CAMBRIDGE
UNIVERSITY PRESS

ORIGINAL ARTICLE

Impairment or difference? The case of Theory of Mind abilities and pragmatic competence in the Autism Spectrum

Eleonora Marocchini*

Institute for Globally Distributed Open Research and Education (IGDORE), Gothenburg, Sweden and Department of Educational Sciences, Psychology Unit, University of Genoa, Italy
*Corresponding author. Email: eleonora.marocchini@igdore.org

Abstract

Psycholinguistic research on pragmatics in the neurotypical population has increasingly framed pragmatic competence and related cognitive skills in terms of individual differences, co-constructed discourse, and meaning negotiation. However, research on pragmatics in the Autism Spectrum has risen from a wide and biased view of autistic communication as fundamentally compromised and autistic pragmatic abilities as impaired. Mostly due to the impactful theory of a deficit in Theory of Mind, early research on autistic communication presumed a unitary pragmatic impairment, only to find that several pragmatic abilities seem to be "preserved." However, the interpretation of these findings usually takes an ableist turn, as most studies subsequently suggest that surface-level performance should not be interpreted as competence, but rather as a result of "compensatory" strategies. The raising number of contributions from autistic academics and participatory research enriched the field with new perspectives focusing on differences rather than impairments and drawing hypotheses on communication difficulties between neurotypes rather than within a specific neurotype. However, such contributions are hardly ever cited in the most prominent works. In conclusion, the field would benefit from a higher level of citation of autistic-led research and from an epistemological perspective shift within the mostly neurotypical academic community.

Keywords: autism; theory of mind; pragmatics

Psycholinguistic research on the Autism Spectrum

During the past four decades, developmental psycholinguistics and experimental pragmatics focused extensively on pragmatic abilities in atypical development and, particularly, in the Autism Spectrum. The field historically suffered, and still suffers, from recruitment difficulties and gender (Russel et al., 2011) and racial

CrossMark

(Imm et al., 2019; Mandell et al., 2009) bias in diagnostic practices, as well as of the numerous changes to diagnostic criteria, enhancing issues of comparability and reproducibility of results. The implications of these problems are known and increasingly discussed. In fact, with regard to gender bias some scholars suggest that we should consider the existence of a specific female phenotype (Bargiela et al., 2016; Hull et al., 2020; Lehnardt et al., 2016), though it is also worth reminding that some autistic[1] men could mask their autism as much as autistic women and that there seems to be a high incidence of transgender and gender-diverse individuals in the Autism Spectrum (Warrier et al., 2020). With regard to the changes to the diagnostic criteria, the conflation of Asperger's syndrome in the Autism Spectrum in the fifth edition of the DSM has been particularly discussed. The main reason for this is that this choice allowed for diagnoses of autistic people who are increasingly distant from prototypes of the historical classical autism. As a consequence, it has sparked debates on the potential benefits in terms of clinical practice and advancement of knowledge, with some scholars who are in favor of such a change (Hobson & Petty, 2021) and some who call for the identification of subtypes in the spectrum (Harris, 2019; Mottron & Bzdok, 2022).

Some of these points have an impact on some of the issues that will be raised in the present paper, particularly the fact that the autistic population (participating in research) now includes more (and more diverse) people than in the past, when some of the research in question was conducted. However, while these issues are increasingly taken into account, only a few works addressed the epistemic limits that specific theoretical approaches to clinical populations put forward, sometimes affecting decades of research on a given phenomenon. In fact, research on autism has risen from a biased view of severe impairments and has mainly revolved around the observation of autistic communication and behavior from a normative perspective: as compared to neurotypicality and, therefore, fundamentally compromised, rather than on its own, focusing on its specificities and individual differences.

As argued by Monique Botha (2021), psychological research is often conducted this way in the name of objectivity, conceived as distance from the object, though this objectivity is never discussed and is, instead, widely assumed. Although scientific positivism posits that any research product obtained through the scientific method is free from social and cultural values (Fondacaro & Weinberg, 2002), this kind of academic posture can lead to otherizing behaviors and dehumanization. In what follows, we will critically discuss a wealth of research whose main claim is that autistic people are more or less incapable of comprehending others (where "others" are invariably conceived of as neurotypical), inferring their intentions, feeling for them, and communicating with them. We will then see whether these dehumanizing claims are supported by the data, whether alternative accounts of autistic communication exist and how to possibly bring these lines of research closer to one another.

Positionality statement

As a supposedly neurotypical autism researcher[2], I was exposed to pathologizing views of autism through both mainstream media and academic research. Autism was usually listed among the disorders, or even "diseases," where empathy and

communicative abilities were lacking or severely impaired. Moreover, I was only familiar with reductionist accounts of the autism spectrum as "ranging from low-functioning to high-functioning" and observations of how "patients with autism" would "treat people as objects." I had started thinking that the statistical notion of normality was sometimes used prescriptively rather than descriptively, but I never rose the issue in any academic context. When I started doing science communication on social media, in my third year of PhD, I got in contact with the autistic community. Their experiences resonated with me so much that I had to question all I knew about the spectrum. Autobiographical books written by autistic women as well as critical discussions with autistic advocates led to a radical reframing of autism. I self-identified as autistic and got into the formal diagnostic process at the age of 28, as many other autistic women. At first, I thought this made me less suitable for autism research, as I would be less objective from then on. Then, I started reasoning on all the ways I had been less objective as a "neurotypical" autism researcher. This paper is the result of these reflections.

Autism and Theory of Mind

The Theory of Mind deficit theory

Several theories have been proposed to explain autistic traits and behavior in the socio-communicative domain, traditionally framed as impairments. Arguably, the most impactful has been Baron-Cohen et al. (1985) attempt to attribute them to a deficit in Theory of Mind (ToM), whose role in communication is debated in pragmatic literature but central in autism research. Although several other accounts have been published, explaining autistic differences in pragmatic comprehension as hinged on more general linguistic and cognitive abilities[3], the ToM deficit account is still one of the most cited, particularly in pragmatics research. The "Theory of Mind hypothesis of autism" was and is still seen by some scholars as a unified explanation for the core diagnostic features of autism (Tager-Flusberg, 2001), at least in terms of social and communicative difficulties. Said proposal attributed these to a lack of ability to infer other people's mental states, beliefs, and emotions and consequently read their behavior through these lenses. The first studies investigated ToM abilities in autistic children through false-belief tasks (such as the now famous Sally-Ann task), where a character of a story falsely believes that an object is placed somewhere, while participants know that it has been moved and it is now elsewhere. Though neurotypical children tend to answer correctly to questions about where this character thinks the object is (distinguishing between their view and its representation in the character's mind) by the age of four (Wellman et al., 2001), Baron-Cohen and colleagues found that most autistic children (though not all) with the same intellectual and verbal abilities did not pass the task: this led to describe the theory as having "the potential to explain both lack of pretend play and social impairment by virtue of a circumscribed cognitive failure" (Baron-Cohen et al., 1985).

It is comprehensible, though unfortunate, that early works on this topic would suffer from outdated views and language choices. However, even more recent publications on the matter still hold the dehumanizing flavor mentioned earlier. Baron-Cohen starts his review on ToM and autism, published in 2000, quoting Whiten and stating that "A

theory of mind remains one of the quintessential abilities that makes us human," then proceeds to state how its impairment "seems to be universal" in autism. This "universal" deficit entails the inability to infer "the full range of" mental states, such as desire, belief, intention, imagination, and emotion, which, in turn, can cause difficulties in pragmatic tests and correlate with real-life social skills (Baron-Cohen, 2000: 177–178).

