

Autism, constructionism and nativism*

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Abstract

The aim of this paper is to provide a balanced assessment of the significance autism has for the scientific study of language. While linguistic profiles in autism vary greatly, spanning from a total absence of functional language to verbal levels within the typical range, the entire autism spectrum is robustly characterized by life-long deficits in inter-subjective communication and persistent difficulties in adopting other people's perspective. In that sense, autism constitutes a unique profile in which linguistic competence is dissociated from communication skills. Somewhat paradoxically, autism is often mentioned to underscore the importance of mind reading for language use, and of inter-subjective communication for the emergence of language. Yet, experimental studies on pragmatics in autism indicate that many pragmatic processes unfold without adopting one's conversational partner's perspective. Moreover the patterns of language acquisition and learning in autism represent a strong challenge to the central role constructionist theories assign to socio-communicative skills. Data on autism thus forces a reconsideration of the a priori conceptual boundaries on language learnability that shape the foundational debates between constructionist and nativist linguistic theories.

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1 Introduction

The last three decades have seen our understanding of autism sharply increase, in aspects ranging from behavioral to neuro-cognitive to biological. Scientific interest in language in autism is no exception to this welcome trend. A rapid search on Scopus, with keywords autism AND (language OR linguistic*), yields a total of 9039 publications between 1990 and 2019, with an estimated growth of 27.16 entries per year ($se = 1.53, R^2 = 0.92$). Atypical language development and use is a core aspect of autism, as well as a major predictor of individual outcomes, and, expectedly, most of this research is part of the ongoing effort to better delineate the clinical profiles of individuals on the autism spectrum. However, as more and more evidence is available from experimental and clinical studies, autism research also becomes increasingly important for more foundational debates about the nature of linguistic competence. In the current nosological definition of autism, the linguistic profile is included as a diagnostic specifier, which may span from a total absence of functional language to verbal levels within the typical range ([American Psychiatric Association, 2013](#)). Nonetheless, and in spite of the important heterogeneity that is otherwise inherent in the autism diagnosis, a consistent characteristic of verbal autistic individuals¹ is that their linguistic knowledge and their use of language in context combines with lifelong difficulties in intersubjective perspective-taking and communication. This unique linguistic profile should prompt linguistic theory to distinguish matters of linguistic competence from the use of language in communication. More specifically, research on language in autism poses an important, but somehow overlooked, challenge for two related lines of thought that have considerable sway in contemporary linguistics. The first is that inter-subjective, socio-communicative skills are determining for acquiring language; the second is that these skills are indissociable from mind reading abilities.²

A crucial premise of contemporary constructionist theories is that inter-subjective language use underpins the acquisition of the structural properties of the child's native tongue. This idea is also rightly characterized as one of the most fundamental differences between these approaches and a rationalist, Chomskian research program ([Goldberg,](#)

¹In line with the preferred usage of many individuals on the autism spectrum and of parents of children with a diagnosis of autism ([Kenny et al., 2015](#)), throughout the paper, I will use 'autistic individual (or child)' rather than 'individual with autism' or 'individual with Autism Spectrum Disorder'.

²In this paper I will interchangeably, and in a theoretically agnostic way, use the terms 'Theory of Mind' and 'mind reading' to refer to the cognitive ability to attribute mental states to other people.

2003, 2013). On the one hand, language use is seen as essential to the development of language, as the following quote aptly illustrates:

[..] all linguistic knowledge—however abstract it may ultimately become—derives in the first instance from the comprehension and production of specific utterances on specific occasions of use. (Tomasello, 2000, 237-8)

And, on the other hand, in constructionist theories, using language in context is unambiguously seen as being dependent on the capacity to attribute complex mental states to other people—intentions about other people’s beliefs or, at least, about what lies in their attentional focus:

With regard to language in particular, the child has to understand a special class of intentions known as communicative intentions. Thus, a child might hear her father exclaim, “Look! A clown!” To fully understand his linguistic behavior (with an eye toward reproducing it) she must understand that her father intends that she share attention with him to a particular object; that is to say, understanding a communicative intention means understanding precisely how another person intends to manipulate your attention [...]. It is only by understanding the communicative intention behind these funny noises that the child can learn how to use a particular linguistic expression appropriately when she has ‘the same’ communicative intention (towards someone’s attention). (Tomasello, 2000, 238)

Constructionism heavily relies on classic Gricean reconstructions of human communication as a coordination problem, to which building a model of the speaker’s mental states may provide an optimal solution (e.g. Grice, 1957; Lewis, 1979; Thomason, 1990). However, constructionism also endorses the transposition of such Gricean reconstructions into a psychological theory, in which utterance interpretation is necessarily a (complex) exercise in mind reading (e.g. Sperber & Wilson, 2002), and turns mind reading into the essential component of human language acquisition (see, for instance, Tomasello, 2008, chapters 3 and 4).

