Comparing the Number of Syntactic and Morphological Mechanisms Used by Nigerian Children with Features of Asd and Sli

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Abstract
The similarity between language impairments in people with ASD and those diagnosed with SLI appear controversial. This study compares the number of syntactic and morphological components (SMs) employed by Nigerian children with features of an autism spectrum disorder (FASD) and their peers with structural language impairments (SLI). Fourteen children with FASD were matched with 14 children for mean length of utterance (MLU), sex, socio-economic status and language spoken at home. All came from middle income backgrounds and spoke English as their primary language. They had a mean MLUm of 2.1 morphemes and ranged in age from 2-12 years. The male: female ratio was 9:5 in favour of boys. A spontaneous language sample was obtained from each child during a 2 hour play session. The results were analyzed non-parametrically. They adduced that with MLU held constant; children in the FASD condition were significantly older than those with SLI. The number of utterances (UU) were held constant. Significantly more SMs were utilized by children with SLI than those with FASD. A positive correlation was found between MLU / SMs and MLU /UU for both groups. The strength of these relationships varied for each group. These results were interpreted with caution given the small sample size. The hypothesis that language impairment in FASD sufferers follows equivalent patterns to that exhibited by people with SLI was not upheld. Studies have highlighted differences in the linguistic abilities of Nigerian children with FASD and reports from the West. Implications for further research were addressed.

Key words: ASD, SLI, syntax, morphology, comparisons, Nigeria.

Introduction
Until recently, pragmatic language disorders have been the primary research focus for spoken language deficits in ASD sufferers (Bishop, 2003). Current studies have suggested however that for a sub-group of people with ASD, SLI may be co-morbid with overlapping symptomatology (Tager-Flusberg, 2006; Whitehouse, et al., 2007 & Verhoeven, et al., 2012). Research has reported similar syntactic deficits between what has been dubbed as ASD, LI and people with SLI. Findings by Leyfer, et al., (2008) support a possible overlap in the symptoms of ASD and SLI. In their study, an approximate 40% of those with SLI met the diagnostic criteria for ASD on standardized ASD tests. Whitehouse, et al., (2008) noted parallels between the language profiles of their sample with ASD and those with SLI, while reporting disparities in their performance on short-term memory and non-word repetition tasks. A study of toddlers with ASD and neuro-typical late talkers found similarities in the syntactic complexity of both groups (Weismer, et al., 2011). McGregor, et al., (2012) examined two sub-groups of children with ASD and one
group with SLI. The first group with ASD had no attendant language deficits while the second ASDLI group had structural language impairments. The latter performed equivalently to the group with SLI on syntactic tasks. The performance of the first sub-group with ASD but no syntactic deficits was comparable to their regular peers.

On the other side of the divide, there is a dissenting voice amongst some researchers. Williams, et al., (2008) in a review of the literature adduced a very small potential linguistic overlap between ASD and SLI sufferers. They averred that a vast majority of the data reviewed did not support co-morbidity between the two groups. A study by McConnell, (2010) reported that high functioning children with ASD minus language deficits used similar syntax to their neuro-typical peers. She also observed that children from an ASDLI sub-group actually demonstrated a wider range of linguistic abilities than did their counterparts with SLI alone. Sukenik & Friedmann (2013) argued that syntactic errors made by ASD sufferers with language deficits were completely different from those made by SLI sufferers or any other group with language impairments including those with intellectual handicaps.

MLU is considered to be a standard measure of syntactic complexity in children with emerging grammars (Brown 1973; Parker, 2005; Rice, et al., 2010 & Ranalli, 2012). A study of MLU-m matched 56 Nigerian children with SLI and peers with features of ASD for age and sex (Nwanze & Williams, 2013). The authors discovered significantly more severe spoken language delays amongst children with FASD than those with SLI alone. In the present study, they examine the number of syntactic and morphological components (SMs) present in the speech of a small sample of children with FASD and SLI matched for syntactic complexity. They authors hypothesized that with MLU and UU held constant, both groups would produce an equivalent number of SMs in their utterances.

Method

Participants

The 28 children who participated in the study were recruited from the speech therapy clinic of the Lagos university teaching hospital (LUTH) Nigeria prior to the onset of intervention. They ranged in age from 2 to 12 years. Fourteen children with FASD were matched for MLU-m, sex, socio-economic status and language spoken at home with 14 children with SLI alone. Only children with an MLU exceeding 1 morpheme were included in the study. All the children came from middle income English speaking backgrounds. There were 18 boys and 10 girls.

