The Constructionist Approach Offers a Useful Lens on Language Learning in Individuals on the Autism Spectrum

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The constructionist approach argues that communication is central to language learning, language use, and language change. It suggests two key factors that influence the commonly delayed and unusual language profile of individuals on the autism spectrum. First, a reduced ability and interest in sharing joint attention toward external entities should negatively impact initial language learning, and a wealth of evidence indicates that it does. Secondly, and less discussed until recently, a hyper-focus on specifics at the expense of generalizations, common among people on the spectrum, should also negatively impact language development, and recent evidence suggests this is also the case. Pace Kissine (this volume), it is unsurprising that verbal children can learn some second language from watching videos, and it is unclear how an appeal to "innate" language-specific knowledge could explain the range of outcomes of individuals on the autism spectrum.

1. **Autistic Spectrum Disorders**

While the overwhelming majority of neurotypical children learn the language(s) they are regularly exposed to, 20-30% of children on the autism spectrum fail to acquire functional language. That is, a substantial proportion of children on the spectrum are unable to regularly produce utterances that are meaningful and communicative (Anderson et al. 2007; Wodka et al., 2013; Kim et al., 2014; Tager-Flusberg & Kasari, 2013, Yoder et al., 2015). This situation demands that we as language researchers take an interest in factors that support or inhibit language learning, as the stakes could hardly be higher.

A clinical diagnosis of Autism Spectrum Disorder (ASD) is made on the basis of persistent deficits in social communication and interaction, as well as restricted, repetitive behaviors that include two or more of the following: repetitive movements or repetitive speech, an insistence on unchanging routines or ritualized verbal or nonverbal behavior, intense highly specific interests, and an unusual sensitivity to sensory patterns (DSM-5). A significant delay in language comprehension is extremely common among children diagnosed with ASD, as they commonly fail to respond to linguistic cues until they are three years old or older (Kim, Paul, Tager-Flusberg, & Lord, 2014; Henry, Farmer, Manwaring, Swineford, & Thurm, 2018). Specific symptoms and the severity of symptoms vary widely, which is why autism is defined as a spectrum disorder, and the majority of individuals on the spectrum ultimately do acquire functional language.

The usage-based constructionist approach provides a useful perspective on language learning among children on the spectrum as it makes testable predictions for which there is ample support. Surprisingly, Kissine (this volume) claims the opposite is true: that evidence from autistic individuals poses a challenge to the constructionist perspective and instead lends credence to a "language-specific genetic endowment" or what is commonly referred to as a "Universal Grammar" (UG). After providing a brief description of autism

and the constructionist approach, I discuss the evidence that leads to such different perspectives.

Beyond challenges with social interaction and repetitive behaviors, individuals on the spectrum typically display an important cognitive difference when compared to neurotypical (NT) individuals: they are more likely to hyper-focus on distinctions, which leads to a reduced ability to detect similarities and relationships across experiences. That is, individuals on the spectrum find it more difficult to form abstract categories on the basis of instances that are noticeably distinct, because their attention tends to be drawn to specific perceptual distinctions rather than to the similarities. Rather than generalizing, children on the spectrum show a tendency to treat similar instances as entirely new (Molesworth, Bowler, and Hampton 2005; Mottron et al. 2006; Mottron, Morasse, and Belleville 2001). For instance, Plaisted, O'riordan, and Baron-Cohen (1998) found that children with ASD were significantly less successful than NT children at identifying new instances of a category of dot patterns, tending instead to treat similar dot patterns as entirely novel. Children with ASD show a reduced ability to sort by gestalt principles (Brosnan et al. 2004) or to categorize entities along more than a single dimension at a time (Klinger, Grofer, and Dawson 2001). Challenges in generalization lead to challenges transferring successful strategies from one context to the next (De Marchena, Eigsti and Yerys 2015). Increased attention to specifics and relative neglect of generalization also explains the fact that individuals with ASD have been found to be less likely than NTs to fall prey to believing they had witnessed a target word in the false memory paradigm of Roediger and McDermott (1995). That is, individuals with ASD are less likely than NTs to falsely believe that a target word (e.g., *sleep)* had been seen after witnessing a number of strong associates of the target word (e.g., *bed*, *dream*, *night*) (Beversdorf et al. 2000).

