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# Frequency of verb use in young children who stutter

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**Abstract**

Several recent studies have suggested that young children who stutter (CWS) tend to show depressed lexical performance relative to peers. Given the developmental literature as well as several studies of verb processing in individuals who stutter, verbs may pose a particular challenge for this group. The purpose of the present study was to examine verb use in CWS. In theory, if young CWS differ in their production of verbs, this finding would partially explain the findings of studies that probed conversational vocabulary skills more generally. Fifteen CWS and 15 children who do not stutter (CWNS) participated in a play-based conversational sample with a parent. Samples were analyzed for the total number of verbs, the number of different verbs, and the proportion of general all-purpose (GAP) verbs within the samples. CWS produced significantly fewer different verbs and total verbs than the CWNS. However, previously reported near-significant differences in utterance length between groups would appear to temper the robustness of this finding. The groups did not differ in the proportion of GAP verbs used, suggesting that the CWS did not over-rely on GAP verbs in conversational language production but rather used these verbs to the same extent as their peers.

***Educational objectives*:** As a result of this activity, the participant will be able to: (1) relate the purpose and rationale for examining verb use in children who stutter (CWS); (2) summarize the procedures used to assess verb use and GAP verb use in the present study; (3) explain the findings of the present study; (4) relate findings to the extant literature on lexical diversity in CWS.


*Keywords:* Stuttering; Preschool age; Verb use; GAP verbs; Vocabulary

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## 1. Introduction

There is a longstanding literature that has examined whether the language abilities of children who stutter (CWS) are equivalent to those of children who do not stutter (CWNS; e.g., see Bernstein Ratner, 1997, for a review). The need to more closely examine lexical features of language produced by CWS is motivated by several recent findings suggesting depressed lexical performance of CWS relative to peers (Anderson & Conture, 2000; Bernstein Ratner & Silverman, 2000; Pellowski & Conture, 2005; Silverman & Bernstein Ratner, 2002; see Hall, 2004, for a discussion).

For example, Bernstein Ratner and Silverman (2000) assessed 15 CWS, each of whom was within 4 months post-onset of stuttering, and 15 normally fluent peers. A variety of language skills, including lexical skills, were examined through formal testing and language sample analysis. The results indicated that the CWS did not differ significantly from peers in their one-word receptive vocabulary scores, but they had significantly lower expressive vocabulary scores than the CWNS. Later inspection of the children's conversational vocabulary, using *vocd* (Malvern & Richards, 1997; Malvern, Richards, Chipere, & Duran, 2004), a measure of lexical diversity that takes into account differences in sample size across participants, revealed that the samples of CWS yielded significantly lower *vocd* values than those of CWNS (Silverman & Bernstein Ratner, 2002).

More recently, Pellowski and Conture (2005) administered a lexical priming task to children, aged 3;0–5;11 years. They found that, though CWNS benefited from a semantically related prime, demonstrating faster speech reaction times when a prime was presented, CWS did not display the same advantage under the prime condition. The authors interpreted these findings as suggestive of lexical encoding difficulties for CWS.

Young children who have *recently* begun to stutter are a particularly relevant population with respect to questions of the relationship between language and stuttering, because these children are in the early stages of their language development; the interaction between language learning and stuttering is most likely to be seen during this crucial time in development. Although there is a sizable and growing body of studies examining vocabulary performance of CWS on standardized measures (e.g., Anderson & Conture, 2000; Anderson, Pellowski, & Conture, 2005; Bernstein Ratner & Silverman, 2000; Murray & Reed, 1977; Ryan, 1992, 2001; Westby, 1974) and conversational language samples (e.g., Silverman & Bernstein Ratner, 2002; Watkins & Yairi, 1997; Watkins, Yairi, & Ambrose, 1999; Westby, 1974), to our knowledge, none have explored the underlying qualities of the words that comprise the lexicon of CWS.

### *1.1. Acquisition and use of verbs*

Verbs, or action words, are a particularly interesting class for exploration of observed lexical differences. The developmental literature suggests that verbs are more difficult than nouns for young children developing language (e.g., Camarata & Leonard, 1986; Gentner, 1978, 1982; Gleitman, Cassidy, Nappa, Papafragou, & Trueswell, 2005; Lidz & Gleitman, 2004). For example, Camarata and Leonard (1986) examined young, typically developing children between the ages of 1;8 and 2;1 years in the production of emerging consonants within each child's phonological repertoire. For each child, 10 nonword objects and 10 nonword actions were designed such that their phonological makeup consisted of emerging sounds within the child's repertoire. Object and action nonwords were matched for consonant and syllable structure. Following eight sessions involving exposure to the nonwords, children responded to post-test production probes of the target object or action. Results were that children produced emerging consonants less accurately

in novel action words than in novel object words. The authors suggested that the results point to an interaction between phonology and semantics. Thus, the greater semantic complexity of action words manifests itself in a greater number of phonological errors on action words compared to object words.

