

How do Sampling Contexts Impact Language Production in Individuals with Developmental Disorders? Expanding Our “Toolbox” for the Assessment of Diverse Populations

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Abstract

This study presents a) a critical review examining the effects of sampling contexts on the oral language of children and adolescents with developmental disorders, and b) a retrospective, within groups, repeated measures study exploring the impact of play contexts on the oral language of pre-school children with Autism Spectrum Disorder. The critical review included evaluations of five nonrandomized clinical trials, and three within groups, repeated measures studies. The empirical study analyzed language samples from parent-child play with symbolic toys, tactile toys, and gross motor toys collected prior to treatment as part of a larger randomized control trial (Casenhiser et al, 2013). Findings from both studies revealed that sampling contexts impact various measures of oral language production in individuals with developmental disorders and ASD, including: language complexity, lexical diversity, mean length of utterance (MLU) in words and morphemes, and pragmatics. Beneficial contexts include: narration of wordless picture books, interviews and free play with symbolic and gross motor toys.

Introduction

Language Sample Analysis (LSA) is a gold standard procedure for obtaining representative language samples in children (e.g., Miller, 1981). In fact, Caesar & Kohler (2009) found that 94% of Speech-Language Pathologists (SLPs) report using some form of a language sample as part of their standard protocol for assessing children’s oral language abilities.

Extensive research comprising both typically developing (TD) children, and those with developmental disorders (DD) has identified that different sampling contexts yield different language outputs (e.g., Miles, Chapman & Sindberg, 2006, O’Brien & Bi, 1995). Contexts can vary by changing the location, types of toys, or conversation partners. In TD children, free play and natural conversation, rather than clinician-led, structured activities, are associated with larger, more representative samples of oral language skills (e.g., Kwon et al, 2013; Southwood & Russell, 2004). For children and adolescents with DDs, such as Down Syndrome (DS), Fragile X Syndrome (FXS), Intellectual Disability (ID), and Autism Spectrum Disorder (ASD), language sampling contexts typically used with TD children may not accurately reflect the upper bounds of their oral language abilities (e.g., Abbeduto et al, 1995). As such, considerable research has aimed at exploring the effects of an array of

sampling contexts on different oral language measures in order to determine which context(s) can be considered optimal for individuals with DDs (e.g., Evans & Craig, 1992). Evaluating current evidence across sampling contexts with consideration of specific disorder types is important for informing clinical practice. Given the constraints on interactions in children with ASD, it may be particularly important to consider context when eliciting language samples from this population (Kasari et al, 2013).

Objective

The objective of Study 1 was to critically review existing literature examining the impact of different sampling contexts on language samples collected from children with ASD and other developmental disorders. The objective of Study 2 was to perform a retrospective analysis of pre-test data from a larger previous study (Casenhiser et al, 2013) to explore the impact of play context, or types of toys presented during free play, on the language production of pre-school children with ASD.

Study 1: Critical Review

Methods

Search Strategy

Online databases (PubMed, CINAHL, Proquest, PsychInfo, Google Scholar) were searched using the following terms: [(ASD) OR ("Autis*") OR ("Developmental Disorder") AND ("sampling context") OR ("language sampling context") OR ("play context") AND ("expressive language") OR ("language production")]. Reference lists of select articles were also used to obtain other relevant articles.

Selection Criteria

Studies included for review were required to describe the effects of sampling context on the oral language production of children with developmental disorders as the main focus of their investigation. Studies including adolescent or adult participants were required to have matched participants for mental age or language skills to TD children. In this way, all included studies focused on groups of similar developmental age. Studies were excluded if they focused on clinician or parent language use during child/adolescent-adult interactions, or if the effects of sampling context were not main findings.

Data Collection

The literature search resulted in the selection of eight articles to be used for critical analysis. These articles consisted of five nonrandomized clinical trials and three within groups, repeated measures studies.

Results

Abbeduto, Benson, Short and Dolish (1995) conducted a nonrandomized clinical trial to determine whether narrative production, as opposed to naturalistic conversation, would be a more optimal sampling context for assessing expressive language skills in individuals with mental retardation. Participants included 16 individuals with a diagnosis of mental retardation (age 9-20) and 16 TD children (age 5;16-9;67) matched for mental age using well known measures. Linguistic measures tested included: lexical diversity, syntactic complexity, intelligibility, rate of speech, and fluency.