A hyper-focus on specifics to the neglect of recognizing relationships and generalizations is consistent with the idea that individuals with autism find it challenging to form accurate predictions (Sinha et al. 2014; Van de Cruys et al. 2014). Forming accurate predictions requires the person making the prediction to perceive relevant similarities between the current and previous contexts. For instance, learning to predict an upcoming event requires a recognition of how the current context is similar to previously experienced contexts. In rare cases in which individuals who were once diagnosed with autism no longer qualify for the diagnosis a few years later, an ability to generalize has been found to be a particular area of strength (Fitch, Fein, & Eigsti 2015). The tendency to focus on distinctions rather than forming generalizations should have broad implications for language learning according to the usage-based construction ist approach to language, a fact returned to in section 5.

2. Constructionist (usage-based) approach to language

The CONSTRUCTIONIST APPROACH argues that communication is central to language learning, language use, and language change (e.g., Lieven et al. 2003; Tomasello 2003; Goldberg 2006, 2019; Christiansen and Chater 2016). Language learners need to understand messages on the basis the formal patterns they witness, and need to select formal patterns that successfully convey their intended messages. In order to approximate these goals, children must learn how formal patterns air paired with communicative functions. These pairings of learned form and function define constructions, which exist at varying levels of complexity and abstraction (see Table 1 for examples).

Table 1. English constructions at varying levels of complexity and abstraction

Construction	**Examples**
Words	*milkshake, again, saunter, afraid*
Words with open slots	*pre*-N, V-*ing*, #th
Noun compound construction (lexically unfilled and recursive)	[N N]$_N$ (e.g., *propane heater storage box*)
Lexically-specified idioms, collocations	*SPILL tea, HUG it out, happily ever after, louder for the people in the back, Pass it on*
Idioms, collocations with open slots	*e.g., What TAKE <person> "so long" VP?* *I don't know <which people/who> NEED to <hear/say> this*
The Xer the Yer construction (minimally lexically filled with open slots)	The <comparative$_1$> S, the <comparative$_2$> S *e.g., The more you think about it, the less you understand; The sooner you start, the sooner you finish.*
Verb complement construction (open and recursive)	V [(that) [S]]
Passive construction (minimally lexically filled with mostly open slots)	*Subj [BE [VP$_{participle}$ PP$_{by}$]* *e.g., The bear was killed by a lion.*

The constructionist approach emphasizes that nuanced and detailed information is learned, and, because new information is related to prior information, generalizations emerge during the learning process. That is, knowledge of language does not consist of a set of unrelated separate exemplars, but rather a rich interrelated network of partially generalized and interrelated information. In this way, usage-based constructionist approach expand the familiar *lexicon* to include a vast network of partially-filled word templates (i.e., morphology), collocations, idioms, and grammatical constructions (Ambridge 2020; Bybee 2010; Culicover, Borkowski, & Nowak 2014; Goldberg 2019; Herbst 2018; Jackendoff & Audring 2016; Kapatsinski, 2018; Langacker, 1988; Savage, Lieven, Theakston, & Tomasello 2003; Tomasello, 2003). Thus, constructions comprise a complex and dynamic network of linguistic knowledge: a CONSTRUCTICON.[i] The approach allows for a broad and inclusive view of language that includes conventional rhetorical devices of various kinds that extend beyond individual sentences (e.g., Dancygier 2011; Harris et al. 2017; Hoffmann 2015; Pérez-Hernández 2020; Ruppenhofer & Michaelis 2010).

This very brief review of autism and constructionist approaches immediately suggests two variables that are predicted to impact language development in children on the spectrum:

(A) To the extent that ability and interest in joint engagement is impaired, language development should be impaired, particularly during early stages when the meanings of initial words and constructions are learned.