Materials

1. A doll’s house with a boy and girl doll.
2. A toy car with a slot in doll.
3. A toy plate, cup, cutlery and a water bottle, plastic food: - apple, banana, orange, bread, biscuit, chicken, egg, ice-cream, tomato, corn on the cob, a milk bottle and a juice packet.
4. A toy train, boat, bus and aeroplane.
5. Shape sorter.
6. Stacking disc and/or a set of graduated cups.
7. A set of 12 pictures each depicted a child performing one of the following actions: - sitting, standing, walking, eating, crying, sleeping, running, waving, crawling, hopping, singing and talking.

Procedure

Selection of FASD group

The DSM-IV checklists were completed for each child referred for speech therapy who exhibited a behaviour disorder. The DSM-IV stipulates that for a diagnosis of ASD, a minimum of 4 characteristics from the checklist be evident: two from category A and one each from Category’s B and C. (American
Psychiatric Association 1994). The children selected for this study met the DSM-IV criteria for a diagnosis of ASD. Of the 156 children who met these criteria; 32 (20.5%) had an MLU of over 1 morpheme. Of the 32, an SLI match was found for the 14 who participated in the study. A parent interview also included only children whose motor developmental milestones were attained within normal limits.

Selection of SLI group
For the purpose of this study, the term *structural language impairment* refers to children with language impairments interfaced with an otherwise average profile of abilities. Children whose parents reported delays, limited to speech alone were recruited for the study. A parent interview selected children with normal development in the areas of self help skills (e.g. toilet training, feeding, and dressing) and no delays in the acquisition of early motor developmental milestones i.e. cited delayed speech as their only concern.

Socio-Economic Status
The children were matched for their father’s educational level and occupation (or that of the primary bread winner) and locale. Within the Lagos metropolis, locale effectively distinguishes between the various economic strata of society.

Obtaining speech sample
A spontaneous speech sample was elicited informally from each child during a 2 hour play session. Each child was seen individually in a clinical setting. A parent was present. The authenticity of the speech sample obtained during play was validated by the parent. A set of toys and flash cards were presented to the child. The investigators’ comments ran as follows as they presented the items: - take/look at this or what are you/is he or she doing? The toys were presented in separate sets as listed above.

Computing MLU-m
The MLU-m was computed for each child as instructed by Brown (1973).

Extraction of syntactic and morphological structures (SMs)
Each utterance was examined for the use of the following syntactic components: - verbs; auxiliary verbs e.g. *is, are, am, have*. Also located were pronouns e.g. *I, you, he, she, they*. Prepositions- *e.g. in, on, under* etc and conjunctions. The following morphology was also extracted- tense markers: - present continuous tense….ing, regular past tense….ed and the irregular past tense e.g. *swam, fell, ate* etc. Each type of tense marker was counted as a separate component. Also extracted were plurals, articles and negatives e.g. Don’t, can’t. The use of questions was included.

Utterance unit (UU)
A UU was defined as a segment of speech unbroken by a pause of 1 second or longer. The number of UUs made by each child was computed. For the extraction of SMs, UU was held constant by limiting the analysis to the number of UUs of the lowest UU child in each matched pair.
Statistical analysis
Due to the small sample size in the study, all the data was analyzed non-parametrically. The Wilcoxon Matched Pairs Signed Ranks Test was employed to test the significance of difference between the two groups. The Spearman Rank Correlation Coefficient was employed to evaluate associations.

Results
Approximately 80% of the children with FASD seen at LUTH had MLUs of below 1 morpheme. Hence just over 20% could be reviewed for the study. Forty four percent of these found a compatible match with a child diagnosed with SLI. These 14 peers participated in the study. The children with FASD had a median MLU of 1.6 morphemes and those with SLI a median of 1.7 morphemes. The male/female ratio was 9:5 in favour of boys. All the children came from a middle socio-economic background. English was the primary language spoken in each home.

