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Cite this article: Jaswal VK, Akhtar N. (2019) Being versus appearing socially uninterested: Challenging assumptions about social motivation in autism. *Behavioral and Brain Sciences* **42**, e82: 1–73. doi:10.1017/S0140525X18001826

Target Article Accepted: 11 June 2018
Target Article Manuscript Online: 19 June 2018
Commentaries Accepted: 6 January 2019

Keywords:

autism; echolalia; eye contact; firsthand accounts; motor stereotypies; pointing; social interest; social motivation; testimony

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Being versus appearing socially uninterested: Challenging assumptions about social motivation in autism

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Abstract

Progress in psychological science can be limited by a number of factors, not least of which are the starting assumptions of scientists themselves. We believe that some influential accounts of autism rest on a questionable assumption that many of its behavioral characteristics indicate a lack of social interest – an assumption that is flatly contradicted by the testimony of many autistic people themselves. In this article, we challenge this assumption by describing alternative explanations for four such behaviors: (a) low levels of eye contact, (b) infrequent pointing, (c) motor stereotypies, and (d) echolalia. The assumption that autistic people's unusual behaviors indicate diminished social motivation has had profound and often negative effects on the ways they are studied and treated. We argue that understanding and supporting autistic individuals will require interrogating this assumption, taking autistic testimony seriously, considering alternative explanations for unusual behaviors, and investigating unconventional – even idiosyncratic – ways in which autistic individuals may express their social interest. These steps are crucial, we believe, for creating a more accurate, humane, and useful science of autism.

The way people see autistic folks is that they don't want to be around other people. That's wrong. The truth about autistic people is that we want what everyone else wants, but we are sometimes misguided and don't know how to connect with other people.

Owen Suskind (quoted in R. Suskind 2014, p. 366)

1. Introduction

Autistic¹ people behave in unusual ways. Sometimes they do things that non-autistic people do not regularly do, like flick their fingers in front of their eyes (Goldman et al. 2009) or repeatedly recite dialogue from movies or television shows (Gernsbacher et al. 2016). Sometimes they *fail* to do things that non-autistic people regularly do, like engage in sustained eye contact (Senju & Johnson 2009a) or point with their index finger to draw attention to an object or event (Baron-Cohen 1989).

One way to interpret many of the behavioral differences between autistic and non-autistic people is that autistic people are not interested in other people: If you expect socially interested people to behave in certain ways (e.g., to engage in eye contact), you might infer that someone who does not do so (or who does so infrequently) is aloof and uninterested. This inference is evident in some lay characterizations of autistic people as “perfectly happy within themselves” and “confined in their own world” (Huws & Jones 2010, p. 339). It is also evident in some scientific accounts of autism, where autistic behavior has been seen as signaling a “powerful desire for aloneness” (Kanner 1943, p. 249), “little or no social interest” (Grelotti et al. 2002, p. 214), and “an aversion to social stimuli” (Helt et al. 2008, p. 353). Some scientists have argued that autism “can be construed as an extreme case of diminished social motivation” (Chevallier et al. 2012b, p. 231).

Indeed, the belief that many of autistic people's unusual behaviors reflect diminished social interest is central to social motivation accounts of autism (e.g., Abrams et al. 2013; Chevallier et al. 2012b; Dawson 2008; Klin et al. 2003; Kohls et al. 2012; Mundy 2016). On these accounts, because of differences in the reward circuitry of the brain, autistic people do not find social stimuli to be as rewarding as non-autistic people do (Kohls et al. 2012). As a result, they are less likely to behave in socially interested ways: They are less likely to (a) orient toward, (b) seek out and enjoy, or (c) attempt to maintain relations with other people (Chevallier et al. 2012b). These behavioral differences can alter the interactions autistic children and adults have with other people. Altered interactions may deprive autistic children of the kinds of experiences thought to be necessary for typical language and social development, and they may deprive autistic children and adults of opportunities to develop strong social relationships,

which have important mental and physical health benefits (e.g., Baumeister & Leary 1995; Holt-Lunstad et al. 2010).

There is no doubt that many autistic people do not *seem* by conventional standards to be as interested in the social world as many non-autistic people seem to be.² Indeed, atypical social behavior constitutes part of the diagnostic criteria for autism (American Psychiatric Association 2013). There is also evidence that autistic people may process rewards differently from non-autistic people (see sect. 6; for reviews, see Bottini 2018; Clements et al. 2018) and that they may have fewer and lower quality friendships (e.g., Billstedt et al. 2011; Kasari et al. 2011; but see Petrina et al. 2017). But the fundamental assumption underlying social motivation accounts of autism – that some of autistic people’s unusual behaviors reflect diminished social motivation or interest (we use the two terms interchangeably) – is problematic for at least three reasons.

First, it is contradicted by the testimony of a number of autistic people themselves (see the appendix). As the quotation from Owen Suskind that opens this article makes clear, someone can appear uninterested in the social world but long to be a part of it. Second, it ignores the fact that explanations unrelated to social motivation are possible for many of autistic people’s unusual behaviors. Third, it misconstrues social motivation as residing within an individual when it is more appropriately understood as arising from a dynamic interaction between the individual and how others perceive and react to that individual. I may perceive another person’s behavior – say, sidelong glances toward me or use of my hand to open a door – as indicating social interest, and you may not. Who is right? Is that person socially motivated?

Assuming that people are not socially motivated when in fact they are can have devastating consequences. If you misinterpret the behavior of autistic persons as indicating that they are not interested in interacting with you, it can affect the way in which (and even whether) you interact with them. This, in turn, may undermine their motivation to engage with you, which will confirm your beliefs about their lack of interest, thus resulting in a self-fulfilling prophecy. Furthermore, being socially motivated is considered by some to be an essential part of being human (Baumeister & Leary 1995; Tomasello 2014); proposing that deficits in social motivation “ought to appear in all or nearly all individuals with ASD [autism spectrum disorder]” (Chevallier et al. 2012b, p. 236) effectively dehumanizes autistic individuals (Gernsbacher 2007a).

In this article, we challenge the assumption that some common behavioral differences between autistic and non-autistic people necessarily reflect a deficit in social motivation. We begin by presenting alternative explanations unrelated to social motivation for four of these differences. We next describe some of the unintended, negative effects the social motivation perspective has had

on research and intervention efforts in autism. Finally, we consider the possibility that autistic people may show their desire to engage with other people in unconventional ways.

In making our case, we draw on both quantitative and qualitative sources. Like a number of others, we believe that autistic people represent an essential, but surprisingly underused, source of insight into autism (e.g., Friedner & Block 2018; Gernsbacher 2007b; Nicolaidis et al. 2011; Pellicano & Stears 2011). The perspectives of autistic people are rarely included in scientific accounts that make claims about their social interest or motivation even though they are the ones most affected by this research. We recognize that there are limits on introspection (e.g., Wilson 2002), and some scientists have cautioned against taking “at face value” autistic (and non-autistic) self-reports (Frith & Happé 1999, p. 18; Happé 1991; O’Neill & Jones 1997). However, if an autistic person expresses a desire to connect with other people – as many autistic people so clearly do (see the appendix) – it seems perverse not to take that testimony seriously, a courtesy we certainly extend to non-autistic people who express the same sentiment. This, in turn, compels us to search for alternatives for why they behave in ways that are sometimes interpreted to mean they are not socially interested. Autistic people’s self-reports provide a valuable data point in this endeavor and, at the least, a starting point for additional research. We provide further discussion of our use of autistic testimony in section 3.

Before beginning, it is important to note that social motivation accounts represent just one class of several theories of autism; not all theories make the assumption that autistic individuals have inherent deficits in social motivation (e.g., Baron-Cohen 1995; Happé & Frith 2006; Hill 2004; Mottron et al. 2006; Pellicano & Burr 2012). However, many early intervention programs do make this assumption. For example, the Early Start Denver Model is designed to “make social relationships more rewarding for the child, thereby improving the child’s social motivation” (Webb et al. 2014, p. 39). According to the authors of another popular intervention called Pivotal Response Training (PRT), “at its core, PRT aims to improve social motivation” (Bradshaw et al. 2017, p. 2444). The primary way in which most early intervention programs attempt to improve social motivation is by trying to increase the frequency of behaviors that are conventionally interpreted as indicating social motivation (Mottron 2017). Additionally, a recent study designed to inform interventions to improve social functioning in autistic adults “highlight[ed] the importance of targeting social motivation in treatment” (Pallathra et al. 2018, p. 10). Thus, the influence of the social motivation perspective on the treatment of autistic people has been and continues to be profound even as its core assumption is questionable. To be clear, we are not offering a new theory of autism in this article; rather, we are interrogating an influential approach to studying and intervening in autism.

2. Alternative explanations for behaviors commonly interpreted as indicating diminished social motivation in autism

Behavior is only an imperfect index of what someone is thinking or feeling (for a review, see Gilbert & Malone 1995). Although observers tend to assume a one-to-one correspondence between the two – a smile indicating happiness, for example, and a frown indicating sadness – there is no necessary relation between them. People regularly behave in ways that we later learn were not

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consistent with how they were thinking or feeling. They may do so deliberately, as when they smile despite feeling sad, or they may do so for reasons that are beyond their control. For example, people with Parkinson's disease may speak slowly and repeat themselves (e.g., Benke et al. 2000). Members of Western, middle-class cultures expect adult conversational partners to respond promptly and to make their contributions to conversations unambiguous and relevant (Grice 1975). An uninformed interlocutor therefore might infer that someone with Parkinson's who regularly violates these (and perhaps other) conventions is socially aloof and/or uninterested in conversation. But that inference would be based entirely on interpretations of behaviors over which the individual has no control.

Autism is a neurological condition with widespread effects, including in attentional, perceptual, and sensorimotor systems (e.g., Burack et al. 2016; Leekam et al. 2007; Mottron et al. 2006). As we will show in this section, some behaviors that social motivation accounts of autism interpret as indicating a lack of social interest can occur because of factors unrelated to social motivation (see also Donnellan et al. 2013). Some may occur deliberately, as when autistic people choose not to engage in eye contact so as to avoid the anxiety it produces, and some may occur involuntarily, as when they cannot control their repetitive hand movements. There may be different causes for the same unusual behavior across autistic individuals and even within the same individual at different points in time. But in any case and as we will describe, these unusual behaviors do not have any necessary relation to social motivation, and some may constitute adaptive responses to the unique circumstances of being autistic.

We focus on four behavioral differences between autistic and non-autistic individuals: reduced levels of both eye contact and pointing as well as increased levels of both motor stereotypies and echolalic speech. We chose these four differences because they are well established in the literature and because they map onto the three categories of behavioral manifestations of social motivation proposed by Chevallier et al. (2012b): Socially motivated people are expected to (a) orient toward others by engaging in behaviors like sustained eye contact; (b) seek out opportunities to share experiences with others by, for example, pointing to interesting objects or events; and (c) maintain and enhance relationships with others by, for example, refraining from behaviors that could be stigmatizing (e.g., motor stereotypies and echolalia).

2.1. Low levels of eye contact

People look each other in the eye for a variety of social reasons – to acknowledge each other, communicate emotion, and coordinate visual attention.³ Autistic people tend to engage in eye contact much less frequently than non-autistic people. Indeed, in infancy, reduced eye contact is one of the features that distinguishes infants who are later diagnosed with autism from those who are not (Elsabbagh & Johnson 2010; Oner et al. 2014; Zwaigenbaum et al. 2005). One explanation for why autistic children and adults infrequently engage in eye contact is that they are not motivated to do so. For example, Chevallier et al. (2012b) describe “a spontaneous disinterest in mutual gaze” (p. 235) as part of a suite of behaviors that indicate “diminished social orienting” (p. 231), which is in turn taken to indicate diminished social motivation. But there are alternatives to this social explanation.

Although sustained eye contact is often assumed to be a universal behavior among non-autistic people, there are striking cultural differences in the extent to which individuals engage in it

(LeVine et al. 1994). For example, among the Gusii of Kenya, “conventions of adult conversation involve much less mutual gaze” than among Westerners (Richman et al. 1992, p. 617). Among the Navajo, “looking someone in the eye while they are speaking is a form of rudeness and causes the Navajo speaker considerable discomfort” (Connors & Donnellan 1993, p. 273). Similarly, in China, direct eye contact was historically not common because it was considered “rude and arrogant” (Zhang et al. 2006, p. 112). Despite the fact that eye contact is less common in some other cultures, no one would propose that members of those cultures have diminished social motivation.

There are also cultural differences in the amount of eye contact between non-autistic mothers and infants. For example, Richman et al. (1992) compared naturally occurring social interactions between Gusii mothers and their infants with those between suburban American mothers and their infants. For the American mothers, the most common category of social behavior directed toward their 10-month-old infants was “looking.” In contrast, the most common category of social behavior for the Gusii mothers was “touching”; “looking” was fourth of the five categories coded. We doubt that Gusii mothers are less interested in connecting with their infants than American mothers. Rather, as LeVine (2004) has suggested, other behaviors, like touching and holding, may be “functionally equivalent to the verbal and visual engagement of Americans” (p. 161). This is a crucial point that is frequently acknowledged in cross-cultural comparisons but rarely in the autism literature: There are multiple ways to communicate social engagement (see sect. 5); gaze aversion may be a useful diagnostic marker for autism in Western cultures (Norbury & Sparks 2013), but it does not necessarily indicate social aversion (Akhtar & Gernsbacher 2008; Gernsbacher et al. 2008b).

In fact, looking away from another person's eyes has been shown to have several adaptive functions in non-autistic individuals. In early infant-caregiver interactions, for example, when infants become overstimulated, they often look away, which leads to lowered heart rates (Field 1981). In some cultures, caregivers avert their gaze when their infants are upset as a means of calming them (Dixon et al. 1981). Doherty-Sneddon and Phelps (2005) argue that, because maintaining mutual gaze consumes processing resources, gaze aversion can help manage cognitive load: Non-autistic adults avert gaze when solving difficult problems (Glenberg et al. 1998), and training young children to avert gaze can improve their performance on cognitively demanding tasks (Phelps et al. 2006).

For autistic individuals too, both experimental evidence and first-person accounts suggest that gaze aversion can confer adaptive benefits. For example, in a classic study, Klin et al. (2002) showed autistic adolescents clips from the film *Who's Afraid of Virginia Woolf* and measured what they looked at and for how long. There was no relation between the amount of time they spent looking at the actors' eyes and measures of social competence; however, the more time they spent looking at the actors' mouths, the better was their social competence. Klin et al. argued that social information conveyed through speech may be easier for some autistic individuals to interpret than social information conveyed through the eyes. Concentrating visual attention on the channel that produces the social information they find most interpretable (i.e., the mouth) may help them gain a better understanding of the social world (see also Rice et al. 2012).

In fact, some autistic people say that they avoid looking at a speaker's face altogether to concentrate on what they are saying. For example, one autistic informant in Robledo et al. (2012)

explained, “I can hear a person better if I don’t look at their face ... So, when I’m making an effort to listen, I’m not making an effort to look, so sometimes when I’m listening to somebody I might look away from them, but I might turn my ear toward them” (p. 5). This is consistent with the autistic self-advocate Kedar’s (2012) explanation for why he does not commonly engage in eye contact: “I can listen better if I don’t look at the person” (p. 49).

Another reason many autistic individuals avoid eye contact is because they find it uncomfortable. It “feels a bit creepy, so I tend to avoid it” (Higashida 2013, p. 25); “I can look but it’s not pleasant” (Kedar 2012, p. 49); doing so feels “strange and uncomfortable” (Tamm et al. 2006, p. 75); and “It is painful for me to look people in the eye” (Robledo et al. 2012, p. 5) (for several additional first-person accounts, see McGlensey 2016). Rather than indicating a lack of social interest, gaze aversion may be a strategy that some autistic people use to focus or to reduce or avoid stress.

There may be circumstances where learning to engage in eye contact more frequently can be beneficial (see sect. 4.2). But for now, the important point is that relatively low levels of eye contact do not necessarily signal a lack of social interest; in fact, gaze aversion is used adaptively by both autistic and non-autistic individuals to manage affective and cognitive resources.

2.2. Infrequent declarative pointing

Autistic children point less often than non-autistic children (e.g., Mundy et al. 1986), a behavioral difference that is sometimes interpreted as indicating that autistic toddlers lack the motivation to share experiences with others. In this section, we describe weaknesses with this social motivation interpretation of reduced pointing in autism and discuss alternative explanations.

Non-autistic children begin pointing with their index finger around 12 months of age (e.g., Bates et al. 1975; Camaioni 1997; Carpenter et al. 1998; Liszkowski et al. 2012). Researchers have traditionally suggested that infants are motivated to point for two primary reasons: to obtain things (“proto-imperatives”) and to share experiences with someone (“proto-declaratives”). For example, an infant may point to a desirable toy because she wants it; in this case, obtaining the toy is the goal and the adult is merely the means to that goal. Or an infant may point to a helicopter overhead to direct the adult’s attention to that interesting event; in this case, sharing the experience with the adult is the goal and the helicopter is the means to that goal (Bates et al. 1975; Brinck 2004).

Declarative points are generally considered to be more socially, cognitively, and communicatively sophisticated than imperative points are. Someone who points to share an experience is assumed to be (1) motivated to inform the addressee of something interesting and (2) sensitive to whether the addressee has registered the intended message. For example, typically developing 12-month-old infants in one study pointed more at an interesting event (e.g., a puppet popping out of a display) if the experimenter expressed positive emotion toward the infant but did not actually look at what the infants were pointing to than if she expressed positive emotion and looked (Liszkowski et al. 2004). These kinds of findings suggest that infants who engage in declarative pointing do so because they want to affect their addressee’s attentional state – specifically, they want them to notice something the infant finds interesting or noteworthy (e.g., Baron-Cohen 1989; Bates 1976; Camaioni 1997).

Imperative points, in contrast to declarative points, are viewed as purely instrumental (e.g., Baron-Cohen 1989; Camaioni 1997). To produce imperative points, some understanding of others as causal agents – as individuals who can be directed to carry out desired actions – may be necessary. But the assumption is that imperative gestures can be produced for no purpose other than obtaining a desired object; affecting the mental state of the addressee is not the primary goal (but see Grosse et al. 2010; Shwe & Markman 1997).

It is commonly asserted that autistic children point to obtain things, but not to share experiences. For example, DeMarchena and Eigsti (2014) write that “protodeclarative pointing is reduced in young children with ASD, while protoimperative pointing is not” (p. 375). Camaioni (1997) writes, “children with autism have severe difficulties in producing ... declarative, but not imperative, pointing” (p. 222). And Whalen and Schreibman (2003) have suggested that autistic children are “profoundly impaired” on declarative pointing, but not on imperative pointing (p. 456). If autistic children do point imperatively but not declaratively, it would be consistent with the assumption that they lack the motivation to share experiences with other people (Chevallier et al. 2012b; Liszkowski 2005). The logic is as follows: Because they point imperatively (and, perhaps, to direct their own attention; Goodhart & Baron-Cohen 1993), they are capable of producing the pointing gesture when they are motivated to do so; their failure to point declaratively must therefore be due to reduced motivation to share experiences with others.

But there are both empirical and theoretical problems with this line of reasoning. As noted earlier, there is no doubt that as a group, autistic children point less frequently than non-autistic children (e.g., Mundy et al. 1986). But the data on the dissociation between imperative and declarative pointing are not nearly as conclusive as they are sometimes made out to be. Specifically, an autistic child who does not point declaratively also tends not to point imperatively. For example, in one highly cited study (Baron-Cohen 1989, Experiment 3), 4 of the 10 autistic preschool-aged children observed during a 45-minute play session pointed imperatively but not declaratively, which is consistent with the notion that autistic children are uniquely impaired on declarative pointing. But the remaining 6 autistic children did not point at all, suggesting that pointing simply may not be a part of the behavioral repertoire for many or most young autistic children.

Similarly, in Baron-Cohen et al.’s (1996) report on the development of the Checklist for Autism in Toddlers (CHAT), 9 of the 10 parents of toddlers who were later diagnosed as autistic reported that their child did not engage in either type of pointing. Later work on the development of the Modified CHAT confirmed this finding (Robins et al. 2001): Parents of 82% of toddlers who later received a diagnosis of autism reported that their child did not point declaratively, and 72% reported their child did not point imperatively.⁴ In short, autistic children as a group are not specifically impaired on declarative pointing, which undermines the claim that autistic children do not point declaratively because they are not interested in sharing experiences with other people.

An alternative explanation is that, as Gernsbacher and colleagues (2008b) have argued, “it is the core act of pointing and its underlying motor demands rather than any deficit in intentionality or desire to share experience that underlies autistic children’s lower frequency of [declarative] pointing” (p. 42). Indeed, autistic children and adults have well-documented and widely

acknowledged difficulties with the planning, coordination, and execution of intentional movements in a variety of domains (e.g., Fournier et al. 2010; Glazebrook et al. 2008; LeBarton & Iverson 2016; MacDonald et al. 2014; Torres & Donnellan 2015).

In firsthand accounts, too, autistic individuals describe occasionally or regularly experiencing a disconnect between a movement they would like to make and the movements they are actually able to make (e.g., Grandin 1992; Robledo et al. 2012; Williams 1992). For example, an autistic 12-year-old explained his movement difficulties as follows: “I may wish to say something or do something. I can’t get myself to move ... It is confusing because I can initiate some things like eating or getting things in the house sometimes. I don’t have an insight into this aspect of my illness. I just know it’s there” (Kedar 2012, p. 63). At 13, the same child wrote of difficulties he had in getting his body to do what he wanted: “I am telling my hand to raise in class, or my feet to run, or my fingers to move on the piano, however they don’t listen to me. Either they don’t move, or they move badly. It’s really rotten” (p. 101). Another autistic individual explained that, as a child, he “could not point at objects for many reasons. The most important reason is that I had very little sensation of my body” (Mukhopadhyay & Biklen 2005, p. 133). Thus, some autistic children may have difficulty pointing because of motor and/or sensorimotor challenges, not because of a deficit in social motivation.

Furthermore, among autistic children who point, many do, in fact, point declaratively. For example, Mundy et al. (1986) showed that although autistic preschoolers pointed less frequently overall in a standardized assessment than non-autistic children, the autistic children produced, on average, as many declarative as imperative points.⁵ Additionally, in a study in which parents of autistic children were asked to rate the frequency of declarative pointing, more than 25% selected “a few times/week,” “a few times/day,” or “many times/day” (Allison et al. 2008).⁶ Given that many autistic children at least occasionally point declaratively, one cannot argue that they are not motivated to share experiences with others.

One could argue that because autistic children engage in declarative pointing less often than non-autistic children, they are *less* motivated to do so. But this neglects the previously mentioned motor challenges that may make pointing difficult for many autistic children. Furthermore, it is possible that autistic children are similarly motivated to share experiences, but that there are differences in the kinds of things they find interesting or worth sharing. For example, in one commonly used assessment of nonverbal communication (the Early Social Communication Scales; Mundy et al. 2013), autistic toddlers are less likely than non-autistic toddlers to point declaratively at a moving wind-up toy or to pictures in a picture book. The behavioral difference is indisputable, but the social interpretation that is frequently offered – a lack of motivation to share experiences (e.g., Mundy 2016) – is disputable: It is possible that some autistic children simply do not find these toys or events as interesting as most non-autistic children do.

Some empirical support for this possibility comes from a study in which autistic children were less likely than non-autistic children both to engage in declarative communication about toys and to explore the toys themselves (O’Neill & Happé 2000). This is consistent with reports from some autistic individuals, who describe focusing on and finding enjoyment in different things than non-autistic people. For example, one autistic adult wrote that “Lots of times I’m surprised by what other people said they saw and heard, because it is not what I saw and

heard ... I don’t know why my head picks things to focus on, but I know it is usually not the same things other people pick to focus on” (Jones et al. 2003, p. 119; see also Rubin 2005). As a 12-year-old, Kedar (2012) explained, “I’m not entertained by the ordinary things that most people enjoy” (p. 45).

The production of declarative gestures, including pointing, has been linked to a number of positive language outcomes (for reviews, see Colonna et al. 2010; Goldin-Meadow 2009). When a child points to an object, many parents in Western, middle-class families use it as an opportunity to offer the object’s name (e.g., Goldin-Meadow et al. 2007). Clearly, there can be benefits if a child and adult attend to the same referent when it is labeled (Tomasello & Farrar 1986). But as with eye contact, pointing is just one of several ways joint attention – a shared focus on the same object or event – can be achieved (Akhtar & Gernsbacher 2007; Gernsbacher et al. 2008b), an issue we consider in more detail in section 5.

Although it is possible that the reduced frequency of declarative pointing in autistic children is somehow caused by a reduced motivation to share experiences, alternative explanations are possible, including differences in motor ability and in what they find worth sharing.

2.3. Elevated levels of motor stereotypies

Most autistic people engage in motor stereotypies: rhythmic, repetitive movements that (from a naïve observer’s perspective) appear purposeless (Bodfish et al. 2000; Goldman et al. 2009; Seltzer et al. 2003). For example, they might flap their hands or arms, rock their bodies, wiggle their fingers in front of their eyes, or spin objects.⁷ Many non-autistic people also engage in motor stereotypies when anxious or bored, twirling their hair or a pencil, biting their nails, drumming their fingers, or tapping their feet. Motor stereotypies are also common early in typical development, where it is thought that they may help infants transition from uncoordinated motor activity to voluntary motor control (Thelen 1981). But whereas they are infrequent beyond the preschool years in most non-autistic children, they tend to persist or become more frequent among autistic children (Harrop et al. 2014; MacDonald et al. 2007). In MacDonald et al. (2007), for example, 2- and 4-year-old non-autistic children were observed engaging in motor stereotypies, on average, for 4.8% and 2.1%, respectively, of a 10-minute sample; in autistic children, the average percentages were 6.9% and 20.2%.

When as much as one-fifth of an autistic child’s time is spent engaging in behaviors that appear meaningless to many observers, questions arise about whether that time would be better spent doing other things. Repetitive behaviors in autism have been called “debilitating” (South et al. 2005, p. 155), “disrupting” (Goldman et al. 2009, p. 36), a “prominent impairment to the daily life of affected individuals” (Langen et al. 2011, p. 356), and a “major barrier to learning” (Leekam et al. 2011, p. 562). Additionally, because motor stereotypies look odd (Smith & Van Houten 1996), they can be a source of social stigma (Cunningham & Schreibman 2008).⁸ For these reasons, reducing or eliminating them is an explicit goal for many clinicians, teachers, and parents (e.g., Lanovaz et al. 2013; Rapp & Lanovaz 2014; Rapp & Vollmer 2005).

The cause of motor stereotypies in autism is unknown, but one proposal suggests that it may be related to a lack of social motivation in infancy. In a recent review, Leekam et al. (2011) noted that non-human animals raised in restricted or deprived environments

can develop stereotyped motor movements, such as pacing, body rocking, and compulsive grooming (e.g., Lewis et al. 2007). They suggested that autistic infants may also suffer from a restricted environment, specifically, a “self-imposed” restricted environment caused by their “extreme social withdrawal” (p. 577). According to Leekam et al., this restricted environment could have a number of cascading effects, including the development of motor stereotypies (see also Schultz 2005).

But the link between perceived social withdrawal and motor stereotypies is tenuous at best. Among autistic toddlers and young children, the level of impairment in the social domain (as measured by observation and parent report of conventionally expected social behaviors) is not correlated with the frequency of repetitive and restricted behaviors (RRBs), the umbrella category of behaviors of which motor stereotypies are a part (Harrop et al. 2014). A large population-based study investigating autistic-like traits reported very low correlations (0.1–0.3) between social impairments and RRBs in 7- to 9-year-old children, even when considering only those with extreme scores (Happé & Ronald 2008).

Furthermore, when Leekam et al. (2011) suggest that the ultimate cause of motor stereotypies could be autistic infants’ “extreme social withdrawal” (p. 577), the implication is that these infants are not motivated to interact with people. Leekam et al. do not describe the particular behaviors they believe constitute evidence for extreme social withdrawal in infancy, but we imagine they might include things that are also routinely interpreted as indicating diminished social motivation (e.g., failing to engage in sustained eye contact, not responding when called by name, not actively seeking out adult interaction). As we have been arguing, however, explanations unrelated to social interest are possible for these kinds of behaviors. An infant may be *perceived* as lacking in social interest, but this does not necessarily mean that the infant actually *is* lacking in social interest (see sect. 5).

Lack of social motivation has also been implicit in some explanations for why motor stereotypies persist. Many scientists and clinicians believe that motor stereotypies can be brought under voluntary control (e.g., Rapp & Vollmer 2005), and individuals who do not learn to suppress them are sometimes thought to lack the motivation to do so (Miller et al. 2006). The underlying assumption seems to be that individuals who want to connect with other people would not engage in apparently meaningless behaviors that can cause others to ostracize them. Although some autistic individuals have described using stereotypies because they want to be left alone (Joyce et al. 2017), others have reported that they simply cannot control these movements even though they would like to (e.g., Fleischmann & Fleischmann 2012; Robledo et al. 2012; Tamm et al. 2006). As one autistic informant explained, “I want to stop doing anything that doesn’t look normal” (Robledo et al. 2012, p. 6).

For some autistic people, motor stereotypies can serve important self-regulatory and even communicative functions. For example, one informant explained that “one of my most interesting and prevalent repetitive behaviors (stims, ‘stereotypies’) is rubbing objects (e.g., door knobs) because of the unpleasant sensations they leave on my hands – I keep trying to ‘rub’ the touch off” (Jones et al. 2003, p. 118). A study of autistic young adults found that many described engaging in stereotypies as a coping response to anxiety or uncertainty (Joyce et al. 2017), which is consistent with data showing a link between parent reports of their child’s anxiety and parent and clinician measures of

stereotyped behaviors (Sukhodolsky et al. 2008). In terms of communication, Julia Bascom (2011), executive director of the Autistic Self Advocacy Network, has explained that she expresses emotion through hand flapping: Friends “can ‘read’ my flapping better than my face ... I wish everyone could look at my hands and see *I need you to slow down* or *this is the best thing ever* or *can I please touch* or *I am so hungry I think my brain is trying to eat itself*” (italics in original).

Non-autistic individuals can engage in motor stereotypies that look very similar to those produced by autistic individuals, but when they do, their behaviors are not assumed to reflect deficits in social motivation. For example, Harris et al. (2008) studied 100 non-autistic children referred to a pediatric neurology movement-disorders clinic specializing in tic disorders. These children (on average, 8 years of age) were otherwise typically developing but engaged in many of the same kinds of stereotypies as autistic children (e.g., hand flapping, rocking), often multiple times a day, and sometimes for several minutes each time. Social motivation was not mentioned as a possible cause. The way in which the very same unusual repetitive motor movements are characterized “appears to depend more on the underlying diagnosis of the patients than the movements themselves” (Edwards et al. 2012, p. 181; see also Leary & Hill 1996).

In one study offering a particularly compelling demonstration of how laypeople interpret motor stereotypies differently depending on diagnosis (Sperry & Symons 2003), mothers of young autistic children watched several 10-second home-movie clips of infants between the ages of 9 and 18 months and were asked to rate how intentional the infants’ behaviors were (i.e., “On a scale of 1–6, how much do the children mean to do what they are doing”; Feldman & Reznick 1996). Half of the mothers were told that all of the children in the clips had a diagnosis of autism, and half were given no diagnostic information. Unbeknownst to the mothers, in fact, all of these infants had later received a diagnosis of autism. For clips showing a child engaged in stereotyped motor movements (e.g., arm flapping, leg kicking, body rocking), there was a striking effect of condition: Mothers who had been told that the infants were autistic rated the behavior shown in those clips as less intentional than mothers who had not been given any diagnostic information.

According to autistic individuals, some motor stereotypies are involuntary behaviors and some are intentional, and the same individual may engage in stereotypies for a number of different reasons. But engaging in them does not necessarily have anything to do with one’s interest in connecting with other people.

2.4. Frequent echolalia

Echolalia involves the verbatim repetition of part or all of another’s utterance and can include words and phrases that do not appear to be relevant in the current context. For example, on meeting a therapist for the first time, one young autistic child repeatedly exclaimed, “Got a splinter!” (Prizant 2015). It has been estimated that 75% of autistic children engage in echolalia (Rutter et al. 1967), and in the *DSM-5*, it is listed alongside motor stereotypies as an example of a restricted, repetitive pattern of behavior (American Psychiatric Association 2013). To a naïve interlocutor, these violations of conversational conventions can make it appear as though the individual’s utterances are not communicative and that the individual is therefore not interested in social engagement or communication.

Because echolalic speech is so common in autism and can appear to be meaningless, it (like motor stereotypies) has been a target for behavioral interventions designed to reduce or eliminate it (for a review, see Neely et al. 2016). Indeed, some have argued that echolalia is not just meaningless but actually problematic: Some have argued, for example, that repetitions of (apparently) irrelevant words and phrases interfere with language development (Valentino et al. 2012) and contribute to communicative breakdowns (Neely et al. 2016). In this section, we argue that echolalia should not be dismissed as meaningless merely because a listener is unable to immediately decipher its meaning. We describe how autistic and non-autistic children and adults use it communicatively – to connect with other people – as well as for self-regulatory purposes.

If a young non-autistic child is asked, “Is your sister bothering you?” and responds, “Bothering you,” this would likely be interpreted as an affirmative reply (“Yes, she is bothering me”). These “frozen phrases” are structurally and perhaps functionally equivalent to echolalic speech and are seen as playing an important role in language development. Typically developing children use unanalyzed chunks of spoken language to convey meaning (Bretherton et al. 1983). In the case of “bothering you,” a young child may not yet be able to separate that phrase into its constituents or know how to slot in a different pronoun, but the child is using that phrase to communicate a meaningful proposition (Bloom 1973; Nelson 1981). Indeed, the use of frozen phrases in typical development is seen as a step on the road to productive speech.

Just as frozen phrases give way to productive multiword utterances in typical development (Lieven et al. 1992), echolalia can serve as a stepping stone to productive use of grammar for speaking autistic individuals (Blanc 2012; Gernsbacher et al. 2016; Manning & Katz 1989; Roberts 2014). A sentence or phrase that starts as fully echolalic can become modified over time as some elements are replaced by others. For example, one autistic child regularly repeated, “One day in Teletubbie land, all of the Teletubbies were very busy when suddenly a big rain cloud appeared.” Later, this boy (named Bud) described his father’s returning home by saying, “One day in Bud’s house, Mama and Bud were very busy when suddenly Daddy appeared” (Dawson et al. 2008, p. 766).

Non-autistic adults also repeat utterances verbatim for various communicative functions. For example, they repeat what someone else has said to express agreement (e.g., Speaker 1: “Let’s go.” Speaker 2: “Let’s go.”). They use repetition to express incredulity (e.g., after a child asks for ice cream for breakfast, a parent might respond, “Ice cream for breakfast?!”) and quote lines from television shows or movies to comment on the similarity between the current situation and the one depicted on film (e.g., “No soup for you!” from *Seinfeld*). In all these cases, the speaker’s use of repetition is intended to be communicative, and a listener who shares the relevant common ground would interpret it as such.

Why is something that occurs regularly in typical development and in non-autistic adult speech often seen as aberrant and meaningless in autism? There are at least three reasons. First, autistic people use echolalia more often than non-autistic people do (van Santen et al. 2013).⁹ Second, autistic individuals who engage in echolalia likely also engage in other behaviors that are frequently perceived as meaningless (like motor stereotypies; sect. 2.3). Finally, it may be more difficult to decipher the meaning behind a given instance of autistic echolalia.

This last point about meaning may be the most problematic. The tension between when and whether echolalia should be

considered meaningful can be seen even in Kanner’s (1943) original description of autism. Some of the autistic children he described engaged in “parrot-like repetitions” (p. 228) that could not always “be linked up with immediate situations” (p. 227). He considered some of these utterances to be meaningful, as when he inferred that one child “expressed agreement by repeating the question literally, echolalia-like” (p. 220; also p. 243) or that the same child was asking his mother to pull off his shoe even though he said “pull off your shoe” (p. 219). But Kanner considered other examples of echolalia (e.g., “You’ll fall off the bicycle and bump your head”; p. 227) to be meaningless, writing, for example, “None of [the child’s] remarks was meant to have communicative value” (p. 227).

But just because a listener is unable to decipher the meaning of an utterance in a particular context does not mean that the speaker did not have a meaning in mind (e.g., Stiegler 2014). Sometimes, the intended meaning can be understood only by someone who knows the speaker well and is motivated to take the time to carefully study the contexts of use. For example, the child introduced at the beginning of this section, who repeated “Got a splinter!” when meeting a new therapist, had sometime in the past experienced a painful splinter and used that phrase to communicate her anxiety (Prizant 2015). One autistic boy echoed the phrase “UPS [United Parcel Service] is here” as a clever means of getting his father’s attention (Light et al. 1998, p. 166). Another repeated, “Chicken Little thought the sky was falling, but the sky is not falling” when his mother was despondent over the death of a friend (Gralow 2008). Listeners who did not know these individuals well or know what was going on in their lives would probably mistakenly consider these phrases meaningless.¹⁰

Anecdotal evidence suggests that when interlocutors impute meaning to echolalic speech they had previously considered meaningless, the effects can be profound. For example, Suskind (2014) describes how his young autistic son, Owen, would repeatedly say “juicervose,” an apparently meaningless sequence of sounds. One day, however, Suskind and his wife recognized that “juicervose” was Owen’s approximation of the phrase “just your voice,” a line that figures prominently in *The Little Mermaid*, one of his favorite Disney movies. In that movie, a witch offers a mermaid human legs in exchange for her voice, explaining, “It won’t cost much: just your voice!” Putting these pieces together, the Suskinds concluded that Owen’s use of “juicervose” was an attempt to draw attention to his own lost ability to speak.