(B) The degree of deficit in the ability to recognize relationships among instances should predict the degree of deficit in using constructions in new, contextually appropriate ways.

There is a great deal of evidence confirming the prediction in (A), some of which is reviewed in section 3 (see also Carpenter & Tomasello 2000; Lieven 2017; Abbot-Smith 2020). Kissine (this volume) focuses on this first prediction, and we review his argument in section 4. The second prediction has been far less explored, but suggestive evidence is reviewed in section 5, with the goal of generating more interest in and investigation of this prediction. Let us first consider prediction (A): the role of joint engagement in language learning in neurotypical and autistic populations.

3. Ability and interest in joint engagement correlates with early language development

3.1. In neurotypical language learners

Joint engagement or joint attention refers to the coordination of attention with another person in order to jointly attend to a third entity or event. Its relevance to language learning is not complicated: it is impossible to learn a language only by listening to the radio, since there would be no way to understand what the speakers are speaking about. A wealth of evidence supports the role of joint attention in early language learning among neurotypical children (Bruner 1978; Kuhl, Tsao, &Liu 2003; Mundy & Jarrold, 2010; Tomasello 2009;Yu & Smith 2016). For instance, Tomasello and Farrar (1986) found that children whose caregivers were more likely to refer to objects within their child's focus of attention at 15 months had larger vocabularies at 21 months. Yu & Smith (2016) have found that typically-developing children extend their own attention toward an entity when their caregiver shows an interest in the same object (see also Suarez-Rivera, Smith, & Yu, 2019).

The fact that joint attention is critical for language learning does not entail that learning requires children to interact directly with a communicator. Children can also learn language from attending to *others'* joint engagement: i.e., through 2ND-ORDER JOINT ATTENTION. For example, Akhtar, Jipson, Callanan (2001) found that 2 ½ year old typically developing children learned novel object and action labels by attending to a conversation between the experimenters. In certain Mayan cultures, adults rarely speak directly to children, but the children have ample opportunity to watch others engage in face-to-face interactions (Casillas, Brown, & Levinson, 2019).[ii]

It is worth noting that the vast majority of work demonstrating the importance of joint attention in language development, whether direct or second-order, focuses on its role in *initial* stages of language learning. We all agree that that once some language has been learned, language learning depends less on the ability to share or interpret attention toward external entities with others. That is, once a child has acquired a foundation of language, learned through direct joint engagement or from watching others communicate (2nd order joint engagement), that foundation can be used to bootstrap additional language learning. For instance, in literate cultures people learn additional words and constructions, and even new dialects, through reading. That is, it is possible to infer the intended meanings of new words and constructions on the basis of the context evoked by familiar words and constructions.[iii]

Yet in order to begin to glean intended meanings, one must engage in joint attention or monitor others' joint attention.

3.2. Joint engagement in individuals with Autism Spectrum Disorders

Kissine (this volume) appears to equivocate about whether there exists a correlation between skill in joint attention and language development in people with ASD:

> "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 *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) [italics added]"

However, the vast majority of studies, including those cited by Kissine in the passage just cited, report that joint attention *is* predictive of autistic language development. For example, Anderson et al. (2007), a longitudinal study of children with autism between the ages of 2 and 9, finds that "Nonverbal IQ and joint attention emerged as strong positive predictors of verbal outcome (abstract)." Ellis Weismer & Kover (2015), another longitudinal study of children with autism between the ages of 2 ½ and 5 ½, similarly reports that "cognition, maternal education, and *response to joint attention* correctly classified over 80% of total cases" of the highest and lowest language performers (1327; italics added); the study emphasizes that a lack of joint attention at the initial visit was a strong predictor of particularly low language ability three years later. A study by Paul et al. (2013) reported that children with ASD who displayed stronger joint attention skills initially learned significantly more vocabulary over the 12-week study. Citing the Paul et al. paper, Thurm et al. (2015) similarly emphasizes the importance of joint attention in initial language learning: "Based on results from the present study and recent findings by Paul et al. (2013)…we might suggest that the importance of joint attention in language development is at the preverbal stage or for children who remain minimally verbal after age 5 years."[iv]

