

Article

How Grammatical Are 3-Year-Olds?

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Purpose: This study investigated the level of grammatical accuracy in typically developing 3-year-olds and the types of errors they produce.

Method: Twenty-two 3-year-olds participated in a picture description task. The percentage of grammatical utterances was computed and error types were analyzed.

Results: The mean level of grammatical accuracy in typical 3-year-olds was ~71%, with a wide range of variability. The current study revealed a variety of error types produced by 3-year-olds, most of which were produced by fewer than 5 children. The pattern observed for most of the children was

to produce a scattering of errors with no more than a few of any 1 error type.

Conclusion: The level of grammatical accuracy in 3-year-olds was skewed toward the high end. Although tense marking errors were the most frequent error type, they accounted for only 1/3 of the errors produced by 3-year-olds. A more general measure of grammaticality that considers additional aspects of language might, therefore, be useful in assessing language at this age.

Key Words: normal language development, language sample analysis, preschool children

Diagnosing language impairment in the absence of other complicating conditions (i.e., specific language impairment, SLI) is difficult before the age of 4 years (Leonard, 1998; Rescorla & Lee, 2001). Although the majority of late talkers, defined as children with small vocabularies and/or who are not combining words by 18 to 24 months, move into the normal range by school age and are not at serious risk for continued language impairment (Paul, 1993; Thal & Katich, 1996), language impairment is likely to persist for children beyond the age of 3 whose language has not normalized, with the risk for continued language impairment growing with increasing age (Rescorla & Schwartz, 1990; Thal & Katich, 1996). This makes age 3 a critical time for identifying language impairment. In order to do this, more information is needed to set normative expectations for children of this age.

Leonard (1998) described five ways in which children with SLI might differ from typically developing (TD) children of the same age. Children with SLI could show

a *delay* involving a late onset or slower rate of development overall or for particular aspects of language. Development could *plateau*, never reaching the level achieved by typical children. Children with SLI could manifest a *profile difference* such that the relationship among different aspects of language development does not match that seen for TD children. In particular, children with SLI tend to show a lower usage frequency for grammatical morphemes relative to their mean length of utterance (MLU). Children with SLI might show an *abnormal error frequency*, meaning that they produce the same error as typical children but at a rate that is higher (e.g., even that for younger typical children). Lastly, children with SLI may show *qualitative differences*, producing errors that are not produced by TD children. These latter patterns are of particular interest to the current article as documenting a profile difference, abnormal error frequency, or qualitative difference depends on knowing what typical children do.

By the time children are 3 years old, they are producing multiword utterances that encompass a range of sentence forms and have mastered many of the inflectional morphemes (see Retherford, 2000, for a chart summarizing these developments). The elements of language are not, however, learned in an error-free, all-or-nothing fashion; rather, they increase in usage gradually over time. There is also considerable variability in the age at which children acquire linguistic structures. Thus, it can be difficult to determine when a child is sufficiently ungrammatical or when a child's linguistic profile is qualitatively different from typical patterns that we should be concerned. It would, therefore, be helpful to know what to expect in terms of grammatical

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sentence production at this age. The aim of the current investigation was to provide descriptive information about the overall level of grammaticality achieved by 3-year-old children and the types of errors produced at this age.

Previous Data on Grammaticality in 3-Year-Olds

There are few data on the overall level of grammaticality of 3-year-old children. As part of the developmental sentence scoring (DSS) analysis, Lee (1974) included a sentence point score that took into account errors on grammatical structures and semantic irregularities. Language sampling included three contexts in a fixed order—play with toys followed by talking about pictures and then telling a familiar story. However, because the DSS data were based on the last 50 utterances produced by each child, most of the samples included utterances during the latter two conditions rather than utterances produced during play. Lee reported a mean sentence point score of 35.28 for forty 3-year-olds, corresponding to a 70% grammaticality rate for the sentences included on the DSS analysis. However, because Lee reported only the mean without reporting variability, the reported sentence point score is not useful for clinical decision making. In addition, because the DSS analysis excludes sentences without a main verb, including copula omissions, and nonimperative utterances without a subject, Lee may have overestimated the overall rate of the children's grammaticality.

The only other data we found concerning the overall rate of grammaticality by preschoolers were reported by Dunn, Flax, Sliwinski, and Aram (1996). The percentage of structural errors, which computed the percentage of utterances that contained one or more errors of word order, morphemes, or negation or use of telegraphic speech in spontaneous speech during play, was reported for a group of 41 children ages 2;6 (years;month) to 7;8. Children at this age range produced a percentage of structural errors ranging from 0% to 35%. That is, the grammaticality rate for these children ranged from 65% to 100%. Because of the wide age range of the participants, it was not possible to estimate the grammaticality level of 3-year-olds from this report.

Other studies (described in the following paragraphs) have focused on specific aspects of syntax and morphology that may account for grammatical errors in young children. These areas include, but are not limited to, argument structure, pronominal forms, and grammatical morphology. Most of these studies included 3-year-olds as language-matched controls for older children with language impairment.

Argument Structure

Previous studies have indicated that preschool children inconsistently omitted preverbal (i.e., subject) arguments. Grela and Leonard (1997) reported an overall rate of 10% to

11% subject omissions in spontaneous speech by 10 children ages 2;11 to 3;4 but did not indicate how many of the children produced subject omissions or the range of such omissions across children. Subject omissions on a story completion task by children ages 3;3 to 4;0 were also reported (Grela, 2003). Three of the 10 language-matched children were inconsistent in their use of subject arguments, one omitting subjects with intransitive verbs and two omitting subjects with transitive and ditransitive verbs (i.e., verbs requiring both a direct and indirect object).

P. Bloom (1990) examined the transcripts of Adam and Sarah between the ages of 2;3 and 2;7 and of Eve from 1;6 to 1;10 (Brown, 1973) for both subject and object omissions. All three children demonstrated both types of argument omissions but with a lower rate for object omissions (7% to 15%) than for subject omissions (43% to 61%). To the best of our knowledge, no studies have looked at postverbal argument production in older children. In a study of preposition and particle usage (Watkins & Rice, 1991), 3-year-old control children produced few omissions of postverbal phrases with particles or prepositions (e.g., *kick* instead of *kick over the chair*) or of the noun phrase following the preposition or particle (e.g., *kick over* instead of *kick over the chair*). Loeb, Pye, Richardson, and Redmond (1998) investigated causative alternations on a structured task. Six of the seven 3-year-olds in their language-matched group produced at least one overgeneralization of a causative construction to a fixed intransitive verb (e.g., *I swam her*).

Based on these data, the presence of subject omissions would not be atypical for 3-year-olds. However, there are insufficient data to determine if there is some frequency of subject omissions that would be considered abnormal. We also lack data about the use of other argument types. Commission errors of producing a nonallowed argument appear to be an infrequent error that is common across children on a structured task. However, it is not clear how common this error would be in conversational speech.

Pronominal Forms

Several studies have reported on the production of case errors on pronouns, particularly subject pronouns. Loeb and Leonard (1991) reported considerable variability in use of third person subject pronouns (i.e., *he* and *she*) for eight children ages 2;11 to 3;4 who were included as language-matched controls. Language sampling included both play activities and storytelling about picture sequences. Five of the children produced subject pronouns with at least 90% accuracy, and one child had an accuracy rate of 62%. The other two children showed low accuracy rates of 36% and 31%. The errors tended to be substitutions of object case pronouns for subject case pronouns (e.g., *him* for *he*).