Whether they were correct that Owen intended “juicervose” to have this or any meaning is almost beside the point. If they were correct, it was a clear instance of Owen successfully communicating with his family. If they were not correct, it was still a breakthrough: From that moment forward, Suskind (2014) writes, they began actively encouraging Owen to use dialogue from Disney movies to express his thoughts and feelings (and they also communicated with him in the same way). As an adult, Owen now uses non-echolalic speech to communicate, but he continues to recite dialogue from movies to convey particular meanings and to make sense of particular situations, just as non-autistic people do. It is impossible to know for sure, but it seems likely that the Suskind family’s willingness and ability to see meaning in Owen’s echolalia as a child played an important role in his subsequent linguistic, cognitive, and social development.

Indeed, in the literature on typical development, the meaning parents ascribe to their child’s behavior influences how they treat

the child, which is thought to have important downstream consequences (e.g., Reddy & Trevarthen 2004). Parents of typically developing infants often react to early vocalizations *as if* they were intended to communicate something, responding in ways that are thought to promote communicative development (Snow & Ferguson 1977). For example, Gros-Louis et al. (2014) found that mothers in a Western culture frequently responded to the “meaningless” vocalizations made by their 8- to 14-month-old infants by expanding upon them: If the infant babbled “da-da-da,” the mother might respond with “Da-da is working. I am mama” (p. 392). Gros-Louis et al. found that these kinds of maternal responses predicted an increase in infants’ vocal production. Similarly, treating echolalia as intentional communication is likely to signal to an individual that conversational partners are interpreting their attempts to communicate as meaningful, which may reinforce the individual’s desire to communicate.

Some instances of echolalia may not be intended to communicate anything to other people, but this does not necessarily mean that they are meaningless. Like motor stereotypies, some autistic people use echolalia as an adaptive, self-regulatory strategy, repeating a phrase to assure themselves that things will be okay, for example (Prizant 2015). This is not so different from the mantras that some non-autistic people repeat to calm themselves in stressful situations (see, e.g., Eddie Murphy’s repetition of “Keep it together” in the movie *Bowfinger*). Some autistic individuals have also reported using echolalia as a means of keeping material in short-term memory (Higashida 2013), the same strategy non-autistic individuals use when trying, for example, to remember an address or phone number long enough to write it down.

Some autistic people have reported that they occasionally repeat words and phrases involuntarily (Rentenbach & Prislowsky 2012; Robledo et al. 2012). But echolalia is also clearly used by autistic (and non-autistic) people communicatively, as a creative means of connecting with other people.

2.5. Summary and key points

We have described four behavioral differences commonly associated with autism: Compared with non-autistic individuals, autistic individuals are less likely to engage in eye contact or point, and they are more likely to engage in motor stereotypies and echolalia. We have explained how each of these behavioral differences has been interpreted by some scientists as reflecting diminished social interest or motivation. Using arguments from logic, existing quantitative data, and the testimony of autistic people themselves, we have described alternative explanations for each behavioral difference. Here we synthesize two key points from the previous sections.

The first is that most of the unusual behaviors documented in autism have also been documented among non-autistic children and adults (Bishop 1989). When non-autistic people engage in these behaviors, they are not attributed to deficits in social motivation; to the contrary, they are often considered to be adaptive responses to a particular situation. Take reduced levels of eye contact. As noted, many autistic people do not consistently engage in eye contact. But many non-autistic people also refrain from eye contact when they are trying to concentrate or control their emotions. Similarly, many autistic people repeat words or phrases. But so do typically developing children when they are learning to communicate, and so do non-autistic adults when they are trying to emphasize a point or self-regulate. Finally, most autistic

individuals engage in motor stereotypies, rhythmically moving parts of their bodies or engaging with objects in unusual ways. But stereotypies are also not unique to autism: They are ubiquitous in typical development, where they are considered essential to motor development, and common among non-autistic adults, who use them to combat anxiety and boredom.

The second key point is that many autistic people have explained that they do not intend their atypical behavior to reflect anything about social interest. For example, they report that averting gaze allows them to concentrate and regulate their emotions, just as it does for non-autistic people. They report that motor stereotypies and echolalia both serve self-regulatory and communicative functions, just as they do in non-autistic people. They describe experiencing an occasional or regular disconnect between movements they would like to produce and those they can actually produce in the moment: a disconnect that could affect their ability to engage in pointing and other behaviors that are conventionally interpreted as indicating social interest.

3. Use of autistic testimony

In section 2, the explanations we reviewed for several behavioral differences between autistic and non-autistic people were many and varied. The social motivation perspective is admittedly more parsimonious in that it proposes that these kinds of behavioral differences can be attributed to a single cause. But parsimonious accounts are favored in science only to the extent that they can explain the available evidence. One readily available source of evidence that the social motivation perspective does not explain is the testimony of many autistic people who claim to be socially motivated and who offer alternative explanations for why they sometimes behave in ways that suggest they are not. Given that the input of autistic people is not traditionally included in the scientific literature on autism (Jivraj et al. 2014), we anticipate that there may be implicit or explicit concerns about our use of their testimony in this way.

One concern could be that we have focused on autistic individuals who report being socially motivated (e.g., those in the appendix) without considering others who report that they are not. For example, Temple Grandin has argued that “autistic people tend to be less social” (quoted in Flatow 2006), Sue Rubin (2005) has written, “A room full of people does not intrigue me as much as a toy or object on the other side of the room” (p. 93), and some studies have found that autistic people report experiencing less social enjoyment, on average, than non-autistic people do (Chevallier et al. 2012a). We recognize that, just like non-autistic people, autistic people vary in how socially motivated they report themselves to be (e.g., Calder et al. 2013; Garman et al. 2016). But we have focused on testimony from autistic people who profess an interest in others because we have not seen their perspective or experiences well represented in the scientific literature on autism and because they present a challenge to social motivation accounts of autism.

Furthermore, we believe that attempts to measure whether autistic people are, on average, less socially motivated than non-autistic people are unlikely to yield data that are useful in theory or practice. Like other kinds of putatively innate motivations (e.g., intrinsic motivation; Ryan & Deci 2000), whether people are socially motivated at any given point in time depends not just on their innate predisposition toward social stimuli and interaction, but also on a number of other factors, including the context, the attitudes and behaviors of potential social partners, other

competing goals, their history of successes and failures in similar situations, and so on. We suspect that a lifetime of having their behavior (mis)interpreted as indicating they are not socially motivated may lead some autistic people to withdraw from, and experience little enjoyment in, social situations (see sect. 6).

One might also be concerned that we relied on autistic testimony when we described reasons unrelated to social motivation that autistic people sometimes behave in unusual ways. A large body of work shows that people are not very good at explaining their own behavior, sometimes ignoring factors that an experimenter knows are relevant and sometimes emphasizing others that an experimenter knows are irrelevant (e.g., Wilson 2002). We acknowledge that people do not always have insight into the reasons for their behavior. However, as described in section 2.5, the explanations autistic people offer for the behavioral differences we examined are consistent with objective measures and/or accepted explanations for why non-autistic people engage in the same behaviors.

A third concern might be that the explanations unrelated to social interest that some autistic adults provide for their behavioral differences may not apply to autistic children. For example, autistic adults have reported that they find eye contact to be uncomfortable, but this does not necessarily mean that young autistic children (who cannot articulate why they do not engage in eye contact) also find it uncomfortable. Indeed, some have argued that a behavioral difference that begins in childhood because of a lack of social interest might persist into adulthood for different reasons (e.g., Leekam et al. 2011; Moriuchi et al. 2017). At the very least, however, the fact that autistic adults offer explanations unrelated to social motivation for some of their unusual behaviors should lead researchers to consider and examine whether those (or other) explanations might also apply in childhood.

4. Effects of the social motivation perspective on autism research and intervention

The assumption that behavioral differences between autistic and non-autistic people that appear to indicate lack of social interest actually do indicate lack of social interest has had unfortunate consequences for how some findings in autism science are interpreted and for what the targets of intervention in autism have traditionally been.

4.1. Research

Consider, as an example, a recent study by Moriuchi et al. (2017) designed to investigate whether autistic toddlers do not engage in eye contact as often as non-autistic toddlers because they find it aversive (see sect. 2.1) or because they do not find eyes engaging or informative. Recall that eye contact is one behavior conventionally assumed to reflect social motivation because it represents an obvious example of orienting toward another person (Chevallier et al. 2012b). Moriuchi et al. hypothesized that if autistic toddlers found eye contact aversive, they would look away more quickly if they happened to look at a videotaped actress's eyes than if they happened to look at her mouth or other stimuli in the scene.¹¹ The results did not support the gaze aversion hypothesis as it was operationalized in that study: Just like non-autistic toddlers, autistic toddlers looked away from eyes as quickly (or slowly) as they looked away from mouths or non-face stimuli.

The authors also hypothesized that whereas non-autistic toddlers would seek out the videotaped actress's eyes when she was behaving in an especially socially engaging manner, autistic toddlers who were averse to gaze would avoid the actress's eyes at those times. Results again did not support the gaze aversion hypothesis: Autistic toddlers spent less time overall than non-autistic toddlers looking at eyes, but they tended to seek them out at the same times as the non-autistic toddlers. The authors concluded that their results "contradict the hypothesis that children with ASD actively avoid looking at the eyes early in life" and instead suggest that autistic children have a "passive insensitivity to social signals in others' eyes" (Moriuchi et al. 2017, p. 33).

We find the second part of this conclusion puzzling. That autistic toddlers in this study tended to seek out the actress's eyes at the same times as non-autistic toddlers (though less frequently) suggests a *sensitivity* to social signals, not an insensitivity. It suggests that, like non-autistic toddlers, autistic toddlers were motivated to look at the actress when she was most likely to be providing interesting or important social information. As the authors note, this is not consistent with the prediction one would make if they had an aversion to looking at others' eyes. But it is also not consistent with the prediction one would make if they were passively insensitive to social signals in others' eyes.

Thus, one negative consequence of assuming that autistic individuals are socially uninterested is that it can lead researchers to interpret autistic participants' behavior as indicating that they are socially uninterested, even though that interpretation is not made about non-autistic participants who behave in the same ways. Additionally, researchers tend to emphasize differences between autistic and non-autistic behavior even though, as in the Moriuchi et al. (2017) study, the similarities may be at least as interesting and important (see Jaswal et al. 2016).

4.2. Interventions

At some level, a focus on behavioral differences is understandable; this is what allows diagnoses to be made and support provided. But when differences between two groups are obtained, members of the marginalized group are generally assumed to lack something desirable (Medin et al. 2010). Even differences that could be benign or adaptive tend to be interpreted as "deficits" in need of remediation (Akhtar & Jaswal 2013). In autism, the practical effect is that many interventions focus on making autistic people appear more like non-autistic people with little consideration of the potential negative consequences of these efforts. These efforts may sometimes have the unintended and ironic effect of undermining their interest in interacting with other people.

For example, research targeting the reduction or elimination of echolalia has recently been described as "burgeoning" (Stiegler 2014, p. 750) despite the fact that, as described in section 2.4, echolalia can serve important communicative functions. The potentially adaptive functions of echolalia do not seem to be considered in these elimination efforts: An exhaustive review of published studies on echolalia interventions noted that "none of the studies reported the function of the target echolalia behavior" (Neely et al. 2016, p. 90). Ignoring the function of echolalia is not just a questionable practice, it is a dangerous one: If someone's unconventional attempts to communicate are ignored or, worse, discouraged, their motivation to communicate is likely to be reduced (Akhtar et al. 2016; Prizant 2015; Sterponi et al. 2015).

Motor stereotypies are also a common target for intervention, presumably because they are ubiquitous, apparently purposeless, and thought to interfere with social and academic development. But reducing motor stereotypies has not been particularly effective at increasing desired behaviors (Lanovaz et al. 2013) and may result in new undesirable behaviors (Epstein et al. 1985) that parents actually report as more problematic than the original motor stereotypies (South et al. 2005). We hope that some of the techniques that were employed to eliminate stereotypies in the past, including shouting at and shaking autistic children who engaged in rocking behavior (Risley 1968), are no longer used. But parents are still routinely advised to try to eliminate these harmless movements. For example, in a recent op-ed piece in *The New York Times*, one mother of a young autistic child explained that she was told by therapists, “Try to cut down on his arm flapping” and “Don’t let him spin objects.” She explained, “I drove myself to tears trying. At nap time I resorted to climbing into his crib to snuggle and sing because it was the only way I could get him to stop waving his hands in front of his eyes” (O’Brien 2017).

Autistic individuals have described finding efforts to prevent them from engaging in harmless and adaptive motor stereotypies as both frustrating and aversive (e.g., Bascom 2011). It is not difficult to see how autistic people’s desire to interact with someone might diminish if that person prevents them from engaging in harmless “stims” that may be soothing, enjoyable, or something over which they have no control.

Autistic children are also regularly instructed to look other people in the eye. There may be circumstances in which learning to make eye contact more frequently can be beneficial. For example, Krstovska-Guerrero and Jones (2016) trained autistic toddlers to shift their gaze from an object to an adult’s eyes and found an increase in other conventional communicative behaviors such as initiating requests and smiling. This, in turn, may have led caregivers of these children to behave in ways that facilitated further social and communicative development. That said, insisting on eye contact may backfire. For example, Moriuchi et al. (2017, supplemental materials, p. 20) suggest that autistic children may be conditioned to find eye contact aversive when adults’ exaggerated bids for eye contact become associated with “non-preferred activities.” Thus, attempting to increase a behavior that is conventionally interpreted as indicating social interest could paradoxically actually undermine that interest.

5. New directions for research and intervention

Social behavior is behavior that an observer *perceives* to be social. As we have been arguing, just because a given observer fails to see conventional signs of social interest does not mean that the person being observed lacks social interest. In this section, we describe the importance of studying how non-autistic people interpret autistic behavior, and we consider possible benefits of helping them recognize and respond to unconventional ways autistic people may show their social interest.

5.1. Who is responsible for altered social interactions?

Recall from section 2.3 that, in the context of motor stereotypies, Leekam et al. (2011) proposed that autistic infants experience a “self-imposed constrained environment” caused by their “extreme social withdrawal” (p. 577). As noted in that section, we cannot know whether an infant who is perceived to be socially withdrawn

is actually socially withdrawn. It is true, however, that an infant who is interested in people but who – because of a neurological condition affecting her perceptual, attentional, and sensorimotor systems – does not frequently smile, coo, or engage in sustained eye contact with her caregivers will not get the same kinds of social opportunities in Western cultures as one who routinely does engage in these behaviors. Crucially, however, this would not represent a “self-imposed” restricted environment; it would represent an environment that became restricted over time as a result of the way the infant was treated by adults who expected her to show her social interest in conventional ways. All social environments arise from an interaction between how a person behaves and others respond. It is simply inaccurate to describe any child’s environment as “self-imposed.”

This is a crucial point because it has important implications for intervention efforts. If an infant’s restricted environment is thought to be “self-imposed” because she is socially withdrawn, then interventions are likely to focus on making her appear less socially withdrawn. For example, Leekam et al. (2011) advocate for “active and intensive intervention [on autistic infants] that acts upon that self-imposed constrained environment to enhance brain development and reduce stereotypies” (p. 577). Similarly, Dawson (2008) recommends early behavioral intervention to correct the “failure on the part of the [autistic] child to actively engage in early social interaction” (p. 776).

If, however, we take seriously the possibility that an autistic infant’s restricted environment comes about, at least in part, because caregivers (mis)interpret her unusual behaviors as indicating social withdrawal and so treat her as if she were socially withdrawn, then an important target for intervention should be caregivers’ perceptions of the infant’s behavior. Broadening the range of behaviors seen as indicating social interest might provide alternative ways for autistic infants to gain the experience-dependent stimulation needed to support healthy social, communicative, and cognitive development (e.g., Akhtar et al. 2016; Prizant 2015).

An instructive analogy can be seen in the education of deaf individuals in the United States. When forced to lip-read and speak, deaf individuals have difficulty with both language development and academic achievement (Marschark 2006). However, when exposed to sign language – particularly early in life and from fluent signers – deaf children’s developmental trajectories in those domains more closely match those of their hearing peers (for a review, see Lederberg et al. 2013). Sometimes the most effective intervention is one that broadens the range of behaviors deemed acceptable by the majority group, accommodating individuals’ unique needs and strengths rather than insisting that they behave in the conventional way (Mottron 2017).

5.2. A path forward

In disabilities other than autism, it is widely recognized that there are unconventional ways in which social interest can be expressed. For example, blind infants’ behavior could lead observers to assume they are not socially motivated: They do not orient toward others by engaging in eye contact; they sometimes turn away when others are talking; and they rarely use gestures like pointing, offering, or showing (Pérez-Pereira & Conti-Ramsden 1999). But parents do not assume, on the basis of these behaviors, that their infants are uninterested in social interaction. Parents are not instructed to insist that their children engage in eye contact, pointing, or showing. Instead, parents learn “to be more patient and careful in detecting responses

and signs of engagement,” to establish joint attention via touch, and to recognize “idiosyncratic movements/gestures” as bids for experience sharing (Pérez-Pereira & Conti-Ramsden 1999, pp. 45-47; see also Bigelow 2003; Fraiberg 1977).

Among typically developing children, too, there is evidence that social engagement can be shown in alternative ways. For example, although gaze following is the most commonly studied route to achieving a shared focus on an object, Yu and Smith (2013) found that it was not necessary. In a study of 12-month-old infants and their parents interacting with several toys, infants rarely looked at their parent’s face. But because parents tended to hold and look at a toy when attempting to draw their child’s attention to it, infants could (and did) successfully coordinate visual attention with their parent simply by looking at their parent’s hands. In fact, there was so much redundancy between the hands and the eyes that the authors concluded that “Current approaches [to joint attention] that concentrate on looks to faces and eyes, and to teaching those looks as parts of intervention programs for individuals with various developmental delays may be making the task harder” (p. 6).

In the case of autism, Ochs and Solomon (2010) pointed out that autistic people “possess a characteristic range of possibilities for social coordination that is shaped not only by their disorder, but also by the sociocultural practices of the communities they inhabit and the interlocutors with whom they interact” (pp. 73–74). In ethnographic work observing autistic children in a variety of settings, they found that what they called “autistic sociality” was often limited by interlocutors relying on standard ways of interacting, including face-to-face body alignment and insistence on speech (see also Ochs et al. 2005). Based on our own preliminary work, informed by autistic people and their families, we hypothesize that sociality is also limited when interlocutors fail to recognize and respond to unconventional bids for social connection, including proximity, touch (see also Escalona et al. 2002), coordinated movement, repetition (see also DeThorne et al. 2015), and rituals.

Investigating unconventional ways autistic people may show their social interest will require a multipronged approach. One important step should involve further theoretical work on the psychological construct of social motivation itself. As noted earlier, Chevallier and colleagues (2012b) operationalized social motivation in terms of an individual’s tendency to (a) orient toward, (b) seek out and enjoy, and (c) maintain relations with other people. This definition bears a striking resemblance to some descriptions of extraversion (e.g., Costa & McCrae 1980): “Extraverts have a preference for seeking, engaging in, and enjoying social interactions” (Fishman et al. 2011, p. 67). Introverts, by contrast, are described as “withdrawn, retiring, reserved, inhibited, quiet” (McAdams 2000, p. 305) – adjectives that might also be used to describe many autistic individuals. In fact, autistic people (and non-autistic people with more autistic-like traits) do score higher on measures of introversion and lower on measures of extraversion than non-autistics (Ozonoff et al. 2005; Schwartzman et al. 2016; Wakabayashi et al. 2006). Thus, an important question is how what social motivation theorists call “diminished social motivation” relates to what personality psychologists call “introversion.”

This question is important because there is evidence that although introverts may not show their social interest in ways that have traditionally been valued or associated with social interest in Western cultures, many do seek out and enjoy social interactions; those interactions are just different from the ones pursued by extraverts (e.g., smaller groups, less small talk; see Cain 2012). We see an

interesting parallel to autism: Like introverts, perhaps autistic people show their social interest in unconventional (i.e., non-extraverted) ways. To be clear, we are not arguing that autism can be explained as an extreme form of introversion (see Grimes 2010); much more work would be required to make that case. But clarity and insight could be gained from a thorough examination of how social motivation is related to other psychological constructs.

Research is also urgently needed to identify and characterize the range of behaviors that can signal social interest. For example, interviews with autistic individuals and their families can identify candidate behaviors, and observations can quantify and investigate how they change over time. Experience sampling methods and experimental manipulations can shed light on both the idiosyncratic and common conditions under which those kinds of behaviors occur and what effects they have on different social partners. Cultural comparisons can investigate ways in which observers’ judgments of social interest may be mediated by cultural expectations, which could inform debates about the range of behaviors that can demonstrate social interest. Intervention studies can investigate whether caregivers can be trained to see behaviors already in an autistic child’s repertoire as bids for social connection – albeit unconventional ones – and what effects this training might have on the child, the caregiver, and their relationship.

Proponents of the social motivation perspective are likely to agree that social interactions are reciprocal (e.g., Dawson 2008), that is, that each member of a dyad influences the other. But theoretical and empirical work in this area has focused primarily on the problems that arise when autistic individuals fail to show their social interest in conventional ways; little consideration has been given to how (mis)interpretations of autistic behavior may contribute to those problems (Dinishak & Akhtar 2013; Gernsbacher 2006). Investigating and capitalizing on unconventional ways that social interest may be expressed and responded to represents a domain with rich potential and should be a high priority for autism research and intervention.

6. Concluding thoughts

Many autistic people describe themselves as interested in others and motivated to engage with them. Autistic adults and adolescents express a desire for friends (Gillespie-Lynch et al. 2017b; Marks et al. 2000), autistic children are as likely as non-autistic children to choose to play with someone else rather than alone (Cage et al. 2016), and some autistic people report experiencing greater loneliness than non-autistic people (Bauminger & Kasari 2000; Bauminger et al. 2003; but see Chamberlain et al. 2007). Autistic individuals’ desire for friendship and connection may be frustrated by lack of social skills (e.g., Mendelson et al. 2016), but for many, social interest itself is not lacking. This dissociation between social interest and social skills has also been noted clinically:

[A]t least some high-functioning¹² adults with ASD have a strong – sometimes even fanatical – interest in what other people feel or think: They spend a great deal of time trying to infer what a certain behavior or utterance means. Often they describe this uncertainty about what is going on in other people’s minds as the greatest stressor in their lives. These adults clearly do not suffer from a lack of motivation to share things psychologically with others, but rather from the conflict between their desire to understand others and their inability to do so adequately. (Verbeke et al. 2005, p. 718)

In the face of this kind of empirical evidence, testimony, and clinical observation, why is there still a stereotype among laypeople that autistic people are happiest when left alone (e.g., Huws & Jones 2010)? Why does a popular undergraduate textbook in abnormal psychology continue to claim a central feature of autism is “lack of interest in other people” (Comer 2013, p. 539)? Why is social motivation still considered by many scientists to be a “core deficit” in need of remediation, one that requires the autistic individual to appear more conventionally socially interested (e.g., Dawson 2008; Kohls et al. 2012; Mundy 2016)? We suspect there are at least four reasons.

First, autism has traditionally been considered a social disorder (e.g., Kanner 1943), and so attributing behavioral differences to a deficit in social motivation fits squarely within a very entrenched paradigm. Second, people tend to assume that others are as they act (Gilbert & Malone 1995). Autistic people are assumed to lack an interest in others because they rarely engage in some behaviors that non-autistic people expect as indicators of social interest (e.g., eye contact and pointing), and they regularly engage in behaviors that non-autistic people believe indicate a lack of social interest (e.g., motor stereotypies and echolalia). But as we have discussed, alternative, even adaptive, explanations for these behavioral differences are possible.

Third, evidence showing diminished reward processing in autistic compared with non-autistic people has been interpreted as providing the neurobiological basis for social motivation accounts of autism. Specifically, the cortical-basal ganglia circuit – considered to be “at the heart of the reward system” (Haber & Knutson 2010, p. 4) – is disrupted in autism (for a review, see Bottini 2018).¹³ For example, Scott-Van Zeeland et al. (2010) found reduced response in the ventral striatum to social rewards among autistic compared with non-autistic children. Similarly, Abrams et al. (2013) found diminished resting-state connectivity between areas of the temporal cortex where the human voice is processed and areas of the dopaminergic reward pathway in autistic compared with non-autistic children.

According to social motivation accounts, if reward networks in autistic brains do not respond to social stimuli in the same way they do in non-autistic brains, it follows that autistic people do not find social stimuli as intrinsically rewarding as non-autistic people do: “It is most likely that the lack of social-seeking tendencies in individuals with ASD is caused by an inability of the ‘wanting’ circuit to activate motivational behaviors, particularly in social contexts” (Kohls et al. 2012, p. 13).¹⁴ This might explain why autistic individuals are less likely to engage in attempts to seek out, orient toward, or maintain relations with other people (Chevallier et al. 2012b).

The problem with this line of reasoning is that, as we have noted, many autistic people claim to be very interested in other people. Kohls et al. (2012) acknowledge that some autistic individuals may show greater social interest than others, but they seem to assume that this would be done in conventional ways. For example, in the context of intervention, they write that “[autistic] children who display stronger [conventional] social approach (‘wanting’) and fewer avoidance behaviors at treatment onset are more responsive to early behavioral interventions than are passive and avoidant children” (p. 14). This does not account for the alternative ways in which social interest may be expressed – presumably because those have not yet been widely considered or studied in autism (sect. 5) – or for the alternative explanations for why autistic people may not engage in conventional approach behaviors (sect. 2).

Research is beginning to bridge the gap between neurobiological data, assumptions about autistic people’s social interest (formed on the basis of interpretations of conventional behavioral indicators), and autistic people’s testimony about their behaviors. For example, consistent with autistic self-reports about eye contact feeling uncomfortable (see sect. 2.1), Hadjikhani et al. (2017) found oversensitivity in the subcortical system when autistic participants were attending to the eye region of neutral and emotional faces. They conclude that “In everyday life, such oversensitivity may lead to attempts to decrease one’s arousal levels, and firsthand reports suggest that simply avoiding to attend to the eyes of others is one common strategy among individuals with ASD” (pp. 2–3). We hope that the arguments we have outlined in this article underscore the importance of taking seriously the phenomenological experiences of those being studied.

A final reason for the belief that autistic people are not socially interested is related to the self-fulfilling prophecy we alluded to in section 1. It is possible – perhaps even likely – that for some, “both emotional poverty and an aversion to company are not symptoms of autism but consequences of autism” (Mitchell 2013, p. xv). After repeatedly being ignored or treated as not socially motivated, after repeatedly being told to act in certain ways and not others even when that is not possible, some autistic individuals report experiencing a form of learned helplessness whereby they give up trying to engage with others (e.g., Kedar 2012; Robledo et al. 2012). As one autistic informant explained, “I have been endlessly criticized about how different I looked, criticized about all kinds of tiny differences in my behavior. There’s a point where you say to hell with it, it’s impossible to please you people” (Robledo et al. 2012, p. 6). For this reason, we believe that in research, interventions, and daily interactions, it is far less dangerous to assume that someone is interested in other people and later learn that they were not than to assume that someone is not interested in other people and later learn that they were (see Donnellan 1984).

In conclusion, we have shown that the assumption that many of the behaviors associated with autism indicate that autistic people are socially uninterested is deeply problematic. It does not reflect how many autistic people describe themselves, it does not recognize the many reasons other than lack of social interest why autistic people may behave in unusual ways, and it can have unintended negative impacts on how they are studied and treated. Understanding and supporting autistic individuals will require taking autistic testimony seriously, continuing to investigate explanations that are not related to social motivation for their unusual behaviors, and studying and capitalizing on unconventional – even idiosyncratic – ways in which they express their social interest.

Appendix

Autistic individuals describe being socially interested

Blackman (2005)

“It may be that the social deficits which are the cornerstone of an autism spectrum diagnosis tell us far more about the person who made them markers for such a diagnosis than about the child whom he observes ... [T]he whole testing procedure is somehow actually constructed on whether the tester observed the person to socialise in a way the tester understood to be socialisation” (p. 149).

Burke (2005)

“Teachers can help me mollify my desire for friends. You can give students a chance to know me” (p. 250).

Drew (2017)

"You might have been told that people with autism do not want social or romantic relationships, but this is a myth. While it is true that many of us struggle to create or maintain them, this does not mean that we do not want them. I have met some people with autism who, as a result of their experiences of repeated failure, have decided not to pursue friendships or relationships and focus on spending their lives on their own, but this is a rarity" (p. 127).

Frugone (2005)

"Nobody would have bet I could become the social person that inside me I wanted to be" (p. 195).

"Glenn" (quoted in Marks et al. 2000)

"I want to be known as just someone who, uh, someone who works hard and also, someone who likes to be around others" (p. 12).

Harris (2015)

"Motivated as I was to find a place of belonging among my peers, I did not give up but started to talk to and hang around a group of 'popular' girls" (p. 41).

Higashida (2013)

"I can't believe that anyone born as a human being really wants to be left all on their own, not really. The truth is, we'd love to be with other people. But because things never, ever go right, we end up getting used to being alone ... Whenever I overhear someone remark how much I prefer being on my own, it makes me feel desperately lonely" (p. 27).

Kedar (2012)

"[E]xperts deduce that because of my autism I am not a social person and that I like objects more than people. This is a big misconception" (pp. 99–100).

Page (2009)

"Learning to make connections with people – much as I desperately wanted to – was a bewildering process, for they kept changing, and I felt like an alien, always about to be exposed" (p. 7).

Prince-Hughes (2004)

"Many people, again lay and professional alike, believe that all people with autism are by definition incapable of communicating, that they do not experience emotions, and that they cannot care about other people or the world around them. My experience, both personally and with others like me, is that in many cases quite the opposite is true" (p. 31).

Rentenbach and Prislowsky (2012)

"Many times, autistics revert to isolation by default rather than preference. It is infinitely easier to back away and not try to be included instead of awkwardly stepping in and attempting to convey your intent to be a part. Loneliness is the most predominant side effect of our unique design" (p. 39).

Sequenzia (2012)

"Once I meet people or when I know I will meet people who know me only through my writings, my anxiety level is so high, I can act in very strange ways. I can look very childish and silly and I am very self-conscious about this. I can also seem uninterested, but this is only a self-preservation mask. I find it hard to communicate even if I have a lot of things I want to say" (p. 114).

Suskind (2014)

"The way people see autistic folks is that they don't want to be around other people. That's wrong. The truth about autistic people is that we want what everyone else wants, but we are sometimes misguided and don't know how to connect with other people" (p. 366).

Tammet (2006)

"People with Asperger's syndrome do want to make friends but find it very difficult to do so. The keen sense of isolation was something I felt very deeply and was very painful for me" (p. 78).

Triplett (one of Kanner's [1943] original case studies, quoted in Donvan & Zucker 2010)

"I just wanted those boys to think well of me" (p. 90).

Yergeau (2012)

"I wish you wouldn't interpret my silence as silence. My silence is, in fact, a compliment. It means that I am being my natural self. It means that I am comfortable around you, that I trust you enough to engage my way of knowing, my way of speaking and interacting" (p. 208).

Acknowledgments. We thank Maureen Callanan, Jerry Clore, Ben Converse, Jennifer Henderlong Corpus, Audun Dahl, Janette Dinishak, Morton Gernsbacher, Denny Proffitt, Bobbie Spellman, Christine Stephan, Tauna Szymanski, Dan Willingham, participants in "The Science & Lived Experience of Autism," and the reviewers for helpful comments.

Notes

1. We use "autistic" to refer to those who have received a diagnosis of autism, both to respect the identity-first preference of many autistic self-advocates (e.g., Kenny et al. 2016) and because use of person-first language (e.g., "person with autism") in scholarly writing may accentuate the stigma associated with disabilities (Gernsbacher 2017).
2. Note that some autistic individuals do engage in some behaviors that are conventionally interpreted as indicating social interest. For example, Wing and Gould (1979) described a subgroup of autistic children who spontaneously approached potential social partners. The resulting interactions, however, were considered unusual because these children did not adapt their behavior or conversational style to match social norms expected in such situations (hence the name given to this subgroup: "active but odd").
3. Attention to another's gaze is also common in learning situations (e.g., Csibra & Gergely 2009); for example, where a speaker is looking can indicate what that speaker is referring to. Our discussion here, however, is limited to eye contact as a means of communicating emotional connection and social engagement.
4. For comparison, only 2% of parents of toddlers who did not later receive a diagnosis of autism in the study of Robins et al. (2001) reported that their child did not point declaratively, and just 3% indicated their child did not point imperatively.
5. Non-autistic children in Mundy et al. (1986) produced more imperative than declarative points. Ironically, one could interpret this pattern of results to mean that non-autistic children are the ones who have a specific impairment in declarative pointing: They regularly used pointing to obtain objects but much less often to share attention with others.
6. Ninety-seven percent of the non-autistic sample pointed declaratively at least a few times per week (Allison et al. 2008).
7. In discussions of motor stereotypies, self-injurious behaviors are sometimes included (for discussion, see Symons et al. 2005). However, whereas the prevalence of motor stereotypies in autism is thought to be around 100% (e.g., Bodfish et al. 2000), one recent population-based study estimates the prevalence of self-injurious behavior in autism to be around 30% (Soke et al. 2016). Thus, the two may represent different classes of behaviors. Our discussion focuses on motor stereotypies that do not involve self-injury.
8. In fact, there is evidence to suggest that motor stereotypies in and of themselves do not cause stigmatization. In Harris et al. (2008), only 18% of non-autistic children referred to a pediatric neurology movement-disorders clinic because they engaged in many of the same kinds of stereotypies as autistic children (e.g., hand flapping, rocking) reported being teased or facing difficulties in group activities because of their stereotypies: "Despite the concerns of caregivers, the behaviors appear to be of little concern to the affected child, whose daily activities are rarely affected" (p. 271). At least part of the reason motor

stereotypes are considered so problematic in autism may be because they are produced by autistic people.

9. Note that in one study, the rate of echolalic speech in autistic children was not different from the rate in children with specific language impairment and did not correlate with frequency of other autistic behaviors (van Santen et al. 2013).

10. Kanner (1946) later described uncovering the meaning behind some of the apparently meaningless echolalic utterances produced by autistic children he observed. He explained that that “whenever such tracing was possible, the utterances, though still peculiar and out of place in ordinary conversation, assume definite meaning” (p. 242).

11. We question the hypothesis of Moriuchi et al. (2017) given the conflicting research about autistic toddlers’ ability to disengage from visual stimuli (e.g., Fischer et al. 2016; Landry & Bryson 2004) and the lack of evidence that the procedure used is actually a valid measure of aversion to eye contact. When latency to disengage is used as a dependent variable in work with non-autistic children, the question is typically how long it takes them to disengage from a central stimulus when a target is presented in the periphery (e.g., Peltola et al. 2009; for a similar procedure with autistic toddlers, see Fischer et al. 2016; Landry & Bryson 2004); the procedure in Moriuchi et al. (2017) did not include a peripheral target. Additionally, the prediction of Moriuchi et al. was that autistic toddlers would be faster to disengage from eyes if they found them aversive. But the prediction might have been that if autistic toddlers found eyes aversive, they would be *slower* to disengage. In work using peripheral targets, typically developing infants are *slower* to disengage from stimuli that are assumed to be threatening (e.g., a fearful face), not faster (Peltola et al. 2009). Similarly, non-autistic adults who are anxious are *slower* to disengage from threat-related central stimuli (Fox et al. 2001).

12. The distinction between “high” and “low” functioning is not clear in the autism literature, and these terms should be replaced with more precise ones (Bal et al. 2017). Additionally, we consider this terminology offensive because of the negative and uninformed inferences that tend to be made about individuals referred to as “low-functioning.”

13. The jury is still out on whether autistic people respond differently to social rewards specifically or rewards more generally (Bottini 2018; Clements et al. 2018).

14. The reward system can be dissociated into “wanting” and “liking” components, which are subserved by distinct but overlapping neural substrates (Berridge & Robinson 2003). Kohls et al. (2012) argue that the “wanting” circuit is specifically impaired in autism, but that the data are inconclusive about whether the “liking” circuit is also disrupted.

as those on children’s typically developing behaviors regarding others’ minds and morals. Extending skeptical analysis to other areas may reveal new approaches for evaluating competing claims regarding social interest in autistic individuals.

In questioning the widespread assumption that individuals with autism are not interested in others as social beings, Jaswal & Akhtar (J&A) open the door to inspecting similar assumptions that lurk in psychological characterizations of other groups, including the young, the shy, bystanders, and those with disorders such as Parkinson’s disease. Indeed, J&A’s thesis points to the hazards of complacently defaulting to assumptions about either motivation or capacity in the absence of apposite evidence. Rigorous scrutiny of unexamined assumptions, as demonstrated by these authors, has the potential to illuminate other psychological phenomena and, in doing so, uncover additional methodologies for examining the social uninterest hypothesis with respect to autism.

J&A focus on a perpetual challenge for psychologists, that of determining whether a difference or putative deficit in behavior stems from lack of capacity (knowledge, skill, motor ability, etc.) or motivation. Their argument that autism research slants toward an assumption of social uninterest intriguingly hints that assumptions regarding the relative primacy of motivation or capacity may color perceptions of a group, even in the absence of germane evidence. The tendency to assume (here, about autism) a motivation deficit consistent with behaviors that merely fail to reflect interest constitutes an unexamined inference, an infelicity that likely infects literatures beyond that on autism.