Appropriate, detailed statistical analyses revealed that both groups spoke significantly more during conversation, whereas they produced significantly more complex syntax during narration. The methods of this study were appropriate for the planned objectives. Four trained experimenters with experience working with individuals with developmental disabilities collected the language

samples in both contexts using standard procedures. All samples were transcribed using conventional methods by highly trained individuals who did not participate in the experiment, although blinding regarding the purpose of the study was not reported. Acceptable reliability was reported. Methods were described in great detail such that replication would be possible. However, this study was limited by a very small pool of participants.

These findings provide suggestive evidence that conversation samples and narrative samples may provide unique information regarding total output and syntax, respectively, in individuals with cognitive delay. In clinical practice, the combination of both contexts may result in optimal measures of oral language skills in individuals with cognitive delay.

Evans and Craig (1992) conducted a within groups, repeated measures study using 10 children with Specific Language Impairment (SLI) (age 8;1-9;2) to determine the feasibility of interview, compared with spontaneous conversation during free play, as a language sampling context. Samples were obtained from clinician-child dyads, then transcribed and scored using conventional methods. Linguistic parameters of interest for comparison in both contexts included both structural and conversational characteristics of both child and clinician. However, only results from the analyses of child language production were of interest for the purposes of this review.

Appropriate statistical analyses revealed significantly more utterances, more advanced syntactic and semantic forms, as well as higher mean length of utterance (MLU) during interview than during conversation. Findings also indicated significantly less conversational turn-taking, but greater responsiveness during the interview. This study included descriptions of inclusion criteria, participant factors and methods. As a result, the study is highly replicable. The authors also verified the level of impairment in all participants using gold standard language measures and inter-rater reliability was indicated to be high. In addition, 15-minute samples in each context allowed for the collection of a substantial amount of utterances (total of 3650) from which to interpret results. A certified SLP carried out the experiments, however, it is unclear whether the transcribers were trained or blinded to the purposes of the study. Training of transcribers/scoring was not

reported. In addition, the study was limited by a very small sample size and lack of a control group with TD children.

Overall, findings provide suggestive evidence for the use of interview as a reliable alternative to free play in the assessment of oral language in children with SLI.

Kover, Davidson, Sindberg and Ellis Weismer (2014) conducted a within groups, repeated measures study with 63 children with ASD (age 2;1-3;7), 55 of which were male. The study explored the impact of three sampling contexts including: the Autism Diagnostic Observation Schedule (ADOS) modules 1-3, play with an examiner, and play with a parent, on the expressive language of preschool children with ASD. Toys selected during the play-based language samples included a Fisher-Price dollhouse during examiner-child play, and a Mr. Potato Head and Fisher-Price farm during parent-child play. The authors also explored whether performance in various sampling contexts affected how children with ASD were classified into developmental language phases (First Words, Word Combinations, Sentences). Language measures of interest included: total number of utterances, percentage of intelligible utterances (phonology), total number of different words (NDW - vocabulary), MLU in morphemes (MLU_{mor}), as well as requests, comments and turn-taking (pragmatics). Nonverbal cognitive ability and language skills were obtained using gold standard measures.

Appropriate statistical analyses revealed significant differences among variables across all contexts and significant differences for all pairwise comparisons. Total number of utterances, intelligibility, requesting, turn-taking and NDW were highest during parent-child play, with the least number of utterances, and NDW occurring during the ADOS. MLU_{mor} was significantly higher during examiner-child play than the other two contexts, which did not differ. Significantly less commenting occurred during the ADOS compared to examiner-child and parent-child play, which did not differ. In terms of developmental language phases, children with ASD were more likely to be categorized into First Words, the lowest phase, during the ADOS, than during the play-based contexts.

Language measures were collected, transcribed and analyzed using conventional methods and inter-rater reliability was determined to be high. Phonological

Units were used to segment utterances. Transcriptions included echolalia and non-verbal forms communication. Additionally, methods were described in great detail, such that this study could be easily replicated. The study was limited by the lack of a control group, and short language samples (<50-100 utterances) during the ADOS.

This study provides compelling evidence for differences in language performance, resulting in different classifications into developmental language phases, across sampling contexts in children with ASD. In particular, compared with free play with an examiner or parent, the ADOS is the least likely context to elicit a representative sample of language skills in children with ASD.