Other studies report consistent results (e.g., Carpenter & Tomasello 2000; Mundy, Sigman, and Kasari 1990; Kuhl, Coffrey-Corina, Padden and Dawson 2005; Sigman & McGovern, 2005; Paul 2013). For instance, Charman et al. (2003) found that joint attention ability at 20 months predicted higher language comprehension at 42 months. Siller & Sigman (2008) found that the language development of children with ASD was predicted by the extent to which children and parents' managed to coordinate joint attention. Su et al. (2020) report a longitudinal analysis of children with ASD over a 2-year period starting between the ages of 1 and 3, and found that better language outcomes correlated with a greater earlier tendency to seek out and attend to social interactions.

In fact, the empirical report by Kissine et al. (2019:2) acknowledges the link between joint attention and language development:

> "The capacity to monitor eye-gaze direction, to establish joint attention, and, more generally, to show sensitivity to social cues and speakers' intentions bootstraps language development (e.g., Luyster, Kadlec, Carter, & Tager-Flusberg, 2008; Tomasello, 2008; Yeung & Werker, 2009). Poor orientation to social information in the early stages of life may thus have a cascading effect on the acquisition of language (e.g., Kuhl et al., 2013; Preissler & Carey, 2005). In a sense, then, language development delays and deficits in ASD underscore the importance of sociopragmatic factors for language learning."

To summarize, as predicted by the usage-based constructionist approach, which emphasizes the importance of communication and meaning, joint attention is required to learn initial meanings of words and constructions, whether through direct social interactions with language users, or by witnessing others communicate, a type of second-order joint attention. It is only possible to infer the functions of constructions outside of communicative contexts (e.g., via listening to the radio or reading), once the meanings associated with some constructions have already been learned. Most relevant for the discussion of autism is the fact that deficits in joint attention ability predict deficits in early language learning.

4. Kissine (this volume)

Kissine et al. (2019) reports that five Tunisian children on the autism spectrum, between the ages of 5 ½ and 11 years old, showed a "remarkable mastery of MSA [Modern Standard Arabic]" and "favor MSA in everyday conversations" (Kissine et al. 2019: 4). Modern Standard Arabic is only taught in schools and is used in writing and formal broadcasts. It is also spoken by characters in cartoons, most likely as a way to introduce children to the higher register language used in classrooms. Since the children in question did not attend school, they must have learned MSA in the noninteractional context of cartoons. Kissine (this volume) claims that the fact that children with ASD learned MSA without witnessing it being used in face-to-face interactions poses a challenge to constructionist approaches.

I don't wish to dispute the observations in Kissine et al. (2019). I only observe that the facts do nothing to shake the foundations of the usage-based constructionist approach. After all, cartoons tend to involve simple stories and engaging characters, who speak in short utterances often directed at the camera. Examples of MSA-language cartoons available on YouTube include just these features, which can be expected to facilitate children's ability to infer the characters' intended meanings. Presumably *most* children who watch a substantial amount of such cartoons learn some amount of MSA. We have already established that children are capable of language learning from comprehending others' communication: that is, via second-order joint attention. To assume otherwise mischaracterizes the constructionist position.

Did the five children Tunisian children on the spectrum learn all of their knowledge of language from watching cartoons?[v] Clearly not. They learned MSA in addition to the spoken Tunisian dialect they were exposed to through live social interactions. We know this because the children's MSA productions were responses to an experimenter who spoke the children in Tunisian Arabic. Thus, the children must have comprehended Tunisian Arabic well enough to respond to it. More than that, as is clear in Table 2 (based on data in Kissine et al. 2019), all but one child ("C") relied on Tunisian Arabic in their

own productions more than they relied on MSA; and the data for child C was particularly meager: a total corpus of 67 utterances. Given that the children ranged in age from 5 to 11, they each had had ample opportunity to learn the local Tunisian Arabic and some amount of MSA.