It is tempting to speculate, from J&A’s comparisons of typical and atypical populations, that unexamined assumptions arise from essentialist tendencies (e.g., Gelman 2003; Medin & Ortony 1989). The assumption of a social interest deficit in individuals with autism is consistent with behavior such as reduced eye contact. Yet the assumption is not made about children in some cultures where eye contact is considered rude or in non-autistic adults engaged in difficult problem solving who exhibit the same behavior; instead, this behavior is viewed as adaptive to culture or to cognitive overload (J&A, sect. 2.1, paras. 2–4). Perhaps a motivation deficit is assumed when we believe the individual has a disorder (e.g., “that’s not what people with autism care about”) but a capacity deficit is assumed when the individual is young and developing typically (“that’s not something young children know about yet”). The former accords with our conception of disorder, the latter with a conception of typical development that assumes cognitive advances. In their analysis, J&A provide an instructive example of how research literatures may lean, without warrant but perhaps with some predictability, on unexamined placeholder assumptions.

J&A’s articulation of motivational and capacity influences may be usefully extended to characterizing behavioral variations in typically developing children. Researchers who investigate developing theory of mind have long debated the significance of young children’s failure to predict an actor’s search for a desired object when the actor is shown to have a false belief about the object’s location (e.g., Fabricius & Khalil 2003), suggesting that young children may be primarily motivated by irrelevant factors such as object salience. Yet such characterizations dismiss too hastily children’s interest in others’ beliefs. We found that, when asked for explanations of actions, even 3-year-olds invoked beliefs in accounting for incorrect search (“he thinks it’s there”), suggestive of some understanding of, as well as interest in, others’

Open Peer Commentary

Beyond autism: Challenging unexamined assumptions about social motivation in typical development

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doi:10.1017/S0140525X18002273, e83

Abstract

In challenging the assumption of autistic social uninterest, Jaswal & Akhtar have opened the door to scrutinizing similar unexamined assumptions embedded in other literatures, such

beliefs (Bartsch & Wellman 1989). Young children who failed false belief prediction tasks also mentioned false beliefs – eventually – when asked repeatedly to explain actions based on false beliefs (e.g., running toward an attractive apple while unaware that the apple is made of wood), first invoking desires (e.g., “she likes apples”) and finally offering explanations such as “she thinks it’s real” (Bartsch et al. 2007). Like J&A, we found that verbal accounts (i.e., testimony) revealed important information bearing on both cognitive and motivational influences.

Understanding young children’s behaviors as they relate to moral, as well as mental, aspects of other people similarly requires careful inspection of motivational and capacity factors. Researchers have long pondered whether young children’s relatively selfish, sometimes callous, behavior results from lack of empathy or lack of understanding (e.g., Eisenberg 2000). An attractive placeholder assumption is that young children cannot take others’ perspectives, a view that figures substantially in theories of moral development (e.g., Hoffman 2000). Literature on children’s prosocial behavior abounds with efforts to untangle motivational and social competence factors (e.g., Eisenberg et al. 2014). The value of investigating such factors independently is illustrated by research suggesting that even infants prefer helpers to hinderers, as indicated by their choosing to touch actors shown to assist, rather than impede, another’s attempt to reach a destination (Hamlin & Wynn 2011). Such evidence of preferences relevant to moral sensitivities and motivations constitutes an unexpected complement to abundant evidence documenting cognitive deficits related to moral or prosocial behavior, cautioning against complacent assumptions about either motivation or capacity.

Application of J&A’s deep analysis to a broader range of psychological phenomena may also uncover methodologies to further explore “social uninterest” with respect to autism. Elicited testimony is but one example of a method that reveals unexpected engagement in both autistic individuals and young typically developing children, providing data that counter a broad “social uninterest” assumption. This approach has also proved useful in sorting out the roles of emotion and reasoning in older individuals as well, as in Dahl et al.’s (2018) studies of adolescent and adult moral judgment. Perhaps elicited testimony could be used to understand young children’s experience of empathy even when behavior appears callous. Conversely, approaches for parsing motivational and capacity influences in studies of typical development may prove useful in exploring social interest in individuals with autism. Even the infancy methods for detecting preferences for helpers or hinderers (e.g., Hamlin & Wynn 2011) may suggest some similar behavioral measure for assessing social interest in older individuals with (or without) autism. Though motivational and capacity influences will always be conjoined in behavior, each is worthy of thorough scrutiny, and employing methods used with different populations may advance this aim.

Novel epigenetic, quantitative, and qualitative insights on the socialness of autism

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doi:10.1017/S0140525X18002285, e84

Abstract

Three complementary points to Jaswal & Akhtar are raised: (1) As a person with autism, I desire sociality despite vulnerability to others’ antisocial behaviour; (2) Asperger’s conflation of autism with psychopathy (Czech 2018) likely caused clinicians to disregard social motivation among those with autism; and (3) adverse experiences cause social-engagement diversity to develop in all people, not just those on the spectrum.

We strongly endorse Jaswal & Akhtar’s (J&A’s) suggestion that it is empirically and ethically unwise to minimise the existence of social motivation among individuals on the autism spectrum. Further, we are pleased that J&A encouraged the sharing of qualitative accounts from people on the spectrum. Our commentary raises three points we believe the target article authors and field more generally will welcome. First, the communicating author of this commentary is autistic and would like to share his desires to be social despite its perceived costs (e.g., feelings of vulnerability from others’ antisocial behaviour). Second, Hans Asperger’s dark legacy of what he labelled “autistic psychopathy” due to non-conformity to Nazi ideology (Czech 2018) may have caused some theoreticians, therapists, or laypeople to disregard social motivation among people on the autism spectrum by conflating autism with psychopathy (e.g., lack of social conscience). Indeed, some researchers still dangerously conflate autism with psychopathy (Boka & Leibman 2015) despite evidence to the contrary. It is important to note that autistic and psychopathic-like traits are uncorrelated in the general population and share non-overlapping variance with empathetic responses. Third, our proposed commentary will point out that epigenetic changes over the course of socially adverse life experiences are likely responsible for social-engagement diversity among all people, not just those on spectrum. We propose that different life pathways contribute to epigenetic differences underlying the social aversion continuum.

The first author, despite being autistic, has long been interested in human kindness and how more altruistic individuals can be vulnerable to deceit by psychopathic individuals. This special interest stems from his difficulty in accurately reading others’ facial expressions and ultimately their intentions. Unlike his late father, a police officer who distrusted most people, he opted to trust others, despite the costs of exploitation. Interestingly, even though there is evidence that people on the autism spectrum are vulnerable to bullying and antisocial actions of others (Roedel et al. 2009), there continues to be a misleading conflation between autism and antisocial traits, such as psychopathy (Boka & Leibman 2015). Qualitative analyses show that conflating autism with criminal behaviour is rampant in the media, potentially biasing judicial perceptions (Berryessa 2014). However, empirical work is clear that affective empathy or indeed altruistic helping is not necessarily reduced among people on the autism spectrum (Bethlehem et al. 2016; Dziobek et al. 2008). Furthermore, Lockwood et al. (2013) have shown in a community sample that psychopathy predicts cognitive, but not emotional, empathy. However, the opposite pattern was found for people on the autism spectrum. Likewise, in a non-clinical sample of 161 people (63 of which were males) aged 18–74,

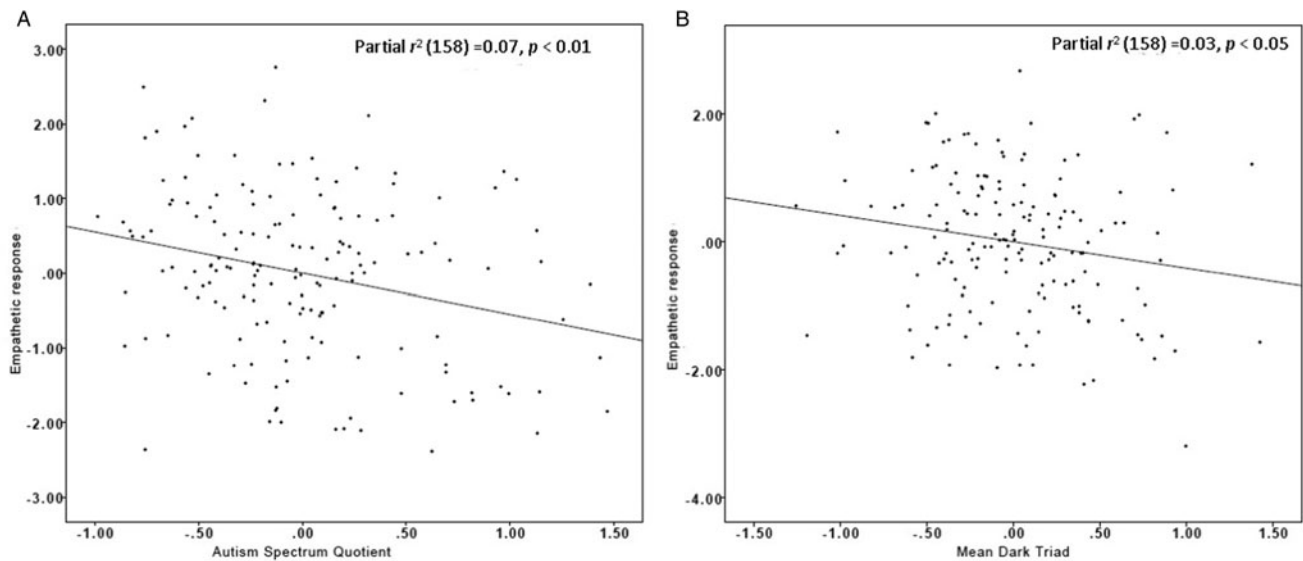


Figure 1 (Brown & Foxley-Webb). Partial regression plots from significant multiple regression model (adjusted $R^2 = .08$, $F(2,158) = 8.26$, $p < 0.01$) demonstrating the independent negative partial associations while the other predictor (i.e., the dark triad or autism spectrum quotient) was held constant (all variables are residuals).

we have found that a degree of the dark triad (i.e., a constellation of narcissism, Machiavellianism, and psychopathy; see Jones & Paulhus 2013) and autistic-like traits are orthogonal: $r(159) = .06$, $p = .43$, despite being statistically significant negative predictors of emotional empathy using Batson and Ahmad's (2001) empathy induction task (Fig. 1).

Interestingly, we also found that narcissism and autistic-like traits were negatively correlated: $r(159) = -.26$, $p < .01$. The pattern of findings is consistent with J&A. Specifically, people with autistic-like traits can be prosocial (Bethlehem et al. 2016), and psychopathy or socially aversive traits such as increased scores on the dark triad do not characterise people on the autism spectrum.

Researchers and laypersons alike may ask “why is there social-engagement diversity among those on the autism spectrum?” This is a reasonable question, as just like all people, some on the autism spectrum may be fearful or avoid social interactions. The reason for social motivation diversity is likely due to experiences during development changing the epigenome. Epigenetics is defined as “above the genome” and constitutes molecular marks placed on DNA modulating gene expression and transmitted cross-generationally without changing the underlying DNA sequence (Brown 2015). Epigenetic regulation is a fine-grained barometer of stress and a diversity of epigenetic mechanisms have been linked to autism (Eshraghi et al. 2018). Importantly, however, unlike the genome, the epigenome is more amiable to change. Our argument is that autistic people are *not* more vulnerable to the epigenetic effects of stress than non-autistic people. Specifically, all stress (including social stress) reconfigures epigenomes (Bernal et al. 2013; Park et al. 2017; Swartz, et al. 2017) causing social aversions among all people, not just those on the autism spectrum.

So rather than lack of social motivation being a defining characteristic of someone with autism, lack of social motivation should be viewed as an individual difference variable caused by adaptive responses to lived experiences. Negative social experiences can cause withdrawal in all people. For example, some social reactions to those on the spectrum could cause distress to people with autism. Positive reactions to autistic behaviours can help

facilitate well-being. Research has demonstrated that the act of stimming within play and embracement of cognition typical of autistic individuals are critical components of socialisation and friendship for autistic children (Conn 2015). Interventions designed to shame people with autism who engage in stimming have clearly caused harm (for moving personal accounts, see Brown 2012; Kelley 2014; “Why I left ABA” 2015). Therefore the quashing of what seems to be a critical social and coping skill for autistic individuals in their formative years could impede their social motivation.

In conclusion, we agree with J&A that lack of social motivation is not a defining characteristic of people on the autism spectrum. Indeed, people with autism can be prosocial, despite having difficulties with aspects of cognitive empathy (e.g., mind reading). Furthermore, our commentary suggests social interest heterogeneity among people on the spectrum may reflect their lived experiences in the social realm as opposed to their underlying condition. We argue that, in some cases of social stress, all people, regardless of their placement on an autism spectrum, may become distrustful of others.

Autistics appear different, but also are different, and this should be valued

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doi:10.1017/S0140525X18002467, e85

Abstract

We agree that autistics' unusual overt behaviors don't necessarily mean reduced social motivation. But Jaswal & Akhtar maintain that, while autistics may appear socially uninterested, their social interest is in fact typical and indeed must be to avoid multiple poor outcomes. This problematic idealization of social typicality deflects attention from important differences in autistic cognition and interests, which should be valued.

In their welcome target article, Jaswal & Akhtar (J&A) provide a range of evidence, as well as quotes from popular narratives, to counter the influential social motivation deficit theory of autism. We share their concerns about unhelpful biases in how autistic differences are interpreted. And we agree that atypical overt behaviors in autism (i.e., differences in how autistics appear) do not necessarily mean that autistics, as a group, lack social motivation and/or interest.

But we see problems with the accompanying premise that appearances aside, autistics are or perhaps should be socially typical, as in the highlighted quote, "The truth about autistic people is that we want what everyone else wants" (target article: epigraph and appendix). J&A emphasize throughout that while autistics may not express social interest in expected and conventional-appearing ways, their social interest is in fact typical. Indeed, J&A specify that if autistics vary in their social interest, this is only in a typical way ("just like non-autistic people," sect. 3, para. 2). Further, they state and imply that it is only by revealing this social typicality that autistics can avoid a host of poor outcomes, from unhealthy cognitive, language, and social development, to poor mental and physical health, to dehumanization.

In addition to their problematic idealization of social typicality, J&A dismiss as irrelevant ("unlikely to yield data that are useful in theory or practice," sect. 3, para. 3) any attempt to test claims about social motivation or interest in autism. Some of these dismissed data have shown typical social motivation in autistic boys, who did not differ from typical boys in being more motivated to view nonsocial (car) versus social (face) images (Ewing et al. 2013). But many of these dismissed data have revealed that autistics not only appear different but also are different socially.

For example, one central aspect of typical social interest or motivation is the automatic prioritization of social information, at the expense of other information (Chevallier et al. 2012a). Autistics in contrast are characterized by cognitive versatility, such that hierarchies of information processing are less mandatory (Mottron et al. 2006). This may result in less automatic social prioritization in autism. Thus while both typical and autistic children over-imitated – they automatically imitated actions they saw another person perform, even when those actions were non-functional – autistic children did so significantly less (Marsh et al. 2013). Typical youth followed eye gaze when it was both informative and uninformative, whereas autistic youth also followed eye gaze but only when it was informative (Ristic et al. 2005). Similarly, typical adults performing a task were more automatically hampered by irrelevant face images than were autistic adults (Remington et al. 2012). Typical adults were also more likely than autistic adults to miss an "unexpected gorilla stimulus" co-occurring with social information (a multiple-person conversation), yet autistics' enhanced detection of the unexpected gorilla co-occurred with typical competence in processing the social information (Remington & Fairnie 2017). Data from these studies and others similar are useful (in theory and practice) and, in our


view, suggest that while autistic social motivation or interest is not lacking, neither is it typical.

Another central aspect of typical social interest or motivation is the automatic prioritization of social reputation at the expense of other priorities (Chevallier et al. 2012a). Again, data on autistics indicate that less mandatory information-processing hierarchies mean more cognitive versatility, which produces social atypicality. Thus, school-aged typical children were much more likely than autistic children to conform with what "most people" thought when this was obviously wrong (Yafai et al. 2014; see also Large et al. 2019). Typical adolescents were also much more likely to jettison their views so as to enhance their social reputations via flattery, in comparison with autistic adolescents who prioritized being honest with themselves and others (Chevallier et al. 2012b). Typical adults prioritized their own social reputations in their charity giving, increasing their donations when they were (vs. weren't) observed, whereas autistic adults did not behave the same way, instead making charitable decisions independently of social reputation concerns (Izuma et al. 2011; see also Cage et al. 2013). Again the data reported in these and other studies are usefully informative about how autistics are atypical in the content and methods of their social interests.

While the scope of this commentary permits only the briefest outline of a small fraction of the relevant literature, we need also call attention to the dearth of interest in how autistics learn well (Mottron et al. 2009). Research in this area is sparse, but it does suggest that given the opportunity, autistics can and do spontaneously learn from complex materials, sometimes in exceptional ways, and this may start early in development (e.g., Kissine et al. 2018; Mottron et al. 2013). This research calls into question assumptions that learning or progress in autism depend on autistics being (if not appearing) typical in their social interest or motivation. We thus question both the urgency J&A attach to revealing typical (if not conventionally expressed) social interest in autistics, and the grim consequences they invoke for autistics who aren't shown to be socially typical.

In summary, we believe it plausible that social interest and motivation in autism are both atypical and characterized by high variance across individuals (Cowen 2011). In the target article, many autistics are in fact marginalized and consigned to difficult fates. This suggests caution in using selective popular narratives about autism as evidence, at the expense of a complex literature on social and nonsocial cognition, based on data from thousands of autistic study participants. Autistics not only appear different when it comes to social interest, but they also *are* different. These differences should not necessarily be dismissed as pathologies or sources of life problems, and indeed they may help contribute to the cognitive and also productivity advantages often shown by autistics.

Being misunderstood in autism: The role of motor disruption in expressive communication, implications for satisfying social relations

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doi:10.1017/S0140525X1800242X, e86

Abstract

Jaswal & Akhtar's outstanding target article identifies the necessary social nature of the human mind, even in autism. We agree with the authors and present significant contributory origins of this autistic isolation in disruption of purposeful movement made social from infancy. Timing differences in expression can be misunderstood in embodied engagement, and social intention misread. Sensitive relations can repair this.

The human mind is not isolated; it is a dynamic relational subject animating the society in which it lives. Heidegger named this *Mitsein*, a state of “being-with” that is the foundation of human experience. We are an ultra-social species, “obligatorily gregarious” (de Waal 2006, p. 4).

Jaswal & Akhtar (J&A) present an impressive array of evidence that individuals with autism retain a fundamental drive for social interaction and meaningful social relations. *Mitsein* in autism is intact, although its means of expression and social interaction are characteristically different. Recent research on the neuroscience of the human social brain, and affective “moral” regulation of acts of social engagement, changes the theory of disorders of relating, including in schizophrenia and autism (Damasio et al. 2013; Nieuwenhuys 2012)

In our work, we have examined the embodied nature of human social interaction in ontogenesis, measuring its origins in expressive intentions of the infant's subjective self (Delafield-Butt & Gangopadhyay 2013; Delafield-Butt et al. 2018), made in relation to the movements of another (Delafield-Butt & Trevarthen 2015; Trevarthen & Delafield-Butt 2017b) that can be affected and contribute to pathology (Trevarthen et al. 2006). Feelings and desires expressed through a reciprocal coherence of felt action co-create social meaning (Delafield-Butt & Trevarthen 2015; Trevarthen & Delafield-Butt 2013b). After 9 months, an infant's acts of selective attention combine interests in objects and other persons (Aitken & Trevarthen 1997; Huble & Trevarthen 1979), which shape the learning of values of a culture (Trevarthen 2009; Trevarthen & Delafield-Butt 2017a).

In autism, we identify a fundamental disruption of the intuitive prospective motor control and its affective regulation in “vitality dynamics” (Fournier et al. 2010; Stern 2010). There is an alteration in the subsecond kinematic patterns of intentional movement of the arms and hands (Trevarthen & Delafield-Butt 2013a), whether to swing the arms, reach to touch, swipe a tablet, or write a name (Anzulewicz et al. 2016; Cook et al. 2013; Dowd et al. 2012; Grace et al. 2018; Torres et al. 2013).

Precise timing is required for efficient, purposeful movement and for effective expressive gesture in dialogue (Trevarthen et al.

2011). Child psychiatrist Daniel Stern called the affective nature of the action pattern “vitality affects” (Stern 2010), meaning autonomic regulations expressed in movements shaped to convey visceral states of feeling (Damasio 1999; Porges 2011). The evidence shows that these actions are timed differently in autism and that perception of others' vitality affects is weakened (Di Cesare et al. 2017; Rochat et al. 2013). This perturbation of human communication and affectionate social engagement (Trevarthen & Delafield-Butt 2013a) is expressed as autistic aloneness and self-protective isolation (St. Clair et al. 2007), which can be misread as absence of sociability by persons with whom an autistic child is seeking meaningful engagement and shared learning (Cook 2016; De Jaegher 2013; Trevarthen & Delafield-Butt 2013a).

A similar break in the reciprocal dynamic of the dyad is found in congenital Moebius syndrome that disrupts or paralyzes facial expression, interrupting affective resonance. Moebius is associated with a high incidence of autism (Gillberg & Steffenburg 1989). Other neurodevelopmental motor disorders, such as deficits in attention, motor control and perception (DAMP) and developmental coordination disorder (DCD), have autistic features. “Motor clumsiness” and autism overlap (Gillberg 1983; 2003; Gillberg & Kadesjö 2003).

A likely site of the origins of this autism motor disturbance is in brainstem sensory and motor integrative systems that are closely coupled to those responsible for affective evaluation and social motor expression, together with closely coupled cerebellar structures (Coleman & Gillberg 2012; Fatemi et al. 2012; Porges 2011; Trevarthen & Delafield-Butt 2013a). Moebius syndrome follows a developmental error of the cranial nerves, and movement disturbance indicative of a brainstem growth error is evident in autism at birth (Teitelbaum et al. 1998), and in preschool children with autism (Bosco et al. 2019). Volumetric differences persist across the life span (Haar et al. 2014). Brainstem disruption affects one's core integration of psycho-motor experience, called the “primary self” (Panksepp & Biven 2012). It is not the wish for social engagement that is disrupted, but the coherence of primary sensory and motor information that make up the “core self” expressed through body movement (Delafield-Butt & Trevarthen 2017).

The new theory of the social brain gives importance to the fore-brain systems centered on the insula, which develop as regulators of motor expressions of vital state and engagement of social affordances. Affective and social neuroscience is undergoing a change with the recognition of the complexity of internal, basic proprioceptive, and visceroreceptive evaluations of plans for action for the embodied self (Merker 2007; Vandekerckhove & Panksepp 2011), and for cooperative action in affectionate relations regulated by intersubjective sensitivity for these intrinsic parameters of consciousness with feeling (Schilbach et al. 2013). This approach supports transformations of psychological theory, with reduced dependence on linguistic communication and more appreciation of social meaning in embodied, non-verbal expression with vitality dynamics to make meaningful contact. It supports an enhanced appreciation of shared awareness in the present moment of what Damasio (2011) calls complex social emotional experiences, such as embarrassment, shame, guilt, contempt, compassion, and admiration. These will be complicated by abnormalities of motor coordination and timing that develop with autism.

Infants, like adults, avert eye gaze in interactions that are felt to be too intense, a normal self-regulation (Jaffe et al. 2001). However, with autistics, this behaviour may be appreciated differently. It is considered asocial in literate, industrial cultures, which

expect “conversational partners to respond promptly and to make their contributions to conversations unambiguous and relevant” (J&A, sect. 2, para. 1, citing Grice 1975). Conventions of motor expression in polite adult dialogues can affect the way autistic avoidance is received and cared for, and these conventions will influence the choice of therapy.

We are led by this thoughtful review to a re-evaluation of human understanding of how a child’s well-being flourishes and develops. Meaningful social relations require sensitive appreciation and forms of response that respect all forms of expression and seek to share experiences (Sullivan & Rees 2008). When this is achieved, understanding and satisfaction in relationships can flourish.

The value of giving autistic testimony a substantial role in the science of autism

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doi:10.1017/S0140525X18002352, e87

Abstract

Jaswal & Akhtar argue that taking seriously autistic testimony will help make the science of autism more humane, accurate, and useful. In this commentary, I pose two questions about autistic testimony’s role(s) in a better science of autism and extract a general lesson about the value of autistic testimony from the authors’ arguments.

A key recommendation from Jaswal & Akhtar (J&A) concerning how to reform the science of autism – how to make it more humane, accurate, and useful – is to take seriously autistic testimony. It is not uncommon to incorporate autistic testimony into autism science by using examples drawn from such testimony as illustrations. But the authors go beyond recommending a merely illustrative role for autistic testimony. They are calling for more substantial ways to take it seriously, ways that would shape how the science of autism is done (e.g., what scientists investigate and how they investigate what they investigate, including what questions they ask and what assumptions they make) and help identify alternatives to taking a deficit view of autistic differences, which can impede scientific progress in our understanding of autism (Dinishak 2016). Below I pose two questions to clarify and develop J&A’s proposal and conclude with a general lesson about the value of autistic testimony that we should glean from their arguments.

First, in making the case for giving autistic testimony a more substantial role in autism science, J&A characterize autistic people as an “essential ... source of insight about autism” (sect. 1). But in what sense precisely are autists an essential source of insight about autism? Is the idea that the only route to acquiring such insight is through autists’ self-reports, such that insight cannot be gotten

any other way? Does it mean that the insight gleaned from taking autistic testimony seriously has special value? If that is correct, what kind of value is this? Is such insight necessary input in the science of autism, for example, when assessing the relevance and explanatory power of hypotheses concerning autists’ atypical behaviors? Our answers to these questions have implications for theory choice in autism science – in particular, whether taking autistic testimony seriously should be thought of as merely a recommendation that scientists could rationally and ethically choose to ignore or as a requirement for the science of autism reform called for by the authors.

My second, related question concerns precisely how to understand the particular roles autistic testimony should play in autism science. The following are among the roles for autistic testimony recommended by the authors:

1. To help identify and test assumptions about autism and autistics
2. To help identify unconventional and idiosyncratic ways autistics show their desire to engage with others or express social interest
3. To help assess existing explanations for atypical behaviors and identify alternative explanations for those behaviors

I will focus on the third one.

Toward the end of the target article, J&A write that they hope to have made a case for “the importance of taking seriously the phenomenological experiences” (sect. 6) of autists. This statement provides an intriguing lead on how to understand the third point. It suggests that autistic testimony contains valuable phenomenological data that should be taken seriously by autism researchers. One way to use autistic testimony to assess explanations of autists’ atypical behaviors, then, is to use the phenomenological data obtained from such testimony as a control on theorizing about autists’ social behavior; one checks that an explanatory hypothesis is consistent with phenomenological data obtained from autists’ self-reports of how they experience social interaction.

To clarify and develop this lead, we need to consider the different ways of reading *should* in “phenomenological data should be taken seriously by autism researchers” (see preceding paragraph), given that different readings may have different methodological implications. For example, the authors note approvingly (sect. 6) that Hadjikhani et al.’s (2017) neurobiological findings are consistent with autistic self-reports about eye contact feeling uncomfortable, as Hadjikhani et al. themselves note. This suggests that, at the very least, it is an attractive feature of a scientific account of autists’ social behavior if it is consistent with phenomenological data obtained from autists’ self-reports of social experience. Stronger construals of “should” are that consistency with the phenomenological data is preferable or even required for acceptance of an explanation, in this case regarding autists’ atypical behaviors.


A different way to develop the third point, also suggested by J&A’s analysis, is to understand autistic testimony as an explanandum, as evidence that a theory of autism ought to explain: “One readily available source of evidence that the social motivation perspective does not explain is the testimony of many autistic people who claim to be socially motivated” (sect. 3).

The particular nature of the constraint (e.g., consistency with versus ability to explain data obtained from autistic testimony) and the constraint’s strength matter for determining the appropriate action when an explanatory hypothesis under assessment fails to meet the constraint. For example, does failure to meet the

constraint constitute decisive grounds for rejecting a candidate explanation?

As we can see, J&A's discussions generate many important and provocative questions concerning how best to pursue their proposal for taking seriously autistic testimony in autism science. Their general argument – that it is vital, in terms of improving autism science and more generally, to explore and cultivate a rich appreciation of the ways our knowledge of autism is dependent on autists themselves and on what autists tell us about what it is like to be autistic – is persuasive and epistemically and ethically significant, regardless of how we answer the particular questions raised above. Through their own use of autistic testimony, J&A demonstrate that it is an epistemological resource. Through their critique of the social motivation perspective they show that there is not just epistemological value in taking autistic testimony seriously, there is also moral value in doing so. All in all, taking autistic testimony seriously can help make the science better at finding out about autism (e.g., by exposing biases and unwarranted assumptions) *and* more ethically responsible (e.g., by addressing a neglect of alternative explanations for autists' atypical behaviors communicated by autists themselves and by helping to address existing and prevent further epistemic injustice – harm or wrongdoing to autists in their capacity as knowers (Fricker 2007)). Ethical justice and epistemic justice are interdependent pursuits (Grasswick 2017) in the science of autism.

Autistic people may lack social motivation, without being any less human

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doi:10.1017/S0140525X18002406, e88

Abstract

In arguing that autistic people are socially motivated, Jaswal & Akhtar miss the opportunity to puncture the notion that social motivation is a prerequisite for humanity. Instead, we contend that some autistic people may indeed find social interactions to be unmotivating and that this doesn't have to be seen as a problem.

Jaswal & Akhtar (J&A) contend that social motivation accounts of autism are dehumanising and that a failure to assume social motivation is present in autistic people has “devastating” results. They go on to select four common features of autistic behaviour that have been invoked as evidence of the absence of social motivation, which may instead be attributed to other phenomena.

We agree that for many autistic people, social motivation and interest may be signalled by non-conventional means and that non-autistic people in general, including non-autistic autism researchers, should not presume that a lack of conventional social behaviour signals a lack of social motivation. Autistic people may

use social cues that fall outside social norms, including differences in facial expressivity and use of gaze (Faso et al. 2015; Neumann et al. 2006), and these cues may not be perceived as “social” by neurotypical others. J&A are likewise correct that many autistic characteristics have multiple potential explanations, including a key role for the behaviour of non-autistic social partners. We also agree that listening to the views of autistic people is a crucial part of understanding autistic experiences – including of course their social experiences and motivations.

However, we do not agree that we ought to conclude that all autistic people are motivated to engage in social interactions with others. And furthermore, we do not agree that a social motivation account is necessarily dehumanising or negatively impactful. Instead, we raise three counter-arguments, as follows.

First, different, diminished, or absent social motivation may be present in some autistic people, and indeed this is reported in the literature, as in the title quote of a recent paper: “Sometimes I Want to Play by Myself” (Calder et al. 2013). This lack of social motivation is not reliably predicted by cognitive or social skills and therefore may be experienced across the spectrum (Calder et al. 2013). Concluding that all autistic people *are* socially motivated (but that this motivation is signalled in unconventional ways) carries risks for autistic people. Those who wish to have less intense or less frequent social contact may find their physical and mental space invaded by well-meaning individuals determined to read social motivation into their behaviours. Instead, the solution to the problem that “being socially motivated is considered by some to be an essential part of being human” (TA sect. 1) is to reject the one-to-one correspondence between social motivation and humanity. We ought to recognise that the variability between autistic people encompasses varying degrees and types of social motivation – as well as multiple methods of signalling social interest – and accept all people regardless of how enthusiastic they are about spending time with other people. Acknowledging and embracing differences in autistic social motivation is a move towards an inclusive spectrum and can help in designing and adapting appropriate support for autistic people.

Second, reliance on the personal accounts of autistic people as evidence that social motivation is present in autism is subject to bias, because not all autistic people are willing or able to share their experiences in this way. Written autobiographies not only largely represent the experiences of cognitively able autistic people, but also, by definition, represent the experiences of people who are motivated to share their stories with others. There is, as yet, no systematic evidence from self-report sources on the distribution of social motivation among autistic people. This is likely to vary widely between individuals and within individuals, depending on context. Mapping variability in the autistic experience is essential. Data from experimental tasks and neuropsychological assessments consistently demonstrate extensive heterogeneity among people with an autism diagnosis, and we should expect – and seek to chart and understand – similar variability in their lived experiences.

Finally, if some autistic people are indeed less motivated by social interaction than others, this has important and positive consequences for how we enable autistic people to learn and thrive. One positive benefit of a social motivation account of autism (though admittedly this is not a feature of the social motivation-focused interventions cited in this target article) is that it can be used to justify the creation of learning and support spaces – such as learning technologies – that do not rely on social motivators.

Thus, we should not reject the social motivation hypothesis just yet. Instead, we advocate for continued exploration of autistic motivations and learning, adopting three methodological approaches that are still rare in the literature. First, systematic explorations of the social experiences of autistic people are required to diversify understanding of the autistic community, especially to capture the motivations of those with learning disabilities and language disorders. Second, cross-cultural research contrasting manifestations and experiences of autism in relation to differing social interactive norms are essential to expose more of the interplay between individual differences and societal expectations. Third, specific investigations of how social motivation for autistic people varies when in autistic and non-autistic company can reveal contextual factors that influence sociality.

In conclusion, rather than reframing all autistic people as being socially motivated, we advocate embracing neurodiversity, including acceptance of those who do not find social interactions generally motivating.

Socially interested, or socially sophisticated? On mutual social influence in autism

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doi:10.1017/S0140525X18002510, e89

Abstract

A lower tendency to influence and be influenced by their social environment seems almost self-evident in autism. However, a closer look at differences and similarities between autistic and non-autistic individuals suggests that some basic mechanisms involved in social influence might be intact in autism, whereas atypical responses point to differences in more sophisticated recursive social strategies, such as reputation management.

Jaswal & Akhtar (J&A) assert that there is no social disinterest in autistic individuals. Social motivation is a complex construct and autism a highly heterogeneous condition, so the question of social motivation in autism might not have a global yes-or-no answer. Hence, defining what is different and what is not in social interest in autism remains open. As a contribution to the discussion, we would like to examine another domain that might also challenge the social motivation account in autism and furthermore, point to alternative explanations of autism: *mutual social influence*.

The idea that autistic individuals might be less influenced by others, and that they might try to influence others to a lesser extent, almost seems a tautology: “autism” derives from a Greek word, whose literal meaning is “self-centered.” Indeed, many aspects of autistic behaviour might be (and often have been)

interpreted as resulting from a reduced social influence: As an example, atypical interests could be indicative of a tendency to orient one’s preferences independently from any *influence from* others, or even from any *interest in* others. Experimental results also suggest that autistic individuals are less influenced by others: When sharing an amount of money (Izuma et al. 2011) or completing a cognitive task (Chevallier et al. 2014; de C Hamilton & Krendl 2007), they are less likely than non-autistics to modify their behaviour in the presence of an observer. Similarly, autistic individuals would be less prone to be influenced by their peers’ opinions (Bowler & Worley 1994) or to attune their speech to their audience (Chevallier et al. 2012) when making a statement. Reduced social interest/motivation is typically interpreted as resulting from an insensitivity to one’s social environment. This is also the case for signs of reduced social influence.

However, there are numerous situations in which the influence of others is clearly observable in autistics’ behaviour: A majority of studies have found an intact orienting of attention by gaze cueing (for a review, see Nation & Penny 2008). Both automatic and voluntary imitation have been found intact (Bird et al. 2007) or even enhanced (Spengler et al. 2010) in autistic individuals. Mimetic desire, the spontaneous propensity to pursue goals that others pursue, is a basic case of social influence that is believed to implicitly shape preferences based on tacit observation of others’ behaviours (Lebreton et al. 2012). Mimetic desire has been found intact in autistic adults (Forgeot d’Arc et al. 2016), suggesting that autistic atypical interests are likely to have other determinants than a lack of influence by one’s peers’ interests. Autistics are also influenced by stereotypes shared in their social environment (de C Hamilton & Krendl 2007; Hirschfeld et al. 2007). However, a recent study (Birmingham et al. 2015) reported an intriguing contrast: an implicit measure revealed stereotypes in both autistic and non-autistic participants but, when asked more explicitly, non-autistic participants reported fewer of them, suggesting that they tended to minimize them when they could, while autistic participants reported them more transparently.

As a whole, basic mechanisms of social influence such as imitation, attentional cueing, mimetic desire, or sensitivity to stereotypes are present in autistics. In these situations, social environment is used in a one-sided way, as a source of information. Conversely, in most situations in which autistic individuals might appear immune to social influence, social environment is involved in a bidirectional relationship: In other words, autistics are less likely to adjust their behaviour in front of an audience to appear more generous (Izuma et al. 2011), more performant (Chevallier et al. 2014) or more friendly (Chevallier et al. 2012), less confronting (Bowler & Worley 1994) or less prone to shameful stereotypes (Birmingham et al. 2015). Thus, the difference between autistics and non-autistics in adjusting their behaviour in the presence of peers might be more about influencing, than being influenced.