Moore (2001) reported a mean correct usage for third person singular pronouns of 71% for a language-matched control group of 12 children ages 3;0 to 3;8, with a higher

mean accuracy rate for *he* (83% correct usage) than for *she* (49% correct usage). Language samples were elicited (a) during play with toys, (b) while talking about pictures of family members and picture sequences, and (c) while talking about actions performed by puppets. The pattern of more errors on *she* than on *he* is in agreement with Rispoli (2005), who also reported a lower rate for the plural *they* than for the two singular pronouns. The error rates for pronouns in Rispoli ranged from 0% to 70% in conversation during play for 44 children ages 2;0 to 4;0. The majority of errors involved substitution of object for subject case pronouns, although there were also substitutions of object for genitive pronouns and a small number of errors involving overgeneralizations of subject case pronouns.

The high error rate on subject case pronouns reported for some TD children is of particular interest given the suggestion by Leonard (1998) that an abnormal error frequency for subject case pronouns may be characteristic of children with SLI. In addition, Rispoli (2005) found that children who showed $\geq 80\%$ accuracy for tense markers did not make pronoun errors. Taken together, the production of pronoun errors by children who show high accuracy rates for tense markers might constitute an abnormal profile.

Grammatical Morphology

The gradual nature of morphological development was first documented by Brown (1973). Although Brown identified Stage 2, with an MLU range from 2.0 to 2.5, as the period in which inflectional morphemes first appear and in which the earliest morphemes reach mastery, many of the grammatical morphemes studied by Brown are not mastered until age 4 or 5 (deVilliers & deVilliers, 1973).

Verb morphology. Leonard, Bortolini, Caselli, McGregor, and Sabbadini (1992) included an English-speaking language-matched group (10 children ages 2;11 to 3;4) in their cross-linguistic study of children with and without language impairment. They used the percentage of correct use of tense markers to examine language samples that included both play activities and descriptions of picture sequences. Copula *be* was correctly used in 70% of obligatory contexts, regular past tense *-ed* in 65%, and third person singular present *-s* in 59%. Irregular past tense was correctly used 77% of the time. Rescorla and Roberts (2002) reported a somewhat higher percentage accuracy for tense markers for a control group of 21 TD 3-year-olds in their study of children identified as late talkers. The percentage of correct use was 72% for third person singular present *-s*, 90% for contractible copula *be*, and 84% for auxiliary *be* in contractible contexts in spontaneous speech during play.

Rice, Wexler, and Hershberger (1998) reported a protracted development for a composite measure of tense markers that included regular past tense *-ed*, third person singular *-s*, copula *be*, and the auxiliaries *be* and *do*. Mean accuracy for these tense markers in the spontaneous speech

of 20 children was only 56% at age 3 and 74% at age 3;6. Errors involved omission of these tense markers, with few errors involving agreement.

As compared to tense markers, aspect markers (e.g., present and past participles) are produced more accurately in children. Rescorla and Roberts (2002) reported 98% correct usage in obligatory contexts for the present participle *-ing* by twenty-one 3-year-old children in conversational speech. Redmond (2005) reported 94% correct usage in spontaneous speech by a language-matched control group of seven children (age range 37 to 53 months) for the past participle (*-ed* and *-en*).

Similarly, modals tend to be produced with high accuracy by young children. All 10 of the children ages 2;11 to 3;4 in Leonard (1995) used modal verbs in spontaneous speech. *Can* was produced by all 10 children, *will* by eight of the children, and *can't* by none of the children. Rescorla and Roberts (2002) also reported high frequency of use (93%) in conversational speech for the modals *can* and *will*.

Together, these data suggest that a high rate of errors on verb tense markers would not be abnormal for 3-year-olds. A high rate of error would not be typical, however, for aspect markers or modals.

Other morphemes. Plural *-s* (hereafter referred to as plural) is an early developing morpheme (Brown, 1973; deVilliers & deVilliers, 1973) with high production accuracy by 3-year-olds in conversational speech. Leonard et al. (1992) reported 96% accuracy for the plural by 10 children ages 2;11 to 3;4. Rescorla and Roberts (2002) reported 90% accuracy in the spontaneous speech of twenty-one 3-year-old children. Articles are mastered later (Brown, 1973; deVilliers & deVilliers, 1973) and show lower usage by 3-year-olds. Leonard et al. reported 62% correct usage. Rescorla and Roberts reported 93% usage in obligatory contexts when accuracy of article choice was not considered.

Watkins and Rice (1991) reported on the production of both prepositions and particles by fourteen 3-year-old children who were used as language-matched controls. Particles were omitted on 14% of the opportunities; prepositions were omitted $<1\%$ of the time on a structured elicitation task. The children produced few substitution errors on either particles or prepositions. Rescorla and Roberts (2002) also found high accuracy for prepositions in spontaneous speech (i.e., 99% for *in* and 96% for other prepositions).

These data suggest that a high rate of errors would not be typical for the plural. Omission of prepositions should be rare, but children of this age might show a somewhat higher, although still low, rate of particle omissions. A high rate of omission of articles also would not be typical, although 3-year-olds are likely to make errors in article selection.

In sum, 3-year-olds demonstrated varying degrees of accuracy for specific aspects of syntax and morphology in separate studies. What remains unknown is the overall grammatical accuracy of 3-year-olds when the use of various aspects of syntax and morphology is considered at the same

time. In addition, the extent to which different aspects of syntax and morphology contribute to grammaticality errors in this age range and represent typical patterns is still an open question.

Language Sample Elicitation

Language samples are typically elicited from 3-year-olds during play (Miller, 1981). This was the method used by Dunn et al. (1996) for their calculation of structural errors. It also was one of the three contexts used by Lee (1974) for DSS. Conversational samples have the advantage of reflecting a child's functional language skills. However, there are limitations to conversational language sampling. For example, conversational samples take considerable time to transcribe and analyze, and the context and referents for the child's utterances are often unclear, which makes transcription more difficult. Conversational samples also are inherently variable in the topics that are talked about and in the adult utterances that are addressed to the child. Given these limitations, more structured elicitation procedures about a known context have been suggested to standardize the elicitation procedure across children and make transcription easier and quicker (Dollaghan, Campbell, & Tomlin, 1990; Evans & Craig, 1992).

As noted earlier, although Lee (1974) used three contexts for DSS—play with toys, talking about pictures, and telling a familiar story—these were administered in a fixed order, and most of the samples included utterances during the latter two conditions rather than utterances produced during play. Evans and Craig (1992) found that an interview format involving a fixed set of questions yielded more varied and advanced language forms than a conversational sample. However, the use of decontextualized questions may not be as appropriate for 3-year-olds as it was for the older children in their study. Washington, Craig, and Kushmaul (1998) presented pictures with a prompt for the child to “tell me about this picture” followed by a second prompt to “tell me what's happening in the picture” if the child responded by just naming objects in the picture. In the current study, we combined these two approaches and asked questions about pictures. The prompts were designed to create uniform opportunities for each child to produce declarative utterances under conditions that obligated full sentences with a subject and predicate.

Aim of the Present Work

The current investigation focused on the grammatical accuracy of 3-year-old children. Judgments about grammaticality in this article considered semantic as well as morpho-syntactic aspects of production. Pragmatic context was considered in determining utterance inclusion, but, consistent with DSS, utterances were not judged for conformity with pragmatic and discourse rules.