Kover, McDuffie, Abbeduto and Brown (2011) conducted a nonrandomized clinical trial to explore the impact of sampling context on multiple measures of expressive language. Participants included 27 boys with FXS (ages 10-17), matched group-wise on non-verbal mental age to 15 adolescent boys with DS (ages 10-17), and 15 TD controls (ages 3-6) matched on receptive language abilities. Aspects of language assessed included: amount of talk, mean length of communication unit (MLCU), lexical diversity, fluency and intelligibility. Language samples were collected during interview-style conversation and narration of wordless picture books. Language samples from both contexts were collected, transcribed and analyzed using well-described, conventional methods.

Appropriate statistical analyses revealed the following results: (1) significantly more attempted communication units (C-units) in children with DS during conversation than narration, (2) significant group effects for MLCU and lexical diversity such that the TD participants had higher scores than participants with FXS, while participants with DS produced the lowest scores, (3) participants with FXS produced higher MLCU in conversation than narration, and (4) context effects for fluency, MLCU and number of attempts per minute.

Strengths of the study included high inter-rater reliability, well-defined language measures, well-described participant factors, and the existence of a language matched TD control group. The study also included a moderate sample size for each disorder type. These characteristics make the study highly replicable and moderately generalizable to clinical

settings. However, the study was limited by a lack of behavioural aspects of language, small language samples and small range of nonverbal cognitive ability among participants.

The data provide suggestive evidence that the impact of sampling contexts differ depending on disorder type. As such, SLPs should consider their choice of sampling context in the assessment of individuals with developmental disorders in order to elicit representative samples of oral language skills.

Martin et al., (2012) conducted a non-randomized clinical trial exploring the type and frequency of perseveration in 30 boys with FXS (age 6;0-15;8), 29 boys with FXS-ASD (age 6;4-15.5 – with comorbid ASD), and 27 boys with DS (age 6;3-16) in social interaction during the ADOS compared with during narration. A TD control group of 25 boys (age 3;9-6;5) were also included, and all participants were matched for nonverbal mental age using gold standard measures. Perseveration was coded based on the following three types: utterance-level, topic, and conversational device, which were all defined and described in detail. Language samples were elicited, transcribed, and analyzed by trained research assistants using conventional methods. Inter-rater reliability was determined to be high.

Appropriate statistical analyses controlling for mental age revealed significant group effects, and a significant interaction between diagnosis, type of perseveration and context. Between group effects revealed the following: (1) the FXS-ASD group produced significantly more utterance-level perseveration than the DS group and significantly more topic perseveration than all other groups. Additionally, and of particular interest to the present study, context effects revealed: (1) significantly more topic perseveration in both groups of boys with FXS during the ADOS than in narration, (2) significantly more conversational device perseveration in boys with FXS-ASD during the ADOS than in narration, and, surprisingly, (3) significantly more utterance-level perseveration in TD boys during narration as compared to the ADOS.

Strengths of this study include: detailed descriptions of participant characteristics and methods for eliciting language samples, large sample sizes, and control groups matched for nonverbal mental age. The study was limited by small language samples in

the narrative context compared to the social interaction context.

Overall, the data provide highly suggestive evidence that sampling context affects perseveration behaviour in boys with FXS. In particular, providing picture support during narration reduces perseveration behaviour in boys with FXS and FXS-ASD.

Miles, Chapman and Sindberg (2006) examined the effect of discourse context on MLU in adolescents with DS. The authors conducted a seven-session nonrandomized clinical trial with 14 children with DS (age 12;10-21) and 14 TD controls (age 2;11-5;8). Groups were matched for receptive syntax skills using gold standard measures. Language measures were elicited, transcribed, and calculated using conventional methods in both contexts. All transcripts were found to have high inter-rater reliability for segmentation and morpheme transcription.

Appropriate statistical analyses revealed significantly higher MLU in the narrative context than the interview context for the group with DS, which did not differ from the MLU-narrative of the TD group. These findings led the authors to conduct 3 follow-up investigations on the data in order to explore possible causes. All analyses were conducted using appropriate statistical methods. Findings revealed higher MLU, which was significantly higher in language samples containing picture support, in the group with DS in the narrative context.

Strengths of this study included the inclusion of a language matched control group with in depth descriptions of participant characteristics. The study also included multiple detailed statistical analyses. However, the study was limited by the restricted inclusion of only adolescents with DS as well as a small sample size. Lastly, lengthy (3 hour) initial sessions resulted in the need to split this session into two (1.5 hour) days for the younger TD participants.

