 2010), which play an important role in contemporary autism studies. However there are at least two further reasons, particular to autism, why infant sibling research is far more feasible at this particular historical juncture. Firstly, research of this type is made significantly easier by 'autism epidemic' of the 1990s, which saw prevalence rates increase from around 4:10,000 to 1:100 (Wing and Potter, 2002: 151). This increased prevalence potentially makes any kind of research into autism easier to conduct, but a longitudinal research programme where a significant majority of participants will never even receive a diagnosis of autism requires a far greater number of willing participants than does an experiment of the type conducted by Baron-Cohen et al. in the 1980s. Research into those at risk of autism has, then, particularly benefited from the twenty five-fold increase in diagnosis over the past thirty years.

Secondly, infant sibling research has been facilitated by the emergence of a variety of methodological techniques which require minimal engagement from the participant. This link between method and subject is expanded upon by another Professor who participated in this study, detailing below what they see as some of the most important research in the field:

"One [important strand of research] is groups who:: are running these at risk sibling [studies] ... Erm, you, and, erm, (.) and, and, and then that overlaps with the group of people who use new technologies. So they use, you know, erm, eye-tracking and::, you know, erm, EEG and n', n', nears, n', n', near infrared spectroscopy and other, other sorts of, you know, w', w', well now

some of the groups now do MRI, including functional MRI in four month olds.” (Professor, interview 17)

Within this extract there is the explicit linking of research into infants at risk of autism and ‘the group of people who use new technologies’; specific technologies mentioned include ‘EEG’, ‘near infrared spectroscopy’ (NIRS), ‘fMRI’, and ‘eye-tracking’.

The methodologies mentioned here are very different to one another. Some, such as functional Magnetic Resonance Imaging (fMRI) and Electroencephalography (EEG) examine brain function while others, such as structural Magnetic Resonance Imaging (sMRI), examine brain structure. Others methods such as eye-tracking experiments, which monitor eye fixation and eye movement with the use of a camera mounted on glasses or a helmet, allow an analysis of behavioural responses only possible with the aid of technology. Further, experiments utilising resting state neuroimaging techniques aim to examine participants’ brain activity as they lie still, in the absence of both stimulus and response, and are directed entirely inwards. Attention based paradigms, meanwhile, still rely upon the presentation of an external, explicit stimulus, albeit a stimulus that the participant need not consciously respond to. What these methods do have in common is that there is no comprehension necessarily required on behalf of the participant; it is perfectly feasible for stimuli (say, ‘auditory stimulation’) to be presented and neural response measured without any particular engagement or understanding. Thus, research becomes possible in new populations such as those with low functioning autism (Hollin, 2013: 172–175) and, the chief concern of both interviewees and this paper, infants. These are experiments done *on* infants, rather than *with* infants. As the same Professor quoted directly above notes:

I think that’s sort of quite an interesting sort of methodology because it suddenly doesn’t rely on you, erm, (.) asking someone a question, you know, erm, and of course a’, you know, there’s a long history it’s also true in infant, you know, experimentation where you do things like habituation tasks that, or looking time tasks, or whatever it is. But this is a sort of, you know, different sort of methodology. (Professor, interview 17)

The professor here focuses upon new types of methodology, those mentioned above, which ‘suddenly’ don’t require the experimenter to ask ‘someone a question’, thus reducing task demands.

Callard and Margulies (2011) have already called attention to the potentially important ontological work based around these methods which require little in the way of active participation on behalf of the participant. Callard and Margulies claim of resting state functional Magnetic Resonance Imaging that:

“... there appear already to be indications that the resting state and the DMN [Default Mode Network] might be installed as a new foundation of the self ... it is the subject ‘at rest’ that – by dint of her default mode brain activity – potentially holds the key to subjectivity *tout court*.”

(Callard and Margulies, 2011: 244, italics in original)

Such ontological claims are clearly crucial for understanding emerging technologies which examine the subject at rest. However these methods also have significant epistemic possibilities and are described by researchers as being crucial for infant research:

I: And it perhaps goes hand in hand with the, erm, (.) recruiting younger and younger infants because there are methodologies which allow you, er, to test hypotheses in different age groups than behavioural tests?