The investigation was conducted to answer the following questions:

- What is the overall level of grammatical accuracy to be expected by 3-year-old children and, therefore, below which we would be concerned about the typicality of a child's language? Given the inclusion of utterances without subjects and/or a main verb, we anticipated a mean grammaticality somewhat lower than the 70% mean level derived from the DSS sentence point (Lee, 1974).
- What types of errors can be expected from 3-year-olds? We anticipated that errors on tense markers as well as errors on articles would be produced by many of the children. We also anticipated that some children would produce subject omissions (P. Bloom, 1990; Grela, 2003), errors on subject case pronouns (Moore, 2001; Rispoli, 2005), and errors on particles (Watkins & Rice, 1991).

METHOD

Participants

Participants were 22 children (11 boys, 11 girls) between the ages of 3;0 and 3;11, with a mean age of 3;6, who were recruited from nursery school programs in suburban New Jersey. Approval for this research was granted by the Montclair State University Institutional Review Board. All children were mainstream English-speaking students. All had passed a hearing screening at 25 dB for the frequencies 500, 1000, 2000, and 4000 Hz and had cognitive ability within the typical range as measured by the odd-item-out task of the Reynolds Intellectual Screening Test (RIST; Reynolds & Kamphaus, 2003). There was no prior concern about language development for any of the children. Typical language was confirmed through a parent rating scale adapted from Hadley and Rice (1993) and through administration of a standardized test, the Structured Photographic Expressive Language Test—Preschool, Second edition (SPELT-P2; Dawson, Eyer, & Fonkalsrud, 2005). The parent rating scale was a 14-item questionnaire. Each item required the parent to rate aspects of the child's language development (e.g., ability to start a conversation) on a 7-point scale, with 4 referring to normal ability, 7 referring to very high ability, and 1 referring to very low ability. All children received ratings ≤ 4 on no more than two items and received no rating < 3 . All children scored within 1 *SD* of the mean on the SPELT-P2 (range 92–115; $M = 106.59$; $SD = 6.40$).

In order to control for gender effects, boys and girls were matched within 5 points on the SPELT-P2. With the exception of one child, all children scored ≥ 37 th percentile on the Articulation subtest of the Fluharty Preschool Speech

and Language Screening Test—2 (Fluharty, 2001), and the percentage of intelligible utterances produced by each child was at least 87%. Socioeconomic status was based on maternal education, with 91% having a college degree and 9% having a high school degree. The racial distribution based on self-identification by the parent was 73% Caucasian, 18% African American, and 9% Asian. Nine percent of the participants were Hispanic.

Materials

Language samples were elicited by asking each child to talk about pictures. There were 15 pictures, each with at least three characters. Eight of the pictures illustrated a problem (e.g., two boys fighting over a bucket in the sandbox and a woman running toward them); the other seven depicted a scene in which the characters were involved in different actions (e.g., a family of four, with the father making toast, the mother pouring milk, one girl at the table waiting to eat, and another girl still in pajamas). Most of the pictures were colored line drawings, with three of the pictures being photographs from magazines.

Procedure

Each child was tested individually by an examiner. The examiners included the second and third authors as well as speech-language pathology graduate students. Pictures were presented one at a time. To avoid order effects, the pictures were randomized for each child. Each trial began with presentation of the picture. Four prompts, adapted from Leonard, Bolders, and Miller (1976), were given for each picture. If the child responded with “I don’t know” or produced an off-topic utterance, a second prompt was given. A sample of the prompts is provided in the Appendix. All responses were audio-recorded for transcription and coding.

Transcription

The samples were transcribed by trained research assistants according to Systematic Analysis of Language Transcripts (SALT; Miller & Iglesias, 2010) conventions. To be consistent with the SALT reference database, utterances were segmented into C-units. C-unit segmentation was also chosen because some of the children produced long responses involving several independent clauses.

As described by Loban (1963), the C-unit is a subdivision of a larger phonological unit, determined by intonation and pausing, and includes no more than one independent clause as well as any dependent phrasal and clausal constituents. Clauses connected by a coordinating conjunction (i.e., *and*, (*and*) *then*, (*and*) *so*, *but*, and *or*) were divided into separate C-units when the conjoined clause included a subject. Conjoined clauses without a subject were, therefore, not separated into a separate C-unit. Embedded clauses,

including clauses with a subordinating conjunction, were also not segmented into a separate C-unit. However, clauses in which a subordinating conjunction was used as if it were a coordinating conjunction were segmented into a separate C-unit (e.g., *the girl started to do something / because the girl want to dance / because there’s a wagon*). C-units can also be utterances without a main clause (i.e., without a subject and/or main verb) when such utterances are preceded and followed by a terminal silence (Hughes, McGillivray, & Schmidek, 1997).

Some decisions were made about transcribing verbs that affected how errors were classified. Verbs produced without an inflection, modal, or auxiliary were transcribed as bare verbs (e.g., *The girl pull the dog*), regardless of the nature of the omission. Omissions of auxiliaries were only indicated when the child had produced a present or past participle form that created an obligatory context for the auxiliary (e.g., *The girl *is pushing the cart*; *The plate *was already washed*). Similarly, omissions of a participle were indicated only when the child had produced an auxiliary that created an obligatory context for the participle (e.g., *The girl is blow/*ing bubbles*).

A consensus procedure (adapted from Shriberg, Kwiatkowski, & Hoffman, 1984) was used for transcription and coding. Each sample was transcribed and coded by one research assistant, who was instructed to listen to each utterance a maximum of three times. Utterances that could not be fully transcribed after three listenings were marked as unintelligible and were excluded from the analysis. A second research assistant then listened to the recorded sample while reading the initial transcription to check the transcription and coding. Transcription and coding for the entire sample were then rechecked by the first author. Discrepancies were discussed, and agreement was obtained on all transcripts. Utterances that could not be resolved were excluded from the analysis.

Utterance Inclusion

Utterances with unintelligible segments were excluded from the analysis. Only on-topic C-units were included (i.e., only language that focused on the pictures in contrast to external comments to the examiner). The DSS analysis includes only utterances that are independent clauses with both a subject and verb. This means that fragments, utterances with an omitted copula, and utterances with an omitted subject argument would be excluded. We included these utterances in the current article in order to more fully capture the range of utterance productions at this age. We also performed a second calculation of grammaticality that did not include these so that the sample would be comparable to the DSS sample and grammaticality could be compared to the DSS sentence point score.

Some of the children asked questions about the pictures. These questions were excluded for several reasons. Questions

involve movement or addition of auxiliaries, and young children frequently produce errors on these elements (Rowland, Pine, Lieven, & Theakston, 2005). Because only a few of the children asked questions, including questions in the analysis could potentially have lowered the grammaticality scores for the few children who asked them. In order to avoid this variability and because the procedure was designed to elicit declarative utterances, only the declarative sentences produced by each child were included in the analysis. Replies to examiner requests for repetition or clarification were excluded if the reply was an ellipsis or if the reply involved an expansion or correction of the child's immediately prior utterance. Following the conventions for DSS (Lee, 1974), all utterance initial uses of *and* after C-unit segmentation were eliminated. All other conjunctions were eliminated only at the start of turns immediately following the examiner prompt.