Overall, the data provide suggestive evidence that narrative samples containing picture support, compared to spontaneous conversation samples, elicit more representative samples of oral language skills in adolescents with DS, resulting in longer, more complex sentences.

Sealey and Gimore's (2008) nonrandomized clinical trial examined the impact of different sampling

contexts on the occurrence of obligatory contexts for, and use of, grammatical morphemes in 5 children with delayed language (DL) (age 3;11-5;6), compared to 5 TD children (age 4;4-5;4). Children were grouped and paired by language age using gold standard measures. Using conventional methods and standard procedures, a certified S-LP elicited 4 language samples in the following contexts: conversation/free play, wordless picture book, story retelling and storyboard. Inter-rater reliability was determined to be high.

Appropriate statistical analyses revealed the following findings: (1) Significantly more language was produced during the conversation/free play task for both the DL and control groups, while significantly shorter samples were produced in response to the wordless picture book, (2) Significantly more morphemes were produced during the story retell task for both groups, (3) All targeted finite verb types and obligatory contexts were found in the conversation/free play context, while the fewest were found during story retell. Additionally, the most accurate finite verbs produced by the DL group were during conversation/free play. Strengths of this study include in depth descriptions of participants, assessment and treatment procedures. However, the study was limited by a very small sample size and lacked formal, nonverbal cognitive measurements.

Overall, this study provides suggestive evidence for the use of conversation/free play as the most optimal context from which to obtain measures of grammatical morpheme development in children with delayed language.

Wagner, Nettelbladt, Sahlen and Nilhom (2000) conducted a within groups, repeated measures study to explore the effects of conversation compared to narration on measures of intelligibility, fluency and MLU in words. Participants included a single group of 28 Swiss-speaking children with Language Impairment (LI) in Sweden (age 4;11-5;9). Clinicians selected participants' demonstrating expressive language delays, who were then confirmed to have LI using standard Swiss language measures. Conversation samples were elicited using a well-known Swiss procedure for conversation, which included details of the child's life, family and the season of the year. Narrative samples were elicited using well-known picture books. One task required the child to retell a story, while the other required the

child to generate a story. Transcription followed conventional methods, and inter-rater reliability was determined to be high. Due to the fact that each single narrative production by many of the pre-school children was insufficient in length for appropriate quantitative analyses, utterances from all narrative tasks were combined.

Appropriate statistical analyses revealed significantly higher MLU, but significantly lower fluency and intelligibility in narration than conversation. Findings also revealed that the children produced significantly more grammatical morphemes, phrasal expansions within noun phrases, but fewer complex verb forms in narration. The language measures and participant characteristics in this study were well-defined. However, the sample size was small and there was no control group of TD children, which limits the interpretation of the data. At the time of the study, all participants were receiving differing amounts of Speech-Language Pathology (S-LP) services and were all identified to have phonological impairments. Additionally, the study lacked descriptions of child language skills and blinding of researchers.

Overall results of this study provide moderately suggestive evidence that narrative samples elicit more representative samples of MLU (in words) and grammatical complexity than conversation samples in children with LI.

Discussion

The current research provides evidence for various effects of sampling context on oral language production in individuals with ASD and other developmental disorders. Taken together, the literature suggests that, in addition to free play, narrative and interview contexts elicit longer, more complex utterances, whereas the ADOS elicits shorter, less complex language samples, and increased perseveration. Overall, language performance differs from context to context depending on disorder type and age of participants. Therefore, results warrant further research into ideal sampling contexts with consideration of specific disorder types.

Study 2 – Empirical Study

Rationale

To date, only one study has been conducted to explore the effects of sampling context on oral language production in preschool children with ASD (Kover et al, 2014). Given drastic increases in the diagnosis of ASD in recent decades, as well as inherent constraints on social skills, play skills, and communication in children with ASD (Hertz-Picciotto & Delwiche, 2009), Study 2 sought to extend current research by focusing on this growing population of children.

