



SUGAR

A Sweet Introduction to Language Sampling


Stacey Povelto, Ph.D., CCC-SLP, FNAP
Binghamton University
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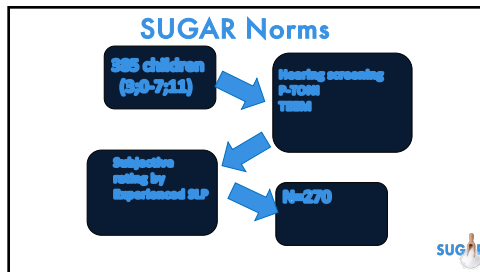
SUGAR Metrics

- Total Number of Words (TNW)
- Mean length of Utterance – SUGAR (MLU_{SUGAR} or MLU₅)
- Words per Sentence (WPS)
- Clauses per Sentence (CPS)

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Procedures

- Collected and transcribed 50-utterance language samples using SUGAR methods
- Calculated MLU, TNW, WPS, CPS

Pavelko, S. L. & Owens, R. E. (2017). Sampling Utterances and Grammatical Analysis Revised (SUGAR): New Normative Values for Language Sample Analysis Measures. *Language, Speech, and Hearing Services in Schools, 48*, 197-215.


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Race/Ethnicity	N	%
Amer. Indian/Alaska Native	1	0.37%
Asian	8	2.96%
White	193	71.48%
Black/African American	25	9.26%
Multiracial	21	7.78%
Not Reported	22	8.15%


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Age	M	F	Total
3;0-3;5	11	9	20
3;6-3;11	17	23	40
4;0-4;5	23	22	45
4;6-4;11	27	28	55
5;0-5;11	24	30	54
6;0-6;11	15	18	33
7;0-7;11	16	7	23
TOTAL	133	137	270

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Norms							
TNW	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-7;11
Mean	192.3	244	261.4	278.7	299.8	337.7	364.5
SD	61.2	58.1	70	60.1	61.5	72.5	54.2
MLUs	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-7;11
Mean	4.24	5.41	5.79	6.18	6.66	7.60	8.19
SD	1.37	1.28	1.53	1.32	1.35	1.60	1.32

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Norms							
WPS	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-7;11
Mean	5.27	6.24	6.48	6.97	7.33	8.05	8.61
SD	1.39	1.17	1.37	1.26	1.21	1.42	1.14
CPS	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-7;11
Mean	1.09	1.15	1.19	1.21	1.29	1.36	1.39
SD	0.13	0.11	0.13	0.11	0.13	0.14	0.14

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Age Group	Average Times and Ranges	
	Total Average Time	Total Range
3;0-3;5	22.04	13.23 – 33.28
3;6-3;11	21.45	14.77 – 31.77
4;0-4;5	20.75	10.55 – 30.78
4;6-4;11	21.05	12.45 – 33.23
5;0-5;11	19.57	13.27 – 25.90
6;0-6;11	22.07	15.30 – 30.15
7;0-7;11	20.87	15.17 – 27.02


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Norms for Older Kids
 We added children ages 8-10;11!

Owens, R. E., Pavelko, S. L. (2020). Sampling Utterances and Grammatical Analysis Revised (SUGAR): Quantitative Values for Language Sample Analysis Measures in 7- to 11-year-old children. *Language, Speech, and Hearing Services in Schools*. 51(3), 734-744.

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Norms for 8-10 Year-Olds

- 112 children
 - 55 females, 57 males
- No history of sensory, neurological, or motor concerns
- No child was receiving special education services
- No parent or teacher reported concerns regarding academic performance
- In an age-appropriate classroom

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Demographics

Race/Ethnicity	N	%
White	83	77%
Not White	16	17%

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Demographics


Maternal Education	N	%
Less than High School	1	<1%
High School Diploma	13	13%
Some College	19	19%
Bachelor's Degree	28	28%
Master's Degree	41	41%

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SUGAR Metrics by Age




TNW	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-8;11	9;0-10;11
Mean	192.3	244.05	261.4	278.71	299.81	337.73	379.63	421.36
1SD	61.22	58.07	69.98	60.14	61.46	72.5	59.28	66.61
-1SD	131.08	185.98	191.42	218.57	238.35	265.23	320.35	354.75

MLU	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-8;11	9;0-10;11
Mean	4.24	5.41	5.79	6.18	6.66	7.60	8.59	9.61
1SD	1.37	1.28	1.53	1.32	1.35	1.60	1.40	1.52
-1SD	2.87	4.13	4.26	4.86	5.31	6.00	7.19	8.09

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SUGAR Metrics by Age



WPS	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-8;11	9;0-10;11
Mean	5.27	6.24	6.48	6.97	7.33	8.05	8.87	9.70
1SD	1.39	1.17	1.37	1.26	1.21	1.42	1.19	1.40
-1SD	3.87	5.07	5.11	5.71	6.12	6.63	7.68	8.30