Analysis

Coding. Codes were inserted by hand into the transcript for each of the following error types. All error coding was reviewed by the first author, and a consensus procedure was used to resolve disagreements. Doubtful instances and all instances that could not be resolved were considered to be

acceptable and were not coded as errors. Examples of each error type are provided in Table 1.

- **Fragments** were defined as phrasal utterances that were produced in response to examiner prompts that obligated a full sentence with a subject and verb. This included all utterances without a verb except for utterances with an omitted copula, which were coded as tense marker errors (see below). As indicated earlier, pragmatically allowable fragments were excluded from the analysis and were, therefore, not coded as fragments.
- **Argument structure errors** were defined as omissions of obligatory constituents before or after a verb. Decisions about required postverbal arguments were based on the *Longman Dictionary of Contemporary Usage* (1999–2009). All other on-topic responses to the four prompts were included. Utterances involving transitive verbs in which the patient (i.e., the semantic object) occurred in subject rather than postverbal position (e.g., *the milk spilled*) were not judged as having an argument error. Any omission that could be considered a pragmatically allowable elision was not coded as an argument error.
- **Tense markers errors** were defined as omissions and usage errors for copula, auxiliaries, auxiliary *do*,

Table 1. Definitions and examples of coded error types.

Error type	Definition	Examples
Fragment [FRAG]	Production of a phrasal constituent without a verb following a prompt that obligated a full sentence with a subject and verb	E: What else is happening in the picture? C: A boy and two girls [FRAG].
Argument structure error [EARG]	Omission of obligatory constituents before or after a verb or preposition	[EARG] fall/ing off the chair. The boy broke [EARG]. The daddy gave her [EARG]. The boy was riding on [EARG].
Tense marker error [EV]	Omission or substitution for copula, auxiliaries, auxiliary <i>do</i> , bound verb tense markers, and irregular verb forms	The boys throw/ing [EV] snowball/s. The boy failed [EV] off the stool. The dog splash [EV] the water. The cat [EV] stuck in the tree.
Pronominal form error [EPRO]	Substitution error for subject, object, reflexive, and possessive pronouns and possessive determiners	Him [EPRO] wants another one. She [EPRO] is wearing a tie {referring to man}. A mom lost she [EPRO] seatbelt. He can't get down by heself [EPRO].
Other grammatical morpheme error [EMORPH]	Omission or substitution for bound or free morphemes other than verb tense markers, pronouns, and conjunctions	A [EMORPH] water spilled. She's run [EMORPH] to her dad. The water's coming out [EMORPH] the sink. He try [EMORPH] get up there.
Other grammatical and semantic error [OTHER]	Any other syntactic error or semantic irregularity that could not be assigned to another error category	She's gonna fall to the ceiling [OTHER]. She's washing the water with her hands [OTHER]. They messed up it [OTHER].

Note. In the examples, the letters within the brackets represent the codes for specific error types.

bound tense markers, and irregular past and third person verb forms. Verbs produced without an inflection, modal, or auxiliary were transcribed as bare verbs; inappropriate uses of bare verbs were coded as tense marker errors, regardless of the nature of the omission. Uninflected verbs with plural nouns and pronouns (e.g., *They pull the dog*) were not coded as errors unless it was clear from the context that the context obligated a tense marker. Errors were only coded as auxiliary omissions when the child had produced a present or past participle form that created an obligatory context for the auxiliary. Colloquial uses of *got* (e.g., *He got dirt on his cheek*) were not coded as errors.

- **Pronominal form errors** were defined as substitution errors for subject, object, reflexive, and possessive pronouns and possessive determiners. Gender errors were judged based on inconsistencies in the child's utterances and not on whether pronoun use agreed with the pictured character. An example would be a child who referred to a pictured character as *the dad* and subsequently referred to that same character as *she*.
- **Other grammatical morpheme errors** were defined as omissions or substitutions of bound or free nominal morphemes other than pronouns (e.g., plural *-s*, articles), aspect markers (e.g., *-ing*), and prepositions. Errors were only coded as omissions of aspect markers when the child had produced an auxiliary that created an obligatory context for the aspect marker (e.g., *He's drive the car*).
- **Other grammatical and semantic errors** were defined as any syntactic error or semantic irregularity that could not be assigned to another error category. Included in this category were lexical errors on content words (i.e., nouns, verbs, and adjectives). As for pronouns, gender substitutions (e.g., *girl* for *boy*) were based on inconsistencies in the child's utterances rather than on whether the word matched the pictured character.

Dependent measures. C-units containing one or more error codes were marked as ungrammatical. The percentage of grammatical utterances including fragments (PGU) and percentage of grammatical utterances excluding utterances without a subject and/or main verb (PGU-X) were calculated for each child by subtracting the number of ungrammatical C-units from the total number of C-units and then dividing this number by the total number of C-units. To inspect the patterns of grammatical errors, the relative proportion of each error type was calculated for all children combined by dividing the number of occurrences of each error type by the total number of errors across children. In addition, mean length of utterance in words (MLU_w) and mean length of utterance in morphemes (MLU_m) were calculated for each child.

Interrater agreement. To check the reliability of coding, six transcripts (20%) were randomly selected and independently

recoded by a trained research assistant for the occurrence of errors. Interrater agreement for these transcripts was 92%.

RESULTS

Effect of Gender and Age on PGU

Because the participants were composed of boys and girls ranging in age from 36 to 47 months, we tested whether gender and age affected the performance of PGU. The mean PGU and PGU-X was 71% ($SD = 10\%$) and 72% ($SD = 10\%$) for boys and 70% ($SD = 13\%$) and 71% ($SD = 13\%$) for girls, respectively. A one-way analysis of variance (ANOVA) showed that there was no gender difference in PGU or in PGU-X: $F(1, 20) = 0.083, p = 0.78, \eta_p^2 = 0.004$ for PGU; $F(1, 20) = 0.239, p = 0.63, \eta_p^2 = 0.012$ for PGU-X. In addition, a linear regression analysis indicated that age did not significantly account for the variance of PGU or PGU-X among 3-year-olds in this study: $R^2 = 0.031, p = 0.44, f^2 = 0.001$ for PGU; $R^2 = 0.001, p = 0.90, f^2 < 0.001$ for PGU-X. For these reasons, we collapsed children across genders and ages in the remaining analyses.

Level of PGU

Table 2 presents the number and length of C-units and PGU on the picture task for each child. The mean was 71% ($SD = 12\%$) for both PGU and PGU-X, which is close to the performance level of 3-year-olds (i.e., 70%) reported by Lee (1974). Thus, there was no difference when utterances without a subject and/or main verb were excluded, as for DSS, or when the utterances were included. Six children showed no difference between PGU and PGU-X, 13 children had a higher score for PGU-X, and three children had a lower score for PGU-X, with the difference being no more than 5% for any child. Because subsequent analyses yielded identical outcomes for all major findings whether carried out on PGU or PGU-X, only the results for PGU (i.e., a sample that included C-units without a subject and/or main verb) are reported in the following paragraphs.