More complex and recent models of ToM, such as the developmental model of ToM presented by Tager-Flusberg (2001), were proposed to enhance the theory and possibly explain how some autistic people would pass ToM tasks. Such a model posits that a distinction must be made between a basic social-perceptual component of ToM (referring to the immediate judgment of others' mental states, on the basis on their appearance, voices, and movement) and a social-cognitive component (referring to more complex inferences, that require the integration of information on others' mental states across different events). However, autism would still be seen as involving "fundamental deficits" in the social-perceptual component of ToM, even later in life, as attested by tasks measuring the ability to attribute mental states or intentions from the eyes (the "Reading the Mind in the Eyes" test) or ambiguous visual stimuli (Klin et al., 2000). From this developmental perspective, difficulties in the social-cognitive component (primarily attested by results from false-belief tasks) would therefore grow from those in social perception. Autistic children who passed the false-belief tasks might then be doing so "hacking out a solution," through a different path that does not build on the social-perceptual component, but either relies on language or logical reasoning only (Tager-Flusberg, 2001). Some evidence in favor of this hypothesis can be found in brain-imaging studies finding that ToM stories did not activate areas in the medial frontal cortex in autistic adults (as compared to neurotypical adults), while they activated frontal regions involved in more general cognitive processing (Happé et al., 1996).

This brief overview on the classic view on ToM in autism already suggests some of the issues that will be raised in the present paper: the complexity of ToM as a construct, the variety of models and tasks to account for and measure its different components, and the tendency, in autism literature, to look for an explanation for good autistic performance in ToM tasks in terms of hacks and compensatory strategies rather than actual competence. The following section expands on these issues exploring the main criticisms this classic view received up to now.

Criticism, recent reflections, and counter-evidence

There are several streams of criticism to this narrative of a universal deficit of ToM in autism and the ways it has been put forward. The first comes from a closer look at the actual results and the refinements of some of the tests used in autism research. The second lies in the epistemic posture toward ToM as a construct in research on the general population and in autism research. The third resides in the suggested explanations for results that are not in line with the expected impairment. The fourth and last regards the effects of the lack of involvement of the autistic community, in terms of task creation and "accuracy" measures, lack of data on autistic adults, and alternative theories of autistic ToM.

Starting from the first, while the idea of a universal ToM deficit in autism prompted a wealth of studies, early experimental evidence demonstrated that some

autistic people did pass the original ToM task, leading to the development of more and more advanced ToM tasks and, even, removal from some tests of items on which autistic participants proved to obtain similar performances as compared to the controls, supposedly trying to increase the sensitivity of the test (Chevallier, 2012). This was the case of the 2007 edition of the "Reading the Mind in the Voice task," which had items that in the 2002 version triggered similar performances across neurotypes removed. As Chevallier (2012) argues, the updated task is arguably a better tool for distinguishing the autistic versus neurotypical groups, but it should no longer be considered a ToM test. Nevertheless, the authors interpret the findings obtained through the new task as evidence that autistic people have "greater difficulties recognizing complex emotions and mental states" (Golan et al., 2007: 1102). Ableist bias toward autistic people influenced the field to the point that subsequent studies were so strongly based on the assumption that autistic people have a ToM impairment and that tests not revealing it were/are considered unsuitable rather than revealing of said bias (Rajendran & Mitchell, 2007: 229). Taking this into account, there has been considerable evidence in the last decades that the hypothesis of a universal deficit of ToM in autism is untenable (Gernsbacher & Yergeau, 2019). In fact, as mentioned earlier, some autistic children did pass the first-order false-belief tasks in the earliest research (Baron-Cohen et al., 1985), and even second-order false-belief tasks that were created as a consequence (Bowler, 1992). Autistic children were also found to perform similarly to neurotypical children on tasks involving simpler mental states, such as intentions (Carpenter et al., 2001). Moreover, research on older autistic children (Happé, 1995) and adolescents (Scheeren et al., 2013) brought evidence that autistic people can pass both false-belief and social stories tasks if tested later in life, possibly highlighting the role of verbal ability or, simply, different developmental trajectories in their ToM development. Recent brain-imaging studies on autistic adults performing false-belief tasks even found similar activation patterns as compared to a neurotypical group (Dufour et al., 2013). Lastly, even in those cases where difficulties are actually found, other constructs and abilities (such as vocabulary and grammar) seem to explain them better than ToM itself (see Gernsbacher & Yergeau, 2019 for a review). These findings call for a reflection on claims of a universal ToM deficit in autism, as well as, possibly, for a reconsideration of ToM as a construct (as will be argued further in the manuscript).

Second, ToM and empathy tests and constructs are heavily discussed in neurotypical research, for instance, while this has only rarely been done for autism research (Fletcher-Watson & Bird, 2020). False beliefs, for instance, have been described as inherently difficult for children regardless of representation of another person's mind (Bloom & German, 2000; Riggs et al., 1998). Nevertheless, they are still widely used in autistic development research. The "Reading the Mind in the Eyes" test, which is frequently used in autism research with adult participants (as seen in the previous section), has been critiqued for its poor internal consistency (Olderbak et al., 2015) as well as recognized as a measure of emotion recognition and not of mental states attribution (Turner & Felisberti, 2017). While mental states attribution is undisputedly a core part of ToM, which is vastly measured by false-belief tasks in developmental research, emotion recognition (i.e., the ability to perceive and distinguish emotions that other people display) is usually considered part

of social cognition but distinct from ToM (Fitzpatrick et al., 2018). Claiming ToM deficits on the basis of performance in emotion recognition tasks is methodologically unsound as it could lead to the interpretation of difficulties in other areas as pertaining to ToM. In fact, ToM, emotion recognition, and empathy dimensions can dissociate from one another (Oakley et al., 2016). Moreover, emotion recognition tasks may vary in terms of abilities that they actually measure depending on the way people display their emotions in the task, which can either be through their facial expressions (in which case it would arguably be testing, at its core, facial expression discrimination) or their voice (in which case it would test prosodic information discrimination); the way these relate to the ability to ascribe others' mental states is unclear (Quesque & Rossetti, 2020). In fact, the use of emotion recognition tasks to test ToM is part of a broader conceptual issue within social cognition and ToM research in particular. The term ToM itself is often used interchangeably with others, such as mindreading, mentalizing, but also mind perception, and, even, social intelligence. The use of these terms most probably reflects a slightly different conceptualization of the construct (Schaafsma et al., 2015). Thus, several scholars call for an urgent conceptual clarification in the field, possibly involving hierarchies of involvement and requirements (Quesque & Rossetti, 2020), or, even, a systematic deconstruction of the construct into its component processes, and subsequent reconstruction, with the ultimate aim to also individuate better-performing testing strategies (Schaafsma et al., 2015). Examples of these components could include perceptual individuation and categorization of social stimuli, interoceptive signals, semantic knowledge, executive and motivational processes, that is, basic processes that should be measurable through known instruments and, ideally, identified with specific neural structures. However, the identification of such components is not an easy task, as it is only clear that they should involve social contents and specific computational features. Moreover, these would still not capture all of ToM, but if combined they would constitute intermediate levels, in a hierarchical scheme, toward ToM as a whole.

The necessity of a revision of both the tasks used and the construct itself has been partially confirmed by recent empirical works. Warnell and Redcay (2019), for instance, administered various ToM measures to preschoolers, school-aged children, and adults and found that these tasks showed minimal correlations with each other, for all ages considered. Navarro (2022) even assessed the structure of ToM psychometrically, confirming that ToM tasks do not test a single ToM construct. Taken together, these results suggest that ToM should be viewed as a complex rather than a monolithic construct and as a multidimensional process that interacts with other abilities. The path toward a clear and shared description of the construct and a sound selection of instruments to test is long and complex. When it comes to autism research, however, most of these issues are not raised.