First verbs tend to emerge later than first nouns in children's language development. One explanation for this observation is that, while nouns can be learned individually, following exposure to the concepts to which they are linked, verbs are learned based on an understanding of relationships between objects or ideas (e.g., see Gentner, 1978, 1982, for discussions). Thus, verb learning is critical from a developmental standpoint, because it plays a pivotal role in the conceptualization of the syntactic structure of utterances (Gentner, 1978, 1982; Gleitman et al., 2005; Gropen, 2000; Lidz & Gleitman, 2004). Verbs can be categorized into groups of similar meaning, such as verbs of giving, showing, creating, moving, etc. Verbs within categories tend to have the same argument structure, which can help a child infer syntactic information about a new verb, based on similar verbs the child already knows (see Gropen, 2000, for a detailed discussion).

### *1.2. GAP verb use*

An aspect of verb use, one that has been an area of focus within the specific language impairment (SLI) literature (Kelly, 1997; Rice & Bode, 1993; Thordardottir & Ellis Weismer, 2001; Watkins, Rice, & Moltz, 1993), is the extent to which children rely on *general all-purpose (GAP) verbs*, high-frequency verbs that can take the place of more specific lexical items. For example, a child might choose *go*, a GAP verb that can take the place of a large set of more specific verbs, including *leave*, *ride*, *walk*, *drive*, *sail*, etc. GAP verbs are generally acquired early in development. Campbell and Tomasello (2001) have argued that children's development and use of GAP verbs (or "light" verbs) early on is most likely due to the frequency with which input to children contains these verbs. That is, one interpretation is that children use these verbs early because adults use them with much greater frequency and across a much greater range of contexts than more specific (or "heavy") verb choices. Another explanation, which is not mutually exclusive, is that children (as well as adults) rely to a greater extent on GAP verbs because it is more efficient to retrieve these verbs from the mental lexicon than a more specific verb. Whether or not either of these possibilities is correct, it is clear that children with typically developing language do, in fact, frequently use GAP verbs in their output (e.g., see Goldberg, 1999, for a discussion).

From a methodological perspective, studies of conversational verb use in CWS should consider the potential impact of GAP verbs on subsequent lexical diversity measurement. Given that GAP verbs are high frequency lexical items (suggesting quick lexical retrieval) and are motorically simple, monosyllabic words, one hypothesis is that CWS may rely on GAP verbs to a greater extent than normally fluent peers. That is, for CWS, the use of GAP verbs may not only serve as a linguistic strategy (i.e., making lexical retrieval more efficient), as it appears to for CWNS, but also serve as a motoric strategy for fluent speech production. Thus, if CWS use GAP verbs to a greater extent than CWNS, this finding would uncover at least one factor contributing to findings of reduced lexical diversity in CWS.

Studies of GAP verb use in children with SLI have sought to assess whether children with SLI differ from peers in their use of these verbs as a potential language production strategy (Kelly, 1997; Rice & Bode, 1993; Thordardottir & Ellis Weismer, 2001; Watkins et al., 1993). These studies provide a methodological base for the present study, in that each resulted in a list of GAP verbs emerging from the samples. Although the methods by which the authors arrived at their lists varied somewhat, the word lists themselves are fairly similar.

### *1.3. Verb use in individuals who stutter*

The extent of GAP verb use in CWS, as well as the range of verbs used by these children relative to normally fluent peers, is an important issue in several respects. First, as has been suggested within the developmental literature, the use of GAP verbs may serve to make language production more efficient, because these verbs are high frequency and motorically simple. It is possible, then, that CWS, in an attempt to remain fluent, may choose a motorically simple word choice over a more specific lexical item with greater phonological complexity. There has been some suggestion in the treatment literature that CWS may differ in the inferences they make about how to "change" their speech in order to produce fluent speech. Onslow, Bernstein Ratner, and Packman (2001), for example, found that two CWS who received treatment with response contingent stimulation (defined as "time-out") reduced the frequency of their stuttering; however, for one child, the reduction was accompanied by vowel duration changes in speech, and for the other child, the reduction was accompanied by a change in lexical diversity and language productivity (also see Bonelli, Dixon, Bernstein Ratner, & Onslow, 2000; Onslow, Packman, Stocker, van Doorn, & Siegel, 1997). Although the present study is not a treatment study, findings of Onslow et al. (2001) and Bonelli et al. (2000) suggest that CWS, when not provided specific fluency strategies by a clinician, may infer the speech and language changes needed to produce fluent speech.

