

Supplementary Table 1

*Mean, SD and Range of Participant Characteristics and Assessments*

	LE group (n=16)	SLI group (n=20)	AE group (n=23)	Group differences
Age	3;7 (0;2) 3;2 - 3;11	5;5 (0;3) 4;11 - 6;1	5;5 (0;3) 5;0 - 5;11	
<sup>c</sup> CMMS	104.3 (11.8) 81 - 122	95.2 (6.2) 86 - 106	106.9 (12) 86 - 128	LE vs SLI** SLI vs AE** LE vs AE
<sup>d</sup> PPVT-R RAW	41.6 (9.3) 30 - 60	44.4 (11.8) 20 - 62	66.1 (11.1) 46 - 86	LE vs SLI SLI vs AE** LE vs AE**
<sup>e</sup> PPVT-R STD	105.3 (9.9) 85 - 121	82.2 (12.9) 62 - 99	103.6 (10.7) 87 - 122	LE vs SLI** SLI vs AE** LE vs AE
<sup>f</sup> TOLD-P2	<sup>a</sup> not applicable	80.2 (8.3) 56-90	100.7 (9.3) 88-124	SLI vs AE**
<sup>g</sup> TOLD-P2 Syntax Quotient	<sup>a</sup> not applicable	76.3 (7.6) -57-85	99.23 (9.4) -85-117	SLI vs AE**
<sup>h</sup> TELD	106.8 (10.4) 93 - 129	<sup>b</sup> not applicable	<sup>b</sup> not applicable	<sup>b</sup> not applicable
<sup>i</sup> MLUm	4.67 (0.58) 3.44 - 5.91	4.45 (0.71) 3.12 - 5.95	5.59 (0.72) 4.36 - 6.94	LE vs SLI SLI vs AE** LE vs AE**
<sup>j</sup> TEGI Screeners	69.1 (19.87) 36 - 97	54.6 (34.2) 0 - 91	87.8 (11.7) 58 - 100	LE vs SLI SLI vs AE** LE vs AE**

\*\*  $p < 0.01$

<sup>a</sup>Children in the LE group were not administered the TOLD-P2

<sup>b</sup>Children in the SLI and AE groups were not administered the TELD

<sup>c</sup>Columbia Mental Maturity Scale, Standard Score

<sup>d</sup>Peabody Picture Vocabulary Test-Revised, Raw Score

<sup>e</sup>Peabody Picture Vocabulary Test-Revised, Standard Score

<sup>f</sup>Test of Language Development – Primary, Language Quotient Standard Score

<sup>g</sup>Test of Language Development – Primary, Syntax Quotient Standard Score

<sup>h</sup>Test of Early Language Development, Spoken Language Standard Score

<sup>i</sup>Mean Length of Utterance in morphemes

<sup>j</sup>Test of Early Grammatical Impairment Screening Test Standard Score

Supplementary Table 2

*Frequency of Verb Occurrence (combined stem and inflected form) in the Hall, Nagy & Linn (1984) corpora*

Familiar verb ( <i>n</i> =28)	Child productions	Caregiver input	Unfamiliar verb ( <i>n</i> = 28)	Child productions	Caregiver input
<b>bites</b>	62	48	<b>gnaws</b>	0	0
<b>carries</b>	23	50	<b>transports</b>	0	*2
<b>cleans</b>	82	130	<b>scours</b>	0	0
<b>climbs</b>	38	25	<b>scales</b>	0	0
<b>cooks</b>	20	58	<b>broils</b>	0	0
<b>cries</b>	19	31	<b>wails</b>	0	0
<b>draws</b>	52	57	<b>drafts</b>	0	0
<b>drinks</b>	135	208	<b>swigs</b>	0	0
<b>dumps</b>	7	3	<b>scraps</b>	0	0
<b>feeds</b>	24	50	<b>fuels</b>	0	0
<b>gets</b>	1859	2522	<b>gains</b>	0	0
<b>hides</b>	56	26	<b>stows</b>	0	0
<b>holds</b>	208	251	<b>grips</b>	0	0
<b>kicks</b>	59	14	<b>punts</b>	0	0
<b>looks</b>	1548	1202	<b>gapes</b>	0	0
<b>moves</b>	155	215	<b>shifts</b>	0	*3
<b>picks</b>	163	243	<b>plucks</b>	0	0
<b>plays</b>	491	461	<b>romps</b>	0	0
<b>pulls</b>	83	108	<b>lugs</b>	0	0