Is it then the case that autistics do not influence others? A study by Scheeren et al. (2010) adds two important elements to the discussion: (1) In a situation where the goal was to convince an audience, autistics and non-autistics both made attempts to present themselves favourably. This suggests that, while only non-autistics seem to manage their reputation by default, as a background process in many situations, autistics might at least do it when it is set as an explicit goal. (2) In addition, when the participants in the Scheeren et al. study were instructed about specific expectations of their audience, only non-autistics appeared to

take them into account in their presentation. Hence, even when both autistics and non-autistics try to influence others, non-autistics appear more strategic in how they do it.

Far from reflecting a general immunity to social influence, a reduced mutual influence in autism might relate to two specific components: First, autistics might have a higher *threshold* for attempting to influence others, the *threshold* being related to either the *motivation or the detection of a possibility* to influence in a given situation. Second, the *skill* to flexibly adjust to specific expectations from the audience seems to be less developed in autistics. Contrary to other components of social influence, this skill necessarily involves strategies based on sophisticated recursive representations (i.e., theory of mind; de C Hamilton & Lind 2016). Both the threshold and the skill components of mutual social influence require further investigation in autism. In particular, although theory of mind has been extensively studied as a decoding tool in social environment (Senju et al. 2009), its strategic use during reciprocal social interaction, and more specifically its role in mutual social influence, remains virtually unexplored in autism.

There is no doubt to us that autistic persons are influenced by their social environment. Hence, we will have to consider whether the term “autism” [self-centered] is appropriate – both from an ethical and a descriptive point of view – to label this domain of human diversity and the persons who relate to it.

What is taken for granted in autism research?

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doi:10.1017/S0140525X1800225X, e90

Abstract

This commentary focuses on three points: the need to consider semiotic ideologies of both researchers and autistic people, questions of commensurability, and problems with “the social” as an analytical concept. It ends with a call for new research methodologies that are not deficit-based and that consider a broad range of linguistic and non-linguistic communicative practices.

As a cultural medical anthropologist who works on disability broadly and on deafness specifically, I read Jaswal & Akhtar’s (J&A’s) essay with great interest. They are to be commended for asking important questions about the assumptions that researchers make about autistic individuals’ behaviors and the motivations behind them. Their argument about the importance of analyzing autistic individuals’ actions as interactional and embedded within enabling or disabling social worlds is spot on. More than this, their attempts to scramble the script by arguing that we need to look at non-autistic peoples’ behaviors and motivations is a welcome intervention in a field that has been heavily focused on autistic peoples’ negative or deficient behavior. In this commentary, I focus on three points: the need to consider semiotic ideologies of both researchers and autistic

people, questions of commensurability, and problems with “the social” as a concept. I end with a call for new research methodologies that are not deficit-based and that consider a broad range of linguistic and non-linguistic communicative practices.

While J&A do not explicitly note this, it seems to me that they are advocating that researchers consider their own semiotic ideologies and how these are applied to their research subjects. According to Keane (2018, p. 65), semiotic ideologies “refers to people’s underlying assumptions about what signs are, what functions signs do or do not serve, and what consequences they might or might not produce.” Keane (2018, p. 66) also points out that semiotic ideologies often “determine what may or may not count as evidence of a subject’s intentions.” (And here I might point out that the title of the target article, “Being versus Appearing,” might set up a false analytical black hole. Or perhaps this was intentional?) Researchers must thus explicitly consider what signs and actions they label as communication and how this communication maps onto intention and vice versa; J&A point out the work of presumptions/assumptions throughout their article. Rutherford (2009, next to last paragraph), in a discussion of her non-verbal daughter’s work with speech therapists, notes that these therapists bring their own beliefs about language and communication to the table. As she notes, “Millie’s therapy also foregrounds dimensions of sign use that receive short shrift in this ideology: the fact that others give us our words, the fact that reference is just a small part of sign use, the fact that we can only know what we ‘meant’ after the fact. Millie’s work with her therapists vividly reveals the multifarious practices of belief entailed in our interactions with one another.” What do researchers working on and with autistic people believe, and how does this influence their research?

More than this, Keane (2018, p. 66) notes that “differences among semiotic ideologies can also be so striking that they suggest quite dramatic contrasts between possible world views.” I want to ask a quick question about the stakes of J&A’s research, given that they are working to render autistic people commensurable to non-autistic people. This is evident in their careful arguments, drawing from diverse cultural practices for example, about the ways that autistic and non-autistic people are actually quite similar. However, what if (some) autistic people were actually quite different from non-autistic people in their world views and in their ontologies? While I do not wish to make this argument here, and while J&A have curated an appendix that clearly foregrounds commensurability, I do want to consider how we might approach difference in a way that does not devalue it or label it as a deficit.

Along these same lines, I wish to push us to think differently about the concept of “the social”; if autism is considered a “social disorder,” it seems to me that we need to know what social is and is not. What does “social” in the concept of social motivation mean, for example? While disability studies scholars have argued for a social model of disability in which disability is created through a disabling interaction between an individual’s impairment and society (e.g., Shakespeare 2002); theorists have argued that we are now post-social or that we are seeing the death of the social in this current period of late capitalist modernity (e.g., Donzelot 1984; Rose 1996). Similarly, how do we carve out a space for valuing asociality as some disability studies scholars (e.g., Price 2011) have advocated for? A focus on asociality can be seen as a critique of the ways in which “the social” is normative and coercive and does not allow for diverse ways of being in the world. Might researchers of autism work to stretch the social to include practices that might not be considered typically or normatively social? Autistic practices thus challenge us to expand our

conceptualization of sociality (Ochs & Solomon 2010; also see McKearney & Zoanni 2018).

How might researchers work to orient toward autistic individuals and ethically engage with them in ways that both maximize their agency and recognize that asociality, or perhaps untypical sociality, is a mode of engagement with others? Of course, there are multiple forms of autistic socialities (Ochs & Solomon 2010). Along with J&A, I argue that researchers would do well to look at autistic people and practices not only through a lens of deficit and lack; as J&A discuss, thinking about autism in relation to other categories of cultural and medical difference, such as deaf people who use sign languages, might prove to be productive. What are autistic peoples' own semiotic ideologies? Autistic scholars and activists have long demonstrated that autistic people are knowledge producers in their own right. Refusing to engage with these individuals' words and actions – on their own terms – is ethically problematic, and as J&A have pointed out, in some cases it can result in puzzling and paradoxical findings.

Have we outgrown the reduced social motivation theory of autism?

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doi:10.1017/S0140525X18002431, e91

Abstract

Although refreshing, Jaswal & Akhtar's critique of the reduced social motivation theory omits reference to Asperger's work and to changes in the diagnostic criteria over time. I situate the theory in the historical contexts that shaped – and eventually contradicted – it to highlight its dehumanizing aspects while emphasizing that critiques should be rooted in recognition of the diversity of the spectrum.

Jaswal & Akhtar's (J&A's) critique of the reduced social motivation theory of autism is insightful and courageous in its efforts to advocate for greater understanding of autistic people by contradicting assumptions generated by a theory that has dominated autism research and treatment for at least the past decade. I appreciate their call for people to respect unconventional ways of communicating and their use of developmental and cross-cultural research to highlight that there is often no clear boundary between "autistic" and "non-autistic" behaviors, as human behaviors are shaped by interactions situated within diverse cultural contexts. Although J&A's target article is the third synthesis about the social motivation theory published this year, their approach is refreshing. (For evidence that social reward processing does *not* appear to be impaired relative to non-social reward processing in autism, see Bottini 2018; Clements et al. 2018.) However, their article omits reference to Asperger's work and to changes in the diagnostic criteria over time. To truly understand the origins and consequences of the reduced social motivation theory, we must examine how it has been shaped by historical contexts.

The article traces the reduced social motivation theory to Kanner's (1943) article, long considered the first account of "autism." Apparently independently, Kanner (1943) and Asperger (1944/1991) introduced classifications that became part of what we now call autism spectrum disorder (ASD; but for evidence that both were influenced by Frankl, a Jewish clinician who left Austria as the Nazis came into power, see Robison 2017). Kanner's participants exhibited severe language difficulties while Asperger's were verbally skilled. Kanner (1943, p. 250) described autism as the "innate inability to form the usual, biologically provided affective contact with people." Asperger (1944/1991, p. 78) described children with "autistic psychopathy" as dwelling "among people as if a stranger." Reduced social motivation was a defining characteristic of both accounts. Indeed, both adapted a term Bleuler (1911) had used to describe social withdrawal in schizophrenia. As emphasized in the target article, many autistic people critique this framing. However, some self-advocates agree with it; Robison (2017, p. 8) asserted that "affective contact is the key component of autistic disability."

Differences in perspectives about social motivation among autistic people align with the heterogeneity of the spectrum. Although Asperger has been described as the first to appreciate the diversity of the spectrum (Silberman 2015), recent research indicates that Asperger may have highlighted the talents of *some* autistic youth to emphasize their value to society while allowing others to be euthanized (Czech 2018). Asperger's (1944/1991) mix of empathy and harshness towards autistic people is evident in his writing; he noted that "one is sometimes surprised at how much is absorbed ... despite the apparent lack of interest" (p. 78) but also said that autistic psychopaths' "malice and cruelty ... arise from this impoverished emotionality" (p. 81). Indeed, Sheffer (2018) interpreted her archival research as evidence that Asperger's *definition of autistic psychopathy* was *shaped* by the Nazi agenda of developing classifications to guide eugenics. According to Sheffer, Asperger and other clinicians in Nazi-governed Austria evaluated the degree to which people showed *gemüt*, which she interpreted as interest in and empathy for others, to determine if they would be valuable to society or not. If Sheffer's interpretation is correct, the dehumanizing potential of the social motivation theory shaped the very emergence of the diagnostic category autism.


Indeed, reduced social motivation, or "*pervasive lack of responsiveness to other people*" (italics added), was central to the diagnostic criteria for autism when it was first introduced into the *DSM-III* (American Psychiatric Association 1980). However, Wing and Gould (1979; mentioned briefly in a footnote in the target article) published evidence that not all autistic people exhibit reduced social motivation. Wing (1981) asserted that there were at least three subtypes of autism: "aloof," "passive," and "active-but-odd," and introduced Asperger's paper into English to highlight the diversity of the spectrum. When Asperger's syndrome was incorporated into the *DSM-IV* in 1994 (American Psychiatric Association 1994), the criteria for autism shifted to include less severe social difficulties (e.g., *qualitative* impairment in social interaction). The criteria for ASD in the *DSM-5* (American Psychiatric Association 2013) remains *far* less severe than the extremely reduced social responsiveness of 1980. Therefore, one might expect reduced social motivation to be more apparent among people diagnosed *before* 1994.

However, the reduced social motivation theory rose to prominence *after* 1994. Although social-emotional disconnection was highlighted in initial definitions of autism, sensory-motor and

cognitive explanations then became popular (Rimland 1964; Schopler & Reichler 1968). When the reduced social motivation theory was first introduced, it was described cognitively before the focus shifted to the possibility that autistic people specifically do not find social stimuli inherently rewarding (Dawson et al. 2004). Not only do the aforementioned syntheses problematize this hypothesis, but also recent prospective research indicates that eye contact and social orienting are *not* typically reduced early in infancy in autism (Elsabbagh et al. 2013; Jones & Klin 2013; Young et al. 2009). Social interest can also develop with time (Rumsey et al. 1985). One of the testimonials in the target article is from Donald Triplett, the first case study in Kanner (1943). The article from which the quote was derived highlights the difference between Triplett's increased social motivation as an adolescent and his father's early descriptions of him as "perfectly oblivious to everything about him" (Donvan & Zucker 2010).

By situating the reduced social motivation theory within the historical contexts that shaped it, we can better critique it. Although it is a gross overgeneralization in relation to current diagnostic criteria and has been used in dehumanizing ways, *some* autistic people *do* report experiencing reduced social motivation; we should respect this difference as well. I am optimistic that the target article and surrounding discussion will be an antidote to a prior article in *Behavioral and Brain Sciences* that used the reduced social motivation theory to assert that autistic people are less than human (Tomasello et al. 2005). Autism researchers commenting on that article mostly endorsed its premise. I believe the times are changing (for evidence of this, see Fletcher-Watson et al. 2018; Prizant 2015).

Classical social reward signatures in infants with later ASD

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doi:10.1017/S0140525X18002492, e92

Abstract

Autistic individuals can be socially motivated. We disagree with the idea that self-report is sufficient to understand their social drive. Instead, we underscore evidence for typical non-verbal signatures of social reward during the early development of autistic individuals. Instead of focusing on whether or not social motivation is typical, research should investigate the factors that modulate social drives.

The adult autism phenotype reflects compounded and compensatory processes as much as the original core biological atypicalities (Johnson et al. 2015). Therefore, one cannot ask whether autism is characterised by a lack of social motivation without taking a

lifelong approach and accounting for the high degree of heterogeneity in developmental pathways to the adult phenotype. To identify causal mechanisms that may allow for effective early interventions, one has to investigate early development.

Prospective studies of younger siblings of children with autism spectrum disorder (ASD) – henceforth, infant sibs – have been doing just that (Jones et al. 2014). About 20% of younger siblings develop ASD themselves (Ozonoff et al. 2011). Because investigating social motivation in infancy cannot rely on self-reports, we design experimental paradigms that measure valid constructs of what human adults experience as rewarding interaction with others. Similar measurement challenges faced research using animal models to elucidate the biological bases of motivated behaviour (Berridge et al. 2009). The critical contribution of animal research was to identify objective signatures of reward systems activation. These signatures may vary in manifestation but converge across species in terms of the function they serve and the neural substrates. For example, "wanting" signatures are behaviours that allow an individual to seek and consume or engage with the reward and may take the form of pressing a lever for food or pointing imperatively to food. "Liking" signatures indicate the hedonic value associated to the anticipation or the consumption of reward and may manifest as facial expressions or physiological reactions.

We (and others) designed paradigms that offer infant sibs the opportunity to seek social stimulation through the simplest behaviour available to them, eye movements. This research showed that in their first year of life, infant sibs who later developed ASD prefer to look at faces over other objects (Elsabbagh et al. 2013). When scanning a face, they distribute their looking to the eyes and mouth in a similar manner as control participants (Elsabbagh et al. 2014; Jones & Klin 2013). Just as typically developing infants do, they gradually decrease their looking to faces and eyes over the second year of life to explore other environmental cues that are critical for learning (Jones & Klin 2013; Ozonoff et al. 2010). Further, in an experimental situation which we directly tested social motivation, infant sibs who later developed ASD were again indistinguishable from controls (Vermetti et al. 2018). In this study 24-month-olds received either social or non-social stimulation, contingent on whether they looked at an image of a person (who turned towards them and smiled) or of a mechanical toy (which spun). Sibs who later developed ASD showed a range of typical signatures of socially motivated behaviour: They oriented to and maintained more attention to faces than to toys (the wanting component) and smiled more in response to social interaction (the liking component).

Taken together, these findings support the claims made by Jaswal & Akhtar (J&A), by showing that early in development ASD is not characterised by a lack of motivation to engage with social stimuli (Elsabbagh & Johnson 2016). However, more refinement in these claims is needed because these same studies show that social behaviour is both context-dependent and variable among individuals.

In Vermetti et al. (2018) all participating toddlers preferred social interaction when they could control it (the contingent condition). However, typically developing but not autistic toddlers preferred a more naturalistic social stimulus: a person who sometimes responded non-contingently and addressed the child in various ways, over a highly predictable stimulus (Vermetti et al. 2018).

Prominent interindividual variability was also observed in early trajectories in most infant sibs studies. In one study, paradoxically, some infants in the group who later developed autism

showed greater fixation to eyes than control subjects (Jones & Klin 2013). This variability is important as it predicts later developmental outcomes. When exploring complex scenes requiring more endogenous control of attention, increased scanning of the mouth relative to the eyes in the first year of life predicted a subgroup with a more advanced language profile later in toddlerhood (Elsabbagh et al. 2014).

Is social motivation typical early in development in ASD? We believe the answer has to be yes and no. Whether a type of stimulus is rewarding or not is highly dependent on the context and on individual differences. For example, many rewards lose their value if they are delayed or unavailable (Blechert et al. 2016). We suggest this is what may happen over development, in ASD, as the demands of social interaction become more complex and the rewards associated with social exchanges fail to materialize, the motivation to take part in those interactions decreases. However, when finding themselves in an optimal social environment, social motivation may surge again.

Thus, we agree with J&A that future research needs to characterise the nature of these optimal environments – that is, those in which autistic individuals will truly be, not just appear, socially motivated. However, we disagree with the suggestion that this requires revisiting the classical way of measuring motivation. We observed social motivation in ASD using the same criteria suggested to index the activation of reward systems – that is, seeking, maintaining, and enjoying the reward. We achieved this by making use of a simple behaviour, with minimal requirement in terms of motor abilities: eye movements. The nature of the behaviour that brings about the reward was never key to theories of motivated behaviour. Whatever other behaviours are employed to satisfy an existing social drive in ASD (e.g., echolalic speech or instrumental gestures) will have to fulfil the same criteria; research will have to demonstrate they are employed to bring a social stimulus closer and maintain engagement with it.

Learning how to read autistic behavior from interactions between autistic people

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doi:10.1017/S0140525X18002364, e93

Abstract

Do autistic people read autistic behavior in the same way as neurotypical observers? We consider evidence that suggests autistic-to-autistic interactions demonstrate enabling norms and question the possibilities for neurotypical researchers to learn from autistic social appraisal.

We enthusiastically support Jaswal & Akhtar's (J&A's) argument that autistic people show their desire to engage with others in unconventional ways. Social psychology has long established that actors and observers may have differing perspectives on the extent to which behavior is social (Jones 1976). J&A demonstrate this insight in the context of autism: Low levels of eye contact, infrequent declarative pointing, motor stereotypies, and echolalia are often misconstrued as social disengagement by observers.

But J&A fail to question the corollary of their insight: Do autistic people make the same assumptions and read autistic behavior in the same way as neurotypical observers? Much of the literature reviewed by J&A is focused on interaction between autistic and non-autistic people. Indeed, their core argument is that non-autistic people may misconstrue the social significance of certain behaviors displayed by autistic people. We suggest that examining how autistic people appraise autistic behavior can provide solutions to improving neurotypical-to-autistic interaction.

Autistic testimonies indicate that autistic people share better social alignment with other autistic people than non-autistic people (Chown 2016; Milton et al. 2018). Perceiver-target familiarity facilitates shared understanding (Ickes 1993), and research has shown autistic people interpret and understand the narratives of other autistic characters better than typically developing characters (Komeda et al. 2013). Contrary to the observation that "little consideration has been given to how (mis)interpretations of autistic behavior may contribute to those problems" (J&A, sect. 5.2, para. 7), empirical studies have identified a lack of experiential overlap (Heasman & Gillespie 2018b) as a contributing factor to why non-autistic people encounter difficulties in understanding autistic perspectives (Chambres et al. 2008; Edey et al. 2016; Sasson & Morrison 2017). However, despite evidence on perceiver-target familiarity influencing social understanding, autistic-to-autistic social interactions have received relatively little consideration.

Motivated to find out how autistic people interact with each other in ideal conditions, we recently published a study of autistic people jointly playing video games, a popular naturally occurring social activity (Heasman & Gillespie 2018a). Across 20 gaming sessions involving 30 autistic adults, we observed the types of behavior identified by J&A, such as echolalic speech where participants would repeat sounds made by characters in the game, often disrupting the flow of conversation. But we also observed that these behaviors were not interpreted as indicative of social disengagement by autistic partners. In addition to echolalic speech, autistic partners tolerated behaviors such as shouting, obscure topic shifts, long detailed monologues, ignored turns in speech, and unreciprocated jokes – behaviors that non-autistic people might construe as disengaged or disruptive.

Autistic-to-autistic interactions, we suggest, are less constrained by neurotypical conventions; revealing a different type of sociality, one that permits periods of incoherent and fragmented dialogue in favor of pockets of intense rapport, reciprocity, and humor. Autistic-to-autistic interactions reveal a dynamic in which actors can explore personal and specific interpretations about the situation within a norm of reduced social judgment regarding the behaviors identified by J&A. Interestingly, the relaxed social norms that we observed did not seem to constrain effective interaction: 19 of 20 gaming sessions were completed efficiently. Indeed, research on creativity shows that the ability to quickly move past potential misunderstandings is an adaptive feature of creative collaboration (Hawlina et al. 2017).

Examining autistic-to-autistic interactions reveals a well-developed set of social norms for handling and interpreting the very behaviors that J&A identify as potentially misconstrued by non-autistic people. Accordingly, we suggest that a solution to the problem identified by J&A might already have been found by autistic people, namely, broadening the norms around expected communication styles.

Taking seriously the idea that autistic people might not only be the source of ostensibly problematic social behavior, but also provide insights into how to appraise this same behavior, raises methodological questions. Namely, how do researchers challenge neurotypical assumptions embedded in the research process itself? Valuing autistic testimony, as J&A demonstrate, is one important step toward this goal. However, the suggestion that “research is also urgently needed to identify and characterize the range of behaviors that can signal social interest” (J&A, sect. 5.2, para. 6) risks reinforcing the same issue that J&A argue against: that social behavior cannot be interpreted from the external observer view of the researcher alone. What counts as signaling social interest will depend on whether one is an autistic actor or a neurotypical observer. A more interactional intervention would be re-educating neurotypical people through learning from autistic social appraisal, so as to diversify neurotypical understanding of autistic social behavior. This is why more autistic involvement in research (Fletcher-Watson et al. 2018; Pellicano et al. 2014b), such as seeking autistic consultation on research proposals, conducting autistic interrater reliability for data gathered, and supporting autistic academics is important; the literature also needs to diversify its understanding of social behavior.

Expanding the critique of the social motivation theory of autism with participatory and developmental research

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doi:10.1017/S0140525X18002479, e94

Abstract

We argue that understanding of autism can be strengthened by increasing involvement of autistic individuals as researchers and by exploring cascading impacts of early sensory, perceptual, attentional, and motor atypicalities on social and communicative developmental trajectories. Participatory action research that includes

diverse participants or researchers may help combat stigma while expanding research foci to better address autistic people's needs.

As a participatory team of autistic and non-autistic researchers, we support Jaswal & Akhtar's (J&A's) critique of the social motivation theory of autism and agree that there are compelling alternative explanations of atypical behaviors in autism. We also advocate for greater inclusion of autistic people as research participants and researchers (see Milton 2014). We believe that J&A's argument could be strengthened by a broader focus on the developmental origins of autistic people's domain-general challenges and experiences with others (see Kapp 2013). This commentary expands upon the article's evidence, methods, and suggestions for interventions and further research.

Low eye contact was among the four behaviors analyzed by J&A, and through it we extend their view that autism relates to sensory, perceptual, attentional, and motor systems. Infant sibling and other developmental autism research suggests that differences in these systems emerge at least as early as atypical social behaviors and may *underlie* them (Gallagher & Varga 2015; Gliga et al. 2014; Rogers 2009). For example, atypically *high* eye contact and social attention within the first seven months predicts autism as well as face recognition, language, and motor difficulties in toddlers (Jones & Klin 2013; Klerk et al. 2014; Pineda et al. 2015; Young et al. 2009). This apparent paradox of strong early social responsiveness to caregivers' faces, such as eye contact, predicting autism (Clifford et al. 2013; Del Rosario et al. 2014; Rozga et al. 2011; Zappella et al. 2015), with *diminished* responsiveness predicting infant siblings who *fail* to meet criteria (Clifford et al. 2013), may lie partly in visual and auditory hypersensitivities (see Cohen et al. 2013). The early decline in eye contact in infants later diagnosed with autism (Jones & Klin 2013) may partly occur because autistic people often find eye contact intense and aversive, according to both self-report and brain scans (e.g., Dalton et al. 2005; Gernsbacher & Frymaire 2005; Tottenham et al. 2014). Conversely, and likely in part because of audiovisual synchrony (see Bahrick 2010), lip-reading while listening enhances autistic people's communicative competence from infancy through adulthood to an atypical extent (Elsabbagh et al. 2014; Falck-Ytter et al. 2010; Klin et al. 2002; Norbury et al. 2009; Tenenbaum et al. 2014), which helps fulfill J&A's call for explorations of ways autistic people express social motivation.

The case of eye contact brings us to another point: while we appreciate J&A's use of autistic testimony, we believe their argument could be strengthened by drawing upon a greater variety of research that includes systematic study of autistic people's perspectives. For example, Tottenham et al. (2014) combined self-report with fMRI and eye-tracking. Turning to the area of interpersonal interaction, research using a variety of methodologies has found that autistic people self-report interest in relationships (e.g., Gillespie-Lynch et al. 2017b; Strunz et al. 2017). Although many autistic people say they want to connect with others, they report that anxiety and self-regulation difficulties can contribute to their atypical behaviors and complicate their interactions (e.g., Kapp et al. 2011). Many autistic people report that they have empathy (Gillespie-Lynch et al. 2017b), and research has found robust evidence for at least typical levels of emotional empathy and sympathy (e.g., Jones et al. 2010; Smith 2009), heightened distress at others' suffering (e.g., Rogers et al. 2007), reduced prejudice (Birmingham et al. 2015; Chien et al. 2014;

Dewinter et al. 2015; Kirchner et al. 2012; Wilson et al. 2011), and decreased reliance on social stereotypes (Hirschfeld et al. 2007; Zalla et al. 2014). Not only do autistic people often prioritize social topics in their conversations (Fletcher-Watson et al. 2013) and goals (Mattys et al. 2018), but also autistic parents and spouses tend to feel satisfied with their relationships (Lau & Peterson 2011). Even social motivation theorists of autism acknowledge autistic people's close attachments to parents and offspring and interest in sexual and romantic relationships (Chevallier et al. 2012). Autistic people report relating to others *differently*; research has found them to have atypically wide developmental diversity in their relationships (Bauminger-Zviely et al. 2014; Gunn et al. 2014) and to often relate better to fellow autistics (Komeda 2015; Rosqvist 2012; Strunz et al. 2017).

Despite their empathy, interest in relationships, and reduced prejudice, autistic people suffer exceptional rates of victimization (Sreckovic et al. 2014), especially when they initiate social interaction, have *higher* skills, or appear *more* typical (Kapp 2018). These hardships may justifiably lead autistic youth to develop low expectations for social reciprocity (Cage et al. 2013). Similarly, autistic adults report attempting to “pass” as neurotypical to fit in and make connections (Hull et al. 2017), but they experience more depression (Cage et al. 2018) and suicidality (Cassidy et al. 2018).

We have suggestions for future research and interventions. First, we believe that autistic people should be involved as co-researchers rather than merely as research participants (Nicolaidis et al. 2011; Wright et al. 2014). This participatory research should involve autistic researchers and participants with diverse backgrounds and communication support needs. Such research is likely to increase understanding of autistic people's needs. For example, Gillespie-Lynch et al. (2017a) used participatory methods to develop a curriculum for a peer-mentorship program for autistic college students, many of whom expressed the need for training in self-advocacy and preferred inclusive programming aimed at increasing accessibility for all students. Participatory research may help to illuminate autistic people's atypical expressions of social motivation, such as hyperimitation of other people's actions, especially among autistics with greater interpersonal difficulties (Sowden et al. 2016; Spengler et al. 2010). Like echolalia (as argued by J&A), hyperimitation may be pathologized (as “echopraxia”) in autistics but accepted (as “mirroring”) in non-autistics. Second, we call for effective interventions to increase knowledge of autism (and thus reduce stigma), reduce bullying, and improve supports for autistic people (Gillespie-Lynch et al. 2015; Sasson & Morrison 2017). Such empirically based interventions can engage with the “double empathy problem” – the mutual difficulties that autistic and non-autistic people have in understanding each other (Milton 2012) – by helping interaction partners understand and support autistic people.

Social motivation in autism: Gaps and directions for measurement of a putative core construct

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doi:10.1017/S0140525X18002418, e95

Abstract

This commentary highlights the observation that social motivation is usually an imprecisely specified construct. We suggest four social motivation conceptualizations across levels of analysis and explore where the target article situates among these. We then offer theoretical and practical guidance for operationalization and measurement of social motivation to support more comprehensive future research on this complex construct in the autism literature.

Jaswal & Akhtar (J&A) provide a novel and compelling argument to rethink presumptions about social motivation in youth with autism spectrum disorder (ASD) – that behaviors presumed to be indicative of reduced social motivation in ASD may reflect causes unrelated to motivational factors. For example, they suggest that self-regulation, rather than reduced social motivation, may influence averted eye contact. However, an alternative explanation bears consideration: that both in the target article and in the preexisting literature, social motivation is an imprecisely specified construct (Bottini 2018; Clements et al. 2018). That is, while social motivation models have proliferated, they have done so in the absence of clear definitions of constructs and specific (and falsifiable) measurement approaches.

J&A focus on *social interest* and use this interchangeably with the term *social motivation*. However, drawing from the broad motivation literature, it is clear that “social interest” is but one part of a larger construct of social motivation. Social motivation may be parsed into four components that have largely distinct neurobiological elements, namely, *reward motivation* (or “wanting”), which is comparable to the *social interest* term used by J&A, *reward processing* (or “liking”), *reward learning*, and *habit formation* (Berridge & Kringelbach 2008; 2011; Graybiel 2008).

Reward motivation (wanting) is defined as a state of incentive motivation salience that regulates approach behaviors toward biologically relevant goals (Table 1; Berridge & Robinson 2003; Berridge et al. 2009). Reward motivation (wanting) also encompasses the willingness to expend effort to obtain rewards, and it is referred to as maintenance behavior in the social motivation literature (Chevallier et al. 2012b). Social wanting, therefore, may be observed in prosocial behaviors (social initiations, i.e., effort expended to maintain social relationships) and in the brain as heightened activity in reward-related mesocorticolimbic regions during the anticipation of social feedback. *Reward processing/responsiveness* (liking) is associated with the hedonic impact associated with reward acquisition (Tindell et al. 2006). Social liking includes subjective, behavioral, and biological components of responses to rewards such as self-reported social pleasure and heightened electrophysiological response to social feedback (e.g., reward positivity or late positive potential

Table 1 (Keifer et al.) Summary of the four putative components of social motivation across levels of analysis

Construct	Reward Motivation (Wanting)	Reward Processing (Liking)	Reward Learning	Habit Formation
Definition	A state of incentive motivation salience that regulates approach behaviors toward biologically relevant proximal or distal goals. Directed toward unconditioned or conditioned cues or goals and therefore influenced by learning and stimulus characteristics. Related constructs include reward valuation, willingness to expend effort, maintenance of rewards, and decision making. Sensitive to the magnitude and probability of reward (Berridge & Robinson 2003; Berridge et al. 2009).	Also called <i>reward responsiveness</i> or <i>reward outcomes</i> , these processes are associated with hedonic responses during reward presentation, acquisition, or consumption. These processes include subjective, behavioral, and biological components or responses to rewards (Tindell et al. 2006).	Processes by which behavior is modified when a reward is unexpectedly presented or omitted and depends on dopamine-mediated reward prediction error signals in the dorsal and ventral striatum (Dayan & Berridge 2014).	Over-learned or over-practiced, largely automatic responses that were once associated with positive hedonic responses but that persist even in the absence of reward presentation. Habitual behavior is adaptive in it is automatic and thus frees cognitive resources and is very resistant to extinction (Graybiel 2008; Smith & Graybiel 2014).
Neural Circuitry	Dopaminergic projections from the ventral tegmental area (VTA) that project to the striatum, orbitofrontal cortex (OFC), ventromedial prefrontal cortex (vmPFC), and the anterior cingulate cortex (Berridge & Kringelbach 2008; Berridge & Robinson 2003; Berridge et al. 2009; Ikemoto & Panksepp 1999; Schultz 1998; 2000).	Opioid (mu, delta, or kappa receptors), endocannabinoid, GABA, glutamate, and orexin projections in limbic “hedonic hotspots,” including nucleus accumbens (particularly the medial shell), ventral pallidum, lateral hypothalamus, and in the brain stem parabrachial nucleus (Castro & Berridge 2014; Smith & Berridge 2007). Prefrontal cortex regions, such as the orbitofrontal cortex and insula, code for the hedonic impact of rewards (Rolls et al. 2003; Small 2010).	Midbrain dopamine neurons in the VTA and substantia nigra encode reward prediction errors that cause learning. These neurons project axons to structures involved in motivation and goal-directed behavior, including the ventral striatum and prefrontal cortex (Bayer & Glimcher 2005; Schultz et al. 1997).	Basal ganglia, including dorsomedial and dorsolateral striatum and ventral striatum (Knowlton & Squire 1994; Yin & Knowlton 2006).
Neural/physiologic measures	fMRI during anticipatory phase of a social incentive delay task (Dichter et al. 2012). Anticipatory startle eyeblink modulation (Dichter et al. 2002). Anticipatory startle postauricular modulation (Hackley et al. 2009). P300 during picture viewing (Kohls et al. 2011).	Outcome phase of a social incentive delay task paired with fMRI or EEG (Dichter et al. 2012). Startle eyeblink modulation (Dichter et al. 2002). Startle postauricular modulation (Benning 2011). Late positive potential (LPP) ERP response (Liu et al. 2012). Pupillary response (Sepeta et al. 2012). P300 during picture viewing (Kohls et al. 2011).	Implicit learning tasks paired with fMRI (Scott-Van Zeeland et al. 2010).	Habit learning task paired with fMRI (Tricomi et al. 2009).
Behavioral Measures	Effort expenditure for rewards task (Treadway et al. 2009).	Choice-based valuation of images (Watson et al. 2010). Keypress task (Kim et al. 2010). Sweet taste test (Dichter et al. 2010).	Implicit learning tasks (Scott-Van Zeeland et al. 2010).	Discrimination task with outcome devaluation (Gillan et al. 2011).

event-related potential [ERP]; Stavropoulos & Carver 2014). *Reward learning* includes the processes by which behavior is modified when a reward is presented or omitted (Dayan & Berridge 2014). Over time, social reward learning is observable behaviorally, for example, when an individual differentially attends to social partners who are friendly and avoids those

who treat them poorly. Implicit learning tasks using socially relevant stimuli can elicit social reward learning in a laboratory setting (Scott-Van Zeeland et al. 2010). *Habit formation* refers to over-learned, largely automatic responses that were once associated with positive hedonic responses but that persist even in the absence of reward presentation (Graybiel 2008; Smith & Graybiel

2014). There are many culturally specific social habits, such as waving or shaking hands when greeting someone, that require effort to learn, but once learned, are largely automatic overtures. The transition from effortful social learning to social habit formation is adaptive in that it frees cognitive resources for other tasks.

J&A suggest the predominant view is that social motivation differences are driven by a lack of *social interest* (wanting) in individuals with ASD. However, most ASD research does not specify any component as decisively representing social motivation. For instance, the seminal paper on social motivation in ASD (Dawson et al. 2005) posits that an absence of preferential processing of social information may be indicative of a social motivation deficit, implicating both social wanting and liking. Other well-cited papers point to various aspects of reward processing and maintenance (e.g., Chevallier et al. 2012b; Kohls et al. 2012). Without consensus on the scope of the social motivation construct, J&A's claim of an extant (but differently expressed) desire for social connection among most individuals with ASD may be appropriate – but it may not impact the plausibility of the social motivation model.

To move the field forward, a number of theoretical and practical issues related to the operationalization and measurement of social motivation should be precisely specified. Presently, researchers often use broad self-report measures (such as the Dimensions of Mastery Questionnaire; Morgan et al. 2015) or the Social Responsiveness Scale (2nd ed.; Constantino 2012) to measure social motivation. Though these measures are easy to administer, and they do not differentiate components of social motivation. Task-based paradigms that can be paired with EEG and/or fMRI are helpful in elucidating the neural correlates of social motivation. Although these measures may be more effective in differentiating components of social motivation, they have limited ecological validity. Thus, we suggest three improvements: First, the assessment of social motivation should be multimethod to investigate each of the four components, combining survey, behavioral, and neural measures. Second, assessment of social motivation should also be multi-informant, incorporating the insight of the individual with ASD as well as outside reporters (e.g., parents, teachers, and clinicians) to provide information about social motivation in different contexts. Third, when reporting results, researchers should specify which of the four components are being investigated to promote clarity and consistency.

We appreciate the novel approach J&A took to the reconceptualization of behaviors frequently assumed to stem from a lack of “social interest” in individuals with ASD. We agree that differences in the expression of social interest should not necessarily indicate a complete absence of social motivation. Their focus on social interest as a proxy for social motivation is indicative of the inconsistency in the field over how to define social motivation. Drawing from the broader motivation literature, we set out four components that may contribute to a larger social motivation construct. In doing so, we clarify that heightened social interest may coexist with attenuated levels of the other three social motivation components. Social motivation as a construct is complex and difficult to operationalize. To better understand the ways in which social motivation is expressed – and may or may not be impacted – in individuals with and without ASD, it is essential for the field to converge on specific definitions of components of this construct.

Pragmatics and social motivation in autism

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doi:10.1017/S0140525X18002224, e96

Abstract

Pragmatic deficits constitute a central feature of autism, which is highly relevant to Jaswal & Akhtar's criticisms of the social motivation theory of autism. Recent research reveals that while certain context-based interpretations are accessible, more complex pragmatic phenomena remain challenging for people on the spectrum. Such a selective pragmatic impairment is difficult to account for in motivational terms.

While impaired pragmatics constitutes one of the most robust characteristics of autism, independent of linguistic or developmental level, Jaswal & Akhtar devote it virtually no space within their criticisms of the social motivation theory of autism. In this commentary, I complement their discussion by arguing that data on pragmatics in autism, especially on the comprehension side, speak against such motivation-based accounts.