A second issue that highlights the importance of understanding verb use in CWS is that, if CWS are, in fact, using a greater proportion of GAP verbs than peers or a smaller range of different verbs overall, then previous findings of differences in vocabulary diversity overall may be impacted by the children's verb use, in particular. That is, the use of GAP verbs can have the effect of making a child's expressive vocabulary appear worse than it is. If CWS produce a higher proportion of GAP verbs than peers, traditional measures of lexical diversity, such as type-token ratio (Templin, 1957), number of different words (Templin, 1957; Watkins, Kelly, Harbers, & Hollis, 1995), and *vocd* (Malvern & Richards, 1997) would yield results suggesting poorer lexical skills. The same is true of verb use in general; if it were found that CWS use fewer verbs than CWNS, reduced verb use could be the underlying factor (or one of several factors) that results in the group differences observed in lexical diversity overall.

It appears that verb use has not been an area of focus in CWS, but several studies have employed tasks involving verb generation or syntactic processing in adults who stutter (AWS; Bosshardt & Fransen, 1996; Cuadrado & Weber-Fox, 2003; De Nil, Kroll, & Houle, 2001; Prins, Main, & Wampler, 1997). For example, Prins et al. examined naming latency in AWS and normally fluent counterparts. They found that the AWS had significantly longer naming latencies than adults who do not stutter (AWNS), a difference which was six times longer for verb stimuli than for noun stimuli.

More recently, Cuadrado and Weber-Fox (2003) administered a grammaticality judgment task to AWS and AWNS. The grammaticality judgments involved making yes/no decisions about verb agreement. Online and offline versions of the task were administered, and ERPs were measured during the online task. The investigators found that the AWS were significantly less accurate than AWNS in the online grammaticality judgment task, but there was no significant difference on the offline, paper-and-pencil task. In addition, ERP findings suggested that, while the ERPs of AWNS showed the predicted P600 pattern observed in previous investigations, the AWS showed an atypical P600 pattern, reduced in amplitude and limited to two anterior lateral sites of the right hemisphere. Thus, results suggest subtle difficulties in grammatical (verb agreement) processing in AWS relative to AWNS.

In sum, then, given findings that (a) the acquisition of verbs represents a challenging linguistic milestone for typically developing children (e.g., Gentner, 1978, 1982), and (b) AWS appear to show some subtle differences in verb processing (Cuadrado & Weber-Fox, 2003; De Nil et al., 2001; Prins et al., 1997), examination of lexical diversity of verbs in CWS would appear to be an important next step. Moreover, given that GAP verbs are high frequency and motorically simple, supplying a potential motivation for their use by CWS in attempting to maintain fluent speech, examination of GAP verb use in CWS seems particularly important in understanding verb use in these children. Particularly in light of observed differences in lexical diversity overall (e.g., Silverman & Bernstein Ratner, 2002), it seems critical to explore verb use as a possible underlying variable impacting the measurement of lexical diversity.

The purposes of this study are to examine verb use in the spontaneous language of CWS and to test the hypothesis that CWS use GAP verbs to a greater extent than CWNS in their language output. The research questions were: (a) Do CWS differ from CWNS in the number of different verbs (NDV) and/or the total number of verbs (TNV) produced in their language samples? and (b) Do CWS differ from normally fluent peers in the proportion of verbs that are GAP verbs, both as defined by previous studies of GAP verb use, and as defined by verbs that occurred within the present samples with high frequency?

## 2. Method

### 2.1. Participants

The children are the same as the participants in the Bernstein Ratner and Silverman (2000) and Silverman and Bernstein Ratner (2002) studies. Fifteen CWS (mean age: 35 months; range: 27–47 months) and 15 age-, gender-, and SES-matched controls (mean age: 35.67 months; range: 27–47 months) participated in the study. Participants for both groups were recruited through postings in pediatricians' offices in the greater Maryland-Washington, DC metropolitan area.

The children within each matched pair were within 3 months of one another in age. Gender matching resulted in 12 pairs of male children and 3 pairs of female children. SES matching was performed using maternal education level ($M = 16$ years). Each of the children was from a middle to upper-middle class family, as reported by the parents in the study. None of the children were suspected by their parents of having a speech or language delay. Thus, none of the children had received a speech–language assessment prior to the study.

Parents of the children completed an interview at the beginning of the study. For the CWS group, children who had been stuttering for 4 or fewer months, according to parent report, were selected for the study. The average time since stuttering onset was 2.53 months. Percent stuttered words was calculated from the same language samples as were used for language analyses. The children had an average stuttering frequency of 9.5% (S.D. = 7.2, range = 2.0–25.2%).

### 2.2. Assessment of lexical skills

As part of a larger protocol of language measures, each participant received a test of one-word receptive vocabulary (*Peabody Picture Vocabulary Test – Revised*, *PPVT*; Dunn & Dunn, 1981) and a test of one-word expressive vocabulary (*Expressive One-Word Picture Vocabulary Test*, *EOWPVT*; Gardner, 1990). As is reported in Bernstein Ratner and Silverman (2000), the CWS obtained significantly lower expressive vocabulary scores than the CWNS, but their receptive scores were not significantly different.