PD: Yeah, exactly so we test four month olds and, you know, there’s so little you can do with a four month old, you can basically look at what they look at and you can look at what their brain does. (Postdoctoral Researcher, interview 14)

Like never before, then, these methodologies permit the possibility to explore what an infant ‘looks at’ and ‘what their brain does’. The availability of these methodologies, alongside the autism epidemic, have therefore facilitated the turn to infancy in autism research.

#### 2.4. Neuroscience and seeing the real autism

Despite emerging, necessarily, at a particular historical moment and resting upon particular understandings of autism, significant claims were made by interviewees of these new technologies and their capacity to revolutionise knowledge concerning autism. An Associate Professor, for example, described ‘brain scanning’ as ‘leading to a lot of new insights’ since being introduced to the field:

I mean brain scanning M, MRI scanning and the analytic techniques and er:: the micro arrays of various k, types have possibly been the biggest, er, new, er:: I mean h’, have, have led to quite, quite a lot of new insights in the last couple, couple of decades. (Associate Professor, interview 6)

The following quote, from a Postdoctoral Fellow, is illustrative when considering the purported nature of these novel insights:

I: ... So how, how do you think all the, or how do you think that (.) imaging and the neurosciences are (.) contributing to (.) issues around autism?

PD: Erm:: (.) I think they’re contributing a lot. I think, erm, so my personal view is that (.) one, one of the best bits of research that’s come out at the moment is looking at increased noise in the neural networks in, erm, in people with autism. And I think that finding a neural marker is so important because it means that it can be seen irrespective of tasks so, and also in whatever age and whatever level of functioning. So I think a lot of the problem with behaviour is, erm, you just don’t know what’s behind it and you also, you don’t know whether task demands are stopping you see the real, the true abilities of people. Whereas if you put them in the scanner then, and especially if you can put them in the scanner at rest or asleep and be able to see a difference between autism and typical populations then you have an amazing ability to diagnose. (Postdoctoral Fellow, interview 12)

While there is a good deal of hype surrounding neuroscience in general and fMRI in particular (Choudhury et al., 2009), and while the majority of fMRI studies do indeed require the explicit, recognised engagement of participants, the above quotation captures so much of the specific hype and the hope surrounding the resting state technologies which are crucial for research with infants. Autism research is constructed here as being fundamentally hampered by reliance upon behavioural measures, the results of which may not reflect ability as much as they reflect ‘task demands’. It has already been discussed, above, how the traditional experimental paradigms of cognitive psychology, such as the SAT, require participants to be able to accurately to report their beliefs verbally. Neuroscientific technologies, especially those that can be used while the participant is ‘at rest or asleep’ provide the opportunity to ‘know what’s behind’ verbal behaviour and ‘see the real, the true abilities of autism’ in a way that is not dependent upon such abilities to perform. It is also noticeable within the present extract that the Research Fellow shifts attention towards a consideration of infants, recognising that the capacity to see ‘the

real autism' in individuals of 'whatever age and whatever ability' is offering an 'amazing ability to diagnose'.

It has been argued that when new technologies are taken to the body, the body is not left unaltered. Numerous technologies from the panopticon (Armstrong, 1985; Foucault, 1991: 200) to the census (Hacking, 1983: 280–281) have attempted to make the body cohere to the demands of particular regimes, leaving a body "totally imprinted by history" (Foucault, 1977: 148). The biosciences generally (Rose, 2007) and the neurosciences in particular (Prasad, 2005) are no different in this regard, being not biologically reductive but productive, encouraging new ways of seeing and being (Buchbinder, 2014). If, as Armstrong has claimed, we should be encouraged not to see "the atlas as a representation of the body but the body as a representation of the atlas" (Armstrong, 1983: 2) then it seems reasonable to conclude that neuroanatomic atlases that have been constructed in the twenty-first century should be seen as possessing the potential to be similarly productive (Beaulieu, 2001, 2003; Prasad, 2005). Instead of, or as well as, going beyond or behind method, as is suggested by the interviewee above, the focus upon passivity and infancy encourages the construction of a new autism with novel characteristics. These characteristics become apparent when considering the questions that autism researchers raise within infant sibling research.