Third, when the results of a study do not reflect the expectation of an impairment, the subsequent hypothesis or suggested explanation is that we should not interpret surface-level performance as actual competence, framing autistic strategies as "alternative" or in terms of "compensation." Livingston et al. (2019), for instance, tested autistic adolescents on various cognitive tasks, as well as the ADOS test and a ToM test, and classified as "High Compensators" participants who had good ADOS scores and low performance in the ToM test (while "Low Compensators" had similar performance in the ToM test and low ADOS scores).

Corbett et al. (2021) classified their autistic participants in the same way in a study investigating the impact of sex and "compensatory strategies" on a set of socio-cognitive measures and defined compensation as "a component of camouflaging in which an individual's observed behavior is considerably better than actual ability." In both studies, "High Compensators" are described as showing more typical (i.e., "stronger") social communication. The concept of compensation itself suggests a supposed superiority of the typical strategies, framed as "normal." This is by no means limited to psycholinguistics literature, nor is it a prerogative of autism research. In any stream of psychology, neurotypical strategies are considered not just the most typical, but the right ones, to which any other is compared and otherized. Moreover, neurotypical strategies are framed, for the sake of comparison, as a single standard route to comprehension, losing insights on both individual differences and cognitive diversity. Individual differences in ToM are widely considered in neurotypical developmental literature, as children under the age of four show huge performance variability and a consistent developmental progression, so that relatively recent proposals consider ToM tasks to be on a scale, for preschoolers, where diverse desire tasks are passed earlier than false-belief tasks (Wellman & Liu, 2004). Moreover, performance in these tasks can also correlate with individual differences in tests of other cognitive functions, such as executive control (Carlson & Moses, 2001), or even social individual differences, such as sociability (usually as measured by teachers' judgments; Apperly, 2012). However, this conceptual perspective on ToM is difficult to implement in research on older children and adults, as "higher order" false-belief tasks, for instance, place higher demands on working memory and executive functions, and other tasks, as mentioned earlier, arguably measure different constructs. Nevertheless, as Apperly (2018) notes, even at the higher level, we can still distinguish between different processes, and individual differences among comprehenders may produce variability in their ability to successfully engage each process: "the likelihood that others' mental states will be inferred, stored, or used depends upon dispositional characteristics of the participants, their motivation, and their cognitive resources" (Apperly, 2018). This is known and progressively taken into account in neurotypical research on ToM abilities, and it reflects on pragmatic research as well: it is highly plausible that the cognitive resources neurotypical adults recruit for pragmatic disambiguation vary on the basis of individual differences: for instance, the comprehender's ability and/or propensity to mentalize seem to predict how much they rely on others' mental states in indirect speech acts comprehension (Trott & Bergen, 2018) and to influence their reliance on ToM abilities even for understanding standardized indirect forms where ToM would not be expected to be necessary (Marocchini & Domaneschi, 2022).

The attention to individual differences however fades in clinical works addressing differences between groups. Neurotypical strategies as well as lower and higher order processes are conflated as opposed to deficits in the autistic population, to which the neurotypical population constitutes a control group, whenever they differ. In case they do not in fact differ, however, researchers tend to state autistic participants put in place different strategies and usually call them "compensatory strategies," as mentioned earlier. In this regard, Zalla and Korman (2018) argue that the term "compensation" should be considered "a misnomer," as it implies that the strategy in place to compensate for ToM abilities would be completely distinct

and irrelevant to ToM abilities. However, these strategies usually entail domain-general cognition, which is a relevant component for ToM in typically developing children as well (Korman et al., 2015). Drawing on literature from neurotypical populations that has been partially shown here as well, Zalla and Korman (2018) underline how inferences from general event schemas and prior knowledge, executive functions, and episodic memory are sometimes demanded by ToM tasks and can even play a crucial role in real-world ToM problems, thus making "compensatory" strategies core, rather than distinct, elements of ToM capacity.

Lastly, a huge issue confounding autism research is the scarce involvement of autistic people, both as conscious participants of legal age and as researchers, which can cause a variety of problems. With regard to autistic people as participants in research, there is a blatant focus on development: autistic people get older, but autism research still largely conceptualizes them as children, whose ToM abilities are investigated in detail, while the outcomes of this ability in adulthood are yet to be properly addressed (Livingston et al., 2019). Recent works on relatively older autistic people, however, seem to suggest that ToM abilities in autism improve already in preschool years (Happé, 1995) and in adolescence, as mentioned earlier (Scheeren et al., 2013). However, research on ToM in adulthood posits several issues in terms of validity of the tasks, as previously discussed, even in the neurotypical population. With regard to autism, however, the scarcity of research on adults reflects the conceptualization of the spectrum as a neurodevelopmental condition, rather than a lifelong neurotype. For the same reason, research on older adults is even more rarely conducted. However, recent studies suggest that neurotypical age-related differences are reduced or parallel, rather than increased, in autistic people: this suggests that autism might even be a protective factor against age-related decline of cognitive functions (Lever & Geurts, 2016).

With regard to the lack of autistic researchers, it can affect both task creation and hypothesis development. In fact, most ToM tasks measure ToM in terms of "accuracy" in target trials of mental state inference. In these cases, it is neurotypical researchers who decide what kind of answer can be considered as "accurate": not only this reflects the normative approach we mentioned in the introduction but it allows for ableist bias toward autistic participants, as there is evidence that neurotypical people tend to rate autistic people less favorably than neurotypical people, especially when they only meet them once (which is usually what happens in data collections), regardless of disclosure of the diagnosis (Sasson et al., 2017), which is nevertheless usually disclosed in research settings. Moreover, these studies currently rely on tasks that use "neurotypically derived mental states," given that stories and script writers, as well as actors in videos, are neurotypical (Livingston et al., 2019). This constitutes a limit that could hold the scientific community back from other promising hypotheses, such as the one presented in the following paragraph.

The double empathy theory

From a theoretical point of view, considering the perspective of autistic researchers would result in potential alternatives to a limited construct of a universal (neurotypical) ToM. In fact, Milton (2012) proposed a theory that has been positively received in the autistic community, known as "the double empathy problem": on

the one hand, autistic people report no difficulties in understanding autistic minds; on the other, neurotypical people have issues in understanding autistic people. The idea that the double empathy theory puts forward is that difficulties in inferring others' mental states would not be part of the autistic condition and directed toward people of any neurotype, but, rather, an issue that impacts cross-neurotype mind-reading and interaction. This would lead to hypothesize deficits in neurotypical individuals' ability to recognize autistic individuals' emotions, intentions, representations of mental states, and interaction style. This view has only been investigated empirically in a few recent studies, but they seem to confirm that neurotypical people find it more difficult to recognize autistic people's emotions (Brewer et al. 2016), to infer autistic people's mental states (Edey et al. 2016), and to understand and reciprocate the interaction style of autistic people (Crompton et al., 2020) as compared to those of neurotypical people. This theory and early evidence also suggest that rather than having deficits in social cognition, autistic people experience low understanding and rapport due to a mismatch of diagnosis. If the two groups were treated equally in academic research, we should then individuate the construct of an autistic ToM and observe a deficit in autistic ToM in the neurotypical population or, alternatively, admit that a normative approach to cross-neurotype interaction and communication is probably untenable.

Autism and pragmatics
From the unitary pragmatic deficit to specific pragmatic impairments

As a core element of social communication, pragmatics has been thoroughly investigated in the autistic population. Pragmatic competence has traditionally been considered as the ability to comprehend the speaker's meaning in context through a mechanism of intention recognition. As such, it has long been framed in psycholinguistics research as a sub-module of ToM, specific for pragmatic processing but evolved from mindreading abilities (Sperber & Wilson, 2002). Other accounts on the relationship between ToM and pragmatics have been put forward, proposing more complex views of pragmatics as relying more on linguistic, ToM, and other cognitive abilities depending on the task and the population (Bosco et al., 2018). Nevertheless, the role of ToM in pragmatics and particularly in the context of autism research is still central. In the same vein as research on ToM in autism, then, literature in experimental pragmatics has risen from the biased root of a presumed unitary pragmatic deficit in the autistic population.