It is not unusual for children to learn some second language from watching cartoons. For instance, the Dora the Explorer cartoon series, which uses both English and Spanish, was designed to expose monolingual speakers to an unfamiliar language, and it has been found successful at increasing children's language skill (Kokla 2016). Since the community of Tunisian Arabic speakers were able to comprehend MSA, the children were able to communicate successfully by producing MSA, which would afford them practice producing the language in contexts of joint-engagement with those around them.

Table 2: Data based on Kissine et al. (2019) for 5 Tunisian children (A-E), their ages, total number of utterances spoken by the children during the 10-20 minute interview, and the percentage of utterances that were produced in Modern Standard Arabic (MSA), the local spoken dialect (TA), or a mixture of the two languages (Mixed).

Child age (# of utterances)	A 5;6 (144)	B 7;11 (101)	C 10;11 (67)	D 8;7 (115)	E 8;1 (185)
Modern Standard Arabic (MSA)	27%	26%	56%	22%	9%
Mixed: MSA & TA	26%	32%	12%	16%	30%
Tunisian Arabic (TA)	47%	42%	32%	72%	69%

Kissine (this volume) seems to imply that any child with a diagnosis of autism should be completely incapable of joint attention or understanding others' intentions.[vi] If that were true, it would indeed be hard for constructionists to explain how any autistic individual could learn any language. However, like other facets of the autism spectrum, skill and interest in joint attention vary across individuals and within individuals across time. Each of the five children on the spectrum reported in Kissine et al. (2019) engaged in a 10-20 minute conversation with an adult. This demonstrates that each child had non-trivial skill and inclination to engage in joint attention: Coherent conversations presuppose shared attention toward the content that is discussed.

To summarize, the constructionist approach predicts that initial language should be delayed to the extent that skill and interest in joint attention is impacted in children on the autism spectrum. A preponderance of evidence supports this conclusion, the claim made in the accompanying perspective notwithstanding. Children who are able to communicate successfully must have some skill in joint attention because successful communication requires directing another's attention to other entities, which is the definition of joint attention. It is unsurprising that the children on the spectrum, who were capable of joint attention and who had learned a functional amount of Tunisian Arabic, which was spoken by those around them, learned some additional language (MSA) from watching cartoons. The only thing that is unusual is that the children used MSA in their speech. It is interesting

to ask why this should be the case, or more generally, why children on the spectrum are wont to use constructions in contextually-inappropriate ways. It turns out, that beyond joint-attention, the usage-based perspective predicts a separate, cognitive factor is relevant to language learning in individuals with autism, and this factor sheds additional light on language in autistic populations, as discussed in section 5.

5. Challenges in generalization predict challenges in language learning

Recall that the constructionist approach argues that language is learned by clustering partially abstract (i.e., imperfect or *lossy*) memory traces within our high-dimensional representational space (Goldberg, 2019). Semantic generalizations are needed for constructions to be used in new contextually-appropriate contexts. For instance, by the age of 2, neurotypical children tend to generalize a novel count noun (e.g., *a fep*) to other entities with the same shape, while overlooking differences in size, texture, or color. This "shape bias" is learned on the basis of a correlation in experience: count nouns are more likely to be identifiable by shape than size, texture or color (Landau, Smith, & Jones, 1988; Smith, Jones, Landau, Gershkoff-Stowe, & Samuelson, 2002). The shape bias is substantially delayed in children on the spectrum (Tek, Jaffery, Fein, & Naigles, 2008), who show a great deal of individual variation in their sensitivity to it (Hartley, Trainer, & Allen, 2019; Potrzeba, Fein, & Naigles, 2015). Highly verbal children on the spectrum eventually develop the shape bias (Tovar, Rodríguez-Granados, & Arias-Trejo, 2019). The delay in developing the shape bias and the fact that the individual variation correlates with language skill is predicted on the constructionist approach, since linguistic generalizations require the recognition of relationships among instances, which individuals on the spectrum are challenged by, to varying degrees.