The range for PGU was 47% to 89%, suggesting that there is considerable variability in the performance of PGU in 3-year-olds. The minimum PGU in this study was lower than that reported by Dunn et al. (1996; i.e., 65%), although some children in the Dunn et al. study were younger than 3 years (e.g., 30 months). However, the overall PGU in the current study was distributed toward the higher end, as shown in Figure 1. The skewed distribution of PGU toward the higher end was consistent with a study of older children by Westerveld and Gillon (2010), in which 30 (77%) out of thirty-nine 5-year-olds produced a PGU $\geq 85\%$. Sixteen (73%) out of the 22 children had PGU values $\geq 65\%$, and 5 (23%) of these children had

Table 2. Number and length of C-units and percentage of grammatical utterances (PGU) and percentage of grammatical utterances excluding utterances without a subject and/or main verb (PGU-X) by child.

<i>Child</i>	<i>Age (in months)</i>	<i>Number of C-units</i>	<i>MLCU_w</i>	<i>MLCU_m</i>	<i>PGU</i>	<i>PGU-X</i>
006MD	43	91	5.27	6.62	80	80
009JL	45	94	6.61	7.71	77	77
012MB	46	63	4.44	6.10	89	89
020MV	44	55	4.89	5.75	78	83
022KS	45	81	6.12	7.19	47	48
024AD	45	81	4.27	5.17	79	76
028MH	42	67	5.13	6.15	70	67
030SN	44	68	4.07	5.49	84	85
034ML	37	83	6.29	7.59	78	78
036SG	42	67	4.87	5.99	82	82
043MS	43	97	5.34	6.45	59	63
045ML	41	97	5.90	6.48	48	47
048JS	46	95	6.86	7.83	58	59
052NR	40	84	6.08	7.49	69	71
053CW	38	48	4.17	5.33	56	58
055JG	37	57	3.67	4.98	63	63
057PF	47	66	4.64	6.08	67	69
058NR	36	66	4.32	5.65	74	73
065JM	42	66	4.70	5.56	65	66
074MD	40	58	4.34	5.60	72	74
080WB	47	76	5.46	6.97	79	80
092GA	44	61	4.05	4.77	80	82
Mean	42.45	73.68	5.07	6.23	71	71
SD	3.31	14.91	0.91	0.91	12	12
Min	36	48.00	3.67	4.77	47	47
Max	47	97.00	6.86	7.83	89	89

Note. MLCU_w = mean length of C-units in words; MLCU_m = mean length of C-units in morphemes.

PGU values $\geq 80\%$. There were, however, two children with PGU values $< 50\%$.

Error Types

We had anticipated certain categories of errors and defined those error types based on previous studies investigating specific aspects of linguistic development. These included argument structure omissions, pronominal form errors, errors in usage of tense markers, and errors in usage of other grammatical morphemes. To allow for other errors, we included an OTHER category for utterances that were ungrammatical in some other way or semantically anomalous. Table 3 presents the frequency and percentage of each error type collapsed across children and the number of children who produced each error type. In total, children produced 571 errors in the C-units that were included for analysis. The most common error types were tense marker errors (30%) and other morpheme errors (27%); the least common error type was fragments (3%). Given their infrequent occurrence, fragments will not be discussed further.

We examine each error type in detail in the following paragraphs. Table 4 shows the frequency and percentage

of subtypes of errors and the number and percentage of children who produced each error subtype. Note that “% of errors” was calculated by dividing the frequency of each error subtype by the frequency of the error category to which

Figure 1. Distribution of percentage of grammatical utterances (PGU).

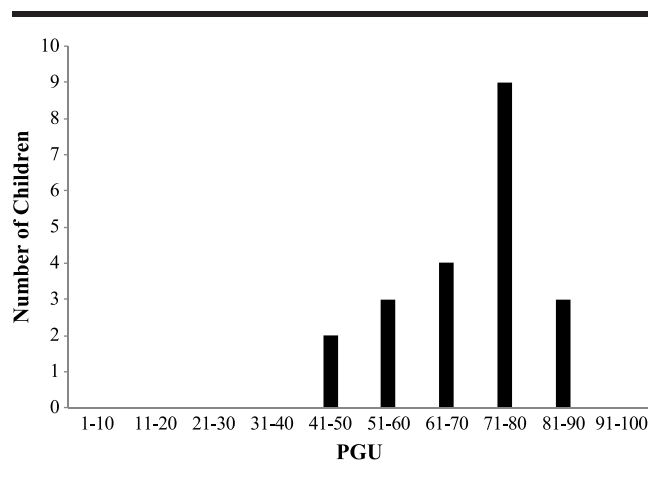


Table 3. Frequency and percentage of each error type and number and percentage of children who produced each error type.

<i>Error type</i>	<i>Frequency of errors</i>	<i>% of total errors</i>	<i>Number of children</i>	<i>% of total children</i>
Tense marker	173	30	21	95
Other grammatical morphemes	152	27	22	100
Other	90	16	19	86
Pronominal form	74	13	17	77
Argument structure	65	11	18	82
Fragment	17	3	9	41
Total	571	100	—	—

the subtype error belonged rather than by the total number of errors. For instance, the percentage of tense marker omissions (80%) was computed by dividing the frequency of tense marker omissions (i.e., 138) by the frequency of tense marker errors (i.e., 173).

The median (that is, the age at which at least 50% of the children demonstrate some achievement) has been used

to set age expectations for a variety of developmental achievements such as growth milestones (Abbassi, 1998), play (Howes & Matheson, 1992), and grammatical structures (Miller, 1981). In keeping with this, in Table 5, we divided error subtypes into those produced by at least half of the children (labeled *common errors*) and those produced by fewer than half of children (labeled *uncommon errors*), which included the majority of errors, and indicated the number of children who produced each error. Errors that were produced only by children with PGU \leq 10th percentile (labeled *low PGU*) were listed in a separate column. The specific errors for each of the subtypes are described below.

Tense marker errors. Children produced 173 tense marker errors, accounting for 30% of the total errors. Only one child did not produce any errors on tense markers. The percentage of correct use of tense markers for younger 3-year-olds (ages 3;0 to 3;5) ranged from 59% to 92%, in contrast to the 34% to 78% accuracy reported by Rice et al. (1998) for this age range. Similarly, the percentage of correct use of tense markers for older 3-year-olds (ages 3;6 to 3;11) was 72% to 100%, in contrast to the 56% to 92% reported by Rice et al. The two children with the highest error rates for tense marking (28% and 41% incorrect tense marking in obligatory contexts) both produced a PGU $<$ 50%.

Table 4. Frequency and percentage of subtypes of errors and number of children who produced each error subtype.

<i>Error type</i>	<i>Frequency of errors</i>	<i>% of errors</i>	<i>Number of children</i>	<i>% of children</i>
Tense marker				
Omission of tense marker	138	80	21	95
Agreement error	17	10	11	50
Overgeneralization of 3SG <i>-s/</i> past tense <i>-ed</i>	11	6	7	32
Other error	7	4	6	27
Grammatical morpheme				
Omission/misuse of article or demonstrative	58	38	19	87
Omission/misuse of preposition or particle	34	22	16	73
Error on plural	24	16	11	50
Omission of infinitive <i>to</i>	22	14	7	32
Omission of participle (<i>-ing, -ed</i>)	12	8	10	45
Other error	2	3	2	9
Other				
Errors on verbs	33	37	16	73
Errors on nouns	25	28	14	64
Miscellaneous	22	24	13	59
Misuse of conjunctions	10	11	5	23
Pronominal form				
Case error	38	52	6	27
Gender error	30	41	13	59
Reflexive error	5	7	4	18
Other	1	2	1	5
Argument structure				
Omission of patient/theme/beneficiary	26	40	13	59
Omission of agent or copular subject	21	32	8	36
Omission of goal/locative	17	26	12	55
Other	1	2	3	14

Table 5 (p. 1 of 2). Common and uncommon errors produced by 3-year-olds.