Starting from early research on autistic pragmatic competence, most studies suggest that autistic people exhibit problems with several pragmatic phenomena, such as figurative language and irony (Happé, 1993), the recognition of Gricean maxims violation (Surian, 1996), turn-taking (Curcio & Paccia, 1987), indirect requests (MacKay & Shaw, 2004; Paul & Cohen, 1985) and humor (Ozonoff & Miller, 1996). Taken together, the most cited studies on pragmatics in autism build a clear narrative of pragmatics as impaired in the autistic population, with particular regard to figurative language. As Kissine (2021) puts it in an interesting commentary on autism and constructionism, "the entire autism spectrum" would be "robustly characterized by lifelong disabilities in intersubjective communication and persistent

difficulties in adopting the perspective of other people." Similarly to what we have already seen for ToM research, pragmatics literature reaches heights of dehumanization, such as discussing "specifically human forms of social engagement" that autistic people would not be capable of (Hobson, 2012).

Criticism, recent reflections, and counter-evidence

The four streams of criticism mentioned for works on the universal deficit in ToM hold for the unitary pragmatic impairment as well. The first is a debate on the actual results of research on pragmatics in autism, looking at a wider range of phenomena and at more recent studies. The second deals with theoretical and methodological issues in research on figurative language in autism. The third recalls the explanation for unexpectedly good performances in ToM tasks, but with regard to pragmatics. The fourth lies in the scarce dedication to test alternative theories, proposed by autistic researchers.

First, recent research in pragmatics suggests that several pragmatic abilities are "preserved" in autism, such as lexical ambiguity resolution through contextual clues (Brock et al. 2008), scalar implicatures derivation (Chevallier et al., 2010; Hochstein et al., 2017), indirect requests comprehension (Kissine et al., 2015; Marocchini et al., 2022), and deception detection (van Tiel et al., 2021). Thus, evidence against a universal pragmatic impairment in autism can be found even in research aimed at testing the expected deficit in autistic people's performance as compared to a neurotypical control group. These results are nevertheless usually explained as either due to exceptions applicable to a small subgroup of the spectrum only, to particularly ecological paradigms, or to compensation strategies.

Second, there are several issues with both the methods and the theory behind research works in the subfield. Pragmatic research in atypical development holds on to inappropriate tests for language abilities, too: despite early warnings against the use of one test to identify language-matched controls for autism research (Tsai & Beisler, 1984), most developmental research on autism still relies on a single vocabulary test to do so. In most cases, this is also considered to be a measure of language comprehension, rather than a mere test of vocabulary knowledge. Sometimes, no language measures are collected, and they are assumed on the basis of participants' IQs. However, there is evidence that IQ and language abilities can dissociate in the autistic population (Bigler et al., 2007; Kjelgaard & Tager-Flusberg, 2001). Once language comprehension abilities are taken into account, several studies suggest that only children who have a language disability, regardless of their neurotype, have difficulties understanding idioms and metaphors, and drawing inferences from stories (Norbury, 2004, 2005; Norbury & Bishop, 2002). From a more theoretical point of view, findings from various studies seem to suggest that pragmatic abilities are independent of ToM abilities (Bosco et al., 2018), therefore attacking the underlying hypothesis of most pragmatic research in autism: that it should be impaired because ToM is. In fact, pragmatic abilities seem to be trainable despite stable and atypical ToM abilities (Gabbatore et al., 2022), though most research on pragmatics in autism suffers from the same blatant focus on development as research on ToM in autism.

Third, as in ToM research, pragmatics studies frequently call for compensation as an explanation of unexpected "preserved" abilities. For instance, van Tiel et al.

(2021) hypothesize that autistic people succeed in deception only "through conscious and effortful reasoning about other people's perspective." Colich et al. (2012) went as far as attributing autistic participants' higher activity in left medial prefrontal activity during sarcasm detection to compensatory mechanisms, though lower activity was attributed to a deficit. As Gernsbacher and Pripas-Kapit (2012) put it, "When non-autistic persons exceed autistic persons in left medial prefrontal activity during sarcasm detection, it's due to an autistic deficit. And when autistic persons exceed non-autistic persons, it is due to an autistic deficit." Another interesting turn in research on pragmatics in autism is the tendency to consider autism to be a test for the role of cognitive functions in specific pragmatic phenomena, as autistic people cannot take their conversational partner's perspective, so the pragmatic tasks that they succeed at would be those that do not need perspective-taking to unfold (see Andrés-Roqueta & Katsos, 2017; Kissine, 2021). In this line of research, experimental paradigms tend to compare a group of autistic participants and a control group, as in ToM research. As a result, not only individual differences in autism are rarely taken into account but also neurotypical people are assumed to use a single, unified strategy in understanding pragmatic phenomena, which we know is rarely the case, starting from development (Matthews et al., 2018). Recent research by Alkire et al. (2022) proposed an observational rating measure of ToM with both a negative scale (addressing ToM-related violations of neurotypical conversation norms) and a positive scale (addressing explicit mental state language and perspective-taking), which the authors used while observing naturalistic conversations between autistic and typically developing youth in three dyad types (i.e., both cross-neurotype and neurotype-matched dyads). Not only the two scales were uncorrelated, in line with recent research calling for distinct components of ToM (Schaafsma et al., 2015; Warnell & Redcay, 2019), but also autistic people did not differ from the neurotypical group on the positive scale, while they were rated higher on the negative scale. This seems to suggest that once autistic people are evaluated in conversations with other autistic people and with finer-grained measures, the data reveal a more nuanced picture of their relative strengths and difficulties with specific neurotypical conversational norms. In this case, even though they violated neurotypical norms more than the neurotypical group, they displayed "typical levels of other forms of mental state representation."

Lastly, the raising number of contributions from autistic academics and participatory research enriched the field with new perspectives focusing on differences rather than impairments, considering autistic people as equal conversation partners, and drawing hypotheses on communication difficulties between neurotypes rather than within a specific neurotype, in line with the double empathy problem (Milton, 2012). Williams and colleagues, in particular, worked on its potential application to mutual (mis)understanding in pragmatics under a relevance-theoretic framework and through empirical research (Williams, 2021; Williams et al., 2021). Given that Relevance Theory sees communication as fundamentally based on shared and mutually recognized relevance, difficulties in cross-neurotype communication could be due to a mismatch in perceived saliency between neurotypes, which would make mutual understanding more effortful for both groups. The authors conducted a linguistic ethnographic study on a small sample that seem to confirm this intuition: when the conversation featured two autistic participants, "flow, rapport, and

intersubjective attunement were significantly increased" (Williams et al., 2021). However, these works are rarely cited in the subfield. Similarly to what we have seen for ToM research, the lack of involvement of autistic researchers and of autistic people in participatory research tends to result in the use of "neurotypically derived" measures of successful and felicitous communication, as well as expectations of impairment in the autistic population. In fact, while experimental pragmatics is shifting toward a view of pragmatic and cognitive abilities in terms of individual differences, sometimes even tackling concepts such as co-constructed discourse and meaning negotiation, research on pragmatics in autism seems to conceptualize communication as a monolithic phenomenon that can either be done right or wrong, where comprehension in a given task is expected to follow the same route for everyone and any other route or strategy is compensatory and presupposes a deficit in autism. Moreover, there is a tendency in pragmatic research to perpetuate stereotypes of impaired pragmatics in autism without citing relevant studies in order to paint the whole picture, as testified by uneven citation patterns even in special issues focusing on a specific pragmatic topic (Gernsbacher & Pripas-Kapit, 2012), although, of course, some scholars admit that "empirically speaking, the data are neither clear nor consistent enough for making strong claims about what exactly are the communicative challenges of highly verbal autistic individuals" (Mazzarella & Noveck, 2021).