CPS	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-8;11	9;0-10;11
Mean	1.09	1.15	1.19	1.21	1.29	1.36	1.34	1.37
1SD	0.13	0.11	0.13	0.11	0.13	0.14	0.14	.15
-1SD	1.00	1.04	1.06	1.10	1.16	1.22	1.20	1.22

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The Science of Tests

- Psychometric Adequacy
 - Validity
 - Reliability
 - Characteristics of the Norming Sample
- Diagnostic Accuracy
 - Sensitivity
 - Specificity



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Diagnostic Accuracy

- Sensitivity: “True Positive”
- Specificity: “True Negative”

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Sensitivity = $a/(a+b)$
Specificity = $d/(c+d)$


a) Children with language impairment correctly identified as language impaired	c) Normal children incorrectly identified as language impaired
b) Children with impaired language incorrectly identified as normal	d) Normal children correctly identified as normal

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Recommendations for Diagnostic Accuracy

90%	Good Discriminant Accuracy
80%-89%**	Fair Discriminant Accuracy
Below 80%	Misidentifications occur at unacceptably high rates


Plante & Vance, 1994
Spaulding, Plante, & Farinella, 2006



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Newer Tests


- Leaders Project
- <https://www.leadersproject.org/>



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Identifying a Cutscore

- What score do you use?
 - Cutscore = the score you will use to decide whether a child has typical or impaired language
 - **Not** the same as IDEA eligibility



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Identifying a Cutscore

- Depends on the individual test
- Is not an arbitrary number



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Test	Cut-score (standard score)	Identification accuracy	
		Sensitivity	Specificity
TEEM	-1 SD	.9	.6
TEEM	-2 SD	.9	.95
PLS-5	-1 SD	.83	.80
TOLD P4	90 SS	.74	.88
CASL-2	-1 SD	.74	.84
CASL-2	75 SS	.47	.96

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“The practice of applying an arbitrary low cut-off score for diagnosing language impairments is frequently unsupported by the evidence that is available ...in test manuals.”

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SUGAR Diagnostic Accuracy

- TD = 270 (same participants as from the normative study)
- LI = 36 (3;4-7;7)
 - 26 males, 10 females
 - 36 (TEEM: >2 SD below the mean)
 - Passed hearing screening
- Were receiving language intervention services (n = 29)
- Parent concern about language (n = 7)
 - *3 had previously received language intervention

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SUGAR Cutscores

MLUs (-1 SD) + CPS (-1.25 SD)

- Sensitivity: .97
- Specificity: .83

Pavelko, S. L., & Owens, R.E. (2019). Diagnostic Accuracy of the SUGAR (Sampling Utterances and Grammatical Analysis Revised) Measures for Identifying Children with Language Impairment. *Language, Speech, and Hearing Services in Schools, 50*(2), 211-223.

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Still NOT Time Consuming...

Measure	LI	TD
Average Collection Time (SD)	5:05 (1:49)	5:38 (1:23)
Collection Range	2:46-11:51	3:12-10:47
Average Transcription & Analysis Time (SD)	9:34 (2:23)	15:18 (4:13)
Transcription & Analysis Range	5:51-15:07	7:02-26:45
Total Average Time (SD)	20:20 (4:37)	20:56 (3:58)
Total Range	13:11-30:25	10:33-33:22


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What to do?


1. Collect SUGAR sample
2. Complete SUGAR analysis
3. Analyze for Diagnostic Accuracy
 1. Calculate MLU -1SD
 2. Calculate CPS -1.25 SD
 3. Did your child fail both?

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Sub-Analysis



Owens, R. E., Pavelko, S. L., & Babinelli, D. (2018). Moving Beyond Mean Length of Utterance: Analyzing Language Samples to Identify Intervention Targets. *Perspectives ASHA SIGs*, 3 (SIG 1), 5–22. doi: 10.1044/persp3.SIG1.5

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80% Criterion

We're really talking about probability. If 80% of kids use a language feature within 50 utterances, we can safely assume more than 80% have that feature.

Even some language development studies use the 80% criterion for mastery, although admittedly not most.

It's nearly impossible to get many language features displayed by 90% of the children, the usual level for mastery, in just 50 utterances.