<i>Error category</i>	<i>Common errors (# children out of 22)</i>	<i>Uncommon errors (# children out of 22)</i>	<i>Uncommon errors only by low PGU children (# children out of 3)</i>
Tense marker errors	Production of bare verbs without tense marking (19) Omission of auxiliary <i>be</i> (15)	Omission of copula (7) Overregularization of regular past <i>-ed</i> (7) Agreement errors for copula (4) Agreement errors for auxiliary <i>be</i> (4) Double marking errors (4) Contraction errors (4) Substitution of <i>don't</i> for <i>doesn't</i> (3)	Agreement errors for lexical verbs (1)
Grammatical morpheme errors	Article omissions (19)	Substitution errors on prepositions (9) Omissions of prepositions (9) Omission of infinitive <i>to</i> (7) Overregularization of regular plural to irregular nouns (4) Overuse of plural with singular referent (4) Omission of present participle (4) Overgeneralization of irregular past tense form to past participle (4) Overregularization of regular past <i>-ed</i> to irregular past participle (3) Overuse of plural with mass nouns (3) Overuse of articles with mass nouns (3) Overuse of articles with plural nouns (3) Substitution of <i>that</i> or <i>them</i> for <i>those</i> (3) Plural omissions (2) Omission of past participle (2) Particle omission (1) Use of schwa in place of infinitive <i>to</i> (1)	Omission of determiners other than articles (2) Overgeneralization of infinitive <i>to</i> to an unmarked infinitive (1)
Pronominal form errors	Gender substitutions (13)	Substitution of object case for <i>she</i> (6) Errors on reflexives (4)	Substitution of object case for <i>he</i> and/or <i>they</i> (3) Substitution of subject case for possessive determiner (1) Substitution of object case for possessive determiner (1)
Argument structure errors	Patient omission with transitive and ditransitive verbs (13)	Omission of the object of a preposition (10) Subject omission with transitive and ditransitive verbs (6) Omission of an entire locative phrase (5) Subject omission with tensed verb (3) Omission of two arguments (3) Subject omission with intransitive verbs (2) Subject omission with copula (2) Dative omission (1)	

(table continues)

Table 5 (p. 2 of 2). Common and uncommon errors produced by 3-year-olds.

Error category	Common errors (# children out of 22)	Uncommon errors (# children out of 22)	Uncommon errors only by low PGU children (# children out of 3)
Other grammatical and semantic errors	Other anomalous utterances (13)	Within class substitution errors for nouns (9) Substitution of related verb (7) Overuse of progressive aspect with state verbs (5) Overt signaling of word-finding difficulty (5) Across class substitution for nouns (4) Noun to verb derivation errors (4) Substitution for conjunction (3) Overuse of general all-purpose verb (3) Violation of selectional restriction (3) Particle ordering errors (3) Overuse of non-specific noun (2) Constituent exchange errors (2) Verb use in inappropriate argument frame (2)	Omission of <i>and</i> (1) Overgeneralization of noun-to-verb derivation (2) Clause order error with <i>because</i> (2)
Fragments		Pragmatically unallowable fragments (9)	

Note. Common errors = errors produced by at least 50% of the children; Uncommon errors = errors produced by < 50% of the children; High PGU = > 10th percentile (56%); Low PGU = ≤ 10th percentile.

The most common error (80% of the errors on tense markers) was omission of the tense marker (21 children; e.g., *They both *are holding presents*), followed by agreement error (10%; 10 children; e.g., *Her eyes isn't closed*; *He were raking up the leaves*), overgeneralization of past tense *-ed* (6%; 7 children; e.g., *He fallled asleep*), and double-marking for tense (4%; 7 children; e.g., *The dog will wants to play*). Among the 138 omission errors for tense and agreement morphemes, 46% (63/138; 19 children) involved the use of bare verbs (e.g., *The dog wash himself*), 46% (64/138; 15 children) omission of auxiliary *be* (e.g., *A girl *is smiling*), and 8% (11/138; 7 children) omission of copula *be* (e.g., *They *are mad*). Commission errors on tense markers included contraction errors involving overuse of an auxiliary in a contracted form with a pronoun (4 children, e.g., *she's is*, *they're can be*), number agreement errors on the copula (4 children) and auxiliary *be* (4 children), and substitution of *don't* for *doesn't* (3 children).

Other grammatical morphemes. The children produced 152 grammatical morpheme errors, accounting for 27% of the total errors. These included errors on nominal morphemes, errors on prepositions and particles, and errors on nontensed verb morphemes.

Errors on nominal morphemes involved the plural and articles. The largest percentage of morpheme errors (31%) occurred on articles. However, although article omissions were produced by most of the children, frequency of article use in obligatory contexts was high (at least 90%), consistent with Rescorla and Roberts (2002). Most of the errors

(38 out of 47; 19 children) involved omission of an article (e.g., **A firetruck is coming*), but a few children also demonstrated overuse of the indefinite article with mass nouns (3 children; e.g., *A water is pouring*) and/or plural nouns (3 children; e.g., *A boys are not happy*). Six children produced errors on another determiner, substitution of either *that* or *them* for *those* or omission of a determiner other than an article (2 children; e.g., *put shoes on _ hands*).

Eleven children produced errors on the plural (16% of the morpheme errors). All but one child had reached mastery (i.e., 90% use in obligatory contexts) for the plural. Errors on the plural included overgeneralization of the plural morpheme to irregular nouns (4 children, e.g., *The boy spilled all the water in his foots*) or mass nouns (3 children, e.g., *The waters fell down to the ground*), and overuse of the plural with a singular referent (4 children, e.g., *There's a trees*) with omissions (e.g., *Then she was blowing bubble/*s*) produced by only two children. The finding that few children produced omissions of the plural was consistent with previous reports showing early mastery for the plural morpheme (Brown, 1973; de Villiers & de Villiers, 1973; Leonard et al., 1992; Rescorla & Roberts, 2002). The combination of high use in obligatory contexts for regular plural with overgeneralization errors is also consistent with previous reports (Maslen, Theakston, Lieven, & Tomasello, 2004).

Errors on prepositions or particles accounted for 22% of the errors; these were produced by 16 of the children. In contrast to Watkins and Rice (1991), there were more errors on prepositions than on particles. Only one child omitted

a particle (*brushing *off the leaves*), whereas 14 children made errors on prepositions. Also in contrast to Watkins and Rice, there were more substitution than omission errors on prepositions. Just more than half of the errors on prepositions (53%) involved substitutions (9 children; e.g., *A boy in the stool is falling down*), with somewhat fewer involving omissions (9 children; e.g., *He's cutting *with scissors*). Six of the preposition omissions occurred in contexts with a particle or prepositional verb (*get down *from the tree*; *went out *of the wagon*). Most of the preposition errors occurred on locative prepositions (e.g., *playing *in the pile*), but there were also errors on nonlocative prepositions (e.g., *fighting *over the bucket*).