Other factors and suggestions for future research
Other factors influencing retention of outdated views of ToM and pragmatics in autism

Overall, the main reason behind the composite situation of autism research and interpretation of results is probably to be ascribed to the existence of different streams of literature involving autistic researchers, frequently adjacent to literature from the disability studies and critical autism studies streams, or predominantly, if not only, neurotypical researchers, mainly focused on earlier psychological literature and normative approaches to atypical communication. In this second stream, contributions from autistic academics are hardly ever known and cited, at least in the most prominent works. However, two other factors might be influencing retention of these outdated views of autism. First, looking at studies on aging and obsolescence of scientific literature might suggest a possible explanation. In fact, despite the steady trend of digitalization of scientific journals, authors tend to cite more older rather than newer literature. In a study conducted on the matter by Google Scholar's researchers, cited papers being at least 10 years older than the paper citing them have significantly increased between 1990 and 2013, from 28% to 36% (Verstak et al., 2014).

Second, as briefly mentioned in the introduction, previous diagnostic criteria might have shaped the prototypical and dominant view of autism as a "severe" condition characterized by the series of impairments we have overviewed here. Results collected from samples selected according to those criteria are still influencing an otherwise growing body of literature which evolved along with changes to the diagnostic criteria. Moreover, the transdisciplinary nature of psycholinguistics as a field

might render the synthesis of diagnostic and observational data more complex and difficult for researchers with a background that did not involve extensive study and training on the Autism Spectrum.

Suggestions for future research

In light of these considerations, it would be important for researchers in the field to try and move on from older views of autism by reading and citing newer (hopefully, also increasingly autistic-led) literature, and in case we need to cite early and stigmatizing literature, we might develop more detailed reporting strategies, both distancing ourselves from dehumanizing statements and specifying changes in diagnostic criteria from one paper to the other. Ideally, it would be preferable to always state the specific diagnosis of the sample of any article cited in our literature reviews and report more accurately on additional intellectual and language disabilities that are not, per se, specific to autism. When conducting new research, controlling for these variables would be critical, and, as mentioned earlier, it also seems to be relevant, if not necessary, to create tests that are not "neurotypically derived," or, at least, to control for ableist bias in neurotypical coding of autistic responses, possibly through the examination of the correspondence between, for instance, multiple-choice and verbal responses in socio-cognitive tasks, as suggested by Livingston et al. (2019), or by including autistic people in our research designs.

It would also seem to be wise to keep in mind some of the issues mentioned earlier in terms of construct and task validity while conducting autism research, too, and to avoid claiming universal deficits in an unclear construct (as well as to describe it as one of the abilities that makes us human while claiming said deficits in a group of humans). It would be advisable to start thinking about cross-neurotype communication in terms of co-construction of meaning and conversation, and of observation of both cross-neurotype and neurotype-matched dyads: studying cross-neurotype interaction is and will always be relevant, but it can and should be done from a more balanced point of view, while also investigating further how autistic people communicate with one another.

Another option would be to conduct more research through different lenses or frameworks, such as within enactive and interactional frameworks, focusing on the interaction rather than on the individuals' cognitive, and more specifically mind-reading, abilities, and operations. Bottema-Beutel (2017) provides an initial description of autistic social interaction within these frameworks, describing interactional coordination, interactional priorities, and enactment of meaning of autistic people. Though this kind of research primarily focused on people having at least near-full spoken language vocabularies, it seems to provide a good general idea of difficulties as well as competence of autistic people in conversational interactions and would be worthy of further investigation.

Increasing inclusion of autistic people at all research stages would also be ideal, though probably difficult in some cases and time-consuming in most. Not many (though increasingly more) autistic researchers are known to be autistic (and this might also change, may the field become less stigmatizing), so it might be difficult to always have an autistic researcher in each team. However, a more inclusive approach to science could obviate the need for an autistic researcher in each team:

incorporating autistic perspectives even within a neurotypical-lead project could help the team change perspective, though it should be done right from the start, when research questions are individuated, in order to make sure they are both relevant to the autistic community and not inspired and/or operationalized from unconsciously ableist point of views. Participatory research is also always a possibility, and it would certainly help design more appropriate contents for our tasks and, potentially, shed light on alternative interpretations. Contrary to the mainstream opinion and attitude, in fact, autistic adults have in fact proven to be experts in their condition (Gillespie-Lynch et al., 2017).

Conclusion

The present paper presented and analyzed the existing literature on ToM and pragmatics in the autism spectrum through a critical lens highlighting theoretical stances, methodological choices, and interpretations of results that seem to be at least partially rooted in ableist bias toward autistic people. As argued in the paper, both early and recent research on these matters reflect an outdated view of a universal ToM deficit and a unified pragmatic impairment in autism, mainly due to a tendency to predominantly read and cite historical yet inaccurate papers and an attitude of exclusion of autistic participants and researchers from paradigm and task creation. Some of these papers, as we have seen, also posit a dehumanized view of autistic people as incapable of understanding and communicating with others, where "others" are always assumed to be neurotypical people, in a dynamic of both linguistic and epistemic injustice. In fact, ableist bias toward autistic people went as far as modifying tests in order to highlight their expected impairment, explaining any unexpected success at specific tasks as the result of "compensatory" strategies, ignoring individual differences and always considering cross-neurotype miscommunication to be due to autistic deficits rather than mutual misunderstanding.

A joint effort toward a just and equitable psycholinguistics would propose solutions to the lack of communication between neurotypical researchers and autistic people, ranging from participatory research paradigms to participation of neurotypical researchers to critical autism studies venues or, at least, fair practices of consideration and citation of autistic researchers. This paper stands as an attempt to start this conversation. In conclusion, the field would benefit from both higher level of inclusion of autistic researchers in our references and from an epistemological perspective shift, so to say, within the neurotypical part of the academic community.

Notes

1. The present article respects the preference of the autistic community in terms of use of an identity-first language when referring to autistic people. For an exhaustive explanation of the reasons behind this choice, see Botha (2021).

2. Psycholinguists are usually assumed to be neurotypical, though it could potentially be useful to test them, as their neurotype could be relevant from a methodological point of view.

3. For example, the Weak Central Coherence hypothesis (Happé & Frith, 2006) frames autistic communication as tied to a certain tendency to focus on tiny details rather than globally integrating information and context (as a result of a 'central system failure'). Another account that is increasingly considered is the executive dysfunction account (Hill, 2004; Kissine, 2012), which explains it in terms of different (or lack of) cognitive flexibility and inhibition.

References

Alkire, D., McNaughton, K. A., Yarger, H. A., Shariq, D., & Redcay, E. (2022). Theory of mind in naturalistic conversations between autistic and typically developing children and adolescents. *Autism*, 13623613221103699. https://doi.org/10.1177/13623613221103699

Andrés-Roqueta, C., & Katsos, N. (2017). The contribution of grammar, vocabulary and theory of mind in pragmatic language competence in children with Autistic Spectrum disorders. *Frontiers in Psychology*, **8**, 996. https://doi.org/10.3389/fpsyg.2017.00996

Apperly, I. (2012). What is "theory of mind"? Concepts, cognitive processes and individual differences. *Quarterly Journal of Experimental Psychology*, **65**(5), 825–839.