The key hypothesis at the root of contemporary constructionist models is thus that language acquisition is fundamentally constrained by cooperative communication, rooted in the ability to adopt other people’s mental states. However, language in autism constitutes a major difficulty for this constructionist (or empiricist, if you wish) hypothesis, as data from autism warrant neither the assumption that language use is intrinsically linked with mind reading nor that language acquisition

is grounded in language use. In the first section of this paper, I will briefly survey recent experimental literature on autism that provides strong evidence that many areas of pragmatics are based on egocentric processes, independent of Theory of Mind. The first conclusion linguists should draw from data on autism, then, is that using language is partly independent of one’s ability to understand one’s interlocutors’ minds or to adopt their perspectives. That being said, early engagement in inter-subjective communicative interaction is clearly decisive for (typical) language acquisition. However, as discussed in the second section of this paper, at least some autistic individuals learn language in a non-interactive way. Autism thus appears to falsify the assumption that the acquisition of linguistic knowledge is a priori impossible without inter-subjective, communicative interaction. A complex, but far-reaching issue that I will broach in the last section of this paper is the extent to which the data from autism can be accommodated in non-nativist theories. Many linguistic theories include usage-based components that are couched in terms of domain-general, statistical mechanisms, independent of inter-subjective communication, or, for that matter, of language. However, all these theories require some kind of upstream constraint on such distributional learning: some authors posit an innate universal grammar (Culicover & Jackendoff, 2005; Yang, 2016), but those who reject nativism usually ground usage-based linguistic learning in cooperative communication (e.g. Goldberg, 2003, 2013; Christiansen & Chater, 2016a; Tomasello, 2008).

2 Language use without mind reading

Around 70% of the individuals on the autism spectrum do eventually reach functional language (Anderson et al., 2007; Wodka et al., 2013; Kim et al., 2014), but pragmatic deficits—which are out of step with the developmental level of phonological and morpho-syntactic skills—represent a lifespan hallmark of autism, as even fully verbal autistic children and adults experience difficulties in all areas of language use that require adapting to one’s conversational partner’s perspective. Furthermore, recent literature on pragmatics in autism, to be surveyed in this section, indicates that context-dependent comprehension of language in autistic individuals remains limited to an ‘egocentric’ perspective by the difficulties in mind reading that are inherent in the autism diagnosis (for detailed discussions, see Kissine, 2012, 2016; Andrés-Roqueta & Katsos, 2017; Geurts et al., 2020).

Let me start with metaphor comprehension, which emerges, across studies, as impaired in autism (Kalandadze et al., 2019). Interestingly, the extent to which metaphor comprehension is impaired in autistic

individuals is predicted by language level, and, more specifically, by lexical knowledge, rather than by Theory of Mind (Norbury, 2005a; Adachi et al., 2004; Kalandadze et al., 2016). At its core, understanding a metaphor boils down to flexible lexical interpretation (e.g. Glucksberg, 2007; Carston, 2012). Some metaphors probably require more advanced mind reading abilities to be understood than others (Lecce et al., 2019), but there is nothing inherent in metaphor interpretation that would make it inaccessible to autistic individuals with a deficient Theory of Mind. Since autistic individuals are able to use linguistic context to resolve lexical ambiguities (Norbury, 2005b; Brock et al., 2008; Hahn et al., 2015), it is therefore plausible that context-sensitive activation processes allow them to reach metaphoric interpretations without necessarily engaging in reasoning about the speaker’s communicative intentions. However, the fact that autistic — and, probably, non-autistic — people may process metaphor without using Theory of Mind, does not entail that such an ‘egocentric’ pragmatic processing is always optimal. Adopting the speaker’s perspective — making hypotheses about her communicative intentions — provides particularly valuable cues as to the direction in which metaphoric interpretation should unfold (Wearing, 2010). It is therefore not surprising that, in spite of performing in the same way as neuro-typicals in decontextualised metaphor tasks, autistic participants may also report significant difficulties in understanding figurative language in everyday conversations (Hermann et al., 2013).

In the same vein, autistic children and adults can use context to understand indirect requests (Kissine et al., 2012, 2015; Deliens et al., 2018). However, such conversational inferences can be correctly reached simply because the linguistic content makes certain assumptions accessible, without there be any need to reason about the speaker’s communicative intentions (Kissine, 2013; Jary, 2013; Ruytenbeek et al., 2017; Ruytenbeek, 2017). Several independent studies also found that autistic participants derive quantity implicatures to the same extent as neuro-typicals (Chevallier et al., 2010; Pijnacker et al., 2009; van Tiel & Kissine, 2018). But again, it is likely that autistic individuals’ derivation of quantity implicatures does not involve mind reading, and is less accurate in more complex cases that require reasoning about the speaker’s epistemic state (Hochstein et al., 2018; van Tiel & Kissine, 2018).