Errors on nontensed verb morphemes predominately included errors on infinitive *to* and on present or past participles. Children showed a bimodal distribution for the frequency of infinitive *to* use in obligatory contexts, with most of the children showing mastery or near mastery of the infinitive marker (i.e., at least 86% usage) and three children showing significant omission rates, including two of the children with the lowest PGU (48% and 58%). The generally high frequency of correct usage for the infinitive marker is consistent with prior reports by Eisenberg (2003) and by L. Bloom, Tackeff, and Lahey (1984). Errors on infinitive *to* accounted for 16% of the total morpheme errors and were produced by seven of the children. All but two of these errors involved an omission (e.g., *It's going — fall out*), with the others involving either use of schwa (e.g., *She doesn't know what a do*) or overgeneralization to an unmarked infinitive (e.g., *Her making her to stop*).

Errors on present or past participles accounted for 8% of the morpheme errors and were produced by 10 of the children. Half of the errors involved omission in contexts that included an auxiliary verb, with six children producing omissions of the present participle (e.g., *The dog is try/*ing to get the squirrel*) and two children producing omissions of the past participle (e.g., *He doesn't want to be wash/*ed*). The other half were substitution errors on the past participle, most of which involved overgeneralization of a regular or irregular past tense form (4 children; e.g., *He's gonna get drived over*).

Pronominal form errors. There were 74 pronominal form errors; these were produced by 17 of the children. The largest category of pronoun errors (52%) involved case errors (e.g., *Her pushing the stroller*) followed by gender errors (41%) and reflexive errors (4 children; 7%; e.g., *He's gonna hurt himself*). However, more children produced gender errors (13) than case errors (6). The large number of gender errors produced by the children in the current study was not consistent with a previous report by Rispoli (1998) that suggested that English-speaking children acquire the feature of gender earlier than the feature of case for pronouns. Loeb and Leonard (1991), however, found gender errors to be more frequent than case errors for some children. Most of the gender errors (80%) occurred on subjective case

pronouns; of these, 79% involved *he-for-she* substitutions, with many fewer (only 21%) involving *she-for-he*.

Consistent with the report by Loeb and Leonard (1991), there was a bimodal distribution for subject case errors, with most of the children having no more than a 7% error rate and three children showing higher error rates (on 21%, 48%, and 50% of third person subject case pronouns). Also consistent with previous reports (Moore, 2001; Rispoli, 2005), the majority of case errors, accounting for 92% (33 out of 36) of the subject case errors, were *her-for-she* substitutions. Only three children with the lowest PGU (47%, 48%, and 56%) made object case substitutions on subject pronouns other than *she*. The majority of case errors involved substitution of objective case (*him/her/them*) for subjective case (*he/she/they*). There were only two errors involving possessive pronominal forms, both in determiner contexts and both by children with low PGU, one involving substitution of objective case (*She's put him shoes on*) and the other involving substitution of subjective case (*A mom lost she seatbelt*).

Argument structure errors. All but three of the children produced at least one argument error. There were a total of 65 errors coded as argument structure errors, all of which by definition were omission errors. Most of the errors involved omission of one required argument, regardless of the number of obligatory arguments, but three children each produced one or two utterances with omission of two arguments (i.e., *— spilling —*; *he's telling —*). The children omitted more postverbal arguments than subject arguments (44 vs. 21), and postverbal argument omissions were produced by more children than were subject omissions (19 vs. 8). This was unanticipated in light of the predominant focus of previous studies on subject omissions.

The majority of subject argument omissions (75%) was with transitive verbs, ditransitive verbs, or the copula (i.e., verb contexts requiring two or more arguments), but there were also subject omissions with intransitive verbs (i.e., verb contexts for which the subject would be the only argument). It should be noted that one-third of the subject omissions (7 out of 21) were produced by a single child, MS, with the majority of her errors occurring on the verb *said* in reported speech (e.g., *and — said "Dad give me that"*); the other seven children each produced no more than three subject omissions. Most of the subject omissions occurred in untensed contexts (e.g., *— trying to get one of these*), but three children produced subject omissions with a tensed verb (e.g., *— puts in the bucket*), including children with the highest frequency of use for tense markers. Only two children omitted the subject within a copular sentence form (e.g., *— shouldn't be triangles*).

More than half (59%) of the postverbal argument omissions involved an object, and 39% involved all or part of a locative phrase. Most of the object omissions (88%) involved the patient, even with ditransitive verbs (e.g., *The mother spilled —*; *The girl's giving the boy —*). Two children

omitted both the patient and dative (e.g., *He's telling* —), and only one child omitted just the dative (e.g., *The sister's giving — the dad's shoes*). In light of the report by Campbell and Tomasello (2001) that ditransitive verbs may first be produced as transitives (i.e., with a direct object and implied recipient), we had anticipated that any omissions would involve the dative, so this finding was unexpected. There was only one instance of an omitted postverbal argument with the copula (*The tree is* —). Consistent with Watkins and Rice (1991), omissions involving locatives included more omissions of just the noun phrase (10 children; e.g., *They're gonna put a snowball at* —) and fewer omission of the entire locative phrase (5 children; e.g., *He's putting the cereal* —).

Other grammatical and semantic errors. There were 90 errors in total coded as OTHER, 37% of which (33 errors produced by 16 children) involved misuse of verbs and 28% (25 errors produced by 14 children) misuse of nominals. Misuse of verbs fell into six categories: lexical substitutions (8 children; e.g., *falling down* for *knocking down*), overuse of progressive aspect with state verbs (5 children; e.g., *He is wanting it*), over-generalization of noun-to-verb derivations (4 children; e.g., *They are brooming*), overuse of general all-purpose verbs (3 children; e.g., *They are doing snowballs*), violation of selectional restrictions (3 children; e.g., *The bus is walking into the dog*), and use of a verb in an inappropriate argument frame (2 children; e.g., *They're standing the dogs now*). Misuse of nouns primarily fell into four categories: within-class substitutions (9 children; e.g., *shovel* for *bucket*), across-class substitutions (4 children; e.g., *circle* for *round*), overt signaling word-finding difficulty (5 children; e.g., *The daddy is looking in I don't know what that word is*), and overuse of nonspecific nouns (2 children; e.g., *He has a this*).

Five children misused conjunctions, accounting for 10 of the errors coded as OTHER. Most of the conjunction errors involved overuse of the conjunctions *but* and *because* (e.g., *He's gonna carry the bucket//But the dog splashed the girl*) or clause order errors (e.g., *A dog don't want a bath because he all dirty*). Five children produced word order errors, three involving particle ordering with pronouns (e.g., *She's starting to clean up it*) and two involving constituent exchanges (e.g., *He's splashing the water with the dog*). The rest of the errors coded as OTHER were anomalous utterances that could not be categorized (e.g., *They are coming in sorry again; He is full of bucket*).

DISCUSSION

One aim of the current study was to develop normative expectations for the level of grammatical accuracy that would be typical for 3-year-old children. We measured grammatical accuracy as the percentage of utterances without

grammatical or semantic errors (PGU). The 71% average level of grammatical accuracy as measured by PGU was comparable to the 70% level derived from the DSS sentence point score previously reported by Lee (1974). The mean for PGU was not significantly different whether or not we followed the DSS rules and excluded utterances without a subject and/or main verb.

There was a large amount of variability in the range of PGU. Although the PGU distribution was positively skewed, with 90% of the children producing a PGU of at least 55% and 75% of the children producing a PGU of at least 65%, there were also two children with a PGU of 47%–48%. Given that the participants were all classified as TD, the implication of these data is that only grammaticality levels below this level would be sufficiently low to be a concern for a 3-year-old.