#### 2.4.1. An othering

What was apparent within the qualitative interviews conducted for this project was a certain tension over the nature of the knowledge obtained via methodologies suitable for research with infant populations. Firstly, and as described above, these technologies are believed to remove or reduce task demands, to get 'behind' behaviour, and see 'the real' or 'the true' autism, thus offering an 'amazing ability to diagnose' and examine autism in all its forms, in new populations, and in new ways. Simultaneously, however, it is apparent that these methodological innovations radically constrict the type of questions that can be asked.

It is clear from the scientists' descriptions of their research that the perceived abilities of the infants under their study constrain the type of research questions which they are able to ask. As quoted above, one researcher remarked that "there's so little you can do with a four month old, you can basically look at what they look at and you can look at what their brain does". Given these restrictions, it is perhaps unsurprising that particular topics, such as attention, which are amenable to study in infants through available technologies, are given significant weighting by researchers in the field:

We could be looking at attention, for example, how are, whether they are shifting attention from one object to another. Again you can do this with the young, very young infants just showing something on a computer screen, making them look at this object and then there's something else appearing, how fast are they to orient. (Postdoctoral Researcher, interview 8)

What becomes apparent is that it is the limitations of infants, as much as their autism-relevant abilities, which drive the questions, such as 'ability to shift attention from one object to another', asked within infancy research:

I: And does a lot of this [research] focus around the area of attention? Is that a kind of

PD: Yeah, it's one of the key areas. Because, because the things that ((laughs)), infants can't, I mean they can do a bit, but there's, there's, there's not a lot they can do, erm, but I think focusing on the more, sort of, domain general mechanisms like paying attention to things, which they can do, they can learn, erm, to habituation (.), erm, they can show preference to a social stimuli,

which is important in terms of them getting enough social input, they can, you know, basic vocalisation which is important in terms of getting, so those sort of basic learning processes that, that all infants have to an extent, but to a varying extent. (Postdoctoral Researcher, interview 14)

In this extract it is noticeable that, after being asked whether attention is a key topic of investigation, the Postdoctoral Researcher focuses upon what the infant can't do; 'they can do a bit, but there's not a lot they can do'. The topic of 'attention', it appears, is not so much of interest *a priori* but is, rather, an area of investigation which is amenable to both the ability levels of infants and the requirements of the technology. Suggesting that infants give their opinions, ruminate, or make active decisions – all staples of the cognitive psychology literature on autism – is clearly not a worthwhile endeavour. Infants can 'learn', 'habituate', and 'show preference' but, as this interviewee noted elsewhere, "they're not going to point at something" (Postdoctoral Researcher, interview 14).

That the capacities of infants are perceived to be limited does not, however, mean that infants do not need to comply with the demands of the experiment. As one Reader succinctly put it, "brain imaging isn't terribly pleasant, you know (laughs)" (Reader, interview 1) and infants, of course, are demanding participants who "don't like lying down in the scanner and it's dark and noisy" (Postdoctoral Researcher, interview 14). Research can only progress "if you can keep them still, which is a challenge, erm, an::d erm get them to look at a monitor and be interested in the thing that's in front of them" (Professor, interview 17). These methodologies which do not require comprehension on the part of the participant, therefore, are still practically problematic. Eye-tracking, for example, is not:

without its difficulties ((laughs)) like anything else, you know, there's (.) there's certain, it's reduced task demands in some ways but you know they do have to sit still, they do have to pay attention, they do have to look at the scre::en, so you know you have task demands there. (Reader, interview 1)

The belief, therefore, that a lack of comprehension in participants investigated with these emerging technologies means that they are 'beyond methods', or demonstrates that participants do not need to actively co-operate seems misplaced. On the contrary, a lack of comprehension should not be equated with lack of compliance, and a great deal of compliance, in a broad sense, is required on behalf of the participant. If the experimenter is unable to make the participant cohere to the methodological demands required of them, then the experiment cannot progress.

What these technologies reveal is a partial picture. However, this particular representation of autism is nonetheless presented as being 'behind' methodology, whole, as 'the truth', as 'the real autism'. This leads to a conceptualisation of autism made in the image of infant, where a significant number of behaviours which do not conform to the requirements of these methods or these participants – those which rely upon meaning, understanding, and language, for example – are othered, while those behaviours amendable to this theoretico-methodological regime (chiefly, bodily states) hold centre stage. It is in this sense that these technologies can be described as productive, forming new visions of autism and social abnormality. Broadly, this performance of autism is related to a somatisation of the disorder.