The need to only generalize *appropriately* has implications for language far beyond the shape bias. Neurotypical children learn that many words and phrases are restricted to certain contexts. For instance, certain words or phrases are associated with fairy tales (*once upon a time, happily ever after*), with flight attendants (*make sure your seat back and folding trays are in their full upright position*), or with certain books (*the places you will go! goodnight air).* People on the spectrum may struggle to pick up on the contextual dimensions that restrict how language is used, because they have more difficulty distinguishing relevant contextual cues from irrelevant ones. The fact that some children with autism use MSA in speech while neurotypical children do not is an instance of a failure to identify the relevant dimensions for generalization.

The role of recognizing relationships among instances applies to word learning in a very general way. By way of background, first observe that the majority of early-learned words are complex in that they can be used for a variety of related yet distinct meanings. Examples of such POLYSEMOUS words include: *bath* (the tub, the activity, the room), *eye (eyes, eye* of a needle*, eye* of a storm*); leg (*left *leg, leg* of a table*)*; and *sorry* (genuine apology; polite means of squeezing by someone; expression of sympathy). Neurotypical children and adults find it relatively easy to extend a word to a distinct but related meaning (e.g., Srinivasan, Berner, Rabagliati 2018) while the assignment of multiple unrelated HOMONYMOUS meanings to a single label is more challenging (e.g., baseball *bat* and flying *bat*) (Casenhiser 2005). In a direct comparison of novel polysemy and novel homonymy learning, Floyd & Goldberg, (2020) found that neurotypical children enjoy a robust, long-lasting advantage for polysemy learning. That is, the fact that the multiple meanings of most words are semantically *related* facilitates vocabulary learning in neurotypical children.

Critically, Floyd, Jepssen & Goldberg (2020) also compared novel polysemy and homonymy learning in 40 children diagnosed with autism and 40 matched neurotypical children (out of a group of 60 NT children). Each child was exposed to 4 polysemous words and 4 homonymous words, each with 3 meanings apiece. Importantly, the NT and ASD groups were matched on their ability to learn homonyms, which was above-chance but fairly weak, particularly when retested on the same materials a week later without intervening exposure. Of particular interest was the groups' performance on the novel polysemous words. As in Floyd & Goldberg (2020), the neurotypical children found polysemous words much easier to learn than homonyms, and showed much stronger retention of the polysemous words after a week delay. Strikingly and as predicted, the verbal children with ASD failed to show the same advantage for polysemy over homonymy. In fact, the children on the autism spectrum essentially found polysemous words to be as challenging as homonymous words were. This is predicted if, unlike their NT peers, the children with ASD failed to recognize the relationships among polysemous meanings. It is unclear from this cross-sectional study whether the ability to generalize increases among those with ASD, but Floyd et al. (2020 found no evidence of an age effect, suggesting that children with ASD may face ongoing challenges in generalizing appropriately.

Again, since autism is a spectrum disorder, we expect individuals to vary in whether or how affected they are in their ability to generalize. The constructionist approach predicts that linguistic generalizations should be impaired to the extent that generalizations of non-linguistic categories are impaired. The idea requires further testing on various types of generalizations, and various types of linguistic constructions, and with children who are learning different languages.[vii] More work is needed to better understand the extent that widespread challenges in generalization underlie widespread challenges among individuals on the spectrum in learning language.