Apperly, I. (2018). Mindreading and psycholinguistic approaches to perspective taking: establishing common ground. *Topics in Cognitive Science*, **10**(1), 133–139.

Bargiela, S., Steward, R., & Mandy, W. (2016). The experiences of late-diagnosed women with autism spectrum conditions: An investigation of the female autism phenotype. *Journal of Autism and Developmental Disorders*, **46**, 3281–3294. https://doi.org/10.1007/s10803-016-2872-8

Baron-Cohen, S. (2000). Theory of mind and autism: A review. *International Review of Research in Mental Retardation*, **23**, 169–184. https://doi.org/10.1016/S0074-7750(00)80010-5

Baron-Cohen, S., Leslie, A., & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition*, **21**, 13–125.

Bigler, E. D., Mortensen, S., Neeley, E. S., Ozonoff, S., Krasny, L., Johnson, M., Lu, J., Provencal, S. L., McMahon, W., & Lainhart, J. E. (2007). Superior temporal gyrus, language function, and autism. *Developmental Neuropsychology*, **31**, 217–238.

Bloom, P., & German, T. P. (2000). Two reasons to abandon the false belief task as a test of theory of mind. *Cognition*, **77**(1), B25–B31. https://doi.org/10.1016/s0010-0277(00)00096-2

Bosco, F. M., Tirassa, M., & Gabbatore, I. (2018). Why pragmatics and theory of mind do not (completely) overlap. *Frontiers in Psychology*, **9**, 1453.

Botha, M. (2021) Academic, activist, or advocate? Angry, entangled, and emerging: A critical reflection on autism knowledge production. *Frontiers in Psychology*, **12**, 727542. https://doi.org/10.3389/fpsyg.2021.727542

Botha, M., Hanlon, J., & Williams, G. L. (2021). Does language matter? Identity-first versus person-first language use in autism research: A response to vivanti. *Journal of Autism and Developmental Disorders*, **50**, 691–693. https://doi.org/10.1007/s10803-020-04858-w

Bottema-Beutel, K. (2017). Glimpses into the blind spot: Social interaction and autism. *Journal of Communication Disorders*, **68**, 24–34. https://doi.org/10.1016/j.jcomdis.2017.06.008

Bowler, D. M. (1992). "Theory of mind" in Asperger's Syndrome. *Journal of Child Psychology and Psychiatry*, **33**, 877–893.

Brett, J., Staniszewska, S., Mockford, C., Herron-Marx, S., Hughes, J., Tysall, C., & Suleman, R. (2014). Mapping the impact of patient and public involvement on health and social care research: A systematic review. *Health Expectations*, **17**, 637–650.

Brewer, R., Biotti, F., Catmur, C., Press, C., Happé, F., Cook, R., & Bird, G. (2016). Can neurotypical individuals read autistic facial expressions? Atypical production of emotional facial expressions in autism spectrum disorders. *Autism Research*, **9**(2), 262–271.

Brock, J., Norbury, C., Einav, S., & Nation, K. (2008). Do individuals with autism process words in context? Evidence from language-mediated eye-movements. *Cognition*, **108**(3), 896–904.

Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child Development*, **72**, 1032–1053.

Carpenter, M., Pennington, B. F., & Rogers, S. J. (2001). Understanding of others' intentions in children with autism. *Journal of Autism and Developmental Disorders*, **31**(6), 589–599. https://doi.org/10.1023/a:1013251112392

Chevallier, C. (2012). Theory of mind and autism: Beyond Baron-Cohen et al.'s Sally-Anne study. In A. M. Slater & P. C. Quinn (Eds.), *Developmental psychology: Revisiting the classic studies* (pp. 148–163). Sage.

Chevallier, C., Wilson, D., Happé, F., & Noveck, I. (2010). Scalar inferences in Autism spectrum disorders. *Journal of Autism and Developmental Disorders*, **40**(9), 1104–1117.

Colich, N. L., Wang, A -T., Rudie, J. D., Hernandez, L. M., Bookheimer, S. Y., & Dapretto, M. (2012). Atypical neural processing of ironic and sincere remarks in children and adolescents with autism spectrum disorders. *Metaphor and Symbol*, **27**(1), 70–92. https://doi.org/10.1080/10926488.2012.638856

Corbett, B. A., Schwartzman, J. M., Libsack, E. J., Muscatello, R. A., Lerner, M. D., Simmons, G. L., & White, S. W. (2021), Camouflaging in autism: Examining sex-based and compensatory models in social cognition and communication. *Autism Research*, **14**, 127–142. https://doi.org/10.1002/aur.2440

Crompton, C. J., Sharp, M., Axbey, H., Fletcher-Watson, S., Flynn, E. G., & Ropar, D. (2020). Neurotype-matching, but not being autistic, influences self and observer ratings of interpersonal rapport. *Frontiers in Psychology*, **11**, 586171. https://doi.org/10.3389/fpsyg.2020.586171

Curcio, F., & Paccia, J. (1987). Conversations with autistic children: Contingent relationships between features of adult input and children's response adequacy. *Journal of Autism and Developmental Disorders*, **17**(1), 81–93.

Deliens, G., Papastamou, F., Ruytenbeek, N., Geelhand, P., & Kissine, M. (2018). Selective pragmatic impairment in autism spectrum disorder: Indirect requests versus irony. *Journal of Autism and Developmental Disorders*, **48**(9), 2938–2952.

Dufour, N., Redcay, E., Young, L., Mavros, P. L., Moran, J. M., Triantafyllou, C., Gabrieli, J. D., & Saxe, R. (2013). Similar brain activation during false belief tasks in a large sample of adults with and without autism. *PLOS ONE*, **8**(9), e75468.

Edey, R., Cook, J., Brewer, R., Johnson, M. H., Bird, G., & Press, C. (2016). Interaction takes two: Typical adults exhibit mindblindness towards those with autism spectrum disorder. *Journal of Abnormal Psychology*, **125**(7), 879–885.

Fitzpatrick, P., Frazier, J. A., Cochran, D., Mitchell, T., Coleman, C., & Schmidt, R. C. (2018). Relationship between theory of mind, emotion recognition, and social synchrony in adolescents with and without autism. *Frontiers in Psychology*, **9**, 1337. https://doi.org/10.3389/fpsyg.2018.01337

Fletcher-Watson, S., & Bird, G. (2020). Autism and empathy: What are the real links? *Autism: The International Journal of Research and Practice*, **24**(1), 3–6. https://doi.org/10.1177/1362361319883506

Fondacaro, M., & Weinberg, D. (2002). Concepts of social justice in community psychology: Toward a social ecological epistemology. *American Journal of Community Psychology*, **30**, 473–492. https://doi.org/10.1023/A:1015803817117

Gabbatore, I., Longobardi, C., & Bosco, F. M. (2022) Improvement of communicative-pragmatic ability in adolescents with autism spectrum disorder: The adapted version of the cognitive pragmatic treatment. *Language Learning and Development*, **18**(1), 62–80. https://doi.org/10.1080/15475441.2021.1924177

Gernsbacher, M. A., & Pripas-Kapit, S. R. (2012). Who's missing the point? A commentary on claims that autistic persons have a specific deficit in figurative language comprehension. *Metaphor and Symbol*, **27**(1), 93–105. https://doi.org/10.1080/10926488.2012.656255

Gernsbacher, M. A., & Yergeau, M. (2019). Empirical failures of the claim that autistic people lack a theory of mind. *Archives of Scientific Psychology*, **7**(1), 102–118. https://doi.org/10.1037/arc0000067

Gillespie-Lynch, K., Kapp, S. K., Brooks, P. J., Pickens, J., & Schwartzman, B. (2017). Whose expertise is it? Evidence for autistic adults as critical autism experts. *Frontiers in Psychology*, **8**, 438. https://doi.org/10.3389/fpsyg.2017.00438

Giora, R. (2012). Introduction: Different? Not different? *Metaphor and Symbol*, **27**(1), 1–3, https://doi.org/10.1080/10926488.2012.638807

Golan, O., Baron-Cohen, S., Hill, J., & Rutherford, M. (2007). The "reading the mind in the voice" test-revised: A study of complex emotion recognition in adults with and without autism spectrum conditions. *Journal of Autism and Developmental Disorders*, **37**, 1096–1106.