In addition to the standardized measures administered, a parent/child play-based speech and language sample was obtained. Each sample was obtained in a sound-treated observation suite using a standard set of toys. The primary interactants were the child's mother or father and the child. For the CWS, 12 of the language samples were obtained with the children's mothers, 2 were obtained with their fathers, and 1 was obtained with both (i.e., the sample was begun with the father, and the second half was completed by the mother). For the CWNS, all 15 language samples were completed by the children's mothers. In half of the cases (7 for CWS and 8 for CWNS) a clinician was in the room and occasionally interacted with the parent or child, but in each instance, the clinician was not central to the interaction as a whole.

Samples were video- and audio-recorded. Following each session, language samples were transcribed according to the conventions of *CHAT*, to enable the use of the language analysis system *CLAN* (MacWhinney, 2000). From each sample, the middle 50 utterances were selected for analyses. In two instances (one instance within each group), it was not possible to obtain 50 complete and intelligible utterances from the children. Analyses for those two samples were based on 31 utterances for the CWS and 49 utterances for the CWNS.

Prior analysis of the lexical diversity of the children's language samples, using the *vocd* utility (Malvern & Richards, 1997) of the language analysis system *CLAN* (MacWhinney, 2000) revealed that, as a group, the CWS demonstrated less lexical diversity in their language samples than their normally fluent peers did (Silverman & Bernstein Ratner, 2002). Thus, the present analyses were undertaken to probe these findings, given that each group's use of verbs would impact the measurement of lexical diversity overall.

### 2.3. Identification of verbs

Identification of the verbs within the samples was performed manually. Using procedures outlined by Rice and Bode (1993), we did not count catenatives (e.g., gonna, hafta, wanna), contractions, auxiliaries, copulas, or modals. All other verbs were tabulated for each participant, so that (a) the number of different verbs and total number of verbs could be computed, and (b) each participant's verb list could be compared against the two GAP verb lists described below.

Intra-rater agreement was estimated by the first author re-identifying verbs within eight of the samples (25% of the dataset) one week after the first codings were completed. Inter-rater agreement was estimated by asking a graduate research assistant to identify verbs within eight samples. The formula used for computing agreement was the total number of verbs identified at both Time 1 and Time 2, divided by the total number of verbs identified at one or both times ("agreed verbs" + "disagreed verbs"). Intra-rater agreement was 98.8%, and inter-rater agreement was 97.5%.

### 2.4. GAP verb lists

Two lists of GAP verbs were developed in order to analyze GAP verb use in CWS and CWNS. The first GAP verb list, external to the samples of the present study, consisted of the identified GAP verbs from Kelly (1997), Rice and Bode (1993), Thordardottir and Ellis Weismer (2001), and Watkins et al. (1993). The list is provided in Table 1 and consists of 29 GAP verbs.

The second list was derived from the samples themselves, using a frequency-based definition. Any verb that occurred within the samples as a whole with a greater frequency than 1 S.D. above the mean was considered a GAP verb. The average verb frequency was 5.7 times (S.D. = 8.7).

Table 1
GAP verbs identified in each of four studies

| GAP verbs | Kelly (1997) | Rice and Bode (1993) | Thordardottir and Ellis Weismer (2001) | Watkins et al. (1993) |
|---|---|---|---|---|
| Bring | × | | | |
| Change | × | | | |
| Come | × | × | × | |
| Did | | × | | |
| Do | × | × | × | × |
| Eat | | | × | |
| Get | × | × | × | × |
| Give | × | | | |
| Go | × | × | × | × |
| Got | × | | | × |
| Have | × | | × | |
| Know | | | × | × |
| Leave | × | | | |
| Like | | | × | |
| Look | | × | | × |
| Make | × | × | × | |
| Move | × | | | |
| Need | | × | | |
| Open | | | | × |
| Play | × | | × | × |
| Put | × | × | × | × |
| Say | | | × | |
| See | | | × | × |
| Take | × | | × | |
| Think | | | × | |
| Try | | | × | |
| Want | | × | | × |
| Went | × | | | |
| Work | | × | | |

Therefore, for a verb to be considered a GAP verb, it had to occur at least 15 times within the samples as a whole. This procedure resulted in a list of 11 verbs. These verbs and their frequencies within the samples are listed in Table 2. Of importance, each of the 11 verbs identified within our samples was also present in the external list of verbs. Thus, our list constituted a subset of the external list.

As a form of external validation, Carroll, Davies, and Richman's (1971) word frequency dataset was consulted to estimate the frequency, within American English, of the 29 GAP verbs used in the study. Using the Standard Frequency Index (SFI), each of these words had an SFI value of greater than 60.0, meaning that all words would be expected to occur within the English language frequently, more often than once per 10,000 words.