### 3. Conclusion: autism is the image of the infant

This paper has argued that, since the turn of the 21st century, there has been a reorientation in autism research, with particular

importance attributed to the pre-diagnostic, at risk, infant. It has been argued that these infants have become available for study through both the autism epidemic of the 1990s and the emergence of various technologies which permit the use of participants who are not meaningfully engaged in the experimental activity. While researchers claim that such technologies allow the examination of the ‘real’ autism, it has been argued here that such technologies are in fact productive, and have led to new forms of social disorder in autism. In particular, it has been claimed here that these technologies shift attention away from symbolic, meaningful, interpersonal interaction and instead focus upon a newly formed, socially disordered body.

It is important to note that the presence of such striking discontinuities does not preclude the presence of important continuities. As has been widely discussed within the literature, the psychological sciences have, over the past fifty years, had a very particular view of what it means to be social, constructing a “social in the shape of a crowd” (Danziger, 1992: 313) where ‘social stimuli’ are reduced to other agents in the immediate vicinity of the individual (Danziger, 1992; Graumann, 1986; Greenwood, 2004). It has been shown that the cognitive sciences of autism rely upon this model (Hollin, 2014) and the conceptualisations of development, infancy, and the social put forward within this framework differ markedly from, for example, psychoanalytic alternatives (e.g. Hobson, 1993).

Nonetheless, even within this broader framework, there has been a significant re-articulation of what it means to have autism and to be ‘social’. Within the current regime, social acts are taken to be both extra- and pre-discursive in nature. The social is pre-discursive in the sense that social (in)ability can be measured in those, like infants, without language abilities. The social is extra-discursive because social (in)ability can be measured without recourse to meaning and language, thus ensuring that individuals with competent language use can still be classified as socially abnormal. Indeed, even the notion of (false) belief, so central to debates within the 1980s and seemingly tied to explicit understanding of other agents and their intentions, has been reimagined within recent years to allow for the possibility of ‘implicit false belief’, a form of belief taken to be animalistic, automatic and unconscious, measured through tasks like those outlined above and without the necessary understanding of participants (Frith and Frith, 2012: 306).

Such a conclusion would be worthy of consideration if the consequences concerned only those infants ‘at risk’ of autism. This, however, is not the case for two quite different reasons. Firstly, interest in, for example, implicit mimicry and imitation is becoming increasingly central to broader narratives of autism. In studies which examine implicit mimicry in autism (e.g. Marsh et al., 2013), ‘social behaviour’ is reduced to phenomena such as contagious yawning – the unconscious, bodily imitation of those in our immediate vicinity. The capacity to extend research findings with infants to the rest of the population with autism is something that was remarked upon within interview. For example, and while expressing some doubts about comparisons between infants and adults, one Professor speculated that:

You can actually get ex’, the same experiment which would rely on new technologies like, erm, (.) eye-tracking or:: EEG or ERP that you can use with infants and adults and y:: so, you know, you can’t do that with behavioural experiments, you have to have different experiments y’, erm, erm, there’s an even issue, even an issue of whether you can really sort of do it with infants and sort of adults. But, but you can get parallel versions at the very least and possibly even completely identical sort of versions. Which I think opens up all sorts of possibilities in

terms of, you know, erm, investigating things across a wide sort of span of development which I think is, erm, good. (Professor, interview 17)

‘New technologies’ may allow for ‘the same experiment’ to be deployed with adults and infants, thereby facilitating comparisons between those populations. It seems certain that as studies such as those described by this Professor seek to make comparisons between adults and infants believed to be at risk of autism, the inability to make the intentionality, meaning, and language of the normal non-infant population intelligible within the context of pre-verbal infants ensures that focus upon the body, and the social disorder inherent within it, will be extended to the rest of the population with autism.

A second consequence of the reconstruction of autism as a social disorder of the body is of relevance for subjects at quite some distance from the condition itself. The biosciences generally (Meloni, 2014) and the neurosciences in particular (Young, 2012) have increasingly come to place sociality at the very centre of what it means to be human. Within this framework autism, understood as social disorder, is increasingly understood to offer fundamental insights into what it means to be human. Thus, the emergence of a pathological, social body in autism proffers new possibilities concerning what it means for humans to be socially normal (Canguilhem, 1991: 100).

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