

## Supplemental Material S1. Computing sentence diversity.

Sentence diversity is conceptualized as a rate-based measure to reflect the facility with which children produce diverse, simple sentences in real time. Therefore, the length of the language sample (measured in time) must be held constant. We recommend using 30 min to provide sufficient time for children who are able to produce less common subjects and verbs more time to do so. However, clinicians could distribute the 30 min in different ways as long as the same procedures are followed at all measurement points. Examples include:

- One, 30-min sample
- Combine two, 15-min samples, collected on two different days within a 2-week period
- Combine three, 10-min samples, collected on three different days within a 4-week period

The sentence diversity metric was designed to be simple enough to compute from structure-specific language sampling in real time. Hadley (2006) described this type of sampling in the following way:

"Structure-specific sampling refers to the clinician listening carefully for a predefined set of structures. By focusing attention on only a small set of structures, the recording task is simplified and can facilitate data recording during the interaction itself (particularly if the clinician is observing while the parent interacts with the child)" (p. 180).

The procedures below describe how to conduct structure-specific language sample analysis for sentence diversity by hand, in real time, without the need for computerized technology. For procedures describing how to code and compute sentence diversity in language samples transcribed in their entirety, using Systematic Analysis of Language Transcripts (SALT), interested readers are referred to McKenna and Hadley (2014) for more procedural details and examples and may contact the first author for more information.

### Structure-Specific Language Sampling, Sentence Diversity Analysis (by hand, in real time)

1. Provide a variety of toys for the child and parent to play with, including multiples of objects to create opportunities for plural subjects (e.g., *they, babies, pigs, blocks*) and toys that are associated with different actions/states (e.g., *eat, sleep, need, like, roll, build*).
2. Write down all intelligible utterances that are sentences during the parent-child interaction. If sentences are produced rarely, write down all utterances with verbs used alone or in combination with other words, too. Several different verbs should be used in spontaneous speech before targeting sentence diversity.
3. After the session, highlight the utterances in your list that meet the operational definition of a sentence. To be counted as a sentence, the utterance must contain a (a) lexical verb and (b) pronoun or noun subject in the pre-verb position.
  - a. Lexical verbs carry semantic meaning, refer to actions/states, and can be inflected for tense *-ed*, agreement *-s*, and/or aspect *-ing* in English (e.g., *eat, sleep, need, like, roll, build*).
    - Copula BE forms that link subjects with noun phrases (e.g., *that's a dog*), adjective phrases (e.g., *I'm hungry*), or prepositional phrases (e.g., *they're in the box*) are excluded.
    - Sometimes it is difficult to tell if a word is a bare verb (e.g., *open, drink*) or some other word class (e.g., "That's no open." = That's not open<sub>ADJ</sub> vs That's not opening<sub>V</sub>). If a verb is ambiguous, the sentence should be excluded.

- b. The sentence subject is the noun phrase (NP) in the pre-verb position. Subjects may be a noun alone (e.g., *doggy*), a noun phrase (e.g., *the dog*) or a pronoun (e.g., *it*).
  - Imperatives with an “understood you” as the subject DO NOT meet our operational definition of a sentence.
  - To identify the subject in a *wh*- question, answer the *wh*- question to determine if the *wh*- pronoun is the grammatical subject or not.
    - *Who’s coming?* → *Andy is coming.* (*who* = *Andy* = subject)
    - *What happened?* → *That/an accident happened.* (*what* = *accident* = subject)
    - *What is he eating?* → *He’s eating his lunch.* (*what* = *his lunch*; *he* = subject)
4. Cross out sentences that use partner names as subjects or are “routine” questions.
  - a. Sentences with partner names as alternatives for “you” are hard to distinguish from addressee terms (e.g., *Mommy hold him. Daddy help me.*).
  - b. Subject–verb (SV) combinations appearing in routine questions are excluded (e.g., *Where NP go/going? What NP do/doing?*).
5. Reduce the sentences to its pronoun–noun subject and the uninflected base form of the verb, and differentiate all subjects by the grammatical features of person and number.
  - a. Lexical variations of the same noun (e.g., *dog, doggy*), noun elaboration (e.g., *dog, the dog*), and correct pronouns and pronoun errors in subject position are treated as a single subject type (e.g., *I, me, my, Child’s own name*).
  - b. Singular and plural nouns (e.g., *dog, dogs*) are treated as different subject types.
  - c. Verbs with different regular inflected forms (e.g., *go, goes*), irregular forms (e.g., *eat, ate*), and auxiliary verb elaboration (e.g., *can eat, is eating*) are treated as a single verb type.
  - d. Catenatives are treated as the same verb type as their root form (i.e., *gonna/go, wanna/want, gotta/get*).
6. Coding for sentence diversity analyses is conceptualized for children who are early sentence users; however, compound and complex sentences may appear as mean lengths of utterance (MLUs) approach 2.50 to 3.00. Guidelines for coding more advanced sentence types follow.
  - a. For sentences with compound sentences, record both SV combinations.
    - *Mary likes bananas and Tommy likes apples.* → Mary likes; Tommy likes
  - b. For sentences with compound verb phrases (VPs), record as:
    - *Andy is eating and drinking* → Andy Compound
  - c. For sentences with compound subjects, record as:
    - *The cows and the sheep belong to the barn* → Compound belong
  - d. For dependent clauses in complex sentences, determine if dependent clause is finite (i.e., can be marked for tense/agreement). If so, count the subject–verb combination.
    - *The chicken said I want to go home* → chicken say; I want
    - *Hold this so nobody can come in* → nobody come

Sentences	Unique SVs	Singular		2 <sup>nd</sup>	Plural	
		1 <sup>st</sup>	3 <sup>rd</sup>		1 <sup>st</sup>	3 <sup>rd</sup>
1 I want spoon.	I want	1				
2 I have a spoon.	I have	1				
3 I want plate.						
4 I want pretzel.						
5 I like grapes.	I like	1				
6 I get it.	I get	1				
7 I want syrup.						
8 I want syrup.						
9 I want apple.						
10 I want apple.						
11 I want pizza.						
12 I want sit down.						
13 I got it.						
14 I cut it.	I cut	1				
15 I got it.						
16 I drop it.	I drop	1				
17 I drop it, mommy.						
18 I get it.						
<del>Mommy hold him.</del> – excluded						
19 I want spoon.						
20 I want pizza too.						
21 I got (uh) him.						
22 I got him.						
<del>where's it go?</del> – excluded						
23 what happen?	what happen		1			
24 horse go for ride.	horse go		1			
25 what's happen?						
26 it break.	it break		1			
27 piggy ride too.	piggy ride		1			
28 piggy ride too.						
29 (sheep) sheep (come) go nightnight	sheep go		1			
<del>where farmer go?</del> – excluded						
30 He fit.	he fit		1			
Total		12	6	6	0	0

Note. SV = subject–verb combination; 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, singular, plural = person/number features of the grammatical subject.

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		1 <sup>st</sup>	3 <sup>rd</sup>		1 <sup>st</sup>	3 <sup>rd</sup>
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Total						

*Note.* SV = subject–verb combination; 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, singular, plural = person/number features of the grammatical subject.

## References

- Hadley, P. (2006). Assessing the emergence of grammar in toddlers at risk for specific language impairment. *Seminars in Speech and Language*, 27, 173–186.
- McKenna, M., & Hadley, P. (2014). Assessing sentence diversity in toddlers at-risk for language impairment. *SIG 1 Perspectives on Language Learning and Education*, 21, 159–172.