Happé, F. (1993). Communicative competence and theory of mind in autism: A test of relevance theory. *Cognition*, **48**(2), 101–119.

Happé, F. (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development*, **66**(3), 843–855.

Happé, F., Ehlers, S., Fletcher, P., Frith, U., Johansson, M., Gillberg, C., Dolan, R., Frackowiak, R., & Frith, C. (1996). "Theory of mind" in the brain. Evidence from a PET scan study of Asperger Syndrome. *NeuroReport*, **8**, 197–201.

Happé, F., & Frith, U. (2006). The weak coherence account: Detail-focused cognitive style in autism spectrum disorders. *Journal of Autism and Developmental Disorders*, **36**(1), 5–25.

Harris, J. C. (2019) The necessity to identify subtypes of autism spectrum disorder. *JAMA Psychiatry*, **76**(11), 1116–1117. https://doi.org/10.1001/jamapsychiatry.2019.1928

Hill, E. L. (2004). Executive dysfunction in autism. *Trends in Cognitive Sciences*, **8**(1), 26–32.

Hobson, H., & Petty, S. (2021). Moving forwards not backwards: Heterogeneity in autism spectrum disorders. *Molecular Psychiatry*, **26**(12), 7100–7101. https://doi.org/10.1038/s41380-021-01226-7

Hobson, R. P. (2012). Autism, literal language and concrete thinking: Some developmental considerations. *Metaphor and Symbol*, **27**(1), 4–21. https://doi.org/10.1080/10926488.2012.638814

Hochstein, L., Bale, A., & Barner, D. (2017). Scalar implicature in absence of epistemic reasoning? The case of autism spectrum disorder. *Language Learning and Development*, **14**(3), 224–240.

Hull, L., Petrides, K. V., & Mandy, W. (2020). The female autism phenotype and camouflaging: A narrative review. *Review Journal of Autism and Developmental Disorders*, **7**, 306–317. https://doi.org/10.1007/s40489-020-00197-9

Imm, P., White, T., & Durkin, M. S. (2019). Assessment of racial and ethnic bias in autism spectrum disorder prevalence estimates from a US surveillance system. *Autism: The International Journal of Research and Practice*, **23**(8), 1927–1935. https://doi.org/10.1177/1362361319827510

Kissine, M. (2012). Pragmatics, cognitive flexibility and autism spectrum disorders. *Mind and Language*, **27**(1), 1–28. https://doi.org/10.1111/j.1468-0017.2011.01433.x

Kissine, M. (2021). Autism, constructionism, and nativism. *Language*, **97**(3), e139–e160. https://doi.org/10.1353/lan.2021.0055.

Kissine, M., Cano-Chervel, J., Carlier, S., Brabanter, P. D., Ducenne, L., Pairon, M.-C., Deconinck, N., Delvenne, V., & Leybaert, J. (2015). Children with autism understand indirect speech acts: Evidence from a semi-structured act-out task. *PLOS ONE*, **10**(11), e0142191.

Kjelgaard, M. M., & Tager-Flusberg, H. (2001). An investigation of language impairment in autism: Implications for genetic subgroups. *Language and Cognitive Processes*, **16**, 287–308.

Klin, A., Schultz, R., & Cohen, D. J. (2000). Theory of mind in action: Developmental perspectives on social neuroscience. In S. Baron-Cohen, H. Tager-Flusberg & D. I. Cohen (Eds.), *Understanding other minds: Perspectives from developmental cognitive neuroscience* (2nd ed., pp. 357–388). Oxford University Press.

Korman, J., Voiklis, J., & Malle, B. F. (2015). The social life of cognition. *Cognition*, **135**, 30–35. https://doi.org/10.1016/j.cognition.2014.11.005

Lehnhardt, F. G., Falter, C. M., Gawronski, A., Pfeiffer, K., Tepest, R., Franklin, J., & Vogeley, K. (2016). Sex-related cognitive profile in autism spectrum disorders diagnosed late in life: Implications for the female autistic phenotype. *Journal of Autism and Developmental Disorders*, **46**(1), 139–154. https://doi.org/10.1007/s10803-015-2558-7

Lever, A. G., & Geurts, H. M. (2016). Age-related differences in cognition across the adult lifespan in autism spectrum disorder. *Autism Research: Official Journal of the International Society for Autism Research*, **9**(6), 666–676. https://doi.org/10.1002/aur.1545

Livingston, L. A., Carr, B., & Shah, P. (2019). Recent advances and new directions in measuring theory of mind in autistic adults. *Journal of Autism and Developmental Disorders*, **49**(4), 1738–1744. https://doi.org/10.1007/s10803-018-3823-3

Livingston, L. A., Colvert, E., Social Relationships Study Team, Bolton, P., & Happé, F. (2019). Good social skills despite poor theory of mind: Exploring compensation in autism spectrum disorder. *J Child Psychol Psychiatry*, **60**(1), 102–110.

MacKay, G., & Shaw, A. (2004). A comparative study of figurative language in children with autistic spectrum disorders: *Child Language Teaching and Therapy*, **20**(1), 13–32.

Mandell, D. S., Wiggins, L. D., Carpenter, L. A., Daniels, J., DiGuiseppi, C., Durkin, M. S., Giarelli, E., Morrier, M. J., Nicholas, J. S., Pinto-Martin, J. A., Shattuck, P. T., Thomas, K. C.,

Yeargin-Allsopp, M., & Kirby, R. S. (2009). Racial/ethnic disparities in the identification of children with autism spectrum disorders. *American Journal of Public Health*, **99**(3), 493–498. https://doi.org/10.2105/AJPH.2007.131243

Marocchini, E., Di Paola, S., Mazzaggio, G., & Domaneschi, F. (2022). Understanding indirect requests for information in high-functioning autism. *Cognitive Processing*, **23**, 129–153. https://doi.org/10.1007/s10339-021-01056-z

Marocchini, E., & Domaneschi, F. (2022) "Can you read my mind?" Conventionalized indirect requests and theory of mind abilities. *Journal of Pragmatics*, **193**, 201–221. https://doi.org/10.1016/j.pragma.2022.03.011

Matthews, D., Biney, H., & Abbot-Smith, K. (2018). Individual differences in children's pragmatic ability: A review of associations with formal language, social cognition, and executive functions. *Language Learning and Development*, **14**(3), e186–e223. https://doi.org/10.1080/15475441.2018.1455584.

Mazzarella, D., & Noveck, I. (2021). Pragmatics and mind reading: The puzzle of autism (Response to Kissine). *Language*, **97**(3), e198–e210. https://doi.org/10.1353/lan.2021.0037.

Milton, D. (2012). On the ontological status of autism: The double empathy problem. *Disability & Society*, **27**(6), 883–887.

Mottron, L., & Bzdok, D. (2022). Diagnosing as autistic people increasingly distant from prototypes lead neither to clinical benefit nor to the advancement of knowledge. *Molecular Psychiatry*, **27**, 773–775. https://doi.org/10.1038/s41380-021-01343-3

Navarro, E. (2022). What is theory of mind? A psychometric study of theory of mind and intelligence. *Cognitive Psychology*, **136**, 101495. https://doi.org/10.1016/j.cogpsych.2022.101495.