Methods

The current study uses a set of pre-treatment data from a larger, randomized control trial (Casenhiser et. al, 2012) analyzing 49 parent-child videotaped interactions. All child participants had a diagnosis of ASD, and were between the ages of 25 and 57 months. The original videotaped interactions consisted of fifteen minutes of access to symbolic toys, five minutes of access to tactile toys, and five minutes of access to gross motor toys. Symbolic toys provided included: Toy food, a shopping cart, cash register, toy house, toy cars, and puppets. Tactile toys included: Beads and strings, a bucket of dried beans, action figures, cups and tactile balls. Gross motor toys included: a crash mat, trampoline, exercise ball and a spinning desk chair.

For the purpose of this analysis, we elected to examine the first five minutes of the symbolic toy section, and the entire tactile and gross motor toy sections. Language samples were transcribed in the Child Language Data Exchange System CHILDES (MacWhinney & Snow, 1990) and the main function of each child utterance was coded for variables of language form, content and use. The following six language functions, which indicated the children's language use included: affirming (defined as a general affirmation to a statement), directing (of attention), obtaining information, protesting/rejecting, commenting, and diversity of language functions, all of which were calculated as a ratio over the total number of utterances in each sampling context. The frequency of each function code was tallied using the Child Language Analysis (CLAN) software in CHILDES and the following linguistic variables were calculated for language form: total number of utterances, MLU in morphemes (MLU_{mor}); and for language content: types (different words), tokens (total words), type-token ratio and number of verbs per utterance.

Results

Table 1 shows descriptive statistics for all language sample analysis measures for each context in the group of children with ASD. Examination of the distribution of the data for each measure revealed that only MLU_{mor} was normally distributed, whereas all remaining measures were not normally distributed. Further analyses of MLU_{mor} employed an ANOVA, whereas for all remaining measures, a nonparametric Friedman's test was completed.

Significant results were obtained for the main effect of context, including: MLU_{mor}, $F(2,96) = 3.723$, $p = .028$, and five additional measures (total utterance, types, tokens, affirming, directing: $X^2(2) > 8.5$, $p < .05$, all cases). Nonsignificant results were observed for the remaining cases (type token ratio, verbs per utterance, obtaining information ratio, protesting/rejecting ratio, commenting ratio, diversity of language functions: $X^2(2) < 5.5$, $p > .05$, all cases). Post hoc t-tests or Wilcoxon tests were completed to examine pairwise differences. Significant pairwise differences ($p < .05$ and $p < 0.001$) are indicated in Table 1.

Discussion

Findings from the empirical study revealed that the types of toys provided during free play with a caregiver affect various aspects of language form, content and use in this population of children.

Findings measuring language form revealed significantly more total words (tokens) and utterances during gross motor and symbolic play (which did not differ), than during tactile play. The children also used significantly more complex language, measured in MLU_{mor}, during gross motor play compared to symbolic play, both of which did not differ significantly from tactile play. In terms of language content, the children used the largest amount of different words (types) during gross motor play, followed by symbolic play, which both significantly differed from tactile play. In terms of language use, children did the most directing during gross motor play, which significantly differed from symbolic and tactile play, during which little to no directing occurred. Additionally, children did the most affirming during symbolic play, which significantly differed from both tactile and gross motor play.

In summary, the group of children with ASD produced the most complex language during gross

motor play, and the most utterances and single word productions during gross motor and symbolic play. The children did the most affirming during symbolic play, and the most directing during gross motor play.

General Discussion

This paper sought to examine the impact of sampling context on oral language production in individuals with DDs and ASD. Findings from both a critical analysis of existing research and an empirical study focusing on a single disorder type, revealed that a combination of various sampling contexts should be used in order to obtain accurate, representative samples of oral language skills.

The critical analysis revealed the following contexts to be the most beneficial for eliciting language samples: free play, narration, and interview. Five of the eight studies found evidence that narrative samples with picture support elicit longer, more complex language in various groups of individuals with developmental disorders (Abbeduto et al, 1995; Kover et al, 2011; Martin et al, 2012; Miles, Chapman & Sindberg, 2006; Wagner et al, 2000). Further evidence suggested that language samples elicited during free play elicit more complex language and higher MLUs in various groups of individuals with developmental disorders (Abbeduto et al, 1995; Kover et al, 2014; Sealey & Gilmore, 2008). Whereas Evans and Craig (2008) found suggestive evidence that clinician-led, interview-style conversation elicits more complex language and higher MLU, specifically in children with SLI. Kover et al (2014) and Martin et al (2012) also found highly suggestive evidence that activities of the ADOS elicit reduced language output in children with ASD, and increased perseveration in individuals with FXS. Interestingly, all of the studies including free play as a sampling context of interest used symbolic toys only. Additionally, examiner-child play interactions were included more often than parent-child play, despite a more naturalistic setting provided by the latter context.