Current diagnostic criteria for autism spectrum disorder (ASD) include difficulties in grasping those aspects of communicated meaning that are not stated explicitly in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*, American Psychiatric Association 2013, pp. 85–86). A straightforward way for proponents of social motivation theory to account for pragmatic deficits in autism is to argue that lack of impetus to interact with others results in poor interactional experience, which, in turn, deprives autistics from a crucial opportunity to learn to interpret context-dependent, non-literal aspects of linguistic utterances. Reaching beyond what is literally said ultimately entails deriving assumptions about the correct speaker's meaning (which, incidentally, is one reason for introducing of the umbrella social (pragmatic) communication disorder in the *DSM-5* (Lord et al. 2012)). Insofar as all pragmatic processes inherently have a social component, one should expect lack of social motivation to uniformly impact all types of pragmatic skills.

However, recent research on pragmatics in autism reveals a rather different pattern. For instance, once receptive vocabulary is controlled for, autistics children and adults seem to understand metaphors (e.g., Hermann et al. 2013; Norbury 2005). Autistic children and adults grasp requests that are cast in an indirect way, such as *Your lunch is in your bag* or *Is it possible to open the door?* (Deliens et al. 2018b; Kissine et al. 2012; 2015). Individuals on the autism spectrum have also been consistently shown to derive non-logical, pragmatic interpretations of quantifiers, namely, interpreting *some* as *some, but not all* and *X or Y* as *X or Y, but not both* (Chevallier et al. 2010; Pijnacker et al. 2009; van Tiel & Kissine 2018). Crucially, these latter interpretations are based on the exclusion of a more informative alternative (*all* for *some* and *and* for *or*), which, at the very least, entails


awareness of the informativity level that can usually be expected in a verbal exchange.

Interestingly, some of the studies that reveal intact pragmatic abilities in ASD are co-authored by advocates of the social motivation theory (Chevallier et al. 2010). Chevallier et al. (2011) even claim that pragmatic processes as complex as irony comprehension are preserved in ASD. These authors suggest that pragmatic – and, for that matter, mind-reading – skills may not be intrinsically deficient in ASD; however, they would not be spontaneously used, due to a diminished drive toward social interaction and poor orientation to social cues. An explicit prediction of this view is that, *ceteris paribus*, the performance on pragmatic tasks should depend on the strength of motivation to engage with the communicative partner (Chevallier et al. 2010). That is, in experimental conditions where factors influencing motivation are kept constant, different pragmatic interpretations should be elicited at the same rate.

Importantly, in Chevallier et al. (2011)'s irony task, to choose between an ironic and a literal interpretations, participants could rely on the association between manifest incongruence with the literal meaning and a distinctive prosodic cue. Deliens et al. (2018a) designed an act-out task that, unlike Chevallier et al. (2011)'s forced-choice paradigm, makes it impossible to couple the ironic reading with a particular pattern of stimuli and requires genuinely reasoning about the speaker's intentions. In this paradigm, autistic participants experience strong difficulties in grasping irony (Deliens et al. 2018b, exp. 2). Crucially, however, in a task that requires deriving indirect request interpretations the same autistic participants who struggled with irony comprehension display a performance similar to that of neurotypicals (Deliens et al. 2018b, exp. 1). A similar picture emerges from van Tiel and Kissine (2018). Their participants on the autism spectrum do not differ from neurotypicals in their pragmatic interpretation of simple quantified sentences, judging sentences of the form *Some X's are Y* as false in a context where all *X's were Y* – hence displaying a pragmatic, non-logical interpretation of *some* as *some*, but not *all*. However, the same participants do struggle with more complex “distributive” inferences; unlike neurotypicals, they tend to judge sentences of the form *Each X is Y or Z* as true even in contexts where all *Xs* were *Y*. Importantly, while pragmatic interpretations of *some* may be arrived at without genuinely making assumptions about the speaker's mental states, distributive inferences involve reasoning about what the speaker would have implied had she used the stronger alternative *Each X is Y* (or *Each X is Z*).

It is, therefore, likely that pragmatic processes that genuinely require adopting the speaker's point of view, such as irony or more complex pragmatic inferences, remain challenging for people on the spectrum. There is little reason to assume that autistic participants are less motivated in pragmatic tasks involving irony or distributive inferences than on those tapping indirect requests comprehension or the pragmatic reading of *some*. In fact, eye-tracking data or reaction times suggest no disengagement from the former tasks by participants on the autism spectrum (Deliens et al. 2018b; van Tiel & Kissine 2018). There are several possible explanations for the selective pragmatic impairment in ASD – for instance, in terms of impaired mind reading or executive dysfunction – that should be explored in future research. What is very unlikely is that poor social motivation would be the reason why autistics derive some context-dependent pragmatic meaning, but struggle with others.

“Autistic people”? Who do you mean?

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doi:10.1017/S0140525X18002261, e97

Abstract

Jaswal & Akhtar (J&A) offer evidence against lack of social motivation in “autistic people,” providing no further phenotypic details as to the autism spectrum disorder (ASD) subgroups that they refer to. I will argue that given the extensive behavioral and neurobiological heterogeneity among people who receive the diagnosis, reference to “autistic people” is misleading. As a consequence, J&A's claims are difficult to interpret.

Jaswal & Akhtar (J&A) consider four behaviors typical of autistic people, challenging the interpretation that is often attributed to these behaviors. While there is general agreement as to these autistic atypicalities, J&A claim that misinterpreting the motivation behind them has a negative impact on autism intervention and research. However, the way the authors use the term *autism*, offering no further qualifications, renders their claims uninterpretable. In fact, generalized references to “autistic people,” such as appear in the current article, have had negative bearings on research related to the causes of the disorder, impeding translational impact (Müller & Amaral 2017).

J&A use “autistic” to refer to people who have received a diagnosis of autism (footnote 1). But this is a highly heterogeneous group that eludes phenotypic as well as neurobiological description. The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., known as *DSM-5*; American Psychiatric Association 2013) has gone a long way in acknowledging this heterogeneity, taking note of levels of severity of autism, along with language status, IQ, and personal history (e.g., age of diagnosis, additional deficits). People with syndromic autism, that is, people who are diagnosed with a neurodevelopmental disorder and autism, whose autism typically varies according to the comorbid diagnosis, are also part of the spectrum.

Most notable is the fact that autism phenotype can vary even among monozygotic twins, not only in comorbid features but also in core autism spectrum disorder (ASD) parameters and severity measures. Furthermore, variation is seen in time of onset of ASD as about 25–40% of children regress after 2 years of seemingly normal development, about 60% have intellectual impairments (for a detailed review and meta-analysis of the prevalence of regression in ASD, see Pearson et al. 2018) and 25–40% have minimal or no language at all. Attempts to account behaviorally for autism subtypes did not demonstrate course of development or treatment validity and showed low interrater agreement in assessment (Lord et al. 2012).

Importantly, along with the diagnostic features of ASD, the non-diagnostic deficits accompanying ASD occur in one combination or another in all, or nearly all, people diagnosed with ASD, while social-communicative difficulties and especially

routine-repetitive behaviors are not infrequent in young typically developing children. It is generally accepted that the extensive behavioral heterogeneity that is seen in autism exceeds that which characterizes other psychiatric disorders (Waterhouse 2013).

Virtually every aspect of autism that has been studied reflects an unexplained diversity. To date, there are reports of structural and mutational variations of between 200 and 1,000 genes involved in ASD susceptibility (Berg & Geschwind 2012). The contribution of common genetic variants to ASD is likely mediated by a large, heterogeneous number of mutations, each contributing a minute risk of the disorder. Still, although it is estimated that while 15–40% of the risk of ASD is accounted for by common variants, only two genome-wide significant loci have been found. Furthermore, even these loci have not been straightforwardly replicated (Anney et al. 2012).


De novo mutations are also involved in ASD. Genetic susceptibility to ID, ASD, attention-deficit/hyperactivity disorder (ADHD), and schizophrenia often arises from de novo mutations in the same genes, suggesting that these disorders share common mechanisms (Fromer et al. 2014) as well as common affected pathways (Ben-David & Shifman 2012). De novo mutations in ASD as well as in ID are seen in genes that are relatively immune to mutations in the general population (Samochoa et al. 2014). Importantly, while reporting common mutations in ASD, ID, and schizophrenia, Shohat et al. (2017) found gene expression patterns that were specific to each disorder. They suggest that convergence among disorders is due to pathways that are affected by mutated genes, while diverse loci of gene expression contribute to specific phenotypes.

Diagnostic as well as non-diagnostic symptoms of autism such as ID, language disorders, ADHD, and seizures often occur with a variety of brain impairments, likely reflecting the complexity of the behavioral manifestations of social-communicative behavior and the varied manifestations of repetitive behaviors. Furthermore, ASD diagnosis or elements thereof have been found with many developmental syndromes, including single-gene Mendelian syndromes that have a variety of genetic and brain bases (Arnett et al. 2019).

Studies of the neuropathology of ASD have identified abnormal brain growth trajectories and disordered cortical organization and subcortical connectivity. In a recent review article, Waterhouse et al. (2016) provide a representative sample of the heterogeneous and often contradictory findings that characterize attempts to uncover the brain abnormalities that characterize people with autism. A summary of this work is beyond the scope of this commentary. Suffice it to say that the general conclusion is that ASD lacks biological and construct validity. Waterhouse et al. (2017, p. 1182) boldly suggest that the diagnosis of ASD, which they refer to as an arbitrary, unscientific “convenient fiction,” should be abandoned in research. Müller and Amaral (2017) offer a more conservative view. They agree that the inadequacy of behaviorally defined ASD mandates a change in research, without which there is little hope for translational progress. Nevertheless, Müller and Amaral argue that for the time being, there is much to be gained by continuing to work along the lines of the clinical diagnosis of autism.

All of the above and more stress the need to qualify reference to “autistic people” in research, in intervention and in daily conversations, so as to avoid the impression that autism refers to a unitary group of affected people. The claims made by J&A would be meaningful if we knew more about the subgroups of people with a diagnosis of autism with respect to whom these claims are made.

Two sources of bias affecting the evaluation of autistic communication

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doi:10.1017/S0140525X18002327, e98

Abstract

We support Jaswal & Akhtar’s interrogation of social motivational accounts of autism and discuss two sources of bias that contribute to how others construe autistic people’s communications: (1) an experience-based bias that limits our ability to discern the speaker’s action as communicative and (2) a prejudice against the credibility of certain speakers that limits a listener’s willingness to believe their testimony.

Trusting another person’s testimony is composed of at least two parts: (1) registering the intentions that distinguish acts of communication and (2) treating those communications as reasons for belief. Jaswal & Akhtar (J&A) discuss alternative explanations for behaviors previously interpreted as indicating a lack of social interest in the autistic population, arguing that social motivation is “more appropriately understood as arising from a dynamic interaction between the individual and how others *perceive* and *react* to them” (sect. 1, emphasis added). We agree, and we think that there may be two distinct sources of bias that can affect an observer’s evaluation of an autistic person’s communication: an *experience-based bias* for the forms that communication can take and a *prejudice* against the credibility of certain speakers.

The first bias, an experience-based bias, limits an adult observer’s ability to register certain non-conventional or less conventional actions as communicative. J&A discuss various ways in which autistic communications are misidentified or misconstrued. What limits an observer’s perceptions of autistic communication? Part of the answer likely relates to increasing exposure to the set of actions, symbols, and routines that mark the conventions of the language we learn. There is a growing body of developmental and cross-cultural research showing that infants begin as quite flexible listeners who are open to a range of communicative actions, and they increasingly develop preferences over time as they encounter more instances of certain recurrent, conventional communications (DeLoache 2004; Namy & Waxman 1998; Namy et al. 2004; Woodward & Hoyne 1999). Also, caretakers from different cultural backgrounds address their infants quite differently. Some seek dyadic interaction using object stimulation and mutual gaze, whereas others predominantly use body contact and physical touch (Kärtner et al. 2008; Keller 2007; Richman et al. 1992). In response, infants increasingly look to their mothers who seek face-to-face contact; but when caretakers primarily focus on physical touch, infants’ gazing behavior does not change with age, and they produce less vocalizations (Kärtner et al. 2010; Keller et al. 2008). This inductive process depends upon *experience* delivering actions that listeners repeatedly encounter and gradually recognize as intentional and communicative for their community, which helps explain both why parents of autistic children are good at

interpreting the communications of their children and why others outside of that experience often fail.

This experience-based bias for certain communicative actions also highlights the more general issue of how placing priority upon certain intentional and conventional communicative signals (pointing, eye gaze, words, statements) may thereby neglect the importance and nuance that other forms of dynamic interpersonal communication can take. As J&A suggest, we caution against using a narrow set of communicative actions to evaluate children's communicative abilities and motivations. For example, empirical evidence shows that Mexican infants use significantly fewer hand gestures compared with infants in the Netherlands and China (Salomo & Liszkowski 2013), but fewer hand gestures does not necessarily mean that Mexican babies are any less socially interested than infants in other countries. Therefore, to better understand communicative development across a diverse group of young speakers and listeners, we think that social cognitive research could benefit from greater consideration of social environments, individual differences, and dynamic interactions.

The second bias, a prejudice against the credibility of certain speakers, can limit a listener's willingness to believe the communication. Underestimating the trustworthiness of certain informants makes it difficult for them to convince us by their testimony, even when we recognize their actions as communicative. We support J&A's recommendation of taking autistic testimony seriously and believe that scientists and clinicians run the risk of committing epistemic injustices to those we work with if we are not aware of prejudices that question the credibility of certain speakers (children, minorities, women, etc.). If we discount the credibility of others' testimony on the grounds of who they are or what they look like, we may give researchers and clinicians more credibility than warranted and less credibility to certain speakers than they deserve.

Developmental research suggests that even the youngest learners may mistrust speakers from less privileged social groups. Children are more likely to mistrust outgroup members who speak with an accent (Corriveau et al. 2013) and speakers of a different race (Chen et al. 2013) or gender (Shutts et al. 2010). When paired with a more appealing informant, they are also more likely to discredit speakers who demonstrate a non-dominant status (Bernard et al. 2016), appear to be unconfident (Jaswal & Malone 2007), have less prestige (Chudek et al. 2012), or are less attractive (Bascandzief & Harris 2016), preferences that have also been documented in adults (Anderson & Kilduff 2009; Chaiken 1979; Henrich & Gil-White 2001). These initial assessments of a speaker's trustworthiness influence the plausibility we give to their communications. If the initial assessment is low, it can lead us to look for signs of incompetence or irrationality, which can serve to confirm or even reduce low initial assessments (Jones 2018). Therefore, without reconsidering and changing our initial assessments of autistic speakers, we may deprive ourselves of the opportunity of learning from them, and we deprive them of opportunities to share their knowledge and experiences with us. To alleviate testimonial injustices such as these, researchers need to have a certain "testimonial sensibility" (Fricker 2003), neutralize the effects of prejudicial stereotypes, and undertake separate assessments of the credibility of the speaker and the plausibility of his or her testimony (Jones 2018).

In conclusion, there are two distinct sources of bias that can affect a listener's evaluation of an autistic person's communication: an experience-based bias and a prejudice against the credibility of certain speakers. To discern the intentions of a

speaker's communicative action, developmental researchers need to revise their non-social assumptions about less conventional actions. To treat these actions as reasons for belief, researchers can foster greater testimonial sensibility to diminish the effects of prejudicial stereotypes that would otherwise influence one's credibility judgments.

Compensation in autism is not consistent with social motivation theory

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doi:10.1017/S0140525X18002388, e99

Abstract

Growing evidence, as presented by Jaswal & Akhtar, indicates that social motivation is not universally reduced in autism. Here, we evaluate and extend this argument in light of recent evidence of "compensation" in autism. We thereby argue that autistic "compensators" – exhibiting neurotypical behaviour despite persistent difficulties in social cognition – indicate intact or potentially heightened social motivation in autism.

Jaswal & Akhtar (J&A) challenge the view that social motivation is universally reduced in autism by exploring alternative explanations for common autistic behaviours and presenting autistic testimony. Additional research supporting this view, not discussed by J&A, is found in the growing literature on "compensation" in autism. Compensation refers to the mechanism underlying improved behavioural presentation (i.e., reduced symptoms) of a condition such as autism, despite ongoing atypicalities at cognitive and/or neurobiological levels (Livingston & Happé 2017). An autistic "compensator" may therefore appear non-autistic in their social behaviour so that they "pass" as neurotypical, but continue experiencing social cognitive differences and difficulties. For example, they may compensate for a core difficulty in understanding others' mental states (i.e., in theory of mind) by using alternative cognitive processes to navigate social situations. This might involve using general cognitive abilities (Lai et al. 2017) to learn and apply social rules (e.g., making deliberate eye contact) and engage in socially normative interactions (e.g., small talk). In a recent study (Livingston et al. 2019), we reported evidence for many "high compensators" who, despite poor theory of mind task performance, showed neurotypical social skills as measured using the Autism Diagnostic Observation Schedule (Lord et al. 2000). Crucially, the existence of high compensators is not consistent with the notion that autistic people do not seek or value social contact, as predicted by social motivation theory (e.g.,

Chevallier et al. 2012). Instead, high compensators appear motivated to overcome substantial social cognitive difficulties by adopting neurotypical social rules and interactive styles, indicating that at least a subgroup of autistic individuals have intact social motivation. More broadly, the existence of compensation in autism follows J&A's argument that, while social motivation may be reduced in some autistic people, several behaviours observed in autism can be explained by cognitive mechanisms unrelated to social motivation.

Further evidence that many autistic people, particularly those showing high levels of compensation, are socially motivated comes from empirical reports on the phenomenological experience of compensation. Whereas J&A focus on autistic testimony in anecdotal form, a new body of qualitative research indicates that many autistic people are motivated to compensate to fit into and succeed in the social world (e.g., maintain relationships and employment). Qualitative responses indicate, for example, a desire to avoid social rejection (e.g., "avoid looking like a social clumsy idiot"; Hull et al. 2017, p. 2525) and behave like neurotypical individuals to make social connections ("I do like people... I would not get along with people at all if I relied on my...autistic impulses"; anonymous, personal communication 2017). This involves several strategies, such as masking socially undesirable behaviours (e.g., hiding special interests) and employing active compensatory strategies (e.g., preplanning conversations) to superficially demonstrate "good" social skills (Dean et al. 2017; Hull et al. 2017; Tierney et al. 2016). Additionally, some of the anecdotes presented by J&A could be viewed in the context of compensation. For example, "I did not give up but started to talk to and hang around a group of "popular" girls" (Harris 2015, p. 41, as cited in J&A), describes a common compensatory strategy of affiliating with and copying socially skilled people. Together, we suggest that the existence and frequent use of compensatory strategies is not consistent with a central tenet of the social motivation theory that autistic people do not work to manage their reputation.

Evidence of compensation indicates that social motivation may even be atypically high in autism. We tentatively speculate that autistic compensators may require greater social motivation than neurotypical people to overcome social cognitive difficulties and perform comparably in social situations. Such heightened motivation is possible given that many autistic people actively choose to use compensatory strategies despite substantial costs to their psychological resources and mental health. Indeed, they report expending energy on compensation, comparing it to physical exercise or mental arithmetic, thus draining resources required for daily functioning (Hull et al. 2017; Tierney et al. 2016). Compensation has been linked with anxiety (Livingston et al. 2019), depression (Lai et al. 2017), and suicidal ideation (Cassidy et al. 2018), indicating a potential cost of using compensatory strategies to mental health. One possible explanation for this is because compensatory strategies can be rudimentary (e.g., inflexible across different contexts and break down under stress; Livingston & Happé 2017), allowing one to "pass" as neurotypical, but may not be sufficient to experience fulfilling social interactions. This could leave autistic compensators feeling isolated and at risk for mental health problems, especially given their potentially high levels of social motivation.

Although we have focused on intact or heightened social motivation in autism, the literature on compensation also provides clues about why some autistic people appear to have reduced social motivation. In light of the emerging link between

compensation and costs to mental health, reduced social motivation could be an adaptive developmental response to limited social cognitive and compensatory resources (see Johnson 2017). Accordingly, instead of compensating, some autistic individuals choose to be in environments where non-social skills are valued over social skills (Livingston & Happé 2017). Reduced social motivation may therefore help to protect these individuals against mental health problems otherwise experienced by autistic compensators. As such, we propose that intact social motivation in autism may not be as positive as framed by J&A and caution against suggestions that reduced social motivation, where observed in autism, should necessarily be targeted in clinical interventions.

In summary, we support J&A's central claim that reduced social motivation is not a universal feature of autism, but extend this argument with research on compensation in autism. We have argued that autistic compensators reflect a subgroup of autistic people with intact or potentially heightened social motivation, but equally, that the costs of compensation may explain why some autistic people appear to have reduced social motivation. Moving forward, we suggest that research aimed at disentangling the interrelationships between compensation, social motivation and mental health could help design interventions to improve the well-being of autistic people who may be socially different, yet socially motivated.

The double empathy problem, camouflage, and the value of expertise from experience

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doi:10.1017/S0140525X18002212, e100

Abstract

To understand why autistic people are misperceived in the way Jaswal & Akhtar suggest, we should embrace concepts like the "double empathy problem" and camouflaging and recognize the negative consequences these have for mental health in autism. Moreover, we need to value expertise from experience so that autistic people have a voice and indeed a stake in research into autism.

The target article by Jaswal & Akhtar (J&A) is extremely welcome, and in our commentary we offer support along with suggestions on how the account should be elaborated even further with reference to the "double empathy problem" (Milton 2012), while highlighting the potentially negative consequences for the mental health of autistic people when they are misunderstood by others. We also comment on the value of participatory research addressing social motivation in autism.

The double empathy problem (Milton 2012) recognizes that autistic people have difficulty connecting with others; but instead of explaining this as a problem residing in the autistic individual, the account locates the problem more at the level of society. It supposes that just as autistic people have difficulty understanding neurotypical people, so do neurotypical people have difficulty understanding autistic people, perhaps because autistic and neurotypical people have rather different perceptions and experiences. J&A note that some researchers misconstrue social motivation as residing within an individual, when it is more appropriately understood as arising from a dynamic interaction between the individual and how others perceive and react to them. The upshot is that difficulty with social connectedness and even social aversion are not so much features of autism but consequences of being autistic. After feeling socially excluded, autistic people will find social situations – at least those involving neurotypical others – to be unrewarding and even aversive. The transactional perspective on development (Sameroff 1975) recognizes that how one grows socially and emotionally depends not just on an immutable aspect of the individual's constitution but also on how the behaviour of others shapes how you behave, which in turn shapes how others behave towards you, which shapes how you behave towards them, and so on. Autistic people might be just as socially motivated as neurotypical people, but this motivation might be blunted by negative experiences or it might prevail unabated but without being apparent to neurotypical people.

The assumptions in the preceding paragraph are that autistic people are both difficult to interpret and perceived unfavourably by neurotypical people. Are these valid assumptions? Yes! Sheppard et al. (2016) reported that the behaviour of autistic people as they spontaneously react to a social event is considerably more difficult for neurotypical people to interpret. Neurotypical observers stand a fair chance of accurately inferring what caused the behaviour of other neurotypical people but do less well when observing autistic people. Meanwhile, Sasson et al. (2017) reported that neurotypical observers rated the behaviour of autistic people significantly less favourably than they rated the behaviour of neurotypical people – even though the observers had no idea that some of the people they were viewing were autistic. Because autistic people are difficult to interpret and are perceived unfavourably by the neurotypical majority, this in turn could impact on how they interact with others, giving the impression they are socially unmotivated.

As noted by J&A, the unhelpful claim that autistic people are socially unmotivated has also led to the supposition that they may not crave social connections. However, this assumption is not consistent with autistic people's experiences of feeling lonely (Hedley et al. 2018), and that belonging (meaningful social connections) is an important part of their well-being (Milton & Sims 2016) and quality of life (McConachie et al. 2018). On sensing that they are liable to be perceived unfavourably, autistic people are thus strongly motivated to “camouflage” (Hull et al. 2017; Lai et al. 2017; Rynkiewicz et al. 2016), meaning that they effortfully imitate relevant aspects of behaviour they observe in people they believe to be more socially skilled than they, in an attempt to be more readily accepted by others. However, camouflaging autism comes at a great psychological cost. Autistic people describe camouflaging as “exhausting” (Hull et al. 2017), increasing risk of depression (Cage et al. 2018), anxiety (Livingston et al. 2019), and even suicidal thoughts and suicide attempts (Cassidy et al. 2018). Camouflaging is symptomatic of a wider societal issue – that is, neurotypical people failing to accept autistic people

(Cage et al. 2018; Cassidy et al. 2018; Milton 2012) – and the unique nature of social motivation and behaviour in this group (Heasman & Gillespie 2018a), which impact their mental health and well-being.

We agree with J&A that it would be bizarre to ignore testimony from autistic people as evidence, but we also acknowledge that these data are unsystematic and prone to various biases associated with the context in which the testimony was given and the motivations of those who gave it. To further the field, and address these concerns, participatory and mixed methods designs would be particularly useful. Participatory methods involve working with the autistic community as equal partners to identify the research questions and refine the design of studies. These approaches offer a systematic method of listening to and taking on board the views of the autistic community and subsequently investigating if these anecdotal observations and ideas play out in findings from research. This approach is being used increasingly by researchers to explore the unique nature of social motivation and mental health difficulties within the autistic community (Cassidy et al. 2018; Crane et al. 2019). We expand on J&A's position in that autistic people's expertise from experience should be incorporated into future research exploring the unique nature of social motivation in autism, so “a more accurate, humane, and useful science of autism” (target article abstract) is achieved together.

In summary, the concepts of the double empathy problem and the transactional model of development are extremely important to the thesis J&A offer, even though they do not refer to these concepts explicitly. Moreover, the thesis would be enriched by reference to recent empirical evidence that autistic individuals are misunderstood and perceived unfavourably by others, and to the wider impact of unhelpful assumptions about social motivation on the mental health and well-being of autistic people. We further argue that participatory research methods are a particularly powerful way of including autistic voices in developing a more accurate and useful science of autism.

The loneliness of me: The assumption of social disinterest and its worrying consequences in autism

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doi:10.1017/S0140525X18002303, e101

Abstract

We share Jaswal & Akhtar's concerns about the unintended repercussions of assumed social disinterest in autism. We expand consideration of these consequences with discussion of the literature and our own work on loneliness, mental ill-health, and self-representation, which is a cornerstone to social and emotional health. Further study is needed with expansive, mixed methodologies and involvement of the autistic community.

Jaswal & Akhtar (J&A) raise the spectre of the unintended consequences that could arise from traditional assumptions of social disinterest in autism. The authors both centre on autistic voices and widen the scope of our view to observe the non-autistic participant in a dyad, whose beliefs may markedly affect, or worse reduce, interaction. As clearly shown in the qualitative data presented by these and other authors (Causton-Theoharis et al. 2009; Hickey et al. 2018), loneliness is an immense problem in the autistic population, and one that might be exacerbated by just this assumption.

Some accounts, in autistic children and adolescents, present different subjective experiences and understanding of friendships and loneliness (Bauminger & Kasari 2000). Social interaction may not actually reduce loneliness, and likewise loneliness can coexist with decreased desire for social interaction (Deckers et al. 2017), which may reflect that social interaction, when it occurs, is not always a pleasant experience. However, other accounts have emphasised the similarity in the way that autistic and non-autistic people experience loneliness, with feelings of “disconnect” and “longing” for understanding and companionship, at the heart of this concept, which is clearly differentiated from the need for time alone (Causton-Theoharis et al. 2009; Hickey et al. 2018). In strong accordance with J&A, these accounts emphasise that it is “not disinterest that separates people with autism from others” but rather their “difficulty navigating the world of people” and their unconventional approach to the same (Causton-Theoharis et al. 2009, p. 92).

As in non-autistic people, loneliness in autism is associated with poor mental health and, by increasing the likelihood of depression, predicts self-injury and suicide ideation (Hedley et al. 2018). Autistic people are at substantially greater risk of suicidality (Cusack et al. 2016), making this a crucial focus for research and intervention. Our group recently investigated self-injury and suicidality in 134 autistic adults who took part in an online survey. The unpublished (thus far) data corroborate the link between loneliness and suicidality ($r = .339, p < .001$) with another measure of suicidality (see Fig. 1).

Qualitative data collected in the same study highlighted difficulties in communication between autistic people and healthcare professionals. One participant wrote: “You are speaking a different understanding and it is so hard to find a moment where understanding touches.” Of course, professionals are subject to the same assumptions as the lay public. In 2005, many primary and specialist healthcare providers endorsed the belief that autistic children are unlikely to form emotional bonds with others (Heidgerken et al. 2005). Ten years later, less than 10% of physicians expected autistic people to show an interest in others (Zerbo et al. 2015). Assumptions of social disinterest may thus mean that autistic individuals who do attempt to connect, however idiosyncratically, are less likely to be diagnosed, which in turn may reduce attempts from professionals to connect with autistic people. Our survey reiterated how much autistic adults value caring relationships and emotional connections with others (“People need relationships, love and appreciation”) and how much they appreciated such a connection (“being heard,” “having regular time”) with their healthcare professionals. Sadly, and perhaps partially pertaining to attitudes about autism, many autistic people are dissatisfied with the care they receive and their relationships with healthcare professionals (Nicolaidis et al. 2015).

Our recent work indicates that these differences in autism may be related to differences in self-related cognition and emotional processing (Sui & Gu 2017). For example, people normally tend

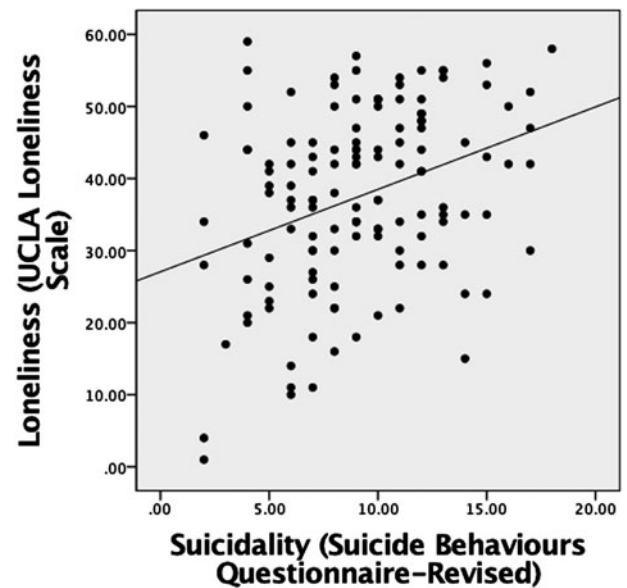


Figure 1 (Moseley & Sui). Data from 134 autistic adults revealed that as loneliness increased, so did suicide ideation and attempts.

to make faster and more accurate responses to information about themselves than others, and a reduction in this trend predicts negative mood state (Sui & Gu 2017). Other researchers have demonstrated that self-referential processing is atypical in autism (Lombardo & Baron-Cohen 2011), and that these differences may be associated with social problems in autism (Gillespie-Smith et al. 2018). We argue that altered self-representation impacts on the way one perceives and reacts to others, because the self–other interaction represents a basic point for our construal of the world through the life span (Sui & Humphreys 2015). Self-representation in autism is related to the development of social competence, relationships, and emotional health (Bauminger et al. 2010), such that understanding changes in self-representation and how they contribute to social interaction in autistic individuals may be important to develop full accounts of the autistic experience.

Further study is needed, and we would reiterate, alongside J&A, the importance of using expansive, mixed methodologies. The way autistic people talk about loneliness, for example, is influenced by the methods used to explore it (Lasgaard et al. 2010). The combination of quantitative and qualitative methods provides a more complete picture of a phenomenon, especially when findings complement each other. We would suggest that qualitative methods allow autistic people a more prominent role in the research process and greater buy-in with the end-product that contains their voices. J&A’s target article challenges scientists to move beyond a purely empirical tradition to a more humane, respectful approach that should maintain scientific rigor while being open to methods from other disciplines. This is evinced, for example, in the combined epidemiological and anthropological approach adopted by Barg et al. (2006) to study loneliness in non-autistic adults. Another way of centring autistic participation in our research is to use instruments specifically designed through collaboration with autistic people, as is emerging in mental health research (Cassidy et al. 2018).

Given the suicide crisis in autism, it is more important than ever to check our normative interpretations of autistic behaviours, lest they impact on everyday well-being and the provision of vital

services. As emphasised by J&A, autistic voices should be embedded in more imaginative approaches to addressing scientific questions of value, such as investigations of mental health and the psychological factors that influence it. In potentially impeding communication between the autistic, the scientific, and the clinical communities, assumptions of social disinterest may ultimately leave us all the poorer, most notably those who can least afford it.

Normocentric biases taint cognitive neuroscience and intervention of autism

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doi:10.1017/S0140525X18002297, e102

Abstract

Stepping away from a normocentric understanding of autism goes beyond questioning the supposed lack of social motivation of autistic people. It evokes subversion of the prevalence of intellectual disability even in non-verbal autism. It also challenges the perceived purposelessness of some restricted interests and repetitive behaviors, and instead interprets them as legitimate exploratory and learning-associated manifestations.

Jaswal & Akhtar (J&A) rightly question the normocentric credit given to *appearance* when modeling autistic atypical social behaviors, stating that they are motivated by the same factors that would have motivated them, if observed in a non-autistic person. J&A's argument challenges the rationale of the Early Start Denver Model (ESDM), an intervention package that focuses on enriching the exposure to the typical markers of non-autistic social reciprocity. The ESDM rationale assumes that if a non-autistic child lacks certain social behaviors in the early stages of life, it would predict a lack of normal social interaction when they are older. However, intensively occupying an autistic childhood with the training of non-autistic prerequisites is the human equivalent of training a kitten to swim. It has a dubious usefulness for the future quality of life. Instead, we prefer the assumption that autistics act socially the way they do because they have a distinctive expression of their sociality – and, specifically, another theory of non-autistic minds. In the field of intervention, this neurodiverse position leads to replacing overtly interactive sessions by *lateral tutorship* and furthering free accessibility to rule-governed material. When a child thus manipulates complex material chosen among interests close to this child, without prompting or reinforcing overt markers of typical interaction (e.g., direct gaze), it creates opportunities for incidental learning and an increased gain in expertise acquisition. It also offers to the child a matrix of actual (and not fake or non-autistic) interaction between two human beings who express their social bonding differently.

J&A, however, could have pushed their argument much further. Distancing oneself from a normocentric interpretation of


overt autistic behaviors is even especially urgent with regard to the appearance of purposeless and non-compliant behaviors during psychological assessments. Taking this appearance at face value for intellectual disability routinely leads to underestimating the testability of autistic children. However, in a substantial number of cases, these same children actually reveal non-verbal intelligence in the normal range. A lack of inclusive approaches to testing is itself a barrier, rather than the ability of the autistic youth (Courchesne et al. 2015).

A similar overhaul of the way the entire set of autistic restricted interests and repetitive behaviors (RIRBs) are interpreted through a normocentric lens is thus urgently required to challenge their apparent purposelessness. Here also, J&A's critique of the prevailing interpretation of RIRBs stops halfway, but a deep refounding of RIRBs is justified. They underline correctly how some RIRBs are the consequence of autistics' lack of access to information. We proposed to call those RIRBs, like rocking, *captivity behaviors* – as they are poorly specific to autism. But even more crucially, some other RIRBs (which we term *intense exploratory behaviors*), for instance, the prolonged fixation upon certain objects, may have a learning purpose in addition to being highly specific to autism. Continuing with J&A's target article, we therefore propose, as a guide for future research on RIRBs, that the role and function of pretend play – a prerequisite for the future mastering of possible words and conditional reasoning in non-autistic children – is reflected in autistics by intense inspection and manipulation of objects of interest.

Consequently, focusing interventions on the typical prerequisites for learning – the “learn to learn” dogma centering behaviorist approaches – is based on a superficial, normocentric interpretation of autistic overt behaviors associated with learning. An apparent lack of interest for non-social information, combined with the orientation toward a narrowly defined class of objects without apparent purpose, does not preclude incidental or implicit learning of the rules governing these objects of interest (Mottron 2017). Understanding intense autistic interests as a manifestation of human intelligence in conditions of impoverished access to complex information, is a long way from classifying hyperlexia or calendar calculations in the Barnum Circus of savant abilities. And among those, the spontaneous, precocious, obsessive, self-taught interest for written code, once taken for a useless manifestation of “islets of abilities” (in a sea of ignorance?), may in fact represent an autistic way to approach language. The high prevalence of advanced orientation toward letters and numbers in prototypical autism, as suggested by systematic investigations of the published cases of hyperlexia may represent the autistic “voie royale,” leading to a future of mastering linguistic function (Ostrolenk et al. 2017). Language in autism may, simply, not be primarily learnt through communicative events, or for communicative purposes.

In the recent history of the scientific study of the human mind, behaviorism – a pseudoscience of appearance – has been succeeded by the cognitive neurosciences, which not only rely on hidden cognitive concepts but also reify them. This later paradigm leads unfortunately to a medical model of autism, that is, to a present versus absent or, barely better, to a more versus less causal modeling of atypical behaviors. If one wants to integrate a scientific content to the generous neurodiverse perspective, diversifying the interpretation of the apparent absence of typical behavior in human variants is the next step required to be delivered from normocentric biases.

Individual differences, social attention, and the history of the social motivation hypotheses of autism

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doi:10.1017/S0140525X18002509, e103

Abstract

The stereotype of people with autism as unresponsive or uninterested in other people was prominent in the 1980s. However, this view of autism has steadily given way to recognition of important individual differences in the social-emotional development of affected people and a more precise understanding of the possible role social motivation has in their early development.