Finally, autistic individuals, even those with structural language levels within the typical range, are known to struggle with irony (Happé, 1993; Kaland et al., 2002; Martin & McDonald, 2004). This is to be expected, given that irony usually involves keeping track of multiple perspectives, which pile up on each other (e.g. Bryant, 2012). In

a discrimination task, in which ironic items are associated with a distinctive intonation contour (while non-ironic ones are uttered in a neutral tone of voice), autistic participants do perform above chance (Chevallier et al., 2011; Wang et al., 2006; Colich et al., 2012). However, when ironic stimuli are not systematically associated with distinctive prosody, contextual incongruence, or facial expression, Deliens et al. (2018, Exp. 2) found that autistic participants perform at chance in identifying the meaning intended by the speaker. Interestingly, the same autistic participants appear to have no difficulties in interpreting requests cast in an indirect way (Deliens et al., 2018, Exp. 1), which confirms that unlike irony interpretation, some indirect speech acts may be grasped from an egocentric perspective. Likewise, van Tiel et al. (2020) provide evidence that while autistic adults may use strategic deception, they do so by relying on compensatory, cognitively costly learning strategies, which do not involve mind-reading. This dissociation between preserved ego-centric pragmatic processing and impairment in areas that require perspective-shifting is unlikely to be explained away in terms of a deficit in lexical knowledge or morpho-syntax, as autistic and non-autistic participants in Deliens et al. (2018); van Tiel & Kissine (2018) or van Tiel et al. (2020) did not differ on verbal (and non-verbal) IQ measures.³

There is a no dispute that both form and content typically need to be tailored to the communicational context and to one’s interlocutor. Nor would it make sense to deny that linguistic structure contains referential and cohesive devices — such as connectives or discourse markers — geared towards optimizing the processing of one’s verbal production by the audience. Such aspects of language use are precisely those that remain problematic even for highly verbal autistic individuals. Scarce use of referential expressions, difficulties in constructing a coherent narrative or avoiding redundant messages, and, more generally, poor tuning in to the conversational dynamics have consistently been attested in autistic children and adults (e.g. Surian et al., 1996; Colle et al., 2008; Eales, 1993; Asp & de Villiers, 2010; Fine et al., 1994; Baltaxe & D’Angiola, 1992; Baixauli et al., 2016; Diehl et al., 2008; Geelhand et al., forthcoming).⁴

Claiming that language can be wielded from an egocentric perspec-

³I am not denying that some individuals on the autism spectrum may also have impaired morpho-syntax (e.g. Ambridge et al., 2015), even though areas of strength in purely syntactic processing have been attested in autism (Eigsti & Bennetto, 2009; Janke & Perovic, 2017), including at a young age (Tovar et al., 2015).

⁴Some proponents of the social motivation theory of autism (Chevallier et al., 2012) speculate that in autistic individuals, pragmatic processing is rooted in Theory of Mind, but appears deficient due to lack of motivation to engage in inter-subjective communication (see Chevallier et al., 2011, 2014). However, experimental data clearly show that while

tive does not entail, then, that mind reading is not required for much of our successful communication. Incidentally, neither do I claim that attributing communicative intentions to other people should necessarily be a cognitively effortful process—at least for non-autistic individuals (see [Geurts & Rubio-Fernández, 2015](#), for a lucid discussion). While relying on mind reading in conversation may be effortless for many people, it is indisputably challenging for autistic individuals. The point is that when autistic individuals use and interpret language in context, they do so without projecting themselves in the minds of their conversational partners.

3 Language learning in autism

The data from autism discussed in the previous section show that, however important intersubjective, shared intentionality may be for efficient conversation management, it is not inherent in context-based, pragmatic interpretation processes. Now, it could be that even though adopting other people’s perspective is not always required to use language, without an innate disposition for cooperative interaction and shared intentionality, language cannot be acquired in the first place. Clearly, such a view should, at the very least, be able to account for the linguistic profiles of verbal autistic individuals, who combine functional structural language with life-long difficulties in adopting other people’s perspective.

If, as presupposed by constructionist theories, acquired language structures gradually emerge from interactional experience of form-meaning pairs, one should expect language skills in autism to be negatively correlated with the strength of interaction symptoms. On this conception, in sum, when (and if) language emerges in autism, its acquisition should essentially follow the same route as in typically developing children, gradually overcoming difficulties in processing social stimuli. Unfortunately, as will be discussed now, current evidence for such a hypothesis is rather weak. Moreover, there are a few case studies in autism that strongly suggest that communicative interaction is not even required for language to emerge.

the determining factor in autistics’ performance is whether the pragmatic task requires adopting somebody else’s perspective, no clear motivational factors seem to emerge (see [van Tiel & Kissine, 2018](#); [Kissine, 2019](#), for a critical discussion).