Once the two lists of verbs to be included in the analyses were identified, for each sample, the following calculations were performed: (a) total number and number of different GAP verbs of those listed in Table 1 (external list), (b) total number and number of different GAP verbs of those identified from within the samples (see Table 2), and (c) the ratios of number of GAP verbs to total number of verbs for each of the two GAP verb analyses (external and within samples).

Table 2
GAP verbs identified from within the samples and percentage of the total number of verbs in the samples across groups

| GAP verbs | Total frequency | Percentage of total verbs (%) |
|---|---|---|
| Eat | 15 | 2.6 |
| Go | 55 | 9.5 |
| Have | 24 | 4.1 |
| Know | 30 | 5.2 |
| Look | 37 | 6.4 |
| Make | 19 | 3.3 |
| Need | 22 | 3.8 |
| Put | 24 | 4.1 |
| See | 16 | 2.8 |
| Take | 20 | 3.4 |
| Want | 31 | 5.3 |

## 3. Results

Analysis of the 15 language samples of the CWS and the 15 language samples of the CWNS resulted in the identification of 581 total verbs used and 323 different verbs used. Independent samples *t*-tests and Cohen's *d* were used to compare the groups and estimate effect size for the TNV and NDV used. CWS had significantly fewer TNV ($t(28) = 2.1$, $p < .05$, $d = .76$). This difference constitutes a medium to large effect. In addition, the CWS had significantly fewer NDV ($t(28) = 2.9$, $p < .01$, $d = 1.05$), a difference which constitutes a large effect. Group means and standard error are depicted in Fig. 1.

As a post-hoc analysis, the number of copulas produced by both groups was compared to determine whether CWS used more copulas than peers, as a substitute for lexical verb choices. If this were the case, it could explain the above findings that CWS used fewer TNV and NDV than CWNS do (recall that copulas were omitted from verb counts). Results indicated that, to the contrary, the group of CWNS produced more copulas than the group of CWS, a difference which approached significance ($t(28) = 1.9$, $p = .06$). Thus, the fact that the group of CWS

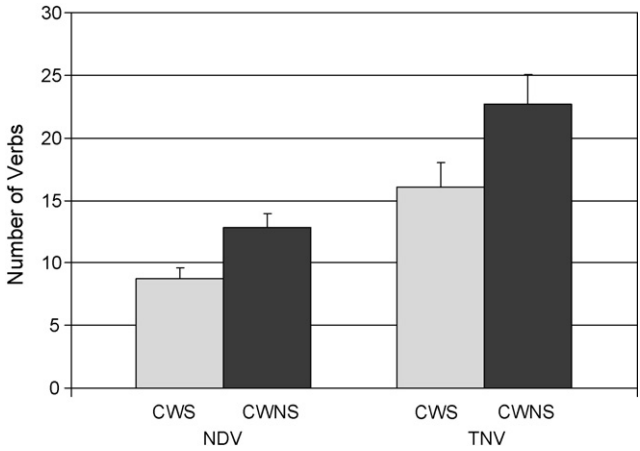


Fig. 1. Means and standard error for number of different verbs (NDV) and total number of verbs (TNV) for CWS group and CWNS group.

produced fewer TNV and NDV than did peers could not be accounted for by greater copula use by CWS.

Analysis of the children's use of GAP verbs, relative to the external list of GAP verbs provided in Table 1, revealed that the CWS had a total of 162 instances of GAP verb use, whereas the CWNS had a total of 234 instances of GAP verb use. Independent samples *t*-tests and Cohen's *d* indicated that the CWS used significantly fewer total GAP verbs ($t(28) = 2.1$, $p < .05$, $d = .77$; medium to large effect), and different GAP verbs ($t(28) = 2.4$, $p < .05$, $d = .88$; large effect) than CWNS. However, when the groups were compared using the ratio of GAP verbs produced to total verbs produced, there was no significant difference between the groups ($t(28) = 0.11$, $p > .05$, $d = .04$).

A similar picture emerged when the GAP verbs list generated from the samples was used as a reference. The CWS had a total of 119 instances of GAP verb use (from the list of GAP verbs in Table 2), whereas the CWNS had a total of 174 instances of GAP verb use. Again, an independent samples *t*-test and Cohen's *d* indicated that the CWS used significantly fewer different GAP verbs ($t(28) = 2.4$, $p < .05$, $d = .88$). This difference constitutes a large effect. However, the difference in total GAP verbs only approached significance ($t(28) = 2.0$, $p = .054$, $d = .73$; medium to large effect). When the groups were compared using the ratio of GAP verbs produced to total verbs produced, as in the previous analysis, there was no significant difference between the groups ($t(28) = -0.23$, $p > .05$, $d = .08$). Fig. 2 depicts the group means and standard error for these proportions for both GAP verb analyses.