Jaswal & Akhtar (J&A) argue that neither research nor the self-report of people with the diagnosis of autism spectrum disorder (ASD) indicate that affected people are disinterested in other people or social interaction. However, autism is a very complex part of human nature. Universal hypotheses like the “socially uninterested” stereotype of autism so prominent in the 1980s have given way to information on the heterogeneity of ASD, research from quantitative self-report measures, the evolution of diagnostic models of ASD, and the more precise application of social motivation hypotheses in ASD research.

Heterogeneity of expression and individual differences in the development of people with ASD are now well recognized (Georgiades et al. 2013; Happé et al. 2006; Lombardo et al. 2016). With this awareness has come the view that universal descriptive statements about what autistic people do and do not do or prefer are rarely accurate (Happé et al. 2006). Accordingly, people with ASD are likely to display individual differences and different patterns of social motivation across development (Burnette et al. 2011). Indeed, based on the observations of Wing and Gould (1979) “children with ASD may exhibit significant individual differences in social motivation. Some individuals with ASD display social inhibition, withdrawal or aloof behavior, yet others exhibit active but odd social engagement that may be associated with positive social motivation, and that the latter may be associated with lower social symptom intensity in children with ASD” (Kim et al. 2015, p. 3892). Research consistent with this possibility indicates that people with ASD display differences in temperament associated with both approach and avoidance motivation (e.g., Burnette et al. 2011; Schwartz et al. 2009).

These individual differences are also observed in quantitative self-reported ASD data on social anhedonia or the report of reduced pleasure derived from social interactions (Brown et al. 2007). Typical males generally report less pleasure from social interactions than do females (Dodell-Feder & Germaine 2018), and males with ASD have reported less pleasure and more neutral responses to social experiences than other people (Chevallier et al.

2012a). However, a closer look at the data of Chevallier et al. (2012a) indicates the presence of significant individual differences; many of the ASD participants reported levels of social pleasure comparable to controls, but a substantial portion also reported the experience of social anhedonia.

In a related study, Novacek et al. (2016) assessed 250 individuals with the autism spectrum quotient (Baron-Cohen et al. 2001) and the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS, Gooding & Pflum 2014). The ACIPS provided a self-reports of differences in pleasure experienced in interpersonal and social interactions. The results indicated a moderately strong association between higher frequencies of reports of autism-related behaviors and lower reports of the anticipation of pleasure in social interactions on the ACIPS ($r = -.59, p < .001$), even after controlling for variance on a measure of general anhedonia was considered ($\beta = -.42, p < .001$).

Self-report on measures of social anxiety is also informative. As many as 50% of samples of adolescents and adults with ASD report clinical levels of social anxiety associated with aversion to social situations (Spain et al. 2018). Of course, these prevalence estimates also indicate that as many as 50% of people with ASD do not report social anxiety. Development may affect symptoms of social anxiety, such as fear of the negative evaluation by others, as this symptom is more apparent for adolescents than younger children with ASD (Kuusikko et al. 2008). Social anxiety may also be related to decreased social motivation in some people with ASD (Corbett et al. 2014; Swain et al. 2015) and may be related to faster disengagement from eyes in people with ASD (Kleberg et al. 2017).

The stereotype of people with ASD as not interested in social interactions was reified by an old diagnostic description that suggested that all people with ASD display a pervasive lack of responsiveness to others (Mundy & Sigman 1989). This was the first and only descriptor of the social behavior of ASD in the 1980 version of the third edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III)*, American Psychiatric Association (1980). This description was removed from the nosology by 1986, and its expiration was hastened by the observation that young children with ASD displayed levels of attachment behaviors to caregivers that were similar to those of children with other disabilities (Rutgers et al. 2004; Sigman & Mundy 1989; Sigman & Ungerer 1984). Subsequent research has indicated that some people with ASD have a desire for bonding and friendships with others (Bauminger et al. 2010) and feel lonely when establishment of friendships is difficult (Locke et al. 2010). Thus, there has been an evidence-based movement away from the universal view of people with ASD as devoid of affiliative social motivation in the science of ASD for quite some time.

Finally, J&A offered hypotheses based on social motivation to explain observations of decreased social orienting, as well as social attention and information in preschool children with ASD (e.g., Chevallier et al. 2012b; Mundy 1995; 2016; Rice et al. 2012; Stavropoulos & Carver 2013). This is certainly the case for the social motivation hypothesis of joint attention in ASD, which figured prominently in their review. This hypothesis arose from the observations that initiating joint attention involved smiling or the conveyance of positive affect to other people less often in children with ASD than in other children (Gangi et al. 2014; Kasari et al. 1990; Mundy et al. 1992). It was also motivated by data indicating that preschool initiating joint attention predicts the development of childhood prosocial behaviors in children with ASD and typical development (Freeman et al. 2015; Parlade et al. 2009; Sheinkopf et al. 2004; Sigman et al. 1999; Vaughan Van Hecke et al. 2007).

Hence, the joint attention motivation hypothesis of initiating joint attention (IJA) in ASD was developed to address the role of positive affect and social motivation that arises in the first months of life (Mundy 1995). Because data indicated that IJA and attachment were not correlated in the development of children with or without ASD (Capps et al. 1994; Claussen et al. 2002; Naber et al. 2007), we hypothesized that IJA did not involve the social-bonding motivation associated with attachment. Instead, we argued that joint attention involved another, less well-recognized type of early social motivation specific to guiding (rewarding) the early prioritization of attending to and sharing experience with others (Mundy & Sigman 2015). Most recently, our motivational model has focused on the development of arousal to eye contact in the first year of life (Senju & Johnson 2009) as a likely motivation factor in joint attention impairment in ASD (Mundy 2016). These elements of the literature on ASD, as well as those reviewed earlier, provide different perceptions of social motivation theory and research in ASD than were described by J&A.

A call for revamping socio-emotional ability research in autism

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doi:10.1017/S0140525X1800239X, e104

Abstract

In light of Jaswal & Akhtar's compelling argument, we argue there should instead be more focus on deficits in socio-emotional abilities. However, current research is limited by the psychometric problems with most measures. We discuss specific problems, outlining examples for theory of mind. We conclude with recommendations for new lines of research derived from findings in the individual differences literature.

The central premise of Jaswal & Akhtar (J&A) is compelling, and we agree that conceptualizing autism as a lack of social motivation is misguided. We expand upon the point that, instead, autism is most likely associated with deficits in what we refer to as socio-emotional abilities, and that these deficits lead to difficulties with social interactions. By abilities, we mean maximal effort constructs, where measurement instruments assess one's best performance under optimal circumstances (Cronbach 1949). This is in comparison to typical behavior constructs, where measures assess everyday behavior or preferences independent of one's ability. Unfortunately, available and popular measures of socio-emotional abilities, within the context of autism and also for typically developing adults, are plagued by psychometric problems. We highlight prominent problems in this field with a focus on measures of theory of mind, and we provide recommendations for autism

research based on socio-emotional ability research with typically developing individuals.

More often than not, measures of socio-emotional abilities do poorly in terms of precision and validity. Often, elementary information concerning the quality of measures is not even reported, arguably, because the authors are unable or uninterested to communicate this essential part of the results. This is especially problematic in autism research, where effective measurement is needed for properly understanding and treating the disorder. When tests are examined, it is often clear that more psychometric work is needed. For example, researchers have found that the popular Reading the Mind in the Eyes test (Baron-Cohen et al. 2001) lacks a unidimensional structure. Therefore, using a singular index to express performance is inadequate. And while the test was developed to assess the first stage of theory of mind, performance is more correlated with measures assessing the ability to perceive emotion expressed in the face of others (e.g., Olderbak et al. 2015) than other measures of theory of mind (Kirkland et al. 2013). Likewise, the test is heavily confounded by verbal abilities, further muddying its construct validity (Olderbak et al. 2015). Thus, psychometric research on this measure suggests the test is imprecise and lacks adequate construct validity.

Socio-emotional ability research is also limited because many tools suffer under jingle and jangle fallacies. *Jingle fallacies* occur when several tests are purported to measure the same thing, but in practice show little convergence with one another, implying that they assess distinct constructs (Thorndike 1904). A recent meta-analysis found that the Reading the Mind in the Eyes test was only weakly correlated with two popular measures of theory of mind, the Strange Stories test ($r = .29$) and the Faux Pas test ($r = .29$; Kirkland et al. 2013), suggesting that these tests measure different things. Jingle fallacies also occur when researchers employ maximal effort ability tests and typical behavior self-report questionnaires but use the same term for the assessed construct (e.g., emotion perception, Olderbak & Wilhelm 2017).

Jangle fallacies occur when tests are purported to measure different constructs, but in practice correlate so highly as to suggest that they measure the same construct (Kelley 1927). This fallacy is apparent in many measures of emotion perception, empathic accuracy, and theory of mind. While each construct is conceptually distinct, in practice, researchers typically use tests where participants are asked to view another person and make inferences about what the other person is thinking and/or their feelings. It is not apparent that participants need empathic accuracy or theory of mind skills to successfully complete these tests; hence, we conclude these tests most likely assess emotion perception abilities.

The implications are that many theory of mind measures lack sufficient construct validity. Instead, it is most likely that researchers are measuring emotion perception or reading comprehension. The lack of construct validity also causes the field to be insufficiently informed as to the distinct profile of impairments in socio-emotional abilities associated with autism.

J&A question prominent classic theoretical models and established phenomena of autism research, which we support as a way to develop new insights into the nature of autism. Likewise, given that research on socio-emotional abilities in autistic people is most likely limited due to poor measurement, previous findings and conclusions may need to be questioned as well. We argue that more specificity is needed in describing and accounting for autism, and distinguishing preferences, motivation, or typical behavior from effort or ability is an essential part.

The number of distinct socio-emotional abilities is unclear. There are competing theoretical models (e.g., Elfenbein & MacCann 2017; Mayer et al. 2016), but the empirical support for each is limited (e.g., Legree et al. 2014). However, there is strong experimental evidence that there are distinct abilities for the perception of faces; memory for faces (Wilhelm et al. 2010); the perception of emotion in faces (Hildebrandt et al. 2015), the voice, and gestures (Schlegel et al. 2012); and for emotion understanding and emotion management (MacCann & Roberts 2008).

We agree with J&A that new avenues in research on autism are needed. Research on typically developing adults may offer that perspective. For example, as is the case with typically developing adults, is the ability to perceive aspects of neutral faces also strongly correlated with the ability to perceive emotion in faces? Likewise, is the ability to remember emotion expressed in faces also strongly correlated with the ability to perceive emotion expressed in faces (Hildebrandt et al. 2015)? We also strongly encourage studies on productive socio-emotional abilities. Importantly, are there emotion expression deficits in autistic persons, and are these deficits larger than deficits in other socio-emotional abilities (Olderbak et al. 2014)? Finally, research should consider newly identified abilities such as emotion attention regulation (Elfenbein & MacCann 2017) and emotion creativity (Ivcevic et al. 2007).

This research would improve our understanding of cognitive processing during social interactions and further add to the ideas expressed by J&A. It may also assist in better describing the symptoms of autism, distinguishing different forms of autism, and improving interventions.

Social motivation in children with autism: Support from attachment research

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doi:10.1017/S0140525X18002200, e105

Abstract

We provide support from attachment research to the argument that children with autism only appear to lack social motivation. This research has shown that the attachment system of children with autism is intact, and one-half form secure attachments. This is illustrated with an observation of a young child with autism during a separation and reunion observation with his mother.

Jaswal & Akhtar (J&A) make a convincing case that while individuals with autism may appear to lack social motivation, this may not be an accurate reflection of their wish to connect with others and be close to them. An additional, important body of research that

supports the target article comes from studies of attachment in autism. These studies have convincingly shown that although children with autism have difficulties communicating and interacting with others, their attachment system – the system whose main goal is to seek others, particularly in times of distress – is by and large intact.

Attachment studies indicate that children with autism seek closeness to their caregivers when distressed, are soothed by the caregivers' presence, and use their caregivers as a secure base for exploration (for a review, see Rutgers et al. 2004). In other words, they form attachments similarly to typically developing children. Moreover, about one-half form *secure* (rather than *insecure*) attachments (Rutgers et al. 2004), a figure lower than that of typically developing children, but not different from those of other clinical groups (Feniger-Schaal et al. 2011).

The security of a child's attachment to the caregiver is assessed using Ainsworth's Strange Situation Procedure (SSP; Ainsworth et al. 1978), an observational procedure that includes two separations and reunions between the child and the caregiver and is designed to assess how the child uses the caregiver as a secure base for exploring an unfamiliar environment and as a haven of safety when distressed. Securely attached children explore in the caregiver's presence, show search behaviors and varying levels of distress following the separation, seek contact with the caregiver upon reunion and find the contact comforting, and resume exploration. Secure children with autism show the same underlying balance between attachment and exploration, although its behavioral manifestation is shaped by the child's autism. We illustrate this next with an example of a 3.5-year-old non-verbal boy with autism spectrum disorder (ASD; the child's diagnosis was confirmed with gold standard assessments of ASD; for details, see Koren-Karie et al. 2009).

In the pre-separation episodes of the SSP, Dan was calm and deeply immersed in his play with cars and crayons. He did not look at his mother or otherwise interact or establish contact with her, and he seemed relaxed and content. However, immediately upon his mother's leaving of the room, Dan showed obvious distress. He cried loudly, looked at the closed door, and went decisively to the door and tried to open it. The experimenter who stayed with him (the "stranger") talked to him soothingly and tried to comfort him and offer him toys, but he did not look at her and did not cease his search. His weeping grew louder, and the separation episode was shortened (standard SSP procedure with all children).

In typically developing children, such profound distress upon separation is usually followed by active proximity and contact seeking combined with establishing eye contact with the mother. These behaviors are thought to indicate the activation of the child's attachment behavioral system, and once contact has been reestablished, children typically calm down and resume exploration. Dan showed the same underlying organization, but expressed differently. When his mother entered the room, he stopped crying immediately and stood very close to her while turning his back to her and holding her hand. Dan's mother bent over and gave him a kiss, to which he responded by moving his head slightly away. He then began walking toward the area in the room where he was previously playing, "pulling" his mother behind him while holding her hand. He did not look at her, vocalize, or ask to be held, and in fact was turning his back to her throughout, but he did keep her physically close to him. Upon reaching the area in the room where he previously played, he resumed his solitary play, calm and content, and his mother returned to her chair. Dan returned to his "baseline" behavior:

content, completely immersed in his play, and *appearing* oblivious to the “outside world.” This was what he looked like prior to the separation and the distress described above, but it is obvious from his strong reaction to his mother’s leaving that he just appeared oblivious. Also, careful observation showed that during his solitary play, he glanced once very briefly at his mother, as if confirming her whereabouts. Thus, while Dan did not show most of the interactive behaviors that we typically see in the SSP, the underlying secure organization of his attachment to his mother was evident: calm exploration prior to the separation; stopping exploration and elevated attachment behaviors upon separation; active search of the absent mother; failure of the stranger’s attempts to comfort him, indicating the specificity of his attachment to his mother; immediate soothing upon the mother’s return; finding proximity to the mother comforting; and resuming exploration and returning to a calm state. In line with the target article’s point, this patterning of the child’s behavior indicates the need and interest of this autistic child (and many like him) in his specific attachment relationship with his mother and the effectiveness of this relationship as a secure base.

Group-level statistics support this conclusion: Several studies have shown that secure attachment is related to maternal sensitivity in children with ASD, just as it is with typically developing children (e.g., Koren-Karie et al. 2009). In other words, the secure organization of the child’s behavior in the SSP is associated with a history of having a sensitive caregiver who sees and feels things from the child’s point of view (Oppenheim et al. 2009), reads the child’s emotional signals correctly, and responds to them appropriately, even when the child, due to his or her autism, seeks very little eye contact, does not communicate effectively verbally or non-verbally, and shows stereotypies and repetitive behaviors. Therefore, studies of attachment in autism also support the reframing of the difficulties of children with ASD as indicating *not* a lack social interest but primarily as difficulties expressing this interest in typical and conventional ways.

To be or not to be emotionally aware and socially motivated: How alexithymia impacts autism spectrum disorders

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doi:10.1017/S0140525X18002315, e106

Abstract

Autism often co-occurs with alexithymia, a condition characterized by no or diminished awareness of emotions that significantly impacts an individual’s social relationships. We investigate how the social motivation of autistics would be eroded by comorbidity with alexithymia and why this diminished motivation would be difficult for non-autistic people to perceive and reciprocate.

Autism is a condition that often co-occurs with alexithymia: Epidemiologically, we have evidence that about 50% of autistics exceed the cutoff score for alexithymia (Berthoz & Hill 2005; Hill et al. 2004; Samson et al. 2012). Alexithymics lack or experience diminished awareness of their emotions. In emotionally salient situations, they do not experience emotions, but only the bodily sensations that typically occur during emotional episodes such as increased heart rate, blood pressure, muscular tension, visceral changes, and so forth. Because they confuse emotions with bodily sensations, they are unable to identify what they feel and to express it verbally. The possible comorbidity of alexithymia and autism is thus highly relevant: The “alexithymia hypothesis” proposes that the emotional impairment exhibited by autistics is due to alexithymia rather than features of autism per se (Bird & Cook 2013). Whether or not we support this hypothesis, it is undeniable that the emotional deficits exhibited by autistics and alexithymics are highly similar (Fitzgerald & Bellgrove 2006). Thus, knowledge we have already obtained regarding the clinical presentation of alexithymia may be effectively transferred to help us understand autism, especially high-functioning autism, because the clinical assessment of alexithymic traits is based on self-report questionnaires that require a fairly high level of linguistic competence (Wotschack & Klann-Delius 2013).

Alexithymia has an extremely significant impact on an individual’s attitudes and behaviors, as well as on his or her social life and social relationships (Timoney & Holder 2013). In spite of this relevance, Jaswal & Akhtar (J&A)’s study on the social motivation of autistics (which largely relies on autistics’ verbal self-report and thus applies primarily to high-functioning patients) does not take into consideration a possible comorbidity with alexithymia or the issue of how autistics experience their own and others’ emotions. Yet these appear to be key elements in understanding both (1) the social motivation of autistics and (2) the reason why this motivation is neither perceived nor easily reciprocated by non-autistic people.

1. An awareness of our emotions, as well as a capacity to identify and understand them, is a precondition for being able to regulate them; this is the reason why alexithymics have severe difficulties in emotion regulation (Taylor et al. 1997). They tend to suppress the expression of what they feel rather than deploying some cognitive strategy of reappraisal (Swart et al. 2009). This applies also to autistics who are, even in mildly frustrating situations, less able than non-autistics to use appropriate emotion regulation strategies (Samson et al. 2012). At the same time, the capacity to regulate emotions is essential to fully participate in social life, which – under normal, uncontrolled circumstances – is characterized by a number of potentially destabilizing emotional contexts. Indeed, dysfunction of emotional regulation is


very stressful and can lead to perceiving everyday sociality as unpleasant, thereby reducing social motivation (Vanheule et al. 2007).

2. People who lack (full) awareness of their emotions also have difficulty showing emotions and sharing them with others through their own expression and behavior. They also struggle to recognize these emotions in others and to react appropriately to others' emotional states through empathy. An incapacity to tune into the emotions of others can lead to a disconnection between autistics (alexithymics) and non-autistics that cannot be easily overcome. Non-autistics have difficulty understanding and relating to autistics, because the spontaneous modality through which non-autistics connect with others requires that these others be "mentally aware" of the dynamics of the relationship: of what is emotionally going on. If this spontaneous mindreading does not work (Gallagher & Varga 2015), non-autistic people may perceive autistics to be socially uninterested and thus become less interested in relating to them.

J&A's discussion of how autistics tend to engage in eye contact much less frequently than non-autistics is an excellent example of the points made in (1) and (2): Eye contact shows that attention is shared; for the non-clinical population, it is an essential element in perceiving others to be mentally aware and engaged in a relationship. Avoiding eye contact is thus naturally interpreted as a sign of lack of interest in a relationship. The authors suggest, however, that autistics do not avoid eye contact because they lack social motivation, but rather, because they seek to "reduce or avoid stress" (p. 13). Indeed, evidence from people suffering from both alexithymia and autism shows that eye contact arouses emotions, which generate anxiety, discomfort, and avoidance (Bird & Richardson 2011; Bird et al. 2010; Fujiwara 2018; Hadjikhani et al. 2017). This leads to an impasse: For typically developing individuals, mutual gaze is an essential means for tuning into non-verbal participation in a relationship; but while autistics who are also alexithymics also experience the power of mutual gaze, they cannot deal with the emotions it arouses, and therefore they avoid it.

In our view, this suggests that, even though autistics are socially motivated, social interactions might be much less rewarding for them than they are for non-autistics. The problem of how to make such interactions less difficult, by avoiding conditions that may potentially lead to emotional dysregulation, still remains unsolved. On a clinical level, it also indicates the need to train non-autistics as well as autistics to interact with each other. In fact, given that certain behaviors typical of autism spectrum disorder (ASD) are naturally interpreted by non-autistics as signs of avoidance in a relationship, non-autistics must be taught to systematically ignore these signals. On the other hand, given that autistics have emotion recognition deficits (possibly pursuant to their alexithymia – Oakley et al. 2016), they must be trained to understand the emotional expressions of others by using alternative, externally focused cognitive means. One such strategy is the use of explicit instructions to infer the mental states of others in emotionally salient situations and to respond guided by adhering to prescriptions for specific patterns of behavior (Lumley et al. 2007). More generally, a deeper assessment of the interaction between alexithymia and ASD may provide an opportunity to test J&A's hypothesis and may also lead to suggestions on how to treat autistics (Poquérousse et al. 2018).

Knowing autism: The place of experiential expertise

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doi:10.1017/S0140525X18002376, e107

Abstract

Jaswal & Akhtar challenge the notion that autistic people have diminished social motivation, prompted in part by a desire to take autistic testimony seriously. We applaud their analysis and go further to suggest that future research could be enhanced by involving autistic people directly in the research process.

Jaswal & Akhtar (J&A)'s compelling target article leaves us in no doubt that autism scientists need to reconsider their explanation of autistic sociality. Previous studies that consistently showed low rates of social contact for young autistic people and adults (e.g., Orsmond et al. 2013; Shattuck et al. 2011), together with parents, clinicians, and educators' anxieties about autistic people's apparent lack of motivation and/or difficulties initiating and sustaining friendships (e.g., Calder et al. 2013; Cribb et al., *in press*), have reinforced a widespread belief that autistic people cannot – and more important to the current discussion, do not *want* to – form friendships and social relationships. These studies and sentiments, however, have almost exclusively focused on the number of friends a person has, not on the *quality* of those connections. J&A make us think again.

In doing so, they are not entirely alone. Some of our own qualitative work with autistic children and young people – those who are cognitively able *and* those with additional intellectual disabilities and/or limited spoken communication – has repeatedly suggested that they value deep and trusting relationships with others, including friends, family members, and those who support them, even when it might be difficult to maintain those relationships (Cribb et al., *in press*; Pellicano et al. 2014c; Sedgewick et al., *in press*). But as J&A highlight, these qualitative, subjective reports have for the most part been eschewed by scientists, who often perceive them as contributing no more than anecdotal evidence – despite the fact that this evidence often flies in the face of popular theoretical accounts of autism.

By their example, J&A instead appeal for psychological scientists to take "autistic testimony seriously," both to avoid the kinds of misinterpretations that these authors describe and "to contribute to a more accurate, humane, and useful science of autism" (J&A, abstract). Such a view builds upon a growing acknowledgment within the scientific community that autistic people possess insight into autism that has been too frequently overlooked. Scientists' knowledge claims are generally built on empirical observation, theoretical argumentation, and, ultimately, objective "truths"; parents and primary caregivers have

unique experience about their child's development and the types of support from which they might benefit most; autistic people, in contrast, have direct experience of what it is like to be autistic and how they negotiate their everyday lives. Lay members of the autism community, and autistic people in particular, therefore have what Collins and Evans (2002) have called "experience-based expertise," which as Milton (2014) and Milton and Bracher (2013) describe, can be crucial in "knowing autism" better.

The value of experience-based expertise has been highlighted beyond the field of autism. Jack and Roepstorff (2002), for example, note that in psychological science, "[subjective] experience is still regarded as a problem, rather than a resource ready to be tapped" (p. 334). They have called for a rethink of psychological paradigms, arguing that our standard methods of experimentation need to be "subject to a methodological triangulation in which objective behavioral measurement, recordings of brain activity and introspective evidence can be related to each other" (p. 337). We believe this must be a crucial component of psychological science in the future.

Returning to autism, the lessons here are clear. A fuller understanding of autism must give due attention to the crucial subjective experiences of autism – the experiential particularities of autism – as well as the objective, scientific facts (Taylor 1977). But we would go even further than that. We contend that the best way to ensure that analysis of autism includes such experiences is by changing the way research itself is conducted. Getting autistic people involved in the research process, not just as participants but also in the design, implementation, analysis, interpretation, and dissemination phases of research, is the surest way of ensuring that our work is attentive to the autistic experience (Fletcher-Watson et al. 2018; Pellicano & Stears 2011; Pellicano et al. 2014a).

Traditionally, research priorities have been set almost exclusively by scientific funders and academics. Autistic people have therefore rarely been involved in the decision-making processes that shape research or its application. They have been excluded from the very research that directly concerns them. In the past few years, an increasing number of researchers have been working with autistic people as partners and engaging autistic people in all stages of the research process to address issues that are prioritized by the autistic community and to ensure that research is conducted in a way that is sensitive to their needs and values (see Fletcher-Watson et al. 2018; Nicolaidis et al. 2011; Pellicano et al. 2014a). Participatory autism research still makes up only a fraction of the plethora of autism research conducted across the globe, but it represents the best possibility of ensuring research that incorporates the breadth of autistic experience.

J&A enable us to think anew about autistic social motivation, doing so in part by drawing upon autistic testimony. The task now is to see how many other orthodoxies of autism science could be challenged by greater attention to the autistic experience.

Note

1. Liz Pellicano is a psychological scientist who does not identify as autistic; Jacqueline den Houting is an autistic research psychologist; Lee du Plooy is an autistic researcher; and Rozanna Lilley is an anthropologist and education researcher who has a son on the autism spectrum. We comment in particular on the social and ethical issues raised by this target article.

Adaptive behaviour and predictive processing accounts of autism

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doi:10.1017/S0140525X18002248, e108

Abstract

Many autistic behaviours can rightly be classified as *adaptive*, but why these behaviours differ from adaptive neurotypical behaviours in the same environment requires explanation. I argue that predictive processing accounts best explain why autistic people engage different adaptive responses to the environment and, further, account for evidence left unexplained by the social motivation theory.

If the behaviours described by Jaswal & Akhtar (J&A) are "adaptive responses to a particular situation" (sect. 2.5, para. 2), then the crucial question is this: Why are the adaptive responses to the environment different in autism than in a neurotypical population? Or, if many of these behaviours are used by the neurotypical population, then why is the frequency of their use different in autism? Given the same environment, what is different about autistic individuals that makes their behaviours distinct, yet still adaptive?

In evolutionary ecology, adaptive behaviour consists of responses to the demands of the environment that promote survival and reproductive success. While originally related to phenotypic strategies of whole populations, it has been extended to individual differences (Buss & Greiling 1999; Wilson 1998) and co-opted by clinical psychology to refer to abilities that conform to social expectations for age-appropriate independent living (Coulter & Morrow 1978; cf. Sohn 1976). J&A repeatedly state that characteristic autistic behaviours are adaptive (10 occurrences). This should be taken to mean that the behaviours have cognitive utility (or constitute a cognitive phenotype with evolutionary success; Montague et al. 2012). We should agree with J&A that many distinctively autistic behaviours are adaptive in this way. This observation is, however, best framed in terms of predictive processing theories of autism.

Predictive processing accounts of autism are promising in that they explicitly account for differences in adaptive strategy and thereby are able to address the question I posed for J&A at the outset (Brock 2012; Lawson et al. 2014; 2017; Palmer et al. 2017; Pellicano & Burr 2012; Van de Cruys et al. 2014). Predictive processing is a general and unifying explanation of brain function with growing application to psychiatry (Friston et al. 2014; 2017). These accounts argue that, as the brain seeks to model current and future states of the world, incoming sensory information is weighted differently in autism than in the neurotypical case. Action and perception become tools for inference about the causal origins of sensory inputs, and these theories can thereby explain differences in both domains in autism. The purported difference in general processing in autism generates

different responses from neurotypicals because superficially identical environments are mentally represented differently. For example, an adaptive response as an autistic person may be to exploit highly predictable affordances (Constant et al. 2018), whereas for neurotypical individuals, it may be to engage in more exploration. Note that our actions shape our environment, and so this challenges the purported equality of the environments experienced by individuals in these two groups, further giving reason for why the adaptive response to it might differ.

J&A are correct to say that insofar as the social motivation theory is meant to be a unified explanation of autistic cognition and behaviour, it fails to explain all the available evidence (sect. 3 introduction). This includes not just the (very important) firsthand testimony, but also other findings not discussed by J&A. Predictive processing theories account for the tendency for autistic individuals to perceive small elements of the sensed world particularly precisely, therefore accounting for differences in sensitivity to sensory information (Ben-Sasson et al. 2009), as evidenced by superior performance in visual search. Weaker prior expectations for stimulus qualities (Pellicano & Burr 2012), higher sensory precision (Brock 2012; Lawson et al. 2014), or inflexibly high sensitivity to the differences between expectations and outcomes (prediction error; Van de Cruys et al. 2014) are potential specifications of this learning rate difference in autism (Palmer et al. 2017). Increased interest in highly regular domains due to the tendency to construct a prediction-satisfying environment (Constant et al. 2018) may also account for autistic savant skills (Meilleur et al. 2015).

Furthermore, predictive processing accounts of autism offer plausible explanations of the four key pieces of behavioural evidence discussed by J&A.

Predictive processing explains why it may be necessary for autistic people to engage in calming, self-regulatory behaviour in social situations, such as avoiding eye contact. Social situations involve some of the most complicated interacting causes in our environment, and so learning from social stimuli (and thereby participating in successful interaction) requires integrating information over many instances to learn what actions and stimuli might yield the clearest social signal. It is hard to predict another person's behaviour, partly because each social interaction is, in many ways, completely novel, and partly because social interactions are interpreted against a rich tapestry of background information. Reduced eye contact during highly demanding social contexts may be related to decreased precision of social cues (from failing to learn these over many instances), which thereby decreases the ability to reduce uncertainty overall (Palmer et al. 2017). Predictive processing accounts of autism also explain repetitive motor stereotypies as active ways of making incoming sensory information more precise (Palmer et al. 2017).




A similarly complex social action is pointing. One must *learn* to use actions like pointing to reduce uncertainty by controlling and predicting the flow of an interaction based on one's social history. Reduction in pointing may be explained by a weaker understanding of what states in the interlocutor are influenced by the autistic person's actions and how to achieve desired states.

Echolalia too can be understood as an adaptive behaviour in that it reduces prediction error. Oral participation in conversation is made more predictable by reusing heard utterances to communicate similar meanings. This plausibly makes the interlocutor's response more predictable, as the same situation is repeated over multiple events. Predictive processing theories are also compatible with firsthand accounts that social situations are not less

appealing, but potentially less accessible to autistic individuals due to the many inferred interacting causes which must be modelled.

Predictive processing accounts of autism suggest that differences in updating mental representations of the self and the environment lead to differences in strategies of inference. This includes perception and action selection which may account for differences in adaptive behaviours between neurotypical individuals and autistic individuals.

Being socially uninterested versus not having social prediction skills: The impact of multisensory integration deficits on social skills in autism

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doi:10.1017/S0140525X18002340, e109

Abstract

Jaswal & Akhtar in their target article convincingly argue that subjects with autism do not have diminished social motivation. However, they still recognize that autistic people behave socially in an unusual way. Why? Here we suggest that these behaviours are the results of a multisensory integration deficit. Viewed from this perspective, the assumption that autistic people's unusual behaviours indicate diminished social motivation has to be replaced by the one that they have diminished social prediction skills.

Jaswal & Akhtar convincingly suggested that subjects with autism do not have diminished social motivation. However, they still recognize that autistic people behave socially in unusual ways: (a) low levels of eye contact, (b) infrequent pointing, (c) motor stereotypies, and (d) echolalia. Why?

By highlighting the outcome of different researchers in the field of autism (Caballero et al. 2018; Curti et al. 2015; Foxe et al. 2015; Stevenson et al. 2014a; Torres et al. 2013) and the suggestions from an emerging field in neuroscience – multisensory integration and prediction (Riva 2018) – in this commentary, we suggest that these behaviours are the results of a multisensory integration deficit. Specifically, we suggest that autistic people's unusual behaviours do not indicate diminished social motivation, but diminished social prediction skills.

Recently, Riva (2018) suggested that our bodily experience is constructed from early development through the continuous

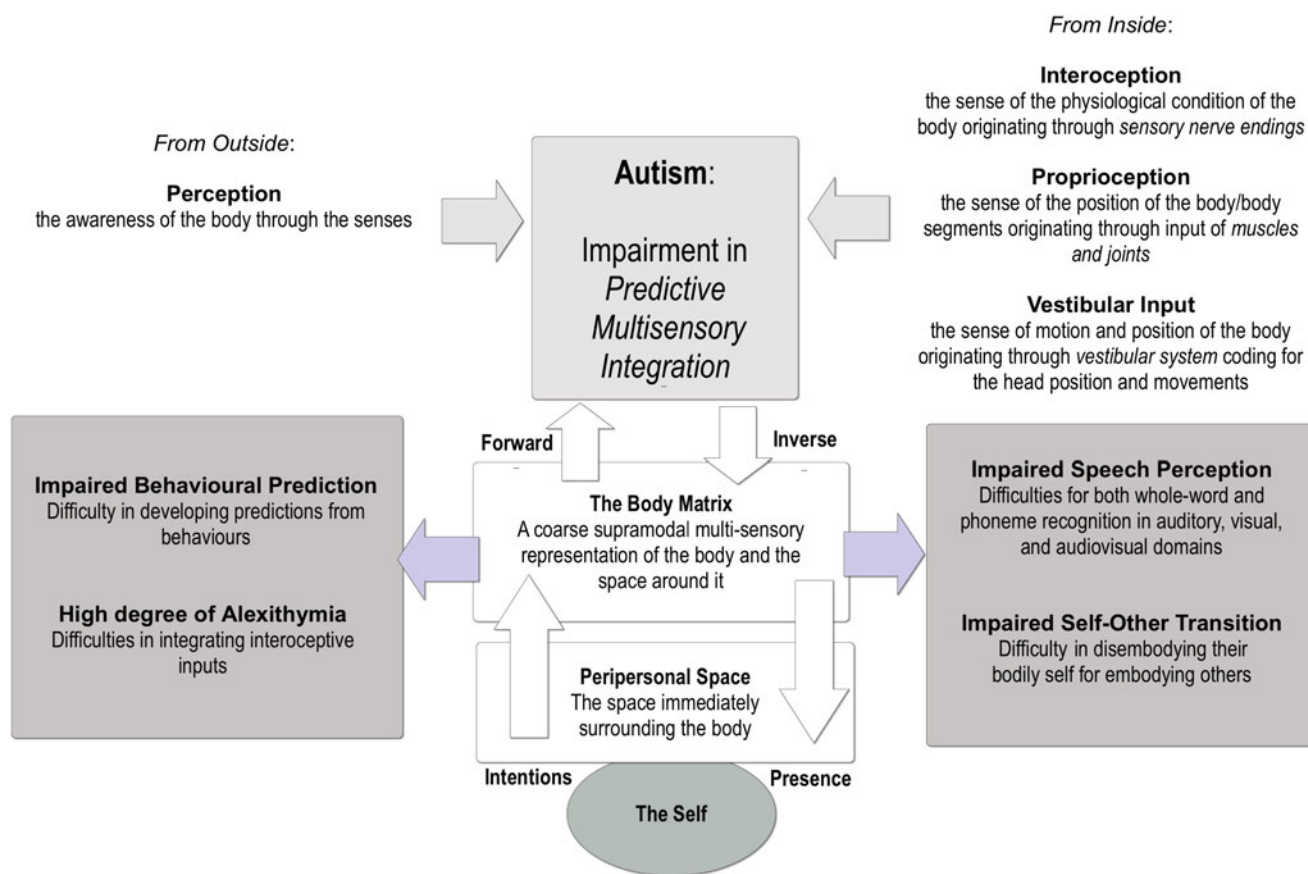


Figure 1 (Riva et al.). Multisensory impairments in autism.

integration of sensory and cultural data from different representations of the body. On one side, these representations are integrated into a coherent supramodal representation (body matrix) through a predictive, multisensory integration activated by central top-down attentional processes. On the other side, this integrated representation allows the self to extend its boundaries. There is a growing body of evidence suggesting that the peripersonal space (PPS) gates the representation of the potential motor acts afforded by visible objects allowing their identification as potential targets for one's own actions or the actions of others (Maranesi et al. 2014). Moreover, multisensory integration within PPS is strictly related to the ability to localize oneself in space and differentiate self from others (Noel et al. 2017). In this view, damage, malfunctioning, or altered feedback from and toward the body matrix (multisensory integration deficit) might be involved in the aetiology of different disturbances (Riva et al. 2017), including autism. Specifically, recent studies showed that all the deficits that characterize autism spectrum disorder (ASD) – the presence of repetitive behaviours and restricted interest, the lack of social reciprocity, and language or communication problems – can be explained by impairments in multisensory processing (Fig. 1).