3.1 Language acquisition and joint attention in autism

Difficulties in attending to and processing social information already emerge as a robust behavioral manifestation of autism towards the end of the first year of life (e.g. [Elsabbagh & Johnson, 2010](#); [Jones & Klin, 2013](#); [Zwaigenbaum et al., 2015](#)). In comparison with their typically developing peers, infants later diagnosed with autism appear to look and smile less at people, to rarely gaze in the direction of a human voice, even when called by their name, and to almost never produce sounds or babbling directed at another person (e.g. [Baranek, 1999](#); [Clifford & Dissanayake, 2008](#); [Maestro et al., 2002](#); [Osterling & Dawson, 1994](#)). Retrospective analyses of home videos, as well as parental reports, indicate that between one and two years of age autistic children display significantly less attention-sharing behaviors than typically developing children or children with other developmental delays. For instance, infants later diagnosed with autism rarely switch their eyes back and forth between an adult and some object they find interesting or point at an object to draw the adult’s attention to it ([Clifford & Dissanayake, 2008](#); [Stone & Lemanek, 1990](#)). Consistently with these reports, eye-tracking studies suggest that during the first two years of life, autistic children tend to spend less time looking at the eyes and the mouth regions of speaking faces ([Campbell et al., 2013](#); [Chawarska et al., 2015](#); [Jones & Klin, 2013](#)).

Acquisition of structural language in autism is also atypical, both quantitatively and qualitatively. In at least 50% of autistic children, expressive language appears with a considerable delay, usually after the age of three, and around 30% of autistic individuals never achieve functional verbal communication altogether ([Anderson et al., 2007](#); [Wodka et al., 2013](#); [Kim et al., 2014](#)). These linguistic deficits resist a reduction to a co-morbid condition, a form of Developmental Language Disorder, distinct from a ‘core’ symptomatology of autism ([Boucher, 2011](#)). The current consensus is rather that the causal origins of atypical language development in autism are at least partly inherent in the socio-pragmatic properties of the disorder itself. Precocious and persistent difficulties in attending to and processing social information are then likely to impact language acquisition in autism.

As alluded to in the Introduction, constructionist approaches to typical and atypical linguistic development assign a central role to the capacity to share a common ground with one’s interactional partners. The most conspicuous early manifestation of such shared intentionality is the ability to respond to social cues, such as gaze direction or pointing, to establish joint attention (e.g. [Farroni et al., 2002](#); [Csibra,](#)

2010; Luyster et al., 2008; Tomasello, 2008). In a sense, language development delays and deficits in autism underscore the importance of socio-pragmatic factors for language acquisition. Low sensitivity to social information in the early stages of the life of an autistic child certainly has a cascading effect on the acquisition of language. However, life-long interactional and pragmatic deficits are robustly attested across the otherwise greatly heterogeneous autism spectrum. And, as argued in the previous section, when autistic individuals use and interpret language in context, they most probably do so without adopting their interlocutor’s perspective. Early-onset socio-pragmatic deficits likely cause language delays, but a very different explanation may be needed to understand how verbal autistics eventually *do* acquire language.

Many experimental studies have sought to causally link joint attention and language in autism by implementing some version of the discrepant labelling task (Baldwin, 1993). Such paradigms feature two novel objects, one of which is labelled by the experimenter. The condition of interest is when a new label is provided while the object in the attentional focus of the experimenter is different from the one to which the child is attending. Typically developing children between 18 and 24 months usually associate the new label with the object the experimenter is looking at, even though this is not the object in their own attentional focus (for a review, see Tomasello, 2008, 158-161). By contrast, many authors report that autistic children tend to associate the new label with the object they, and not the experimenter, are attending to, thus proving unable of sharing attention with the adult to acquire new words (Baron-Cohen et al., 1997; Preissler & Carey, 2005; Luyster & Lord, 2009; Parish-Morris et al., 2007; Akechi et al., 2011, 2013).⁵ However, a noticeable, but seldom acknowledged feature shared by all these studies is that autistic children are matched by vocabulary levels to the comparison groups. Therefore, if anything, this literature indicates that whereas autistic children do not rely on joint attention to acquire new words, they may reach a receptive vocabulary comparable to those of children who do so.⁶

Some retrospective analyses do suggest that, in autistic children, lower social impairment or better joint attention skills correlate with later language levels (Wodka et al., 2013; Yoder et al., 2015). However, in a significant number of other large longitudinal or prospective studies,

⁵For conflicting or more nuanced results, see Norbury et al. (2010), Gillespie-Lynch et al. (2013) and McGregor et al. (2013).

⁶It is also important not to overestimate the importance of joint attention in typical language development, where it is mainly limited to early stages of the acquisition of nouns (Akhtar & Gernsbacher, 2007; Tsimpli, 2013).

socio-communicative variables do not systematically predict language outcomes, especially once non-verbal IQ is factored in (Anderson et al., 2007; Bennett et al., 2015; Ellis Weismer & Kover, 2015; Thurm et al., 2015). In this connection, it is interesting to observe that the most prominent interventions programs are currently grounded in the the constructionist models of typical language acquisition, and prioritize joint attention or social communication in the hope to enhance linguistic development (Dawson et al., 2010; Green et al., 2010). Improving an autistic child’s socio-communicative and joint attention abilities can clearly have beneficial consequences for her interaction skills. Yet, where it comes to predicting the acquisition of vocabulary and morpho-syntax, there is no unambiguous evidence that intervention techniques specifically targeting joint attention skills have an effect on language outcomes (Rogers et al., 2019; Sandbank et al., 2020).