Table 1: Mean ages, MLUs and number of SMs

<table>
<thead>
<tr>
<th></th>
<th>FASD</th>
<th>SLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE IN YEARS</td>
<td>5.8</td>
<td>3.6 *</td>
</tr>
<tr>
<td>MLU IN MORPHEMES</td>
<td>2.00</td>
<td>2.2</td>
</tr>
<tr>
<td>NUMBER OF SMs</td>
<td>5.7</td>
<td>8**</td>
</tr>
<tr>
<td>UU</td>
<td>72</td>
<td>115</td>
</tr>
</tbody>
</table>

* P<.05 (N=14; z score= -1.989)
** p<.03 (N=14; z score= -2.186)

The children in the FASD group were about 2 years 2 months older than were those from the SLI group. This was significant at the p<.05 level. With MLU-m held constant, the children with SLI employed an average of 2 more SMs than did those in the FASD condition. This difference was significant at the p<.03 level. Children with FASD employed a median number of 4 SMs. Their matched pair with SLI utilized a median number of 7 SMs. The following morphological constructs were used sparingly by both groups: - pluralization, the regular and irregular past tense markers and negation. Syntactically, the use of conjunctions to link phrases together was also infrequent. In addition, there was the minimal use of questions by both groups. Children with SLI spoke more within the same time frame than did those in the FASD condition. This difference did not however reach significance.

Table 2: Spearman Rank Correlations

<table>
<thead>
<tr>
<th></th>
<th>FASD</th>
<th>SLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE/MLU</td>
<td>.265</td>
<td>.29</td>
</tr>
<tr>
<td>AGE/SMs</td>
<td>-.05</td>
<td>.27</td>
</tr>
<tr>
<td>AGE/UU</td>
<td>.13</td>
<td>.36</td>
</tr>
<tr>
<td>MLU/SMs</td>
<td>.74**</td>
<td>.48*</td>
</tr>
<tr>
<td>UU/SMs</td>
<td>.79**</td>
<td>.85**</td>
</tr>
<tr>
<td>MLU/UU</td>
<td>.734**</td>
<td>.52*</td>
</tr>
</tbody>
</table>

*p<.05
**p<.01

The children’s ages were not associated with any of the other variables in either group. Their MLUs were significantly positively correlated with the mean number of SMs utilized. The relationship was however
far stronger for children in the FASD than those in the SLI condition. The higher MLU-m children in both groups spoke more but here again this correlation was stronger for the children with FASD. There was a positive correlation for both groups between the quantity of speech used and the number of SMs employed. This relationship was stronger for children with SLI.

Discussion
Less than a quarter of the FASD children processed within the past 2 years at the LUTH speech clinic had emerging grammars. This lends support to indications from a review of the African literature on ASD, that their spoken language skills appear to be poorer than those reported by the West (Bakare & Munir, 2011). Both groups in this study exhibited delays in the development of syntax and morphology. The acquisition of grammar emerged in participants with FASD at a significantly later age than it did in peers with SLI. A mean MLU of approximately 2 morphemes is adduced for typically developing children at 24 months and 2.5 morphemes by 30 months (Otto, 2002). The children with FASD achieved an MLU of 2 morphemes at close to 6 years old and the group with SLI at about 3½ years of age recording delays of almost 4 years and 1½ years respectively.

MLU-m is widely regarded as a standard measure of syntactic complexity for emerging grammars (Brown 1973; Parker, 2005; Rice, et al., 2010 & Ranalli, 2012). In the present study it was held constant. Our results adduced that for the two groups matched for MLU the children with SLI were utilizing significantly more SMs in their spontaneous speech than were peers with the FASD condition. The hypothesis that the number of SMs utilized by both groups would be equivalent was therefore not upheld. More comparable were the grammatical correlates of their speech. In both groups the higher MLU-m children spoke more and used a wider variety of SMs than did the lower MLU children. The intensity of these correlations did however vary between groups. MLU associations were far stronger in the FASD group than in the SLI group. The results of this study weighed in on the side of the argument that structural language impairments in ASD sufferers exhibit some differences from those experienced by people with SLI. They must be interpreted with caution however due to the small sample size. It is possible that these differences reported may be peculiar to this sample or to the presentation of structural language impairments in Nigerians with FASD. The children in this study were evaluated prior to any speech and language intervention. Their language skills may have been modified by the limited availability of speech therapy in Nigeria amongst many other African countries (Bakare & Munir 2011; Abidoun, et al., 2012 & Nwanze, 2013). Further research is needed on a larger sample of children to confirm their grammatical profiles. Perhaps language intervention may reshuffle the variables. McConnell, (2010) also reported disparity but in her study the reverse obtained. The ASDLI sufferers presented a wider range of linguistic abilities than did those who had SLI alone. McGregor, et al., (2012) on the other hand found the grammatical performances of their two groups to be at par. Apparently, suggestions that structural language impairments in people with ASD are the same as those exhibited by sufferers of SLI alone are still controversial and require more extensive investigation.

References

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