Because sample sizes were small, resulting in reduced statistical power, it is relevant to note that only large effect sizes could be detected for the present analyses. Thus, the analysis of the total gap verbs, as derived from the present samples would possibly have reached significance with a larger sample. On the other hand, both analyses of the ratio of GAP verbs to total verbs were not likely impacted by small sample sizes; rather, as can be inferred from the *t* values ($t = .11$ and $t = -.23$), the means of the two groups were similar for these two analyses. In sum, although sample size is small, the two GAP verb findings of primary interest (the two ratios of GAP verbs to total verbs) were likely not impacted by lack of statistical power.

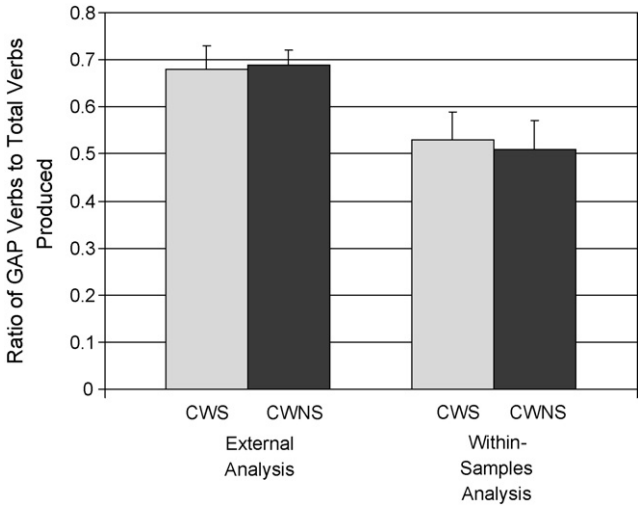


Fig. 2. Ratio of GAP verbs produced to total verbs produced for the external analysis and the within-samples analysis.

A series of post-hoc analyses was conducted to assess whether the nature of the conversational interaction provided by parents contributed to the children's production of verbs. First, an analysis of the number of parent questions preceding child utterances revealed that both parent groups asked a considerable number of questions ($M = 21.4$, S.D. = 10.4); parents interacting with CWS did not differ significantly from parents interacting with CWNS ($t(28) = -1.1$, $p = .27$). Next, the proportion of child verbs that were responses to parent questions was examined. Findings were that, on average, the group of CWS produced a similar proportion of verbs as responses to parent questions ($M = .29$, S.D. = .22) to the group of CWNS ($M = .26$, S.D. = .14). Thus, differences in children's verb productions between groups did not appear to be impacted by parent questioning behavior.

As a final examination of the communicative contexts in which the children produced verbs, we performed three analyses of parent/child utterances to determine whether there were differences in verb obligatory contexts provided. First, we asked, do parents of one group provide more obligatory contexts for verbs than parents of the other group? Results indicated that the parents did not differ in the percent of utterances that were obligatory contexts for verbs ($t(28) = -1.4$, $p > .05$), or the raw number of the obligatory contexts for verbs provided for the children ($t(28) = -1.5$, $p > .05$). Although not significant, parents interacting with CWS actually produced *more* obligatory contexts for verbs than parents interacting with CWNS.

Second, the percent and number of obligatory contexts provided by parents that actually resulted in a verb production by the child were analyzed. The percent of parent obligatory contexts that resulted in a verb by the child did not differ significantly between groups ($t(28) = .4$, $p > .05$), nor did the raw number of parent obligatory contexts that resulted in a verb ($t(28) = -1.2$, $p > .05$).

Third, the percent and number of total verbs produced by the child that were *not* in response to parent obligatory contexts were analyzed. Again, the percent ($t(28) = -0.09$, $p > .05$) and number ($t(28) = 1.2$, $p > .05$) did not differ, suggesting that the children of either group were just as likely to produce a verb when an obligatory context was not provided by a parent.

## 4. Discussion

The purpose of this study was to explore verb use, as a lexical category, in young children who stutter. Participants were preschool-age and in the midst of language acquisition. The CWS were shown in an earlier study (Bernstein Ratner & Silverman, 2000) to have lower one-word expressive vocabulary scores (although not receptive vocabulary scores) than CWNS. However, one-word tests of vocabulary are typically "heavy" in nominal items, as opposed to action words. Thus, these scores should not be interpreted as reflective of children's *verb* vocabulary. Previous findings with this dataset also indicated that the CWS's conversational samples were less lexically diverse than samples of CWNS (Silverman & Bernstein Ratner, 2002). This is an intriguing finding, which led us in the present study to consider one possible underlying factor that could, at least in part, explain lexical diversity differences. Namely, based on the developmental literature as well as studies of adults who stutter, verbs were selected as a theoretically and empirically motivated step in examining underlying semantic factors contributing to observed differences in lexical diversity.

### *4.1. Verb use in CWS*

Results suggested that the CWS, as a group, not only produced significantly fewer total verbs; they also produced significantly fewer different verbs. However, as we have reported in earlier work (Bernstein Ratner & Silverman, 2000), it should be noted that the difference between groups

in MLU approached significance. Therefore, while one important implication of these findings is that the verb use of CWS may be a primary contributor to lexical differences observed in prior studies, it is possible that shorter utterances by CWS contributed to reduced verb use by this group, relative to CWNS.