None of this, of course, is to deny the significance of the link between language and socio-pragmatic factors. Better language skills allow more opportunities for meaningful interaction, which may further foster language development. However, a significant proportion of autistic children also end up acquiring structural language *in spite of* the persisting interactional, socio-pragmatic difficulties. It is possible, therefore, that these children take a route to acquire language which does not relate to its inter-subjective function. And, as we will see now, important, albeit somewhat overlooked data from autism rather strongly suggests that language can be acquired in a non-interactive way.

3.2 Non-interactive language learning in autism

Active child-directed interaction, as opposed to passive exposure to linguistic input, has for long been acknowledged as a crucial factor in language acquisition. Early evidence came from hearing children whose deaf parents extensively exposed them to radio and television, in the hope that they acquire speech. In spite of passive exposure to spoken English, these children exhibited severe language delays (Sachs et al., 1981). Later on, a landmark experimental study revealed that while American infants were capable of acquiring phonological categories of Mandarin Chinese from live exposure to speakers of the language, no such acquisition resulted from watching comparable video recordings (Kuhl et al., 2003; Lytle et al., 2018). Such data are crucial for constructionist models, according to which shared communicative experience allows language structures to be gradually induced from communicative experience.

A recent study, however, indicates that non-interactive language

acquisition from television does occur in some autistic children. [Kissine et al. \(2019\)](#) thoroughly documented five cases of Tunisian autistic boys who spontaneously and productively used the Standard, non-colloquial variety of Arabic. Such a linguistic profile is very intriguing because Tunisia, like the rest of Arabic-speaking communities, is inherently diglossic: a vernacular, colloquial variety, is used in everyday interaction, while the significantly distinct Standard Arabic is reserved for very formal, mostly written settings. Importantly, before (or unless) protracted and explicit instruction takes place at school, children fail to master Standard Arabic, be it at the level of comprehension, production, phonology or morpho-syntax ([Amayreh, 2003](#); [Khamis-Dakwar et al., 2012](#); [Saiegh-Haddad et al., 2011](#); [Leikin et al., 2014](#)). Yet, the autistic children in [Kissine et al. \(2019\)](#) displayed a striking proficiency in the Standard Arabic: they productively and correctly used phonemes, case-marking, complex negation forms and verbal moods that characterize Standard Arabic, but are inexistent in the Tunisian colloquial variety. As Standard Arabic is never used in everyday communication, learning the Standard variety had no communicative value for these children. Furthermore, the only source of exposition from which this learning could have stemmed is non-interactional. Many cartoons and television programs that are broadcast across the Arabic-speaking world are in Standard Arabic. Given their young age, this is the only possible source of exposure from which the autistic children described by [Kissine et al. \(2019\)](#) could have learned Standard Arabic.

While the diglossic context of Tunisia renders non-interactional language learning more apparent, the same phenomenon may also occur but be less visible in non-diglossic environments. A study in progress in our lab is currently documenting profiles of autistic children who would acquire a foreign language, not used in their environment, from exposure to internet. It is too early to report quantitative data on such ‘YouTube bilinguals’, but one among the profiles we documented so far may be worth briefly mentioning here. B is a twelve-year-old autistic boy, with a non-verbal IQ slightly below the norm (67 on Leiter-3; [Roid et al., 2013](#)), who attends primary school in French (in the French-speaking part of Belgium) and whose familial environment is exclusively French-speaking. B has an intense interest in watching videos in English on internet. In spite of the fact that none of his caregivers reported ever using English with him, B insists on speaking only English with his parents, siblings and schoolmates. B’s competence in French and English — sentence comprehension, sentence production, sentence repetition, morphology — was formally assessed using the same standardized scale (CELF-V; [Wiig et al., 2013a,b](#)). While delayed for his chronological age, B’s scores are identical in French and English,

which strongly suggests that B’s non-interactive learning of English unfolded on par with his acquisition of French.

To the cases just evoked one should also add EV, an autistic Bulgarian girl who, by the age of nine, reached impressive mastery of German exclusively from passive exposure to television programs (Vulchanova et al., 2012). Another, extensively described language savant with autistic traits, Christopher, demonstrated an exceptional ability to learn new languages from limited exposure and with a preference for written input (Smith & Tsimpli, 1995; Smith et al., 2011). Interestingly, both EV and Christopher seemed to enjoy the experience of learning a new language for its internal, structural properties, rather than for the communicative potential it could offer; and both acquired foreign language morphological paradigms with a striking ease.