Findings from the empirical study revealed that the types of toys provided during free play impact expressive language output and use of communicative functions in children with ASD. It is interesting to note that play with tactile toys, which included various small sensory items, reduced the total number of utterances, as well as directing of attention. This may have occurred because the tactile

toy spread included smaller items, as compared to the other, larger toy types, which may have increased visual fixation with the items, thereby reducing opportunities for social interaction and communication. The inclusion of symbolic toys likely increased instances of imaginative play and therefore may have provided more opportunity for conversational turn-taking, thereby increasing opportunities for more complex language, more total utterances and use of affirmative language (general affirmations to parent's statements). The larger, gross motor toys may have increased the children's overall body movement and physical activity providing more opportunity for them to use language to direct attention to the toys and how they were using them. However, it is difficult to know whether it was the types of toys alone which led to these outcomes, or if additional factors, such as the effect of the toy type on parent language, or the children's sensory profiles, added to the results.

The critical review was limited by small samples sizes, minimal research into each disorder type, and the inclusion of a wide range of chronological and developmental ages. In addition, some of the contexts of interest could only be used with individuals of school age and higher (such as narration, story retell, and story generation), thereby making it difficult to compare results from Study 1 to those from Study 2. The empirical study was limited by restricted inclusion of verbal pre-school children with ASD, the exclusion of coding non-verbal forms of communication, very short language samples in some children, and the lack of a TD control group. These limitations make it difficult to generalize findings to a large population of non-verbal children with ASD and those beyond the preschool years.

Clinical Implications

Findings from Study 1 suggest that SLPs should consider combining various sampling contexts, beyond solely using free play, in order to obtain language samples which accurately reflect the upper bounds of oral language skills in children with DDs. Findings from Study 2 suggest that SLPs should consider combining symbolic and gross motor toy play during oral language assessments, in order to elicit the most accurate representations of language form, content and use in preschool children with ASD. Study 2 findings add to existing literature by providing evidence for the inclusion of more than just symbolic toys during free play contexts, as well as by

focusing on a single DD during play with a parent, as opposed to an examiner.

Future studies should consider examining the effects of other variables such as: parent language, parent stress levels, gender, sensory profiles, and non-verbal forms of communication on oral language performance in individuals with DDs in order to obtain more detailed information.

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Table 1. Language performance across all parent-child play contexts.

Variable	Symbolic		Tactile		Gross-Motor	
	Median	Range	Median	Range	Median	Range
Total Utterances*	*21.0 ^a	0.00-79.0	*13.0 ^{ab}	0.00-69.0	*21.0 ^b	0.00-80.0
Types*	*20.0 ^a	0.00-90.0	14.0 ^{ab}	0.00-77.0	*22.0 ^b	0.00-83.0
Tokens*	31.0	0.00-219	*18.0 ^a	0.00-239	*36.0 ^a	0.00-232
Type/Token Ratio	0.59	0.00-1.00	0.50	0.00-1.00	0.53	0.00-1.00
Verbs/Utterance	0.21	0.00-0.75	0.24	0.00-0.82	0.33	0.00-0.67
Affirming Ratio*	0.42 ^{ab}	0.00-1.00	0.33 ^b	0.00-1.00	0.22 ^a	0.00-1.00
Directing Ratio*	0.07 ^a	0.00-0.53	0.01 ^b	0.00-0.80	0.19 ^{ab}	0.00-0.67
Obtaining Information Ratio	0.00	0.00-0.15	0.00	0.00-0.15	0.00	0.00-0.14
Protesting/Rejecting Ratio	0.00	0.00-0.50	0.00	0.00-0.25	0.00	0.00-0.71
Commenting Ratio	0.25	0.00-0.76	0.21	0.00-1.00	0.16	0.00-1.00
Diversity of Language Functions	0.32	0.00-1.0	0.25	0.00-1.00	0.22	0.00-1.00
Variable	Mean	SD	Mean	SD	Mean	SD
MLU in morphemes	1.69 ^a	0.91	1.75	1.0	1.0 ^a	0.12

Note: Like superscripts in the same row indicate significantly different pairs ($p < 0.5$).
 * Indicates significance levels of $p < 0.001$

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