Norbury, C. F. (2004). Factors supporting idiom comprehension in children with communication disorders. *Journal of Speech, Language, and Hearing Research*, **47**, 1179–1193.

Norbury, C. F. (2005). The relationship between theory of mind and metaphor: Evidence from children with language impairment and autistic spectrum disorder. *British Journal of Developmental Psychology*, **23**(3), 383–399.

Norbury, C. F., & Bishop, D. V. M. (2002). Inferential processing and story recall in children with communication problems: A comparison of specific language impairment, pragmatic language impairment and high-functioning autism. *International Journal of Language Communication Disorders*, **37**, 227–251.

Oakley, B., Brewer, R., Bird, G., & Catmur, C. (2016). Theory of mind is not theory of emotion: A cautionary note on the reading the mind in the eyes test. *Journal of Abnormal Psychology*, **125**(6), e818–e823. https://doi.org/10.1037/abn0000182.

Olderbak, S., Wilhelm, O., Olaru, G., Geiger, M., Brenneman, M. W., & Roberts, R. D. (2015). A psychometric analysis of the reading the mind in the eyes test: Toward a brief form for research and applied settings. *Frontiers in Psychology*, **6**, 1503. https://doi.org/10.3389/fpsyg.2015.01503

Ozonoff, S., & Miller, J. N. (1996). An exploration of right-hemisphere contributions to the pragmatic impairments of autism. *Brain and Language*, **52**(3), 411–434.

Paul, R., & Cohen, D. J. (1985). Comprehension of indirect requests in adults with autistic disorders and mental retardation. *Journal of Speech, Language, and Hearing Research*, **28**(4), 475–479.

Quesque, F., & Rossetti, Y. (2020). What do theory-of-mind tasks actually measure? Theory and practice. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, **15**(2), 384–396. https://doi.org/10.1177/1745691619896607

Quesque, F., & Rossetti, Y. (2020). What do theory-of-mind tasks actually measure? Theory and practice. *Perspectives on Psychological Science*, **15**(2), 384–396. https://doi.org/10.1177/1745691619896607

Rajendran, G., & Mitchell, P. (2007). Cognitive theories of autism. *Developmental Review*, **27**(2), 224–260.

Riggs, K. J., Peterson, D. M., Robinson, E. J., & Mitchell, P. (1998). Are errors in false belief tasks symptomatic of a broader difficulty with counterfactuality? *Cognitive Development*, **13**(1), 73–90.

Russell, G., Steer, C., & Golding, J. (2011). Social and demographic factors that influence the diagnosis of autistic spectrum disorders. *Social Psychiatry and Psychiatric Epidemiology*, **46**(12), 1283–1293. https://doi.org/10.1007/s00127-010-0294-z

Sasson, N. J., Faso, D. J., Nugent, J., Lovell, S., Kennedy, D. P., & Grossman, R. B. (2017). Neurotypical peers are less willing to interact with those with autism based on thin slice judgements. *Scientific Reports*, **7**, 40700.

Schaafsma, S. M., Pfaff, D. W., Spunt, R. P., & Adolphs, R. (2015). Deconstructing and reconstructing theory of mind. *Trends in Cognitive Sciences*, **19**(2), 65–72. https://doi.org/10.1016/j.tics.2014.11.007

Schaeken, W., Van Haeren, M., & Bambini, V. (2018). The understanding of scalar implicatures in children with autism spectrum disorder: Dichotomized responses to violations of informativeness. *Frontiers in Psychology*, **9**, 1266.

Scheeren, A. M., de Rosnay, M., Koot, H. M., & Begeer, S. (2013). Rethinking theory of mind in high-functioning autism spectrum disorder. *Journal of Child Psychology and Psychiatry*, **54**(6), 628–635.

Senju, A. (2012). Spontaneous theory of mind and its absence in autism spectrum disorders. *The Neuroscientist*, **18**(2), 108–113.

Sperber, D., & Wilson, D. (2002). Pragmatics, modularity and mind-reading. *Mind and Language*, **17**, 3–23.

Surian, L. (1996). Are children with autism deaf to Gricean maxims? *Cognitive Neuropsychiatry*, **1**(1), 55–72.

Tager-Flusberg, H. (2001). A re-examination of the theory of mind hypothesis of autism. In J. Burack, T. Charman, N. Yirmiya & P. R. Zelazo (Eds.), *Development in autism: Perspectives from theory and research* (pp. 173–193). Erlbaum.

Trott, S., & Bergen, B. (2018) Individual differences in mentalizing capacity predict indirect request comprehension. *Discourse Process*, **56**(8), 675–707. https://doi.org/10.1080/0163853X.2018.1548219

Tsai, L. Y., & Beisler, J. M. (1984). Research in infantile autism: a methodological problem in using language comprehension as the basis for selecting matched controls. *Journal of the American Academy of Child Psychiatry*, **23**(6), 700–703. https://doi.org/10.1016/s0002-7138(09)60539-2

Turner, R., & Felisberti, F. M. (2017). Measuring mindreading: a review of behavioral approaches to testing cognitive and affective mental state attribution in neurologically typical adults. *Frontiers in Psychology*, **8**, 47. https://doi.org/10.3389/fpsyg.2017.00047

van Tiel, B., Deliens, G., Geelhand, P., Murillo Oosterwijk, A., & Kissine, M. (2021). Strategic deception in adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, **51**, 255–266. https://doi.org/10.1007/s10803-020-04525-0

Verstak, A., Acharya, A., Suzuki, H., Henderson, S., Iakhiaev, M., Lin, C. C., & Shetty, N. (2014). On the shoulders of giants: The growing impact of older articles. ArXiv, abs/1411.0275.

Wang, A. T., Lee, S. S., Sigman, M., & Dapretto, M. (2007). Reading affect in the face and voice: Neural correlates of interpreting communicative intent in children and adolescents with autism spectrum disorders. *Archives of General Psychiatry*, **64**, 698–708.

Warnell, K. R., & Redcay, E. (2019). Minimal coherence among varied theory of mind measures in childhood and adulthood. *Cognition*, **191**, 103997. https://doi.org/10.1016/j.cognition.2019.06.009

Warrier, V., Greenberg, D. M., Weir, E., Buckingham, C., Smith, P., Lai, M. C., Allison, C., & Baron-Cohen, S. (2020). Elevated rates of autism, other neurodevelopmental and psychiatric diagnoses, and autistic traits in transgender and gender-diverse individuals. *Nature Communications*, **11**, 3959. https://doi.org/10.1038/s41467-020-17794-1

Wellman, H., Cross, D., & Watson, J. K. (2001). A meta-analysis of theory of mind development: The truth about false-belief. *Child Development*, **72**(3), 655–684. https://doi.org/10.1111/1467-8624.00304

Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, **75**, 523–541.

Williams, G. L. (2021). Theory of autistic mind: A renewed relevance theoretic perspective on so-called autistic pragmatic 'impairment'. *Journal of Pragmatics*, **180**, 121–130.

Young, E. C., Diehl, J. J., Morris, D., Hyman, S. L., & Bennetto, L. (2005). The use of two language tests to identify pragmatic language problems in children with autism spectrum disorders. *Language, Speech, and Hearing Services in Schools*, **36**, 62–72.

Zalla, T., & Korman, J. (2018). Prior knowledge, episodic control and theory of mind in autism: Toward an integrative account of social cognition. *Frontiers in Psychology*, **9**, 752. https://doi.org/10.3389/fpsyg.2018.00752

Zivrali, E., Howlin, P., Charlton, R. A., & Happe, F. (2021). Age-related effects on social cognition in adults with autism spectrum disorder: A possible protective effect on theory of mind. *Autism Research*, **14**(5), 911–920.