3.3 The significance of non-interactive language learning in autism

The case studies discussed in the foregoing should not be relegated to some kind of linguistic *Kunstkammer*. The prevalence of autism, in one form or another, may exceed one child in 70 (Christensen et al., 2016, 2019); among these children, around 60% end up acquiring functional structural language (Wodka et al., 2013; Kim et al., 2014). As yet, there is no estimate of the extent to which language acquisition in these individuals is non-interactive. The absence of a clear link, discussed in 3.1, between joint attention and language outcomes in autism strongly suggests that language is acquired in a non-interactive way in many more autistic individuals than currently documented (for a defense of this view from the perspective of early intervention, see Mottron, 2016, 2017). To be sure, one could argue that the way language is learnt by the autistic individuals described above is intrinsically distinct from the neuro-typical pathway to language. However, it is highly implausible and scientifically questionable to posit two drastically different neuro-cognitive mechanisms for a skill as complex as language acquisition.

Language learning in autism unquestionably displaces the conceptual boundary on linguistic learnability endorsed by constructionist models. Both quantitative and case studies discussed in this section indicate that the impetus to engage in communicative exchanges with others is not the only possible motivational factor for acquiring language. These data also unambiguously show that language structures may be acquired without the support of an inter-subjective communicative experience. In this respect, language acquisition in autism is clearly an important challenge for constructionist models.

4 Autism and the nativism debate in linguistics

Studying language learning in autistic individuals — in whom the apprehension of linguistic stimuli is mediated by an inherent socio-pragmatic deficit — can illuminate one of the deepest theoretical divides in the field of linguistics. Contrary to constructionist models, which posit that an innate drive to communicate allows language structures to be gradually induced from communicative experience (Tomasello, 2008), Chomskian nativist approaches hold that essential aspects of linguistic knowledge are innate. For nativists, early linguistic input is crucial, but its role is bounded to activating one among the few possible structural possibilities this innate competence allows (e.g. Berwick & Chomsky, 2016; Chomsky, 2000, 2005). Both approaches assign a central role to early linguistic interaction, but whereas in constructionist models a precocious impetus to engage in inter-subjective communication is a prerequisite for the emergence of linguistic structures, in nativism its role is limited to drawing the child’s interest towards linguistic evidence. In a slightly alternative formulation, in theories of the latter brand, the primary role of linguistic input is to provide the learner with evidence for the structural features of the language, while the former emphasize socio-pragmatic interaction, and joint attention processes, from which meaning-form pairings emerge. The remainder of this section is devoted to assessing the extent to which data from autism may be invoked as evidence for nativism.

4.1 Statistical learning

There is currently no clearly formulated account of how non-interactive language learning in autism may unfold, but it is instructive to consider which ingredients such an account could include. Exceptional abilities are well documented in individuals with autism, albeit more often in non-linguistic domains, such as calendar calculation, absolute pitch or graphic memory (Pring, 2005; Howlin et al., 2009; Mottron et al., 2006a, 2009). These savant skills in autism are usually explained in terms of preferential attention to detail, enhanced processing of local structural properties, as well as of a superior capacity to detect and analyse domain-specific, systematically recurring patterns (Happé & Frith, 2006; Baron-Cohen et al., 2009; Pellicano & Burr, 2012; Mottron et al., 2006b, 2009, 2013). It is therefore plausible that those autistic individuals who learn language outside any interactional frame, do so by relying on a superior sensitivity to structural properties in processing language input. In fact, this explanation has been suggested both for

EV (Vulchanova et al., 2012) and Christopher (Tsimpli et al., 2017).

Since the seminal studies on probabilistic acquisition of word boundaries in infants (Saffran et al., 1996), a rich body of experimental work highlighted the importance of statistical learning in language acquisition. Statistical learning should most probably be thought of as a domain-general capacity to detect the distribution of structural properties, which applies but is not limited to the processing of the linguistic input. Even though the exact nature and scope of the role played by statistical learning in language learning remains an open question, probabilistic extraction of structural regularities is likely to play an important role in language development (Siegelman & Frost, 2015; Frost et al., 2019; Siegelman, 2020). Using slightly different methods two relatively recent meta-analyses concluded to an absence of impairment in implicit statistical learning in autism (Foti et al., 2015; Obeid et al., 2016). Language delays in autism are thus not associated with an impaired ability to induce the structural properties of the linguistic input (probably in contrast to Developmental Language Disorder; see Haebig et al., 2017; Lammertink et al., 2020).

Along with joint attention and shared intentionality, usage-based linguistic theories put a great emphasis on probabilistic and associative learning mechanisms (e.g. Goldberg, 2003, 2006). The data from autism that has been discussed in the foregoing could be integrated within these models by assigning more weight to probabilistic mechanisms over joint attention. It could be that, because of the unavailability of socio-communicative cues, at least some autistic individuals learn language exclusively by relying on probabilistic, associative processes. Such a compensatory strategy could, of course, be facilitated by the hyper-systematizing, enhanced processing of local structural properties, independently attested in autism.