First, the original work by Elizabeth Torres and her team suggests that individuals with autism are impaired in updating the body matrix with new contents from real-time perception-driven inputs (Caballero et al. 2018; Torres & Denisova 2016). In their studies, Torres and colleagues demonstrated that in these individuals there is a deficit in micro-movement proprioception that limits their ability to make meaningful categorizations of movements

and sense unexpected internal and external disruptions. In other words, individuals with autism are not able to perceive the temporal relationship between cross-modal inputs, making it difficult to develop reliable statistical predictions from their behavioural variability (Stevenson et al. 2014b). This situation forces subjects with autism to live with a constant element of surprise, amplifying anxiety and reducing predictability, also in social situations.

Furthermore, recent evidence also suggested that deficits in the integration of bodily inputs that arise from within the body (i.e., interoceptive inputs) might be associated with the fundamental emotional impairments that characterize the autistic condition (Hatfield et al. 2019; Mul et al. 2018). In addition, autistic people often showed a high degree of alexithymia – namely, the inability to correctly recognize emotions and self-related both in other persons – and this trait has also been recently connected to alterations in the processing of interoceptive inputs (Hatfield et al. 2019; Murphy et al. 2018), further supporting the hypothesis that multisensory integration deficits might determine the severe social skill impairments in people with autism (Noel et al. 2018).

In addition, difficulty in predicting behaviours also affects relationships with others. Specifically, as demonstrated by recent studies using the rubber hand illusion, individuals with autism have difficulty in disembodying their bodily self for embodying others, which affects their social and communication abilities (Noel et al. 2017). As noted by Noel et al. (2017), “[these individuals] show a steeper gradient between self and other. Stated more concretely, the prediction is that the spatial extent within which the far exteroceptive sensory modalities, such as audition and

vision, the transition from not influencing tactile processing on the body to influencing tactile processing is smaller than under typical circumstances” (p. 10).

Last, it is well known that individuals with ASD have difficulties for both whole-word and phoneme recognition in auditory, visual, and audiovisual domains (Stevenson et al. 2014a; Stevenson et al. 2017). As recently demonstrated by Stevenson et al. (2017), these difficulties are associated with a reduced ability in multisensory integration. This lack of multisensory integration had a more relevant impact at the level of whole-word recognition and at low signal-to-noise ratios.

In conclusion, the assumption that autistic people’s unusual behaviours indicate diminished social motivation has to be replaced by the one that they have diminished social prediction skills. Specifically, they are not able to use multisensory integration for doing stable prediction of both their own and others’ behaviours. This is due to an impaired ability to integrate multisensory information, including social ones, into a cross-modal and coherent content.

Acknowledgments. This article was supported by the Italian Ministero dell’Istruzione, dell’Università e della Ricerca (MIUR) research project “Unlocking the memory of the body: Virtual Reality in Anorexia Nervosa” (201597WTTM).

The benefits of modesty

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doi:10.1017/S0140525X18002443, e110

Abstract

Speaking as an anthropologist, I comment on three striking features of Jaswal & Akhtar’s argument. I suggest that the boldness of their intervention lies in its modesty. In challenging a parsimonious explanation for autistic behavior, they invite a conversation including scholars from other disciplines, as well as autistic people themselves.

“There’s a point where you say to hell with it, it’s impossible to please you people” (Robledo et al. 2012, p. 6, as cited in the target article, sect. 6, para. 8). This is one of the autistic voices that Jaswal & Akhtar (J&A) amplify in this remarkable essay. They take aim at their own colleagues in developmental psychology, who have hit upon a parsimonious explanation for the atypical things autistic people do. Gaze aversion, stereotypy, and echolalia stem from a lack of “social motivation.” Autistics don’t want to connect with others. Their strange behavior makes this clear.

J&A present a lucid, compelling critique of this view. But it is not just their argument I find compelling, but also their modesty. We’re used to research articles that make strong claims: Most are built of confident assertions conveying what recent research shows to be true about a phenomenon. This essay runs in the opposite direction. J&A’s goal is not to build confidence, but to erode it: to show what we could gain by calling into question

findings that others have presented as fact. What if it weren’t the autistics who were suffering from a deficit, but rather “you people”? How might our approach to the study of autism change?

Speaking as an anthropologist, I found three features of J&A’s argument particularly striking. The first turns on comparisons between autistics and so-called normal people. J&A insist that autistics are more similar to non-autistics than the researchers they critique have admitted. Autistics are similar in their desires, but different in their methods. Rather than describing a deficit in motivation, we could speak of a surfeit of behaviors: Autistic people use a broader array of strategies in their effort to connect. What is at stake here is not the difference between populations but the disciplinary force of the norm (see Hacking 1990; Warner 1999). We anthropologists call this force normativity, and it works by setting up an impossible standard. As the disability studies scholar Rosemary Garland Thomson has argued, the ideal American in the nineteenth century was male, white, employed, married, and athletic, and had a full head of hair (see Thomson 1997; see also Davis 1995). But no one was truly normal in this sense, even if some were what Thomson calls “normates” – people who lived in fear of standing out. Would-be normal people dealt with this fear by projecting their problems onto others, especially the disabled, whose appearance in public both threatened and reassured others. J&A’s intervention provides heft to this insight, at the same time it raises questions: Could the tendency to overlook the social motivation of autistics reflect the fact that no one engages with others in completely “normal” ways?

The second feature involves their deployment of an emic perspective – one that foregrounds what autistic people think is going on. We anthropologists have long been convinced of the value of taking seriously what the people we are studying have to say. But we are not just interested in how others describe their worlds. We are also interested in why. The self-reporting problem is not a problem for us; it is an opportunity. How, when, and to whom have autistics described their lives in the terms J&A bring to light? There is a wealth of ethnographies on “biosociality,” the process through which medicalized conditions have given rise to communities that engage in struggles for recognition and rights (see Dumit 2004; see also Hacking 2009; Rose & Novas 2004). For many anthropologists, autism is no longer a pathology; it is simply one among an array of ways of being in the world (see Grinker 2008). There are all sorts of things to say about the historical moment that has made possible the kind of testimony J&A draw on, but one thing is clear: If anything reflects “social motivation,” it is the very existence of this effort on the part of autistics to describe their experiences to others. To testify is to address an imagined audience – to share one’s world is to meet outsiders to it halfway. Skepticism about the limits of self-reporting seems misplaced in this instance. Some autistics speak of their longing for closeness. Some say they want to be left alone. But the very fact that they are relating these experiences reflects a desire to be socially engaged.

The third key feature of J&A’s intervention is perhaps the most important. Social motivation is social, they insist: It exists in the space between persons. For most anthropologists, nothing is truly individual; our species would not be our species, in mind or body, in the absence of the social worlds we create and in which we are immersed. As J&A point out, caregivers tend to impute intentionality to non-autistic infants, even when the meaning of their behavior is opaque. Whatever fuels behavior, motivation becomes social when others interpret a gesture as a

bid for connection. J&A call for interventions directed at caregivers, who must learn to look for all the subtle ways autistic people may be trying to engage with them. Caregivers who take on this challenge have to learn to live with uncertainty, creating relationships with others whose intentions they cannot fully grasp.

Of course, it's not just autistics whose motives are opaque. We "normal people" arguably only ever know what we ourselves are up to when we consider how our actions appear through others' eyes (see Keane 2015). There are more or less good ways of living with this dilemma, which J&A make clear – for researchers and for all of us who inhabit social worlds. J&A clear the ground for a new approach to research on autism. It will be less self-assured, but far more convincing: modest in the best possible way. And, who knows? We might all get lucky. "You people" might learn how to look in the mirror.

What do autistic people want from autism research?

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doi:10.1017/S0140525X18002522, e111

Abstract

Research that engages the experiences and insights of autistics and their caregivers can be more ethical, less stigmatizing, and innovative. To avoid reproducing established assumptions, researchers should learn how autistics and their caregivers understand behavioral and communicative differences, and how they prioritize interventions and accommodations. Fostering "autistic flourishing" requires that researchers focus on similarities between autistics and neurotypical people while allowing for autistic differences. Consulting autistics helps ensure that their personhood is acknowledged.

Over a decade ago, Chamak et al. (2008) asked, "What can we learn about autism from autistic persons?" Some readers might find the question confusing – how could anything about autism be learned without the active participation of autistic people? – but the question critiques a longstanding habit in studies of psychiatric and neurodevelopmental differences. Researchers regard those diagnosed with such conditions as unreliable narrators of their own experiences, even when they have the capacity to communicate. Researchers might recruit autistic people as study participants, but they are unlikely to solicit their input on research design or their insights into the underlying causes of the behaviors that characterize autism, though autistic people might understand their own motivations at least as well as those observing them.

Jaswal & Akhtar (J&A), like Chamak et al. (2008), consulted the published testimonies of autistic people to interrogate the belief, reiterated in both expert literature and popular media, that autistic people lack social motivation and that this deficit is a central feature of the condition. They conclude that there is much to suggest that the opposite is true. Autistic people are

socially interested and socially motivated, and behaviors that scientists conventionally describe as demonstrating social disinterest may have been misinterpreted by (often neurotypical) scientists. Accounts authored by autistics suggest, for example, that they avoid eye contact because the sensation is uncomfortable and that motor stereotypies serve a calming and regulatory function. Loneliness, in fact, could be a real problem for autistic people, a finding borne out by other studies (e.g., Mazurek 2014). However, authors of autobiographies, the primary source for autistics' testimony used by J&A, may be more invested in reframing conventional accounts of autism than others. It would be worth exploring whether these alternative explanations persist in answers to interviews from a broader sample.

Asking autistic people about their own understanding of their behaviors and their own priorities for research that frequently demands their time and participation is undoubtedly the ethical course of action – Nicolaidis (2012) compares it to the ethical importance and value of involving representatives of racial or ethnic minority groups in research that affects them. Research informed by autistics' accounts might be both ethically more robust *and* epistemologically more nuanced, because it would not simply reproduce established prejudices. Rodogno et al. (2016), all of them ethicists and parents of autistic children, observe that their shared experience as parents offers a new perspective on the idea of well-being as it has been conventionally studied in philosophy. They argue, importantly, that it is crucial to consider that a "good life" with autism may not look exactly like a good life in neurotypical terms, and that it is essential to systematically consult autistic people if researchers want to develop outcome measures that facilitate what Ashcroft (2012) has called "autistic flourishing." To do so, Rodogno et al. (2016, p. 407) argue that we need to start from the experiences of autistics. Of sociability, for example, they write (drawing on Calder et al. 2013) "the 'socialising' and 'being together' that adds to an autistic's quality of life might not quite have the same nature as what mainstream society would have it."


Put differently, it's possible that a version of social motivation accounts is valid for part of the heterogeneous population defined by the autism diagnosis. J&A demonstrate that behaviors that apparently signal social disinterest do not necessarily mean this, but they do not necessarily demonstrate active social interest either. As Ashcroft and colleagues (Ashcroft 2012; Rodogno et al. 2016) argue, it may be true that autistic people do not share the same desires and pleasures as neurotypical people, and it is therefore imperative that autistics provide input on how outcomes for education and interventions are measured. Sosnowy et al. (2018) found that autistic young adults wanted friendships, but sometimes defined these relationships differently, providing further support for Rosqvist et al.'s (2015) observation that autistic sociability and friendships may need to be defined differently from conventional (neurotypical) expectations. For example, and beginning with the observation that autistic children engage in more "parallel play" and less direct social interaction, autistic adults may perceive social value in interactions that involve sharing space rather than conversation (Brownlow et al. 2013). Recognizing that social motivation accounts are flawed does not mean that autistic sociability will reflect the same patterns as neurotypical sociability.

As J&A note (in sect. 1), this matters deeply for therapeutic practices and interventions. They point out that different research assumptions yield research in support of different types of interventions. Better approaches might acknowledge autistic peoples'

actual social interest and seek to address how neurotypical conversational and interactive partners do not adequately respond to social overtures and may, indeed, frustrate autistics' attempts at social interactions by preemptively judging them to be undesirable conversational partners (Sasson et al. 2017).

Ethicists have addressed (though imperfectly) the ethical implications of prospective biomedical or genetic "cures" for autism and the implications of this for "autistic integrity," meaning the positive sense of self and identity of autistic people (Barnbaum 2008). However, much less ethical discussion has been devoted to interventions that do not promise full normality or cures but instead seek to remediate aspects of autism that lead to subjective experiences of suffering on the part of autistic people. These comprise the majority of behavioral and psychological interventions for autism, and autistic authors have written eloquently of the ability of such treatments to cause lasting harm in some cases. Foregrounding the importance of supporting specifically autistic forms of flourishing while also acknowledging shared desires for belonging and dignity can help us ensure that psychological research and the treatments that follow from it do not reproduce the social harms they hope to ameliorate.

Challenges to the social motivation theory of autism: The dangers of counteracting an imprecise theory with even more imprecision

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doi:10.1017/S0140525X18002339, e112

Abstract

The arguments offered by Jaswal & Akhtar to counter the social motivation theory (SMT) do not appear to be directly related to the SMT tenets and predictions, seem to not be empirically testable, and are inconsistent with empirical evidence. To evaluate the merits and shortcomings of the SMT and identify scientifically testable alternatives, advances are needed on the conceptualization and operationalization of social motivation across diagnostic boundaries.

The social motivation theory (SMT) is an influential framework in the field of autism spectrum disorder (ASD). As such, it can

be challenged, and it should be challenged, by empirically testable alternatives. However, the arguments put forward by Jaswal & Akhtar (J&A) contending that the SMT is imprecise would benefit from a scientific debate to help improve the field of social motivation. In this commentary, we note several that permeate the authors' discussion before putting forward suggestions for future research in this area.

First, J&A counter the SMT using straw man arguments that are unrelated to the tenets and predictions originally articulated in this theory. For example, they challenge the SMT for failing to acknowledge individual differences in social motivation in ASD. However, the proponents of the SMT do explicitly acknowledge the importance of considering "subgroups of ASDs that do or do not have diminished social motivation" (Chevallier et al. 2012, p. 7). Additionally, they criticize the SMT for providing a poor explanation of motor stereotypies in ASD, although the SMT was never claimed to explain such phenomena (as explicitly noted by Chevallier et al. 2012 p. 6). This is further compounded by suggestion that an article authored by contributors to this commentary (Leekam et al. 2011) proposes that motor stereotypies are caused by social withdrawal. The referenced article critically discusses different models of repetitive behaviors, including the one that the authors ascribe to us. However, this account was not the one we endorsed. Instead, the article advocates for the need to acknowledge the dimensional nature of repetitive behaviors across normative and clinical populations, and the range of adaptive functions these behaviors might serve.

Second, many arguments offered by J&A are not scientifically testable. Examples include counteracting the SMT position that a significant portion of individuals with ASD are less socially motivated than their peers with the argument that some (but not all) individuals with ASD disagree with the idea that they are less socially motivated than their peers and that they just manifest their social motivation differently. This statement might be true – just like introverted individuals might enjoy large social gatherings, although they express such enjoyment differently. However, these statements are not consistent with current empirical observations and interpretations, and given that it is not clear how the statements above should be operationalized and empirically tested, it is therefore not possible to narrow down possible explanations for the phenomena under investigation. The authors might argue that their goal has been made explicit; "we are not offering a new theory of autism ...: rather, we are interrogating an influential approach" (sect. 1, last sentence). However, a scientific approach to interrogation is still called for. For example, the statements above might be used to reconsider existing taxonomies of social interest in autism (e.g., Wing & Gould, 1979), reexamine their relevance to social motivation and offer new operational definitions and falsifiable hypotheses for testing. Importantly, the point of theories is not so much to be "true," but to be useful. The SMT indeed does not capture the complexity and individual variations in the phenomena under investigation – in fact, no theory in social science does. The question is whether the theory produces something useful.

Consequently, early interventions informed by the SMT, such as the Early Start Denver Model (ESDM; Rogers & Dawson 2010) and Pivotal Response Training (PRT; Koegel & Koegel 2006), should not be considered as detrimental but should be considered as having some limitations. A balanced discussion is needed in light of the evidence suggesting the benefits from ESDM or PRT observed in several investigations with data supporting better outcomes and fewer services later in life in children who received these interventions (Cidav et al. 2017; Ventola et al. 2014).

Of course, alternative accounts can legitimately challenge the claim of usefulness, but these need to offer testable predictions that produce empirical evidence (e.g., Mottron 2017).


Nevertheless, we do agree with J&A that the SMT should be challenged. Social motivation is a nebulous concept. Constructs such as social interest, affiliation motivation, extraversion, sociability, solitropic orientation, and the need to belong, to name a few, are used across different disciplines to study individual differences in the motivation to affiliate with others. However, the boundaries between these constructs are fuzzy, and consensus is needed on how to conceptualize and operationalize social motivation. It is unclear whether social motivation reflects a hard-wired, evolutionary shaped module that comes online in early development, or it emerges from the interaction between reward processing and learning. Additional open questions include the extent to which reward processes work in similar ways for social versus non-social rewards, and when do continuity and discontinuity arise in typical and atypical development. Crucially, we currently lack measures that would enable precise quantification of this multidimensional construct and measure change and potential mechanisms at work (e.g., reward). Advances in these areas are critical to gain insight into and ultimately improve the social experience of neurodiverse and neurotypical individuals.

In conclusion, the target article provides a thought-provoking reminder that prominent theories in our field such as SMT require additional research as well as consideration of the personal experience of individuals with ASD to account for the complexity of the phenomena observed in this population. A comprehensive review should have been undertaken to evaluate the scientific merits and shortcomings of the targeted theory. Proposing alternative theories is always desirable because they allow healthy discussion and are instrumental in helping the field mature and progress. For progress in the field, we must continue to challenge existing models and establish novel theoretical accounts of ASD symptoms that consider the lived experience of individuals with ASD. These, however, must be articulated around empirically testable hypotheses capable of driving scientific research and generating usable knowledge.

Note

1. Mirko Uljarević and Giacomo Vivanti should be considered joint first authors.

Whose words are these? Statements derived from Facilitated Communication and Rapid Prompting Method undermine the credibility of Jaswal & Akhtar's social motivation hypotheses

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doi:10.1017/S0140525X18002236, e113

Abstract

Jaswal & Akhtar provide several quotes ostensibly from people with autism but obtained via the discredited techniques of Facilitated Communication and the Rapid Prompting Method, and they do not acknowledge the use of these techniques. As a result, their argument is substantially less convincing than they assert, and the article lacks transparency.

Jaswal & Akhtar (J&A) examine the apparent lack of social motivation in people with autism spectrum disorder and present first-person testimonies in support of their hypotheses. Nevertheless, because several of the people quoted used Facilitated Communication (FC) or the Rapid Prompting Method (RPM), the views presented cannot be assumed to be their own. Because J&A present these quotes as evidence, the credibility of their arguments is seriously compromised. In addition, these problematic techniques are not acknowledged, and as a result, their article is lacking in transparency.

FC, which typically involves a “facilitator” providing physical support at the hand, arm, back, or other body part of a person with communication disability as they type on a keyboard, has been thoroughly discredited. Controlled trials and systematic reviews of FC (see Mostert 2001; 2010; Schlosser et al. 2014) consistently show that the facilitator influences the content of the message typed by means of the well-documented ideomotor (“ouija-board”) effect (Lilienfeld et al. 2014).

RPM, which typically involves an “instructor” holding and moving an alphabet board while the person with communication disability points at the board, has been likened to FC (Tostanoski et al. 2014). RPM proponents have often avoided scrutiny by discouraging scientific research (Tostanoski et al. 2014), and there is no evidence that RPM is a valid form of communication. A correlational study by Chen et al. (2012) is often cited as supporting RPM, but it did not test authorship of the messages and instead showed evidence of prompt dependency (Lang et al. 2014).

Given the (a) absence of evidence supporting FC or RPM, (b) substantial scientific evidence against FC, (c) marked similarities between FC and RPM, and (d) widespread acknowledgment of the harms of FC, including false allegations of sexual abuse, at least 19 professional, governmental, and disability advocacy organizations worldwide have issued statements against these techniques (Behavior Analysis Association of Michigan 2018). The American Speech-Language-Hearing Association (ASHA 2018a; 2018b) position statements on FC and RPM, respectively, assert

that information obtained through the use of these techniques should not be considered (FC) or assumed to be (RPM) the communication of the person with a disability.

In total, J&A offer 40 quotes from people with autism in support of their arguments.¹ In many instances, J&A provide attributions for the cited quotes but do not outline the previously reported language skills or communication methods and techniques of the quoted individuals. Twenty-three quotes appear to be from people with autism who use speech to communicate. Many of the remaining 17 quotes appear to be from people with autism who do not use speech to communicate but are quoted via FC or RPM, as illustrated in the following examples:

1. Six quotes attributed to Ido Kedar (2012) come from *Ido in Autismland*. In that book's Introduction, Ido's mother indicated that he first showed expressive language when she began using FC with him and that he later went on to use RPM, receiving instruction from its inventor, Soma Mukhopadhyay (Kedar 2012). She also reported that Ido wrote the book with his RPM letterboard.
2. The quote attributed to Barb Rentenbach derives from a book co-authored with her FC facilitator (Rentenbach & Prislowsky 2012). An author's note reveals that the book was written with FC and includes a photo of her receiving hand-over-hand facilitation.
3. A single quote attributed to Sue Rubin comes from her chapter in a book edited by Douglas Biklen, the primary promoter of FC in the United States (Rubin 2005). Biklen does not indicate how Rubin produced her chapter, but there is other contemporaneous evidence of her language ability. In the 2004 documentary *Autism Is a World* (Wurzburg 2004), in which Rubin appeared, all of her dialogue originated from (a) hand-over-hand FC, (b) typing on a keyboard held in the air by someone else, or (c) previously typed messages played on screen by a text-reading machine. The film contains no examples of her typing independently on a fixed keyboard.
4. Two quotes attributed to Naoki Higashida (2013) originate from the English translation of his book *The Reason I Jump*. Based on readings of the book in both English and Japanese, as well as observations of Higashida at live and videotaped appearances, Fein and Kamio (2014) concluded that he used a form of FC and that the book should not be taken as his words.

By our count, the four aforementioned individuals provide 59% of the quotes attributed to people who do not use speech to communicate and 25% of the quotes overall. J&A also cite these sources frequently without quoting them directly. Several quotations used by J&A were obtained by FC and RPM, so they should not be assumed to be the statements of people with autism (ASHA 2018a; 2018b). Given the strength of scientific evidence against FC, and the scientific questions remaining about the authorship of messages delivered by RPM, such quotations cannot legitimately be used to support J&A's arguments about social motivation in people with autism. In addition, J&A's failure to report the methods used to collect these quotes is problematic.



We encourage careful consideration of the reporting standards and methodologies used in research involving people with autism. Researchers should listen to, include, and respect the voices of people with autism, and not use discredited techniques such as FC and RPM, which risk putting words into their mouths.

Authors who cite the words of people with autism as primary or secondary data sources have a scientific and ethical obligation to ensure that the statements they analyze or quote are those of the participants and have been obtained using validated communication methods. Scholars also have an ethical responsibility to acknowledge when FC, RPM, or any other facilitator-dependent technique has been used in the production of messages reported in research.

Note

1. For a tabulation, see the materials associated with this commentary at <http://osf.io/4qfkw>.

Reconciling autistic individuals' self-reported social motivation with diminished social reward responsiveness in neuroimaging

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doi:10.1017/S0140525X18002455, e114

Abstract

The self-report of some autistic individuals that they experience social motivation should not be interpreted as a refutation of neuroimaging evidence supporting the social motivation hypothesis of autism. Neuroimaging evidence supports subtle differences in unconscious reward processing, which emerge at the group level and which may not be perceptible to individuals, but which may nonetheless impact an individual's behavior.

Jaswal & Akhtar (J&A) bring important and under-represented voices of autistic individuals into conversation with the social motivation hypothesis of autism. However, we challenge their argument that reports of autistic individuals who feel socially motivated are incongruous with neuroimaging evidence for the social motivation hypothesis. J&A cite neuroimaging studies showing decreased reward processing in autistic individuals as the purported neurobiological evidence for the social motivation hypothesis, then argue, "The problem with this line of reasoning is that, as we have noted, many autistic people claim to be very interested in other people" (sect. 6, para. 6). We argue that self-reported claims of social interest are not necessarily at odds with diminished neural social reward responsiveness for four reasons.

First, the human brain performs a range of processes unconsciously. Neuroimaging methodologies are commonly used to assay subtle processes unavailable for conscious reporting. For example, study participants will deny seeing a quickly flashed image despite visual cortex activation (Yuval-Greenberg & Heeger 2013). We do not doubt the veracity of these participants'

reports – we believe that they did not experience seeing the image. At the same time, we accept the evidence that at an unconscious level, their brains processed this image. The value of functional neuroimaging lies in its ability to detect processes underlying cognition and behavior that are difficult to access by direct report or behavioral experiments. Autistic people can both report accurately that they feel socially motivated *and* demonstrate altered motivational processing at the neural level.

Second, our recent meta-analysis of reward-processing neuroimaging studies in autism (Clements et al. 2018) found reliable but small group differences (Cohen's d values of approximately 0.25), indicating that the autism group shows diminished activity in reward circuitry in response to social reward. This small effect may be imperceptible to an individual. These effects do not indicate that autistic participants were not at all motivated by social reward or that they did not experience being motivated by social reward. Rather, they indicate that to a small degree, their neurobiology processed reward differently. Specifically, autistic participants showed a slightly smaller increase in activity when viewing social rewards relative to viewing no reward, as compared to the increase shown by non-autistic participants. These group differences reflect one specific process within the broader, multifaceted process that produces the mental state we call "motivation."

Third, like autism itself, social motivation exists on a spectrum, with a large range in social motivation among both autistic and non-autistic individuals. However, studies are conducted at the group level. When neuroimaging studies report that a group of autistic individuals shows lower social motivation than a group of non-autistic individuals, these effects are averaged across each group; both groups include individuals with higher and lower social motivation than the average. In study samples and in the general population, the distributions of social motivation within each group overlap, with some autistic people showing high social motivation and some non-autistic people showing low motivation. In fact, assuming normal distribution, an effect of $d = 0.25$ means that only 60% of autistic individuals show lower social motivation than the average non-autistic individual. Analogously, people with attention-deficit/hyperactivity disorder (ADHD) fidget more than people without ADHD on average, but some people with ADHD do not fidget at all, and some people without ADHD fall in the 99th percentile of fidgeting. The same is likely true of social motivation. The 16 anecdotes selected for the appendix show high social motivation in some autistic individuals, but in the absence of a randomly selected sample, such reports do not disprove an *average group difference* in social motivation. Given the massive heterogeneity of autism, it is unlikely that any one model will fit every autistic individual. As long as the social motivation hypothesis is supported on average for groups of autistic people, it can be a productive model for generating hypotheses about interventions and developing future models.

Fourth, our meta-analysis (Clements et al. 2018) and a recent systematic review (Bottini 2018) both converged on a similar conclusion: social *and* non-social reward processing are broadly diminished in autism. This bears directly on self-report. Individuals reporting their experience have a limited comparison sample of only their own experiences (see Fig. 1). An autistic person cannot say whether she feels more or less motivated by social interaction than a non-autistic person; she can, at best, compare her own social motivation with her own non-social motivation. Non-social motivation deficits in autism may affect self-report, in that persons comparing lower social motivation with lower

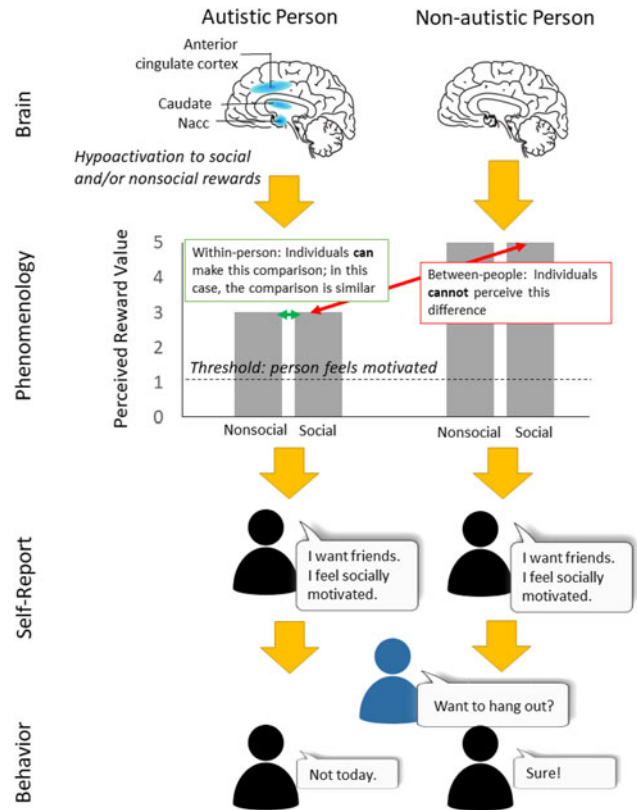


Figure 1 (Yankowitz & Clements). Autistic people show small, reliable hypoactivation in reward circuitry in response to social and non-social rewards. At the phenomenological level, an individual can only compare his own level of perceived social motivation to his own level of perceived non-social motivation (see green; both diminished in ASD); an individual cannot compare his perceived level of motivation to someone else's (see red). Here, we depict social and non-social as equal in each group for simplicity. In reality, many studies report differences between social and non-social reward value that depend upon the specific stimuli and experimental paradigms used. With regard to self-report and behavior, an individual's perceived level of motivation may be sufficient to foster a self-reported desire to establish friendships, but nonetheless lead to subtle or substantial differences in behavior, including reduced initiating and joining conversations, eye contact, and others.

non-social motivation will report that their social motivation is intact. This does not mean that we should discount the self-report of an autistic person who is socially motivated, but that such report does not necessarily reflect underlying typical levels of social motivation. We also note the emerging evidence that autistic people show increased activation to restricted interests; thus, autistic individuals' evaluation of their own social motivation occurs in the context of more broadly altered reward processing, not simply diminished reward processing overall.

In sum, we agree with J&A that some autistic individuals, such as those quoted in the appendix, experience social motivation. In fact, some of these individuals could even experience *greater* social motivation than non-autistic individuals. However, this does not contradict findings from the neuroimaging literature that autistic people, on average, process rewards differently. Although information about the experience of social motivation can be gleaned from self-report, information about between-person differences in processing social reward cannot. We argue that self-reported motivation from any individual cannot negate results from neuroimaging studies of groups, because neuroimaging evidence speaks to unconscious processes and group-level differences. Furthermore, the self-reports of autistic people likely reflect relative comparisons of motivation

toward different types of stimuli, and accumulating evidence indicates that autism affects motivation broadly. The testimony of individuals in J&A serves as an important reminder of the limits of neuroimaging – specifically that group findings with small effects cannot be generalized to every individual – but does not inherently contradict the evidence that, on average, autistic individuals show diminished social motivation at the neural level.

Authors' Response

Supporting autistic flourishing

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doi:10.1017/S0140525X19000025, e115

Abstract

In response to the 32 commentaries, we clarify and extend two of the central arguments in our target article: (1) Social motivation is a dynamic, emergent process, not a static characteristic of individuals, and (2) autistic perspectives are essential to the study of autistic social motivation. We elaborate on how taking these two arguments seriously can contribute to a more accurate, humane, and useful science of autism.

The 32 commentaries on our target article provided a diverse set of opinions, theoretical approaches, disciplinary perspectives, and data in response to our efforts to challenge assumptions about social motivation in autism. Nearly all the commentaries endorsed our efforts, and many offered constructive and important caveats and extensions. We are grateful to the commentators for helping to sharpen and extend our thinking; we particularly appreciate that a number of autistic scholars commented on our work. Unfortunately, we are unable to respond to each commentary in detail, but we have attempted in this response to highlight some of the common themes.

We begin by briefly summarizing the main points of our target article and clarifying aspects of our argument that were not interpreted by some commentators in the ways we intended (sect. R1). We then elaborate on a central thesis – that social motivation is a dynamic, emergent property of interactions rather than a fixed trait residing within an individual (sect. R2). Next, we turn to the role that the testimony of autistic people can and should play in the study of social motivation and autism (sect. R3). We conclude by considering how this exchange of ideas contributes to efforts to promote what **Silverman** (citing Ashcroft 2012) calls “autistic flourishing” (sect. R4).

R1. Summary and a few clarifications

In our target article, we argued that autistic people's unusual behaviors have often been interpreted by laypeople and scientists

to mean that autistic people are not interested in other people, that they are not socially motivated. For example, many autistic people do not engage in sustained eye contact; in Western cultures, lack of eye contact is often interpreted as a lack of social interest. Similarly, some autistic children rarely point to objects to draw another person's attention to them, which some scientists have interpreted as an indication that autistic children may not be as motivated as non-autistic children to share experiences with others.

Using a combination of empirical data and first-person accounts, we provided explanations unrelated to social motivation for these (and other) behavioral differences between autistic and non-autistic people. We also pushed back on the notion that diminished social motivation is universal in autism by quoting several autistic individuals who profess an interest in others and who express frustration that their unusual behaviors are regularly interpreted in the opposite way (by non-autistic interlocutors). We argued that treating autistic people as if they were not socially motivated merely because they do not show social interest in conventional ways risks creating a self-fulfilling prophecy, and we recommended investigating alternative ways in which social interest can be shown.

R1.1. Embracing heterogeneity

Some commentators felt that we ignored the heterogeneity that is part and parcel of autism (**Levy**). Several seem to have interpreted our argument as suggesting that *all* autistic people are motivated to engage in social interactions with others at all times (**Dawson & Cowen**; **Fletcher-Watson & Crompton**; **Gillespie-Lynch**; **Mundy**; **Yankowitz & Clements**). Fletcher-Watson & Crompton (para. 4) worried that such an argument “carries risks for autistic people” if “well-meaning [non-autistic] individuals” insist on social contact when it is not wanted. Dawson & Cowen (last para.) went further, writing that our failure to acknowledge that “social interest and motivation in autism are both atypical and characterized by high variance across individuals” marginalized many autistic people and “consigned [them] to difficult fates.”

We have much more to say about variability in social motivation – and particularly about how experience and expectations contribute to that variability – in section R2. But here we want to be clear that we did not intend to suggest that all autistic people will always be motivated to interact with all other people. We recognize that there will be both inter- and intra-individual variability in social motivation in autistic people. We attempted to acknowledge this in section 3 of the target article and explained that our focus was on “autistic people who profess an interest in others because we have not seen their perspective or experiences well represented in the scientific literature on autism and because they present a challenge to social motivation accounts of autism” (see also **Livingston, Shah, & Happé** [**Livingston et al.**]). We did not intend to suggest that those perspectives or experiences were shared by all autistic people. We regret that we were not sufficiently clear on this point in our target article, especially if the effect could be interpretations that carry risk for and/or marginalize autistic people.

R1.2. Of straw men and mice

Uljarević, Vivanti, Leekam, & Hardan (**Uljarević et al.**) felt that our characterization of the social motivation theory created “straw

man” arguments. For example, they suggested that we misleadingly asserted that proponents of the theory do not recognize that there are individual differences in social motivation in autism. We disagree. In section 1 of our target article, we highlighted the position of one prominent group of proponents, who noted that if the social motivation framework of autism were correct, “social motivation deficits, which are primary, *ought to appear in all or nearly all individuals with ASD* [autism spectrum disorder]” (Chevallier et al. 2012b, p. 236, emphasis added). In section 6, we noted that “Kohls et al. (2012) [four of the five same authors] acknowledge that some autistic individuals may show greater social interest than others,” though we raised concerns that Kohls et al. expected autistic people to show social interest in conventional ways. We could have been more explicit that proponents sometimes predict that social motivation “deficits” are universal and sometimes acknowledge individual differences, but we do not believe that we created a straw man argument on this point.

Uljarević et al. also felt that it was not appropriate for us to include motor stereotypies in our interrogation of social motivation accounts of autism. They noted that Chevallier et al. (2012b) explicitly excluded repetitive behaviors and restrictive interests in their seminal paper outlining their framework of social motivation in autism. But for better or worse, social motivation accounts of autism extend beyond the one offered by Chevallier et al. (2012b), and others have suggested that motor stereotypies may be related to a lack of social interest in infancy.

For example, in section 2.3, we pointed to research showing that non-human animals raised in restricted or confined environments often develop motor stereotypies, a finding some have considered relevant to autism (e.g., Lewis et al. 2007). In a review of this research on non-human animals (and other work), Leekam et al. (2011) wrote that, “It can be argued that the early onset of deficits in social, communicative, and adaptive behavior (arising from extreme social withdrawal) in infants and young children could interfere with experience-dependent behavioral and brain development in early life, as children with ASD begin to create their own restricted environment” and that “the message from these neurobiological findings [in non-human animal research] supports the desirability of active and intensive intervention that acts upon that self-imposed constrained environment to enhance brain development and reduce stereotypies” (p. 577). In section 5.1 of the target article, we argued that Leekam et al.’s framing of the relation between motor stereotypies and social withdrawal was problematic, in part because it is inaccurate to describe any child’s environment as “self-imposed.” In their commentary, Uljarević et al. explained that Leekam et al. did not intend to endorse the social withdrawal-motor stereotypy proposal themselves, and we apologize for misreading them in this way.

R1.3. Do we really believe data about social motivation are useless?