A second aim was to learn more about the types of errors that would be typical for 3-year-old children. This is important in order to avoid overinterpreting particular errors as evidence of language impairment. We divided errors based on the median number of children producing each error type into *common errors* (i.e., errors produced by at least half of the children) and *uncommon errors* (i.e., errors produced by fewer than half of the children). This was based on previous clinical use of the median to set the age at which various aspects of development can be expected. There were only a few common errors, and these all involved the most frequently occurring structures within the samples. Most of the errors were produced by fewer than five children. However, because each of the errors had been produced by children who were considered to be TD, even the least common errors could not be construed as qualitative differences that would trigger concern about the typicality of a child's language.

An abnormal error frequency of substituting object for subject case pronouns has been suggested as a possible characteristic of language impairment (Leonard, 1998). There were children in the current study who produced error rates as high as 50% on subject case pronouns. Thus, although a high error rate for pronoun case may be a common pattern for children with language impairment, the presence of this error pattern cannot necessarily be taken as evidence of a language impairment. We also considered whether the production of pronoun case errors by children with high accuracy rates for tense markers might constitute an abnormal profile. There was, however, one child with a high error rate for subject case pronouns in spite of having >90% accuracy for tense markers.

Comparison With Other Studies

The current study used a structured task to elicit language samples rather than the play sampling that is the typical procedure for eliciting language samples from young children. The prompts were designed to oblige production

of sentences with a subject and predicate. The low rate of fragments and of subject argument omissions suggests that the prompts were successful in creating this obligation. This sampling variable affected utterance length. MLU was higher for the picture sampling than had been previously reported for conversational samples (Leadholm & Miller, 1992; Miller & Chapman, 1981).

The rate of occurrence of tense marker errors was lower for the picture sampling task than had been previously reported for conversational samples (Rice et al., 1998). The picture description discourse context could have influenced the type of verb forms produced as well as judgments about the appropriateness of those verb forms. Some of the children produced narrative episodes in response to the prompts, which created an appropriate context for the historical present (Biber, 1988). Because third person plural is not inflected for present in English, bare verbs with plural subjects were judged as correct usage. In contrast, the conversational sampling used by Rice et al. (1998) is likely to have created more contexts for the present progressive and past tense and the consequent judging of bare verb use as incorrect in those contexts.

In spite of being more structured than a play sample, the picture task left children with considerable leeway in the form and content of their utterances. This affected the number of attempts at producing some forms and consequently could have reduced the number of children demonstrating errors as well as the rate of errors on those forms. This accounts for the small number of common errors (i.e., errors produced by a majority of children), which were limited to a few high-frequency structures. In contrast, there were fewer opportunities for errors to occur on the less frequent structures. For instance, omissions of the *to* infinitive marker were demonstrated by only seven children and hence were classified as an uncommon error. However, there were two children who did not make any attempts at infinitives and, among the children making no errors on *to*, four children produced infinitives with only one or two main verbs. As for more naturalistic language samples, conclusions about whether or not a form has been acquired cannot, therefore, solely be based on the absence of that form or on the absence of errors in a language sample (Eisenberg, 1997).

Clinical Implications

The 10th percentile has been a commonly applied clinical cutoff to identify children with language impairment (Fey, 1986; Lee, 1974; Records & Tomblin, 1994). Setting a cutoff at the 10th percentile would give us a PGU of 55% as a clinical cutoff. However, as noted by McFadden (1996), applying a cutoff based on a truncated sample that does not include children with language impairment could lead to overidentifying language impairment. This PGU level might be useful for screening

to identify an at-risk group of children for whom further evaluation is warranted. An alternative option would be to use the lowest PGU value, 47%, in setting a cutoff criterion for typical PGU.

Clinicians should be cautious in using nonsystematic observations about the presence or absence of errors when identifying or ruling out language impairment. The current study revealed a variety of error types produced by 3-year-old children. Because the participants were judged to be TD, none of the errors could be construed as qualitatively different productions suggestive of language impairment. Based on the current data, error rates as high as 50% for subject case pronouns and infinitive *to*, 40% for tense marking, or 25% for regular plural could not be regarded as abnormally high error frequencies that would trigger concerns about the typicality of a child's language, at least in 3-year-olds.

Limitations of the Current Study

The current study used a structured picture sampling procedure with prompts to obligate complete sentences with a subject and predicate. The results may not, therefore, be generalizable to language samples elicited during play.

The participants in the current study were judged to be TD based on standardized test scores, SPELT-P2 scores, and a parent rating scale. However, the diagnostic accuracy of these measures has not been confirmed for 3-year-old children. Although previous studies of the SPELT-P2 have shown good specificity for 4-year-olds based on an empirically determined cutoff (Greenslade, Plante, & Vance, 2005), no study has looked at the diagnostic accuracy of the SPELT-P2 for younger children or has empirically established an appropriate cutoff score for this age. Hadley and Rice (1993) reported a high correlation between parent and SLP ratings. However, their parent ratings tended to be higher than the SLP ratings. Therefore, it might be the case that some children in the current study were misclassified as TD based on these measures.

Given these caveats, the current data should be used cautiously for setting criteria to diagnose or rule out language impairment. In order to determine the PGU level and error productions that warrant concern, data from children with language impairment are needed. In addition, longitudinal follow-up data from participants who scored low for PGU and/or evidenced uncommon errors or high error rates would also be important for determining whether these measures could be used to diagnose or screen for language impairment.

Conclusion

In the process of mastering the elements of language, 3-year-old children produce a variety of infrequent error types. Although tense marking errors were the most frequent error type, they accounted for only one-third of the errors

produced by 3-year-olds. A more general measure of grammaticality that considers additional aspects of language might, therefore, be useful in assessing language at this age.

Leonard (1998) suggested that children with language impairment may show idiosyncratic errors that are not manifested by TD children. Such a view makes it important to establish the errors that are in fact produced by typical children. Although certain types of errors had been anticipated based on prior studies, there were some unanticipated errors such as particle ordering errors or omission of the present participle *-ing* when auxiliary *be* had been produced. Although uncommon, these errors cannot be considered atypical, and their occurrence cannot be used as evidence of a language impairment, given the current state of available data. Future studies that include children with language impairment for comparison will allow us to determine what error types at what rates could be considered qualitatively or quantitatively different from typical children.

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APPENDIX. ELICITATION AND PROMPTS FOR THE PICTURE TASK

Elicitation Questions (alternative prompts if no response)

1. What is happening in the picture? (PROMPT: POINT TO DIFFERENT PARTS OF PICTURE AND SAY Just tell something about the picture.)
2. What *else* is happening in the picture? (PROMPT: POINT TO DIFFERENT PARTS OF THE PICTURE AND SAY: Tell me something else about the picture.)
3. SAY “NOW I’LL START THE STORY AND YOU FINISH IT.” PROVIDE STORY STARTER AND SAY: And then~ (PROMPT: REPEAT STORY STARTER AND SAY: And then what happens in the story?)
4. Tell me one more thing about the story. (POINT OUT PARTS OF THE PICTURE THE CHILD HAS NOT TALKED ABOUT AND PROMPT: Just tell me anything else about the picture.)

Sample Story Starters for Question 3

- The boy is trying to get the cookies and then ~
 - Ohno! The dog ate some of the cake and then ~
-

How Grammatical Are 3-Year-Olds?

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