The unavailability of socio-communicative feedback may prompt autistics to exploit some learning pathways to a greater extent than their typical developing peers. Carving phonological categories out of the acoustic stream is an essential step towards language (e.g. Kuhl, 2004), which could be partly determined by the statistical frequency of co-occurrence of certain sounds in infant-directed speech (Vallabha et al., 2007). However, in typical language development such distributional learning is supplemented by communicative, referential intentions.⁷ In autism, referential bootstrapping of language learning

⁷The classic example is that of the acoustic variability between dental [ɖ] and retroflex [ɖ̠] dental voiced stops, which in Hindi goes along with different referential intentions (e.g. [ɖal] *lentils* vs [ɖal] *branch*), but corresponds in English to non-phonological co-articulatory variation (e.g. [ɖɒl] in *this doll* vs [ɖɒl] in *your doll*). The intersubjective experience of language as a communicative tool is thus essential for helping Hindi speaking infants learn

is clearly compromised by poor social orientation. It is likely, therefore, that autistic children should rely, to a greater extent than their typically developing peers, on probabilistic learning—or, on other, bottom-up mechanisms non-specific to language, such as, audio-visual integration (see, e.g. [Stevenson et al., 2017](#); [Righi et al., 2018](#); [Robertson & Baron-Cohen, 2017](#))—to acquire phonological and word boundaries.

[Christiansen & Chater \(2016b\)](#) emphasize that rehearsing previously heard linguistic material can help reanalyze it and, in this way, facilitate the chunking of new sequences of speech. Interestingly, intense echolalic repetition of a limited number of previously heard linguistic segments—often excerpts from cartoons or internet videos—is extremely widespread in autism. Such delayed echolalia may serve a variety of communicative functions, unrelated to the compositional meaning of the echoed linguistic sequence ([Prizant & Rydell, 1984](#)). More importantly for the present discussion, though, echolalia also often transits to more compositional and productive language ([Gernsbacher et al., 2016](#); [Mottron, 2016, 2017](#)). Phonological categories can be modeled as density distributions over a parametric (acoustic and articulatory) space, which are gradually shaped by perception-production loops ([Pierrehumbert, 2003](#)). Typically developing children acquire these categories, to an important extent, by mirroring and then adapting the phonological templates used by adults in interaction with the child ([Vihman & Croft, 2007](#)). A reasonable hypothesis is that in autistic children, for whom verbal interaction is often challenging, delayed echolalia constitutes a non-interactional opportunity to induce phonological categories from iterated perception-production loops.

4.2 Third factors

Two important and intertwined theoretical consequences arise at this stage. First, language learning in autism appears to vindicate the famous, but often derided claim by Chomsky that communication is not the primary function of language. Second, a crucial question is whether in the absence of access to social, intersubjective cues, the way autistics learn language can be exclusively explained in terms of domain-general learning skills. To better grasp these two issues, it may be helpful to frame the discussion against the three factors with which [Chomsky \(2005\)](#) associates linguistic knowledge:

1. Language-specific genetic endowment;
2. Experience;
3. Cognitive factors not specific to language.

the contrastive function of the [d̥]-[d] opposition ([Yeung & Werker, 2009](#)).

The content of the first factor varies across different instantiations of nativism, and is fairly frugal in the latest version of Chomsky’s model of language (Chomsky, 1995; Hauser et al., 2002). In constructionist, usage-based models, the first factor is, by hypothesis, defined as vacuous, so that cognitive mechanisms determining for language acquisition are necessarily included within general-domain factors of the third type.

In constructionist theories, joint attention, mind reading and early drive towards inter-subjective communication are viewed as domain-general skills, whose role is posited to be essential for language development. From the perspective of the nativist program such socio-communicative skills also clearly belong to third factors, but with a more modest role, on par with, say, executive functions. Poor executive functioning will without doubt compromise language acquisition and functioning. Yet, as important as it is for language, to the best of my knowledge, no theory holds that executive functioning is the core ingredient that makes human language what it is. Data from autism indicates that the role of socio-communicative and mind-reading skills in language acquisition should be characterized in similar terms: even though the cognitive skills required for perspective-taking and inter-subjective communication are impaired, many individuals with autism manage to learn language in a non-interactive way and use it from an egocentric perspective.⁸

Christiansen & Chater (2016a, chapter 2) contrast two types of learning: C-induction, ‘acquiring the ability to co-ordinate with others’ and N-induction, ‘acquiring the ability to understand and manipulate the natural world’ (p. 69). They propose that language acquisition is an instance of C-induction — and hence is intrinsically communicative. However, in the case of at least some autistic individuals, language