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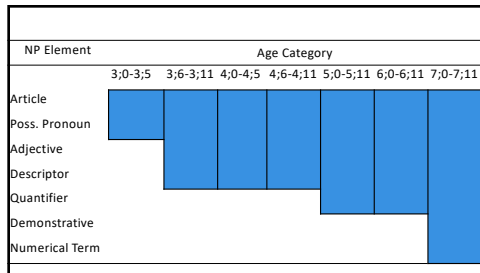
We Examined

- Noun phrases
- Verb phrases
- Brown's 5 bound inflectional morphemes
 - -ing.
 - possessive -'s
 - plural -s
 - 3rd person - s
 - past -ed

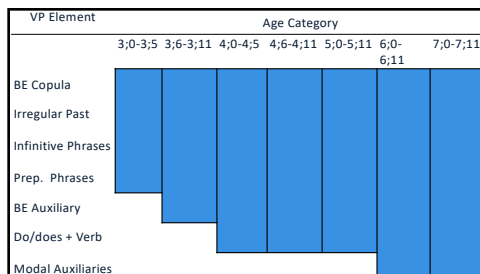
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Grammatical Morpheme	Age Category						
	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;11	6;0-6;11	7;0-7;11
Possessive -s							
Plural -s							
Progressive -ing							
3 rd Person Singular -s							
Regular Past Tense -ed							


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Why do we care about complex syntax?

36-42 months Emergence of coordinate and subordinate clauses

Crystal, Fletcher, & Garman, 1974

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What is a Clause?

- A group of words that express a specific meaning
- All have a subject and a verb
- Types
 - Main/Independent
 - Coordinating/Independent
 - Subordinating/Dependent

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Main Clause

- Typically used when the sentence has an independent clause and one (or more) dependent clause(s)
- Simple sentence
 - When the entire sentence is only a simple sentence
- Independent clause
 - Usually this is used when the sentence has multiple clauses
- Examples
 - The Spaniards brought new animals to Mexico.
 - They introduced new trades

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Coordinate/Independent Clauses

- Must have a subject and verb
- Two or more main clauses connected with a coordinate conjunction
 - FANBOYS: For, And, Nor, But, Or, Yet, So
 - For narratives: so then, and then
- Each Clause can function as a main clause
- Examples
 - I play hockey and I'm a forward
 - And so Luke said, "please" and Darth Vader was watching his son die basically

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Subordinate/Dependent Clauses

- Must have a subject and verb
- Cannot function as a main clause
- Three Types
 - Nominal (noun)
 - Relative (adjective)
 - Adverbial

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Noun Clauses

- Function as a noun
- Fills the same roles
 - Subject
 - What I like to do is play in the snow with my brother
 - Object (direct or indirect)
 - I think that they're really good to play with.
 - Complement
 - It's basically that you just score more runs.

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Relative Clauses

- Immediately follow the noun/pronoun they modify in an independent clause
- Typically introduced by relative pronoun
 - What, that, who, [that]
 - And then there's a girl Madison that goes here.
- Can be introduced by a preposition
 - The tests with which we demonstrated are in the clinic

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Adverbial Clauses

- Function as adverbs
 - Provide information about time, manner, place, reason, condition
 - Answer the "wh"
 - When, where, why, how
- Examples
 - When she was shipped over from Mississippi to Virginia she lost a toe nail
 - And then I like football a lot 'cause it's just a lot of competitiveness.

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SUGAR Findings

- Utterances with only Subordination
 - For every one month increase in age, subordination increases by 0.2%
- Utterances with only Coordination
 - For every one month increase in age, subordination increases by 0.1%
- Utterances with BOTH Subordination AND Coordination
 - For every one month increase in age, subordination increases by 0.1%

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SUGAR Findings

Age	SI	SO	CO	CS
5;0	46.55	1.25	2.05	0.10
5;6	45.35	1.85	2.35	0.40
6;0	44.15	2.45	2.65	0.70
6;6	42.95	3.05	2.95	1.00
7;0	41.75	3.65	3.25	1.30
7;6	40.55	4.25	3.55	1.60

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SUGAR Findings


Age	SI	SO	CO	CS
8;0	39.35	4.85	3.85	1.90
8;6	38.15	5.45	4.15	2.20
9;0	36.95	6.05	4.45	2.50
9;6	35.75	6.65	4.75	2.80
10;0	34.55	7.25	5.05	3.10
10;6	33.35	7.85	5.35	3.40
11;0	32.15	8.45	5.65	3.70

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Complex Syntax

Owens, R.E., Pavelko, S.L., & Hahs Vaughn, D. (2024). Growth of Complex Syntax: Coordinate and Subordinate Clause Use in Elementary School-Aged Children. *Language, Speech, and Hearing Services in Schools*. https://doi.org/10.1044/2024_LSHSS-23-00102

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SUGAR Sub-Analysis

1. Select the appropriate sub-analysis form based on the chronological age or the age for the child's MLU
2. Open the language sample
3. If the utterances are numbered, highlight the entire document and delete all numbers
4. Copy the utterances
5. Paste the utterances into the Sub-analysis form
6. Begin locating structures in the sample

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