There are several reasons, from a theoretical perspective, that we might expect verbs to be produced to a lesser extent by CWS, relative to peers. First, within the child development literature, it has been demonstrated repeatedly that verb learning poses a significant challenge for children (e.g., Camarata & Leonard, 1986; Gentner, 1978, 1982; Gleitman et al., 2005; Lidz & Gleitman, 2004). One possibility, given the greater challenge in learning verbs, is that young CWS may have smaller receptive verb vocabularies than their peers. As discussed, tests of one-word expressive or receptive vocabulary are not adequate to measure verb vocabulary, because of their heavy emphasis on nominal items.

A second reason is the notion that, although CWS and CWNS might have comparable verb lexicons, perhaps CWS use verbs to a lesser extent in spontaneous language than their peers do as a fluency enhancing strategy. Indeed, much conversational language between parent and child, at least in the present study, consisted of elliptical utterances that do not require verbs to be conversationally appropriate. Thus, a child could easily omit a verb in many instances without violating conversational norms.

Findings of Bernstein's (1981) study provide insight into why children might omit verbs more so than CWNS. The study was an investigation of the loci of stuttered speech in the spontaneous language samples of preschool and early school-age children who stutter. Relevant to the present investigation, Bernstein found that, though stuttering occurred frequently at the beginnings of noun and verb clauses, stuttering was more likely to occur at the beginnings of the verb clauses than at the beginnings of noun clauses. Thus, one might speculate that CWS, even if they possess similar lexical knowledge of verbs to peers, may produce fewer of them at this point in development in an attempt to maintain fluency. Admittedly, this interpretation is speculative.[1] Nonetheless, it suggests that for young children who stutter, verbs may be an important area of future study. This suggestion seems particularly compelling in light of the work of Cuadrado and Weber-Fox (2003) and Prins et al. (1997) with adults who stutter. These studies implicate verb processing as an area in which adults who stutter and those who do not stutter show some performance differences.

### *4.2. GAP verbs in CWS*

Contrary to our hypothesis regarding the use of GAP verbs, the CWS did not use GAP verbs to a greater extent than their peers. Rather, the proportion of total verbs produced that constituted GAP verbs was similar across groups. This was the case whether an externally generated GAP verb list or a list derived from the samples was used as a reference.

The literature has cautioned against the use of ratio-based analyses (i.e., the number of different words in a sample divided by the total number of words in the sample) for discerning group differences in lexical diversity (Hess, Haug, & Landry, 1989; Hess, Sefton, & Landry, 1986; Klee, 1992; Watkins et al., 1995). The main criticism is that, as sample length increases in its total number of words, the probability that an additional word will constitute a new lexical entry, contributing to the number of different words, decreases. Therefore, comparatively, ratios from

[1] If children are, indeed, employing a strategy of this type, clearly it is not completely effective, given that the children still produce stuttered speech.

longer samples, in which the total number of words is greater, will underestimate lexical diversity. In this study, however, the number of verbs produced in the individual samples was relatively small ($M = 19.4$, S.D. = 9.0). Therefore, sample size variation was unlikely to account for the lack of group differences in GAP verbs produced.

In examining the use of GAP verbs in CWS, we attempted to arrive at a relatively comprehensive a priori list of GAP verbs observed in other samples of children from prior investigations. The fact that the GAP verb list derived directly from our samples was a subset of the externally generated list suggests that the externally generated one was sufficiently comprehensive for preschool-age children. Thus, future investigators of GAP verb use with other populations within this age range may find the external list we compiled beneficial for the identification of GAP verbs.

It is noteworthy that, in theory, if the CWS had displayed an over-reliance on GAP verbs relative to their peers, this, too, would impact the measurement of overall lexical diversity for CWS. That is, if one group relies on a small set of verbs and uses them with high frequency relative to the other group, the outcome of a general lexical diversity analysis would be that the first group's lexical diversity would be reduced. Thus, our finding that the production of GAP verbs did not differ between the groups is an important one and complements our overall verb use finding. Taken together, they suggest that, although the verb use of CWS appears to impact this group's overall lexical diversity scores, measures of verb use were not impacted by an over-reliance on GAP verbs by either group.

### *4.3. Conversational context of verb production*

One consideration, in analyzing the data for the present study, was the possibility that parents of CWS and parents of CWNS differed in the nature of the interaction with their children, such that one group asked more questions (impacting the verb productions of children) or produced more obligatory contexts for verb responses by children. Our findings do not support this possibility. Rather, post-hoc analyses suggested that parents of CWS and those of CWNS did not differ in the number of questions asked of children or the number of obligatory verb contexts provided for the children. Moreover, although it was observed that children in both groups frequently did not produce verbs following the obligatory contexts provided by parents, the children did not differ in this regard. In fact, it was observed that children of both groups produced most of their verbs when obligatory contexts were *not* present (i.e., 80.7% of verbs for CWS and 79.7% of verbs for CWNS were produced in non-obligatory contexts). As a group, these analyses suggest that the differences in verb performance between groups were not likely due to the ways in which parents interacted with the children within each group.