⁸Hinzen et al. (2020) recently argued that autism — especially in non-verbal individuals — constitutes a counter-example to Chomsky’s refusal to see communication as the primary function of language. Hinzen et al. (2020) insist that the absence of language in autism (almost) universally co-occurs with intellectual disability (note that gaining a precise idea of the general intellectual level in non-verbal autistic individuals is notoriously difficult; see, e.g. Bishop et al., 2015; Tager-Flusberg et al., 2016; Courchesne et al., 2019), and claim that nativism should predict that such individuals could ‘be linguistic thinkers, while language is only missing externally’ (p. 13). That language should not be equated with communication does not affect the obvious fact that for language acquisition to unfold — or, in less theory-neutral terms, for the linguistic faculty to become instantiated as a particular language in the learner’s mind — the learner has to be able to process linguistic stimuli, which necessarily represent the externalization of somebody else’s language. This ability is certainly dependent on non-verbal IQ, which, incidentally, is the most robust predictor of language outcomes in autism (Anderson et al., 2007; Ellis Weismer & Kover, 2015; Thurm et al., 2015; Brignell et al., 2018; Pecukonis et al., 2019).

learning would rather belong to N-induction, as it amounts to detecting the underlying structure of what, from the learner’s perspective, are non-communicative stimuli. A particularly illuminating aspect of Christiansen and Chater’s distinction between C- and N-induction is that it cuts across the nativist/empiricist divide. Some instances of C-induction are clearly innate, such as the dance of honey-bees, and some aspects of N-induction are learned, such as the location of edible food in some environments or food preparation techniques in chimpanzees and gorillas (p. 71). It is therefore possible for constructionist models to accept that language acquisition is, or may be, an instance of non-interactive learning — of N-induction —, without necessarily conceding that linguistic knowledge is underpinned by language-specific acquisition mechanisms.

More precisely, language learning in autism forces constructionists to posit that in the absence of top-down communicative feedback, probabilistic and associative mechanisms still allow the acquisition of structural language. But this is a consequence that rather heavily shifts the burden of proof towards constructionist models. Statistical learning is clearly a third factor in the nativist program (e.g. [Lidz & Gagliardi, 2015](#); [Yang, 2016](#)). For the linguistic input to determine the direction in which the grammar of the language learner will develop, this learner has to be able to detect regularities in the linguistic inputs and to chunk it in structurally meaningful units. Therefore, assuming that the core linguistic faculty is intact and that there is sufficient linguistic input, nativism clearly allows for language learning in autism to unfold in a non-interactive way. Given language-specific genetic endowment, the structure of the linguistic input — independently of how and why it is used — may provide enough evidence for an autistic individual to build one’s own internal language competence.

By contrast, in order to accommodate data from autism, constructionist models have to show that the weight of statistical, associative learning processes in language learning is sufficient to dispense with the idea of any kind of innate mechanism specific to language. In the case of autistic language learning, such a deflationary position would require that, without any socio-communicative bootstrap and without any innate specifically linguistic predisposition, language acquisition be modeled as a fully unsupervised statistical learning, in which most of the lowest-level parsing of the acoustic stream occurs without any kind of top-down guidance. For instance, [Christiansen & Chater \(2016a, chapter 5\)](#) review an impressive array of experimental and computational studies which indicate how different aspects of linguistic structure may be acquired by integrating multiple distributional cues. However, in none of these experimental paradigms or simula-

tions does learning starts from the scratch, viz. from a non-parsed acoustic stream, and goes all the way up to morphology and syntax (cf. also [Goldberg, 2006](#), chapters 4-6). Furthermore, the whole suite of multi-cue integration learning mechanisms, put forth by [Christiansen & Chater \(2016a\)](#), is explicitly situated within a framework where language acquisition is viewed as a solution to a coordination problem, as in instance of C-induction. Conversely, some nativist models assign a central place usage-based or probabilistic mechanisms, but complement them with an innate universal grammar component (e.g. [Culicover & Jackendoff, 2005](#); [Yang, 2016](#)). The challenge for non-nativist theories, then, is to show that non-interactive language acquisition in autism can be modeled in terms of fully probabilistic learning, with no reliance on a priori defined phonological features, word boundaries, parts of speech or hierarchical relations and no (or very minimal) access to the form-meaning pairings intended by the speakers of the linguistic input.

5 Conclusion

Once relegated to the backstage of phonology and morpho-syntax, pragmatics has been brought to the fore of linguistics by the considerable progress that has been made in understanding the cognitive mechanisms that underlie language use. As pragmatics was becoming a cognitive science in its own right (see [Noveck, 2018](#)), however, also grew the temptation to link — and, to some extent, reduce — the core aspects of language to communication. Language in autism invites a critical examination of linguistic theories that put mind reading at the core of language use, and language use at the source of linguistic knowledge.

The study of the way autistic individuals acquire and use language should not be confined at some periphery of ‘serious’ linguistics. The prevalence of autism is far from negligible; therefore, verbal autistic individuals represent an important proportion within the variety of instantiations of human language. Careful investigation of linguistic profiles in autism is crucial to better map the heterogeneity of the autism spectrum or to predict individual developmental trajectories and outcomes. But taking language in autism seriously may also bring linguistic theory a step closer to answering foundational questions about the nature of linguistic competence.

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