Dawson & Cowen (para. 3) asserted that we “dismiss as irrelevant (‘unlikely to yield data that are useful in theory or practice,’ sect. 3, para. 3) any attempt to test claims about social motivation in autism.” This is incorrect. We love data and are most definitely in favor of attempts to test claims about social motivation in autism.

What we wrote was that “attempts to measure whether autistic people are, on average, less socially motivated than non-autistic people are unlikely to yield data that are useful in theory or practice” (sect. 3). This was in a section about autistic testimony, and

we had just described a study showing that autistic adolescents report, on average, less pleasure in social situations than non-autistic adolescents (Chevallier et al. 2012a). We do not find average differences in self-reports of social motivation to be “useful in theory or practice” because, as we tried to explain in the target article and as we describe in more detail in section R2, whether someone reports themselves to be socially motivated at any given time depends on much more than their innate predisposition toward social stimuli and interaction. We agree that studies like those Dawson & Cowen summarized in their commentary, showing average differences between autistic and non-autistic participants on tasks related to the prioritization of social information and reputation, can be useful and important in efforts to understand the nature of social motivation in autism.

In our target article, we questioned whether neuroimaging data that show average differences in reward network activity between autistic and non-autistic people were useful in understanding autistic people’s social motivation. Yankowitz & Clements mounted a vigorous defense of these neuroimaging efforts, suggesting that their utility lies in being able to “detect processes underlying cognition and behavior that are difficult to access by direct report or behavioral experiments” (para. 2). We agree that neuroimaging can uncover interesting and possibly important underlying processes. But we worry when average differences in neural responses to reward in autistic people compared with non-autistic people are used to make claims about differences in psychological constructs like social motivation (e.g., Poldrack 2011; see also Mottron).

This is not an idle worry. Yankowitz & Clements explained in their commentary that “when neuroimaging studies report that a group of autistic individuals shows *lower social motivation* than a group of non-autistic individuals, these effects are averaged across each group” (para. 4, emphasis added), and that the effect size of 0.25 they found in their meta-analysis of reward processing differences means that “only 60% of autistic individuals show *lower social motivation* than the average non-autistic individual” (para. 4, emphasis added). But the neuroimaging studies included in their meta-analysis showed diminished reward processing, not lower social motivation. In their commentary, Yankowitz & Clements conflated an average difference in activity in particular brain regions on a particular set of tasks having to do with reward processing with differences in what they acknowledged is “the broader, multifaceted process that produces the mental state we call ‘motivation’” (para. 3). They are not the same thing.

Dawson & Cowen cautioned that our argument was based on “selective popular narratives about autism” that were provided at the expense of “a complex literature on social and nonsocial cognition, based on data from thousands of autistic study participants” (last para.). We disagree. We certainly made use of autistic testimony, but throughout we also described and relied on a complex literature on social and nonsocial cognition, with both autistic and non-autistic participants. Uljarević et al. similarly suggested that many of the arguments we offered were “not scientifically testable” (para. 3), including our proposal that social motivation may be manifested in unconventional ways. We disagree. We laid out the start of such a research agenda for investigating this issue in section 5.2 of the target article.

R2. What is social motivation anyway?

Some commentators suggested that as a field, autism science has moved beyond the stereotype that autistic people are uninterested

in others. For example, **Mundy** asserted that “there has been an evidence-based movement away from the universal view of people with ASD as devoid of affiliative social motivation in the science of ASD for quite some time” (para. 6). He and **Gillespie-Lynch** described historical changes in the diagnostic criteria for autism, with Gillespie-Lynch noting that the “pervasive lack of responsiveness to other people” (para. 4) that was part of the *DSM-III* is not part of the *DSM-5* criteria (American Psychiatric Association 1980; 2013).

We hope that the field is moving in a more progressive direction, but it is not clear to us how much progress has been made or whether that progress is reflected in the current experiences of autistic people. For example, as **Moseley & Sui** (para. 4) pointed out, in a study published in 2015, “less than 10% of physicians expected autistic people to show an interest in others (Zerbo et al. 2015),” a finding that has unfortunate consequences for their healthcare. Additionally, as we discuss below, even if they no longer believe the stereotype themselves, autism scientists sometimes make claims that may unintentionally promote it.

R2.1. Wanting versus wanting plus

Keifer, Dichter, McPartland, & Lerner (Keifer et al.) rightly pointed out that the construct of social motivation in the scientific literature is poorly defined. In their view, there are four components: reward motivation (“wanting”), reward processing (“liking”), reward learning, and habit formation. Each may be subserved by distinct neurobiological circuitry. Keifer et al. suggested that our argument that many autistic people say they want social interaction (despite behaviors that get interpreted otherwise) may present a challenge to the reward motivation (“wanting”) component of social motivation, but it may not challenge the other three components.

We agree that we used “social motivation” in our target article (and use it in this response) primarily in the sense of wanting social interaction or social connection (see also **Kissine**). This is arguably what most people who would like to make use of the science but are not embedded in it themselves understand social motivation to be. This is reflected in, for example, a Centers for Disease Control (2018) fact sheet on autism, which asserts that “some people with ASD might not be interested in other people at all,” and an Autism Speaks (n.d.) “learn the signs” web page, which suggests a “red flag” for autism “at any age” is a “persistent preference for solitude.” Some readers may object that a lay definition of a construct should not drive scientific discussions of that construct. But “wanting” is not just the sense of social motivation in lay terms; it also has been used as the default definition in professional and scientific discourse on autism.

Consider a series of events that helped motivate us to write the target article and to begin studying unconventional ways that people can show their social motivation. A few years ago, one of us (Jaswal) met with the parents of a 9-year-old nonspeaking autistic boy who had received an evaluation to help determine what kind of augmentative and alternative communication device the school district might provide him. As part of that assessment, his teacher had been interviewed about his ability to communicate in various ways. The first line of a section called “communication interaction skills” included the following summary: “Per teacher report, [this child] does not have a desire to communicate.” That is, according to his teacher, this child was not motivated to engage in the social act of communication. Such a conclusion came as a surprise to the child’s parents, who could list a dozen or more ways in

which he showed his desire to communicate, and who were understandably concerned about the negative effects this teacher’s essentialized belief about their son’s motivation (see **Bartsch & Estes**) would have on how she treated him.

Coincidentally, at around the same time, we came across a paper on nonspeaking autistic school-aged children, in which the authors described some factors that may predict why about 30% of autistic people do not acquire fluent spoken language (Tager-Flusberg & Kasari 2013). Among the factors they described was a lack of social motivation: “In some cases, the almost complete absence of any social motivation may be associated with no spoken language” (p. 469). The authors did not specify what component of the scientific construct of social motivation they thought was absent. But we think a fair reading is that they meant it in the “wanting” sense: Some individuals may not speak because they are not motivated to engage in the social act of communication.

We have gone on at some length here because **Keifer et al.** noted that “most ASD research does not specify any component as decisively representing social motivation” (para. 4). We agree, but the “wanting” component seems to be the default interpretation – the component that, in the absence of any specification, is most often assumed to be lacking or somehow deficient when this term is used in the context of autism (see **Brown & Foxley-Webb** and **Gillespie-Lynch** for historical accounts of why this may be). Like Keifer et al., we are not sure what implications our challenge to the wanting component of social motivation has for the other components they describe; we look forward to additional research that investigates how they are related to one another. Regardless of how the components are related, we believe (and expect that Keifer et al. would agree) that it is a mistake to assume that any of the components are static traits of individuals.

R2.2. Social motivation is dynamic, emergent, embedded, and perceived

Social motivation (in the sense of a desire for social interaction) is frequently talked about as if it were a fixed trait. Even when heterogeneity is acknowledged, it tends to be discussed as variability across individuals, as in “some people are more socially motivated than others.” But this characterization misses two critical features of social motivation.

First, an individual’s motivation to interact with other people is not fixed; it varies over the course of their lives (e.g., Carstensen 1993) and even over the course of a day, depending on a host of variables, including their other goals, who is available for interaction, their ability to tune out distracting sensations and thoughts, the effort required, and importantly, how they have been treated in the past. Indeed, **Brown & Foxley-Webb** argued that at least part of the reason there is variability in social interest in autistic (and non-autistic) people has to do with variability in how they have been treated. They proposed that frequent adverse social experiences – being socially excluded, for example, or routinely being prevented from engaging in self-regulating motor stereotypies – could result in epigenetic changes to genes thought to be relevant to social interaction (e.g., Gordon et al. 2011). **Mitchell, Cassidy, & Sheppard (Mitchell et al.)** pointed out that “how one grows socially and emotionally depends not just on an immutable aspect of the individual’s constitution but also on how the behaviour of others shapes how you behave, which in turn shapes how others behave towards you, which shapes how you behave towards them, and so on” (para. 2).

A second critical feature of social motivation we tried to highlight in our target article is that an individual's social motivation depends not just on how much that person wants social interaction at a particular point in time, but also on how others interpret that person's behavior. If others see a person's behavior as a bid for connection – say, that person's echolalia or a sidelong glance – they are more likely to act on it than if they do not interpret it in that way, which, as described above, will affect how much that person wants to interact, and so on.

Our emphasis on the observer's interpretation of behavior resonated with a number of commentators. For **Rutherford**, for example, social motivation “exists in the space between persons” (para. 5). **Friedner** noted that autistic individuals' actions must be seen as “interactional and embedded within enabling or disabling social worlds” (para. 1). **Heasman & Gillespie** noted that “actors and observers may have differing perspectives on the extent to which behavior is social” (para. 1). **Delafield-Butt, Trevarthen, Rowe, & Gillberg (Delafield-Butt et al.)** wrote that “meaningful social relations require sensitive appreciation and forms of response that respect all forms of expression and seek to share experiences” (last para.). **Moseley & Sui** appreciated our focus on the role of “the non-autistic participant in a dyad, whose beliefs may markedly affect, or worse reduce, interaction” (para. 1).

In section 5 of the target article, we advocated for research into unconventional, idiosyncratic ways social interest could be manifested and perceived in autism as a step in changing unhelpful non-autistic beliefs. We suggested that lessons might be learned from how social interest is manifested and perceived in disabilities other than autism (e.g., blindness) and across cultures. **Gliga & Elsabbagh** agreed that additional research to characterize environments in which social motivation is likely to be high in autism (what they call “optimal environments”) is important. But they disagreed “with the suggestion that this requires revisiting the classical way of measuring motivation” (last para.). They argued that attempts to “bring a social stimulus closer and maintain engagement with it” represent the critical features of social motivation and that “the nature of the behaviour that brings about the reward was never key to theories of motivated behaviour” (last para.).

Even though the nature of the behavior may not be key to theories of social motivation, whether an observer perceives that behavior as socially motivated *is* key. For reasons having nothing to do with their social interest, some autistic people may not behave in ways that non-autistic people interpret as indicating social interest (e.g., eye contact), and/or they may behave in ways that non-autistic people sometimes misinterpret as indicating social disinterest (e.g., echolalia). These “errors” of omission and commission can lead some observers to mistakenly assume that they are not socially motivated, which may have cascading effects.

Gliga & Elsabbagh described a number of important studies demonstrating, for example, early similarities and differences in overt orientation toward faces and eyes between infants who later receive a diagnosis of autism and those who do not. But we think studying how infants respond to typical social stimuli like faces is only part of the equation; it is also important to consider how infants (and others) are responded to. This requires a consideration of what behavior “counts” as indicating social motivation. It is in this sense that we believe that “revisiting the classical way of measuring motivation,” per Gliga & Elsabbagh, may be useful.

One lovely example of such a revisitation comes from work on attachment described by **Oppenheim, Koren-Karie, & Joels (Oppenheim et al., paras. 4-6)**. They described how one

3.5-year-old nonspeaking autistic boy did not show the conventional interactive behaviors indicative of secure attachment on reunion after separation from his mother in the Strange Situation Procedure (SSP): He did not engage in eye contact, “vocalize, or ask to be held, and in fact was turning his back to her throughout.” Nevertheless, they explained, he kept his mother close, pulling her by the hand behind him as he returned to the playroom and later glancing at her once briefly “as if confirming her whereabouts.” This constellation of behaviors may very well have been unique to this particular child, but **Oppenheim et al.** interpreted it (in combination with his distress during the separation period) as indicative of a secure attachment to his mother – a pattern they say is associated with “a history of having a sensitive caregiver who sees and feels things from the child's point of view” even when the child may not act in expected ways (see also **Delafield-Butt et al.**). Note also that **Oppenheim et al.** interpreted the boy's brief glance toward his mother in a rich, intentional way, not as an accidental or meaningless aside. In the context of what had just transpired during the SSP, it appeared to them a meaningful bid for connection.

Because our target article focused on experiential, contextual, and interpretive factors that contribute to differences in social motivation, a reader might wonder whether we believe that there are any inherent aspects of an individual that contribute to these differences. We do, but here too we want to emphasize the role the environment plays in how such predispositions are expressed. Consider temperament, for example. Some infants are highly reactive: They tend to respond strongly to novel people, places, and things, and they become distressed more easily or more quickly than less reactive infants (**Rothbart 2011**). One could interpret their distress on meeting new people as indicating diminished social motivation; they do not appear to find this kind of social situation very rewarding. But in some contexts, some of these infants can appear highly sociable; for example, if they are introduced to new people one at a time and in familiar contexts (**Thomas & Chess 1977**). Autistic individuals may have different thresholds for social (and sensory) stimulation than non-autistic people (see **Kapp, Goldknopf, Brooks, Kofner, & Hossain [Kapp et al.]; Olderbak, Geiger, & Wilhelm; Pastore, Dellantonio, Mulatti, & Esposito [Pastore et al.]; Perrykkad; Riva, Di Lernia, & Dakanalis**), and this may lead them to withdraw from certain social situations. But that does not mean that they are not socially interested.

Another inherent aspect of an individual that could contribute to differences in social motivation involves motor differences. **Delafield-Butt et al.** made a convincing case that the production and perception of motor movements are disrupted in autism, which could disrupt the ability to appear (and, perhaps in the long term, be) communicatively and socially engaged (see also **Torres et al. 2013**). If the timing of the production of movement in an interaction is perturbed, for example, this “can be misread as absence of sociability by persons with whom an autistic child is seeking meaningful engagement and shared learning” (para. 5). Additionally, when motor development is delayed or different, there can be cascading effects on the number and quality of opportunities for social interaction and communication a child is provided (e.g., **LeBarton & Iverson 2016**).

R2.3. Valuing different forms of sociality

According to **Friedner**, one reading of our target article is as an attempt to “render autistic people commensurable to non-autistic

people” (para. 3) (see also **Rutherford**). Despite surface-level differences in social interest, we seem to be saying that autistic and non-autistic people are actually quite similar on this dimension. But Friedner (para. 3) poses a provocative question: “What if (some) autistic people were actually quite different from non-autistic people in their world views and in their ontologies?”

Indeed, a number of commentators suggested that autistic people do not just express social interest differently than non-autistic people, as we argued in our target article; autistic people also experience and value it differently. For example, **Kapp et al.** (para. 3) wrote that “autistic people report relating to others *differently*,” and **Silverman** (para. 4) pointed out that “autistic sociability and friendships may need to be defined differently from conventional (neurotypical) expectations” (see also **Dawson & Cowen; Forgeot d’Arc & Soulières; Mottron**). In our target article, we focused on challenging the view that autistic people are not socially interested; we did not consider whether their sociality could be different from that of non-autistic people. These commentaries have convinced us that it can be.

For example, **Heasman & Gillespie** provided an insightful description of sociality that may seem foreign to many non-autistic people. They found that when playing video games together, autistic people engaged in behavior that, to a non-autistic person, could be interpreted as indicative of social indifference – echolalia, shouting, lengthy monologues, and so on. But autistic participants did not interpret each other’s behavior in this way. They were open to “a different type of sociality, one that permits periods of incoherent and fragmented dialogue in favor of pockets of intense rapport, reciprocation, and humor” (para. 5).

In fact, as **Livingston et al.** noted, some autistic people find having to adopt non-autistic social rules and interactive styles to be highly effortful, “comparing it to physical exercise or mental arithmetic, thus draining resources required for daily functioning” (para. 3). Livingston et al. described a group of autistic people who are so highly socially motivated that they routinely put themselves in social situations with non-autistic people even though they find these situations to be stressful. Unfortunately, the payoff may not be worth the cost: Livingston et al. described links between this approach to navigating the non-autistic social world and some of the same negative health outcomes associated with loneliness in autistic people, including depression and suicidal ideation (**Kapp et al.; Mitchell et al.; Moseley & Sui**). Livingston et al. argued that some autistic people may respond adaptively to the effort required to conform to non-autistic social norms by withdrawing from or avoiding social situations, instead seeking out “environments where non-social skills are valued over social skills” (para. 4). We add that in line with **Heasman & Gillespie**, another adaptive response might involve seeking out environments where a different type of sociality is valued.

R2.4. Valuing and problematizing asociality

Is it possible to carve out a space for valuing not just a different type of sociality in autism, but also asociality (**Friedner; Gillespie-Lynch**)? We embrace **Fletcher-Watson & Crompton’s** call for acceptance of “all people regardless of how enthusiastic they are about spending time with other people” (para. 4). As Friedner wrote, insisting that everyone be socially interested could be seen as “coercive and does not allow for diverse ways of being in the world” (para. 4). We certainly do not want to defend a position that is seen as coercive or intolerant of diverse ways of being.

At the same time, as we explained in section R2.2, we do not see social motivation as a fixed trait residing within an individual. Sometimes people want to interact, sometimes they don’t. Sometimes the environment can be more conducive to interaction, sometimes less so. Sometimes potential interlocutors are appealing social partners; sometimes they are not. How you have been treated in the past will affect how much you want to (or try to) interact. We would be surprised if any of this is controversial. But we think the existence of inter- and intra-individual variability and especially its causes have not been given sufficient attention in traditional approaches to thinking about social motivation in autism. A preference for solitude (and/or aversion to social contact) could be the result of one’s social experiences.

And so, how do we reconcile our desire to accept all ways of being regardless of how much they involve social interaction with what we see as the malleability of social motivation? Here is a preliminary answer that is surely not going to be satisfactory to many people. It seems reasonable to us to presume that from birth, humans are motivated to form social bonds, just as they are motivated to seek nourishment; being part of a community confers considerable survival and reproductive benefits (e.g., **Baumeister & Leary 1995; Dweck 2017; Stevens & Fiske 1995**). To be clear, this is not to suggest that all newborns are driven to form social bonds to the same extent or in the same ways. As we noted earlier, temperamental and other differences can influence both the amount and kind of social motivation they experience, as well as how they express it. Also, as we keep emphasizing, how they are responded to will interact with whatever drive toward the social world they may have, changing that drive in the process.

Over the course of life (or at various points in life), some people may decide that they prefer solitude even when they have been treated well by others. Some people may decide they prefer solitude because they have been treated badly (“to hell with you people,” **Robledo et al. 2012**, p. 6). Both of these are acceptable ways of being if they were voluntarily chosen and/or are ways of being that a person feels comfortable with. But we were motivated to write the target article by autistic people who end up in solitude even though they say they want social interaction. They have been forced into an asocial way of being that they say they are not comfortable with.

R2.5. Why does it matter?

The reason we are so insistent that a desire for social relationships should be considered the default (recognizing that desire can be expressed, experienced, and valued by autistic people differently from non-autistic people) is that there are clear benefits to having them. As **House et al. (1988, p. 541)** put it, “Social relationships, or the relative lack thereof, constitute a major risk factor for health – rivaling the effect of well-established health risk factors such as cigarette smoking, blood pressure, blood lipids, obesity and physical activity.” The mechanisms for this relation are beyond our scope, but proposals have been made that social support may, for example, buffer neuroendocrine and behavioral response to stressors (e.g., **Coan & Sbarra 2015; Holt-Lunstad et al. 2010**).

The health effects of social support among autistic people could be different, but we are not aware of data on this point. Interaction is not a panacea for loneliness (**Moseley & Sui**), and many autistic people prefer different kinds of interaction than non-autistic people (sect. R2.3). But given the elevated risk of

premature mortality in autism compared to the non-autistic population (Hirvikoski et al. 2016); the elevated levels of social isolation among autistic adults compared to other groups (Orsmond et al. 2013); feelings of loneliness among autistic people and its link to depression, self-injury, suicidal ideation, and suicidality (Moseley & Sui); and the fact that some autistic people say they want connection even though their behavior is sometimes misinterpreted to mean that they do not (Pellicano, den Houting, Du Plooy, & Lilley [Pellicano et al.]), we believe a low-cost and potentially high-impact strategy is to presume that people want some kind of social connection until they inform you otherwise.

Do we think everyone *should* be motivated to be social? No. But we do think everyone should be presumed to want some kind of social interaction until they make it clear that they do not. This, of course, raises a number of questions. For example, what would serve as conclusive evidence that someone has chosen and/or feels comfortable with solitude? We have argued that autistic people say their behavior is sometimes mistakenly interpreted to mean that they prefer to be alone, so should we rely on their words instead? What about children who express in actions and/or words a desire for solitude (e.g., Calder et al. 2013), but whose caregivers want to provide them with social opportunities? We have argued that social motivation is not fixed, so should repeated attempts be made to engage someone who has said they are not interested? Answering these questions in a way that applies to everyone under all circumstances is, of course, impossible. But understanding that social motivation can be expressed and experienced in a variety of ways and that it is labile may help people come to more informed answers when these kinds of questions arise.

R3. The role of autistic perspectives in autism science

R3.1. Is autistic testimony important to understanding social motivation in autism?

One type of evidence we used in the target article to argue against the assumption that autistic people lack social interest was testimony from several autistic people who expressed a desire to interact with others and/or who offered explanations unrelated to social motivation for their unusual behaviors. To be honest, we were somewhat apprehensive about how this approach would be received. After all, as Pellicano et al. noted, “these qualitative, subjective reports have for the most part been eschewed by scientists, who often perceive them as contributing no more than anecdotal evidence” (para. 2). Silverman (para. 1) pointed out that researchers sometimes consider people diagnosed with autism (and other conditions) to be “unreliable narrators of their own experiences.”¹ But we needn’t have been concerned: At least among the authors of the commentaries on our target article (even some of the more critical ones), there seems to be agreement that autistic testimony has an important role to play in understanding social motivation in autism.

That said, some of the commentators raised concerns that the testimony we highlighted was, in Mitchell et al.’s words, “unsystematic and prone to various biases associated with the context in which the testimony was given and the motivations of those who gave it” (para. 5). For example, Silverman (para. 2) noted that people who write autobiographies “may be more invested in reframing conventional accounts of autism than others” (see also Fletcher-Watson & Crompton). We did not intend to suggest that the personal accounts we detailed were representative

of all or even most autistic people. Instead, our goal in using such accounts was to highlight a perspective that has not been given sufficient attention in the autism literature, namely, that of autistic people who say they are socially interested (see also Livingston et al.).

We join with the many commentators who called for additional work that can provide a more systematic study of autistic perspectives on social motivation than our target article was able to provide (Fletcher-Watson & Crompton; Kapp et al.; Livingston et al.; Moseley & Sui; Silverman). As noted earlier, we do not think that comparisons of average levels of self-reported social motivation at a given point in time are all that useful. But systematic efforts to learn, for example, how a wide range of autistic people characterize their own social motivation, whether and how they have experienced its lability, and the factors they think contributed to their experience of it would be fascinating and important.

R3.2. How should autistic perspectives be obtained and used?

As Pellicano et al. noted, there is “growing acknowledgment within the scientific community that autistic people possess insight into autism that has been too frequently overlooked” (para. 3). Autistic people are, after all, the ones living and experiencing autism. This positive development raises fundamental questions about how those insights should be solicited and used in the research process.

A number of commentators wrote about the need to overhaul the research process in autism entirely – from the current system where the extent of autistic people’s involvement tends to be as participants in studies that non-autistic researchers have designed on questions that non-autistic researchers have decided are important to one where autistic people are involved in all stages of the research process, from identifying the questions to disseminating the results (Heasman & Gillespie; Kapp et al.; Pellicano et al.; Silverman). We enthusiastically embrace this call to arms. Authentically including autistic people will lead to better, more respectful autism science and to the development of better, more respectful support for autistic people.

Turning to how autistic perspectives can be conveyed via testimony, Dinishak correctly inferred that our position is that “autistic testimony contains valuable phenomenological data that should be taken seriously by autism researchers” (para. 4). She asked whether taking autistic testimony seriously is a recommendation or obligation, pointing out that the answer to this question has implications for the theory and practice of autism science. If it is merely a recommendation, scientists would be free to ignore testimony that was not consistent with the prevailing theory or other kinds of data. If it is an obligation, Dinishak pointed out, there are a number of ways scientists could fulfill it. They could, for example, use testimony as (a) evidence supporting (or refuting) a theory of autism; (b) an explanandum, the thing that a theory ought to explain; (c) the inspiration for a particular research question; or (d) at the extreme, the only way to gain insight about autism.

We think that autism science should be motivated by efforts to understand the lived experience of autistic people, and this requires, as Rutherford put it, “foreground[ing] what autistic people think is going on” (para. 4). Thus, although we do not believe that testimony is the only way to gain insight about autism (sect R1.3), we do believe that scientists have an obligation to seek out and use it in all of the other ways detailed above. This may be

controversial: In anthropology, Rutherford explained, self-report is an opportunity; in psychology, Pellicano et al. explained, it is often considered a problem. But like Pellicano et al., we think that in addition to participatory research, another important aspect in the overhaul of the research process in autism should be a greater emphasis on “methodological triangulation,” whereby introspective reports like testimony are valued and integrated with behavioral and brain measures (see also Kapp et al.; Moseley & Sui; Power et al. 2018).

Dinishak argued that taking autistic testimony seriously has both epistemological value (in that it leads to more accurate knowledge) and moral value (in that it affirms autistic people’s position as reliable knowers, helping to prevent epistemic injustice; Fricker 2007). We agree with this thoughtful characterization. As Li & Koenig explained, “if we discount the credibility of others’ testimony on the grounds of who they are or what they look like, we may give researchers and clinicians more credibility than warranted and less credibility to certain speakers than they deserve” (para. 4).

R3.3. Should testimony from some autistic people be excluded?

About 30% of autistic people cannot use speech reliably or at all (DiStefano et al. 2016), a disability likely caused, at least in part, by significant difficulties in motor planning, coordination, and/or execution (Gernsbacher et al. 2008a). Some nonspeaking autistic people have learned – after years of instruction and practice – to communicate by typing on a keyboard or pointing to letters on an alphabet board. Typically, these individuals rely on assistance from another person as they spell, someone who provides physical, emotional, and/or attentional support (Cardinal & Falvey 2014).

Vyse, Hemsley, Lang, Lilienfeld, Mostert, Schlinger, Shane, Sherry, & Todd (Vyse et al.) objected to our inclusion of testimony from several nonspeaking autistic people who communicate with assistance. In experimental settings, messages produced by people who communicate in this way have been influenced by those assisting them (but see Cardinal et al. 1996). Vyse et al. argued that the testimony of the nonspeaking people we quoted therefore could not have been their own.

We recognize that nonspeaking individuals who communicate with assistance could unintentionally or deliberately be led to produce testimony that is not their own. Indeed, there is always a possibility that a person’s testimony – spoken, signed, written, or written with assistance – could have been influenced in some way. But there are a number of reasons to believe that testimony produced with assistance, including the testimony used in our target article, can reflect a nonspeaking autistic person’s own thoughts. First, some people who learned to communicate with assistance have developed the ability to communicate independently (United for Communication Choice 2018); the perspectives they communicate independently are consistent with those they communicated with assistance (e.g., Kedar 2012; 2018). Second, nonspeaking people who communicate with assistance routinely convey – in naturalistic, everyday settings – information that the assistant could not have known (e.g., Bigozzi et al. 2012). Third, analyses of text produced by nonspeaking autistic people who communicate with assistance have shown their writing styles to be different from those of the assistants (e.g., Tuzzi 2009).

Finally, the speed and accuracy with which some nonspeaking autistic people spell make it unlikely those individuals are merely responding to cues from an assistant. For example, one of us

(Jaswal) has collected timing and accuracy data from an individual who points to letters on an 8.5- by 11-inch alphabet board held vertically by an assistant. In one 47-letter utterance (“I feel like world is waiting on me not the other way around”), he pointed to a letter, on average, every 1,085 ms ($SD = 381$ ms) and made no spelling errors. It seems unlikely that in the span of about a second, he could use a subtle cue produced by the assistant to accurately select 1 of 26 possible letter targets, and then repeat this process 46 additional times consecutively without error.

Given that about one-third of autistic people are nonspeaking, that some have learned to communicate with assistance, and that some of them have written on the topic of our target article, we believe our inclusion of their testimony was reasonable and appropriate. Interestingly, in most cases, and although this was not intentional, when we quoted a nonspeaking person to make a particular point, we also quoted a speaking person who made a similar point. For example, on eye contact, we quoted Higashida (2013), a nonspeaking autistic person, who wrote that it “feels a bit creepy, so I tend to avoid it” (p. 25) and Tammet (2006), a speaking autistic person, who explained that it feels “strange and uncomfortable” (p. 75). The content of the quotes from nonspeaking autistic people was consistent with the content of the quotes from speaking autistic people. Our arguments about social motivation in autism would have been the same had we limited ourselves to quoting only speaking people.

4. Supporting autistic flourishing

Early autism intervention programs that assume diminished social motivation focus primarily on attempting to change autistic children – by trying to teach them to respond to conventional social bids, for example, and to show their sociality in conventional ways. Uljarević et al. suggested that these programs have been shown to result in “better outcomes and fewer services later in life” for children who received them (para. 4). They argued that the social motivation theory should be evaluated by whether the interventions it generates are useful, not by whether it is true that autistic people have diminished social motivation.

We are, of course, in favor of efforts to improve children’s quality of life, but we do not find studies of early interventions derived from theories that posit diminished social motivation in autism as compelling as Uljarević et al. do. But more fundamentally, we disagree with their argument that the accuracy of a theory is not important. We believe that an accurate theory – one that is not based on mistaken assumptions about social motivation – will be more useful than an inaccurate theory (see also Silverman). By better characterizing autistic people, an accurate theory will provide a more effective basis than an inaccurate theory for improving the quality of life of both autistic children and adults.

The point about improving the quality of life of autistic adults is an important one. As Mottron explained, the rationale in many early intervention programs seems to be that conventional displays of sociality are prerequisites for later normal social interactions among non-autistic people. But Mottron pointed out that one cannot assume that autistic children who receive training in how to engage in and respond to conventional displays of sociality will later experience normal social interactions. Or as he vividly put it, “intensively occupying an autistic childhood with the training of non-autistic prerequisites is the human equivalent of training a kitten to swim” (para. 1). It is a skill that will be difficult to teach and that will be of little use when the kitten grows up.

As Mottron (2017) noted, “no valid information is available concerning the adaptive value of EIBI [early intensive behavioral intervention] for the well-being of autistic adults” (p. 818). But there is some reason to believe that teaching autistic children to appear non-autistic in their overt behavior (what Mottron (para. 5) referred to as the “pseudoscience of appearance”) could have unintended negative consequences in adulthood. As Livingston et al. have shown, for example, some autistic adults “appear non-autistic in their social behaviour so that they ‘pass’ as neurotypical” (para. 1)– typically an implicit (if not explicit) goal of early interventions. And yet, the effort required for them to behave as if they were not autistic comes at a considerable cost to their mental health and, ironically, can leave them feeling socially isolated (see sect. R2.3).

So what is to be done? Fortunately, many of the commentaries offer suggestions for a path forward. We begin with two basic premises: (1) Social motivation is not a fixed trait residing within an individual, and (2) autistic people value, experience, and express social motivation differently from non-autistic people. Accepting these two premises has important implications for efforts to foster what Silverman called “autistic flourishing.”

The first implication concerns the kinds of efforts needed to support autistic individuals as they develop in a sometimes (or often) hostile non-autistic world. Autistic and non-autistic people both have to learn to adhere to some social conventions that are relevant to interpersonal relationships and safety – boundaries of personal space, for example. But not all social conventions are equally important. For example, there are some non-autistic ways of showing sociality (e.g., eye contact) that, for a variety of reasons having nothing to do with their social interest, many autistic people do not engage in regularly. Insisting that they show their sociality in non-autistic ways may be difficult, impossible, of limited value, and/or harmful.

We agree with Mottron that the kind of guidance autistic children need and benefit from may be very different from the kind that non-autistic children need and benefit from. In the context of early intervention, for example, Mottron (para. 1) advocates for “replacing overtly interactive sessions” that insist on “overt markers of typical interaction (e.g., direct gaze)” with opportunities for “*lateral tutorship*.” Mottron (2017) recommends taking advantage of the preference many autistic children show for parallel (rather than interactive) play, working alongside the child while engaged in activities selected from the child’s interests. In addition to benefits for cognitive development, as the child learns through incidental learning and delayed imitation, Mottron (2017, p. 822) predicts that lateral tutorship will have benefits in social development: “Activities carried out in parallel with the child, without the child being addressed directly through gestures or speech, may favor the development of a type of social interaction based on a common interest rather than on a common appearance.” Indeed, in his commentary, Mottron posited that this will promote the development of “actual (and not fake or non-autistic) interaction between two human beings who express their social bonding differently” (para. 1).

The second implication of accepting that social motivation is labile and can be different in autistic people is that changing non-autistic people’s assumptions about autistic behavior and appraisals of autistic social interest is key to efforts to support autistic flourishing. Commentators identified at least two cognitive biases that make this difficult. The first is psychological essentialism (Bartsch & Estes). People tend to act as though they believe that overt behaviors are generated by some deep and abiding aspect of an individual. In the case of autism, as Bartsch & Estes explained, reduced eye contact

is consistent with reduced social motivation, and so the assumption that reduced eye contact is caused by reduced social motivation may seem completely reasonable (and difficult to dislodge). The second bias is related to egocentrism (Li & Koenig). People have experience with a limited set of behaviors that indicate social interest and so may have difficulty interpreting other behaviors in this way (see also Heasman & Gillespie).

Several of the commentaries recommended training non-autistic people to recognize their own biases and assumptions and to be more open-minded in terms of what can signal a desire to interact, an approach we think has considerable potential. Kapp et al. suggested that interventions designed to increase knowledge of autism and reduce bullying² could help illuminate (if not ameliorate) the “double empathy” problem, the fact that neither autistic nor non-autistic people understand each other well (see also Mitchell et al.). Pastore et al. argued that “given that certain behaviors typical of autism spectrum disorder (ASD) are naturally interpreted by non-autistics as signs of avoidance in a relationship, non-autistics must be taught to systematically ignore these signals” (last para.). Fletcher-Watson & Crompton noted that autistic people may use social cues that fall outside the norm and so “these cues may not be perceived as ‘social’ by neurotypical others” (para. 2), unless, as Li & Koenig suggested, they have been taught or learned to perceive them in this way. Heasman & Gillespie advocated for “re-educating neurotypical people through learning from autistic social appraisal” (last para.), where norms around expected communication styles are broader than non-autistic norms.

We will end with an example that demonstrates how pernicious non-autistic assumptions about social motivation can be. In section 5.2 of the target article, we explicitly urged research on the range of behaviors that can signal social interest as a means of fostering better interactions between autistic and non-autistic people. However, as Heasman & Gillespie pointed out, it is not so much that we need to identify specific behaviors that non-autistic observers can use as cues that an autistic person is socially interested; instead, they argued, we need to focus on the appraisal process of the observers themselves. Ironically, of course, and as Heasman & Gillespie gently reminded us, this point about social motivation being in the eye of the perceiver was a major prong of our target article (e.g., sect. 5). Despite this, when we wrote about research priorities, we focused primarily on understanding how autistic actors might signal social interest and not on how non-autistic observers perceive it.

We don’t want to get too meta about the whole thing, but we think it likely that in writing about research priorities (sect 5.2), we fell back on our assumptions that there are a set of “real” signals to social interest; they might be different in autism, but non-autistic observers simply need to learn what signals to look out for. Clearly, that is not sufficient: A different way of viewing autistic sociality is called for, and we once again thank the commentators for helping us (and we hope readers) to appreciate this.

Acknowledgments. Thanks to Jerry Clore, Janette Dinisshak, Chad Dodson, Tanya Evans, Morton Gernsbacher, Rachel Keen, Andrew Lampi, Jamie Morris, Barry Prizant, Denny Proffitt, Zach Rossetti, Christine Stephan, Tauna Szymanski, Maura Tumulty, Elizabeth Vosseller, and Dan Willingham for helpful discussion and comments.

Notes

1. Interestingly, in his classic *New Yorker* piece on Temple Grandin (“An Anthropologist on Mars”), Oliver Sacks (1993) admitted that he was initially “suspicious” of her first autobiography: “The autistic mind, it was supposed

at that time [1986], was incapable of self-understanding and understanding others, and therefore of authentic introspection and retrospection. How *could* an autistic person write an autobiography? It seemed a contradiction in terms” (p. 109). On reading her later work and then of course meeting with her, Sacks explained how Grandin shattered those misconceptions.

2. There is an interesting parallel to anti-bullying efforts more generally: Some anti-bullying interventions target peers of bullies because peers’ (mis)perceptions of bullies (based on their reputations and past behavior) often contribute to the maintenance of aggressive behavior (Price & Dodge 1989). Similarly, non-autistic people’s (mis)perception and (mis)treatment of autistic people quite likely serve to decrease autistics’ desire to interact with them (Brown & Foxley-Webb).

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[The letters “a” and “r” before author’s initials stand for target article and response references, respectively]

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