

This theoretical paper is a brief attempt to show that the current mainstream of autism research conceptualizes language in a way that is at odds with currently available empirical data, and that this unfortunate fact considerably hinders investigations into the acquisition of grammar in pervasive developmental disorders. One of the many possible alternative models of language, Construction Grammar, is contrasted with more conventional explanations.

First of all, it is important to notice that most discussion on language in autism is directed toward pragmatics, and the grammatical aspects of language, such as syntax or morphosyntax, have been markedly underinvestigated: for example, as of 20 June 2007, the keywords „syntax autism” yield 23 articles in PubMed, the major biomedical article finder, while queries in other databases produce even fewer results. A very recent paper on morphosyntax in autism by Eigsti, Bennetto and Dadlani (in press) has stated that „*there has not been a[n] [...] in-depth exploration of syntactic development in autism, nor how it may relate to underlying cognitive impairments*”. They also point out that most investigations were conducted before diagnostic measures for autism were standardized and, therefore, may not be adequate.

The probable reason to this deficiency is that since Tager-Flusberg’s literature review (1981) and her own experiments (1990), it has generally been assumed that while children with autism are syntactically impaired, there is no difference between the autism group and learning-disabled controls; so the impairment probably does not have much to do with autism itself and thus it is not of particular research interest. Tager-Flusberg has been maintaining this resolution quite firmly since then, e.g., in Tager-Flusberg (1996), while Kjelgaard and Tager-Flusberg (2001) have criticized other investigations; mostly on the basis of unclear diagnoses, small sample sizes and inhomogeneous samples.¹

However, more recently there has been an amount of data pointing toward the opposite conclusion, namely that impairments do show autism-specific patterns (cf. Eigsti, in press). Even still, most researchers think that the issue of grammar is mar-

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1 These are all valid points, but they apply to their own previous investigations as well, and Kjelgaard and Tager-Flusberg (2001) is also amenable to criticism; see later.

ginal in pervasive developmental disorders; as reflected by the lack of interest. The reasons are elusive, a fact that might lead one to believe undeclared assumptions were at play. We will examine their nature and the consequences that follow from them.

1. Two positions

Even though non-Chomskian approaches to language currently enjoy great popularity among psycholinguists in general, autism researchers in particular have implicitly adopted an orthodox view of language that is much closer to the Chomskian transformational-generative approach – not necessarily to current Minimalism, but the underlying cognitive assumptions of both are relatively similar for our present purposes.² Henceforth, this view will be called „traditional”, and to make the contrast even more salient, a radically anti-Chomskian model of language has been chosen for the purposes of comparison: Construction Grammar.

While both of these were intended to be abstract models of grammar as far as it is possible to tell, each quickly acquired a set of ideological suppositions that became associated with them. Chomskians espoused strict modality and strong nativism, while constructionists emphasized the role of neural plasticity and epigenetic development (e.g., Elman et al., 1996).

For the purposes of this short paper, it should only be sufficient to discuss Construction Grammar, as the kind of Chomskian position we criticize has been taken up by many prominent popular-science texts in psycholinguistics such as Pinker (1994, also see footnote 2); the reader is kindly referred to those.

In Construction Grammar, there are three different kinds of objects: form-objects, meaning-objects and mapping relations joining the two. Forms can range from the concrete such as strings of phonemes to the abstract such as [Subj V Obj₁ Obj₂]. There is only one kind of mapping relation, a very simple one that creates <form, meaning> pairs. (If the reader is reminded of Saussure at this point, (s)he is not mistaken; construction grammars are essentially modern computational applications of Saussurean sign theory.) Of course, this does *not* mean that compositionality – the principle that the meaning of a given expression is a function of the meaning of its parts and the rules applied to combine those parts – is abandoned in its entirety; if we were to do that, we wouldn't be able to predict anything. To the

² These views are more likely informed by the brand of transformational-generative grammar persuasively backed by Pinker (1994) – who later parted ways with Chomsky –, and not by direct exposure to Chomskian linguistics.

contrary, construction grammars provide us with tools to create useful predictions even when traditional semantic compositionality breaks down, ie. in the case of idioms (Kálmán, 2001; Verspoor et al., 2003).