6. Conclusion

The constructionist approach offers a particularly useful lens for studying language development and language use in populations on the autism spectrum. I have briefly reviewed the extensive evidence documenting that deficits in joint attention impact language development in both neurotypical and autistic populations. I have also briefly described recent evidence suggesting that the challenges faced by those with autism in forming generalizations can be expected to result in additional challenges. New evidence suggests this is the case, but more work is needed. There is nothing surprising in the fact that verbal children, whether on the spectrum or neurotypical, can learn some second language from watching videos. The fact that some children on the spectrum incorporate into their own speech a language that has only been witnessed used in cartoons (in their experience) reflects the fact that children on the spectrum tend to have more difficulty recognizing which contextual features are relevant.

In conclusion, it is important to ask, can an appeal to some sort of "language-specific genetic endowment" (or UG, for short) explain any aspect of the language profile of individuals with ASD? Kissine (current volume) suggests it can (pg. 15). Yet the perspective provides no indication of any particular way a UG might be relevant. The only observation made renders UG mysterious and unhelpful: "The content of the first factor [the language-specific genetic endowment] varies across different instantiations of nativism and is fairly frugal in the latest version of Chomsky's model of language" (pg. 16). Indeed, any appeal to

a UG raises a stark dilemma: If a UG is assumed to be unaffected in individuals with ASD, it is unclear why 25-30% fail to acquire functional language. But if a UG is assumed to be impaired in individuals with ASD, it is unclear how 70-75% manage to successfully acquire language. More generally, appeal to a Universal Grammar is meaningless unless one is explicit about exactly which specific properties are supposed to be impaired or unimpaired (Dąbrowska 2015; Tomasello 2009). The constructionist approach, on the other hand, aims the focus squarely on skills in joint attention, social cognition, and on generalization, which we are subject to individual variation.

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[i] The term CONSTRUCTICON is intended to evoke a greatly expanded lexicon that consists of a complex dynamic network of associations between forms and their functions, (where the functions are semantic, discourse, and/or social).

[ii] It is unclear whether 2nd order joint attention depends on prior understanding of 1st order joint attention. Even in cultures in which children are directly engaged rarely, reports

suggest that adults do engage children directly in communicative interactions for a few minutes per hour, or roughly 30 minutes a day (Casillas, Brown, & Levinson, 2019 for Tseltal Mayan children; Shneidman & Goldin-Meadow 2012 Yucatec Mayan children).

[iii] For example, the English subject-auxiliary inversion in comparatives as in (1) and the gapping construction illustrated in (2) are much more common in texts than spoken language (Tao and Meyer 2006).

Subject-Auxiliary inversion in comparatives

1a. Students were significantly more negative about plus/minus grading than were faculty. COCA ACAD 2014

b. the self was rated as being more likely to change than was Janet. COCA ACAD 2004

Gapping

2a. Yet, they were all relieved that Aunt Meterling found Uncle Archer and he, her. COCA FIC 2013

b. Both of them face the same danger-he, death; and she, darkness. COCA FIC 2006

[iv] The final study cited in this passage, Bennett et al. (2015), examined effects of social abilities that were broader than joint attention, namely "social competency" over a 12-month period in children 2-4 with a diagnosis of ASD. Even though social competency included evidence of report that social competency and language skill was "moderately to highly correlated" at the initial assessment and tended to diverge over time.

[v] Is it possible to learn all of one's knowledge of language from watching videos? While neurotypical infants learn less from video than from witnessing real world events and interactions (Kuhl, Tsao, & Liu 2003; Strouse, & Samson, 2020), less is known about whether the same is true for children with autism. While a child might learn to understand a language from watching videos, learning to produce language in contextually appropriate ways would seem to require that learners attempt to communicate with others.

[vi] Throughout the perspective, Kissine (to appear) implies individuals with a diagnosis of autism are uniformly incapable of interpretations that require perspective-taking; e.g., "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" (pg 4)

[vii] We might further predict that an unusual ability to remember and recall contextually-rich exemplars can compensate for impairments in the ability to generalize across exemplars; possible interactions between generalization ability and memory recall remain to be investigated, but could address rare cases of individuals who apparently have autism who appear particularly adept at learning languages (Smith & Tsimpli 1996). See Bates (1997) for discussion of this case.