### *4.4. Limitations and conclusions*

This study was an attempt to examine verb use as an underlying factor potentially impacting the measurement of lexical diversity. Findings were that CWS produced fewer total verbs and fewer different verbs than peers did, but these differences cannot be attributed to increased GAP verb use of either group. Rather, production of GAP verbs was similar between the groups.

One substantial limitation of the study, indicated above, was that sample size in morphemes was not equivalent for both groups. Rather, as reported in Bernstein Ratner and Silverman (2000), the CWS produced shorter utterances than peers, a difference that approached significance. This factor would seem to temper the robustness of our findings. Future studies might address this issue

by employing an utterance-matching procedure (e.g., Logan, 2001) to compare verb differences across groups with samples of similar utterance lengths.

Related to this, a second limitation was the relatively small language sample sizes. Language sample elicitation with this age range, particularly among children with a clinical profile, can be difficult in a single session. A study is currently underway by the first author that examines verb use by CWS using multiple language samples obtained from the children over time.

Understanding the underlying linguistic factors that contribute to more global language analyses (e.g., vocd, number of different words, MLU) is critical. For example, taken together, findings of our previous work (Bernstein Ratner & Silverman, 2000; Silverman & Bernstein Ratner, 2002) with the same samples of children were that CWS differed significantly from peers in their lexical diversity using *vocd* (Malvern & Richards, 1997), and that the difference between the groups in MLU approached significance. The fact that the CWS produced significantly fewer verbs in their samples could help to explain both findings. That is, overall lexical diversity would be impacted by CWS producing fewer total and fewer different verbs. Likewise, if CWS produced fewer utterances with verbs than peers did, MLU should be impacted, as well.

The focus of this study was on verb use in CWS and CWNS; as such, the findings can only be extended to the single syntactic category of verbs. This category was selected as the focus for preliminary investigation because, as reviewed at the outset, the developmental literature suggests that verbs are a particularly challenging word class for children acquiring language. We cannot rule out the possibility that CWS and CWNS may also show production differences across other word classes or across content words, in general. From a theoretical perspective, however, our focus on verbs, alone, was a critical first step, extending directly from observations within the developmental literature.

Future studies may focus on other relevant aspects of verb use. One important area that requires investigation is the use of a range of arguments and argument structures by CWS. Such an analysis would require an experimental task (or more structured language sample task) that insures a range of *opportunities* to produce different types of arguments and argument structures. Related to this, another relevant area of study would be examination of verb phrase *development* in young children who stutter relative to peers. That is, if verbs pose a significant challenge for children, do CWS differ in the acquisition of verbs?

In addition, future studies might explore verb use in *older* CWS as they develop linguistically, given the observation that older CWS do not tend to show clear differences from peers in language performance (e.g., see Bloodstein, 1995, for a discussion). Finally, and currently underway, the longitudinal examination of the extent to which increased verb use in young CWS corresponds to fluctuations in fluency may also prove informative. The present study serves as a first step in these endeavors, by providing an initial exploration of conversational verb use in CWS.

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## CONTINUING EDUCATION

### Frequency of verb use in young children who stutter

QUESTIONS

1. The purpose of this study was to:
   a. examine verb use in school-age children who stutter
   b. examine verb use in young children who have just begun to stutter
   c. examine verb use in young children who have recovered from stuttering
   d. compare verb use in children who stutter with verb use in children with specific language impairment
   e. compare verb use in children who stutter with verb use in children who have recovered from stuttering
2. The use of GAP verbs in conversational language:
   a. is common in children with typical language skills
   b. is observed mainly in children with specific language impairment
   c. is observed mainly in children who stutter
   d. is unknown because the topic has not been investigated
   e. none of the above
3. In the present study, children's verb use was assessed using:
   a. parent–child conversational language samples
   b. clinician–child conversational language samples
   c. a story retelling procedure
   d. an interview procedure
   e. standardized language measures
4. Results of the present study were that, relative to peers, children who stutter (CWS):
   a. produced significantly fewer GAP verbs
   b. produced significantly fewer different verbs
   c. produced significantly fewer total verbs
   d. b and c
   e. a and c
5. One reason the results are important is that:
   a. they show that verbs are a frequent source of errors for CWS
   b. they show that treatment may impact verb use in CWS
   c. they show that verb use in CWS may impact findings of overall lexical diversity
   d. they show that GAP verb use may impact the ability of CWS to communicate effectively
   e. c and d

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