The question is, where can syntax as an independent module be located? Is it the form-meaning binding? But that is exactly the same relation as the one relating words and their meanings, and calling *that* syntax would be quite a stretch! For this very same reason, many have made the point that in construction grammars, we observe a syntax-lexicon continuum – there is no clear border dividing syntactic and lexical constructions (Kálmán, 2001). But if there is a continuum, does it make sense to talk of the endpoints? It might, especially if we are thinking of prototypes in the Roschian sense (Rosch, 1973). However, in this particular case, it is still misleading, as the more abstract forms like the above-cited [Subj V Obj₁ Obj₂] seem to be the loci where „syntactic” information itself is present.

An other constructionist argument against the existence of strict modular divisions among semantics, syntax and the lexicon is deeply rooted in applications: sharply distinct modules that don't interact with each other during processing make for notoriously unimplementable systems in computational linguistics (Kálmán, 2004). It should also be noted that minimalism is probably the least popular of all frameworks among computational linguists, and lexicalist and frequency-based approaches are most frequently used. This is not accidental since, e.g., lexical functional grammar was developed from the outset with computational applications in mind – cf. Komlósy, 2001.

2. Three predictions

In the field of grammar in autism, a broadly constructionist framework makes different predictions from transformational-generative frameworks in many respects. Here we are going to examine three: autism without grammatical impairment, specific patterns of impairment and the existence of a broader autism phenotype in the linguistic domain. *Table 1* shows an overview.

<i>Different predictions:</i>	<i>'Traditional'</i>	<i>Constructionist</i>	<i>Data</i>
1. Subgroups with no impairment	Y	N	N
2. Specific patterns of impairment	N	Y	Y
3. Broader phenotype	N?	Y	Y?

Table 1: 'Classic' theories versus constructionism in the case of autism

3. Subgroups with no grammar impairment

In a strictly modular system, it is possible - and highly likely - that impairments in pragmatics do not spread out to other modules, or only do so in a rather limited surface manner via the restricted input/output connections. Along these lines of reasoning, mainstream autism researchers have argued for the existence of a subgroup with no grammatical impairment, only pragmatic deficiencies. A review by Wilkinson (1998) states that „in syntax the structures of language often are not deviant from normative patterns. Rather, we see specific difficulties in applying the structures within interactions”, i. e. pragmatics (p. 77).

Since autism is a reasonably heterogeneous and currently only behaviorally defined disorder, it is certainly possible that subgroups differing in the level and characteristics of language impairments are being lumped together, their differences averaging out so that no significant pattern emerges (Eigsti et al., in press). Thus, larger samples need to be assessed, in such a manner that methods have enough power to identify subgroups.

Kjelgaard and Tager-Flusberg (2001) found that, while several children with autism performed badly on standardized tests of language, there were also some who did not have any difficulties. However, Kjelgaard and Tager-Flusberg (2001) mostly used vocabulary- and articulation-related tasks. There was only one test in their battery designed to assess matters related to syntax, the CELF; and out of a sample size of 89 children, there were only *five* „whose language skills, across all the measures, were well within the normal range” (p. 300).

More recent research using different metrics of grammar acquisition (like the IPSyn and the TROG) does not support the existence of a non-deficient subgroup (Eigsti et al., in press; Takács, 2007), though no effort has been made to assess the syntactic abilities of adults. It is possible that grammar acquisition is slowed *in addition to* being atypical.

Furthermore, subgroups in grammar acquisition designated along some criteria other than the simple absence or presence of grammatic impairment are possible, possibly along cognitively-based diagnostic differences. Paul et al. (2004) show that children diagnosed with autism and PDD-NOS³ mainly differ in the domain of expressive language, encompassing both pragmatics *and* syntax; and not in all autism spectrum characteristics, as they originally expected.

3 Pervasive Developmental Disorder, Not Otherwise Specified; a disorder on the autism spectrum not identical to classic autism.

4. Specific patterns of impairment

Because of the lack of strict modularity mentioned above (less rigid forms of modularity are of course possible), constructionist approaches assume that language is reasonably dependent on cognition. This means that all forms of atypical cognition have their parallels in language acquisition – not just autism, but other developmental disorders like Williams syndrome, Down's syndrome etc. correspond to different patterns of language impairment. (There is now an ample body of data showing this phenomenon in Williams syndrome – e.g., Laing et al., 2002.) Even when surface performance reaches that of typically developing counterparts, it is assumed that the underlying neural mechanisms are different; this can be detected with neuroimaging and thus the assumption investigated. In fact, some of this kind of research is already being done: recently there has been an amount of evidence from evoked potential experiments showing that auditory processing, while not necessarily grossly deficient as measured by behavioral performance, is implemented differently in the brains of people with autism as opposed to typically developing controls (Jansson-Verkasalo et al., 2003, 2005; Kujala et al., 2005).

Impaired language acquisition in autism has often been looked upon as a form of 'SLI light', a mild case of Specific Language Impairment, a different disorder; e.g., Kjelgaard and Tager-Flusberg (2001) claim that „the profile of language performance found among the children with autism who have borderline or impaired language abilities mirrors what has been reported in the literature on SLI” (p. 304). However, the similarity usually does not extend too far into the domain of grammar; even in Kjelgaard and Tager-Flusberg (2001), it turns out that the aforementioned autism-SLI parallel only means „poorer performance on tests of grammatical ability than vocabulary [...] even when [children] have good articulation skills, [they] show systematic difficulties on tests of non-word repetition” (p. 304). The exact pattern of grammatical ability is not investigated in detail.

As mentioned above, Eigsti et al. (in press) found that the syntactic profile of children in their experiment was uneven in comparison with what could be expected on the basis of language disorders; children with autism could produce certain forms that are usually assumed to be harder, but had problems with some simpler ones. While it is impossible to reach conclusions without having access to their raw data, an admittedly vague guess can still be hazarded: since the IPSyn test they used was designed with traditional notions of grammar in mind, unusual IPSyn patterns might be better explained using alternative theories.

Some of the author's own research further strengthens the hypothesis that autism is not simply mild SLI (Takács, 2007). In a test of receptive syntax, some of the grammatical constructs seriously impaired in an autism group were not involved in an SLI

group at all; one category of them was even an area of relative strength in SLI! While available data strongly suggests a link between autism and SLI (see the next section), the relationship between syntactic impairment in these two disorders is probably better categorized as an overlap (as e.g., in Bishop, 2003) rather than a containment relation.

5. The broader phenotype

Two issues can be investigated here: first, the question of overlap between autism and other developmental disorders; second, since autism is made up of a spectrum of impairments, relatives of people with autism who have not been diagnosed themselves might still have some autistic traits – while these issues have originally been raised in relation to general cognition, both can also apply to language.

Recently, Bishop (2003) has argued for autism and SLI having common underlying factors, based on three findings: 1. structural language impairments are similar in both;⁴ 2. some children do not clearly belong to either category, but have „mixed” symptoms instead; and 3. relatives of people with autism are often affected by language disorders. She cites Bartak et al. (1975), who found that out of 47 children either with autism or developmental dysphasia (ie. receptive SLI), 5. could not be readily classified as belonging to one group. This sample was investigated again in middle childhood and in adulthood, and, as time progressed, differences between the two groups grew markedly less pronounced. There has also been some evidence that a few children who show pragmatic impairments are otherwise sociable and definitely not autistic (Bishop and Norbury, 2002). Vice versa, in the same study an unexpected amount of autistic symptoms were found among SLI children. Rapin (1996) discovered an overlap between family histories of individuals with these disorders.

However, there undeniably exist reasonably clear cases of pragmatic and structural language impairment. Bishop (2003) claimed that children with autism usually have good phonological production skills, something that is not true of children with SLI. Symptoms tend to cluster together, so their inheritance would also preferably be linked. Keeping all the above in mind, she posits that „a range of genetic risk factors” (p. 220) will influence the development of different brain systems, and these effects will lead to a range of outcomes. Since there is also an overlap between the above-mentioned deficits and other developmental disorders such as dyslexia or ADHD, the

4 Some of the other results quoted here (especially Eigsti, in press) and some of the author's own findings (Takács, 2007) contradict this, see the previous section; but Bishop's other two arguments still stand.

problem of drawing the line understandably arises. These factors are genetic, but they only describe potential risk, and indeed quite a lot can depend on the environment: e.g., there is a case study by Rapin (1996) which describes monozygotic twins, one with classic autism and one with SLI.

Bishop et al. (2004) compared a sizable sample of autistic and PDD-NOS children ($n = 80$!) to typically developing controls and their families on a nonword repetition and a nonsense passage reading task. The children with autism scored much worse than the controls, but a similar pattern was not repeated in family members, so it was concluded that phonological processing deficits were not contained in the broad autism phenotype.

Obviously, this topic needs further investigation that goes beyond case studies and the occasional experiment. Unfortunately, actual research in broader-phenotype issues has not yet caught up to the attention this question has received recently, but this will hopefully change with time. Fortunately, the concept of the broader phenotype has not been originally associated with language, and this means it is freer of the baggage of preconceptions than the other two issues raised here. Also, researchers who study such graded phenomena are less likely to believe in a sharply defined language module.

A new result from Bishop, Maybery, Wong, Maley and Hallmayer (2006) shows that there are indeed promising signs: syntax was the subscale of the CCC-2 (a test of communication) which could differentiate best between siblings of children with autism and controls.

6. Conclusions and further questions

Even though there has been little investigation into grammar in autism, results are by no means as unequivocal as those ignoring the issue would prefer to believe. Classic assumptions of a strictly modular 'language faculty' that develops with little recourse to the environment have provided researchers with a set of predictions that do not hold up well even on the present amount of data. The probable reason why no major autism researcher has switched to alternative theories⁵ is that they feel the issue is marginal and not likely to hold further surprises. Unfortunately, this is largely a case of circular reasoning and stems from their own representations of language, as we have seen above.

⁵ There are a handful of connectionist modelers who have made brief excursions to the field of pervasive developmental disorders, with mixed success. Some of the better attempts are: Balkenius and Björne (2004); de Carvalho, Ferreira and Fiszman (1999).

Fortunately, the more attention one directs toward empirical data, the more important issues of grammar seem; e.g., in their review, Rapin and Dunn (2003) find it „surprising” that others would conclude „that phonology and syntax are not involved in autism”, and claim such conclusions are likely the result of non-representative sampling methods (p. 171). Though they also hypothesize subgroups, they go beyond a simple dichotomy, and provide easily testable hypotheses on their nature.

Autism would be especially well-suited for testing syntactic patterns because of the large volume of *pragmatic* investigations that use some kind of syntactic test as a criterion of inclusion, which data is then discarded. For instance, many researchers have administered the TROG (Bishop, 1989) to groups of autistic children (e.g., Wellman et al., 2002), but this large amount of data has gone unanalyzed.

It would be desirable to assess receptive and productive grammar in adults with autism, as mentioned above, as it is highly likely that the acquisition process eventually catches up when there is no additional cognitive impairment. However, under demanding conditions, these mechanisms might break down easier; there is certainly an amount of anecdotal evidence suggesting such a possibility. We should by no means discount the reverse, namely that different processes might lead to better adaptations in some cases, either.

Autism would also be ideal for testing hypotheses about the interaction of grammar and pragmatics - which pragmaticians tend to shy away from - and, similarly, cognition and language. Since it is possibly the most intensely studied developmental disorder, it might even be of interest to theoretical linguists attempting to find psycholinguistic tests for the validity of their theories.

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