<b>pushes</b>	76	82	<b>nudges</b>	0	0
<b>rides</b>	36	33	<b>guides</b>	0	*2
<b>rips</b>	4	5	<b>shreds</b>	0	0
<b>runs</b>	120	126	<b>scoots</b>	0	0
<b>sees</b>	1855	2077	<b>views</b>	0	*5
<b>sings</b>	88	119	<b>croons</b>	0	0
<b>sneaks</b>	7	6	<b>slinks</b>	0	0
<b>talks</b>	274	302	<b>gabs</b>	0	*14
<b>throws</b>	155	142	<b>slings</b>	0	0

\*All of these verbs appeared only in their uninflected forms in the Adult speech, never in their inflected forms.

## Supplementary Table 3

*Verb Pairs in their Sentence Frames*Training Stimuli

- 1p. The car is blue.
- 2p. I have a big bunny.
- 3p. Her sister is walking to school.
- 4p. The kids like to write.
- 5p. Yesterday he cooked dinner.
- 6p. The dogs run around outside.
- 7p. Their mom is nice.
- 8p. You play on the swings at school.

Test Stimuli

1. The girl *bites/gnaws* into the cookie.
2. The man *carries/transport*s the box.
3. The boy *cleans/scours* the kitchen.
4. The woman *climbs/scales* the ladder.
5. The girl *cooks/broils* the chicken.
6. The girl *cries/wails* for her mom.
7. The girl *draws/drafts* on the sidewalk.
8. The boy *drinks/swigs* the milk.
9. The man *dumps/scraps* the idea.
10. The girl *feeds/fuels* the fire.
11. The boy *gets/gains* a sticker.
12. The girl *hides/stows* her doll.
13. The woman *holds/grips* the phone.
14. The boy *kicks/punts* the ball.
15. The man *looks/gapes* at the tv.
16. The woman *moves/shifts* to the couch.
17. The woman *picks/plucks* the flowers.
18. The girl *plays/romps* in the yard.
19. The girl *pulls/lugs* the wagon.
20. The boy *pushes/nudges* the swing.
21. The man *rides/guides* the bicycle.
22. The girl *rips/shreds* the paper.
23. The boy *runs/scoots* down the street.
24. The boy *sees/views* his brother.
25. The man *sings/croons* on stage.
26. The girl *sneaks/slinks* through the bushes.
27. The girl *talks/gabs* with her friend.
28. The boy *throws/slings* the rocks.

## Supplementary Text 1

*Stimulus recording and task administration*

A male native speaker of Standard American English recorded all stimuli in a sound proof booth. All sentences were digitized and edited and the duration of each sentence measured using Audacity. Sentence durations did not significantly differ across conditions,  $t(54) = -0.45$ ,  $p = 0.65$ . A pilot study with adults confirmed the naturalness of the recordings of each stimulus item. Additional pilot studies with native English-speaking 3- and 4-year-old child participants confirmed that children could perform the task requirements.

The examiner also listened to the stimuli on a second pair of headphones. For the 8 trial sentences, repetitions were provided when necessary with feedback on imitation accuracy provided. Feedback was not given for the test items and repetition was only provided if another noise prevented the child from hearing the stimulus. Any repetitions were from the taped stimuli. The first author administered, transcribed and scored the sentence imitation task for all children. All imitations were initially transcribed online but were also taped for additional transcription and scoring. Each imitation was transcribed at the level of each individual word. Words produced by the child that were not considered real words were transcribed phonetically. To check and correct transcriptions if needed, the author listened to each taped imitation via headphones in a quiet environment.

## Supplementary Text 2

*Full Coding System*

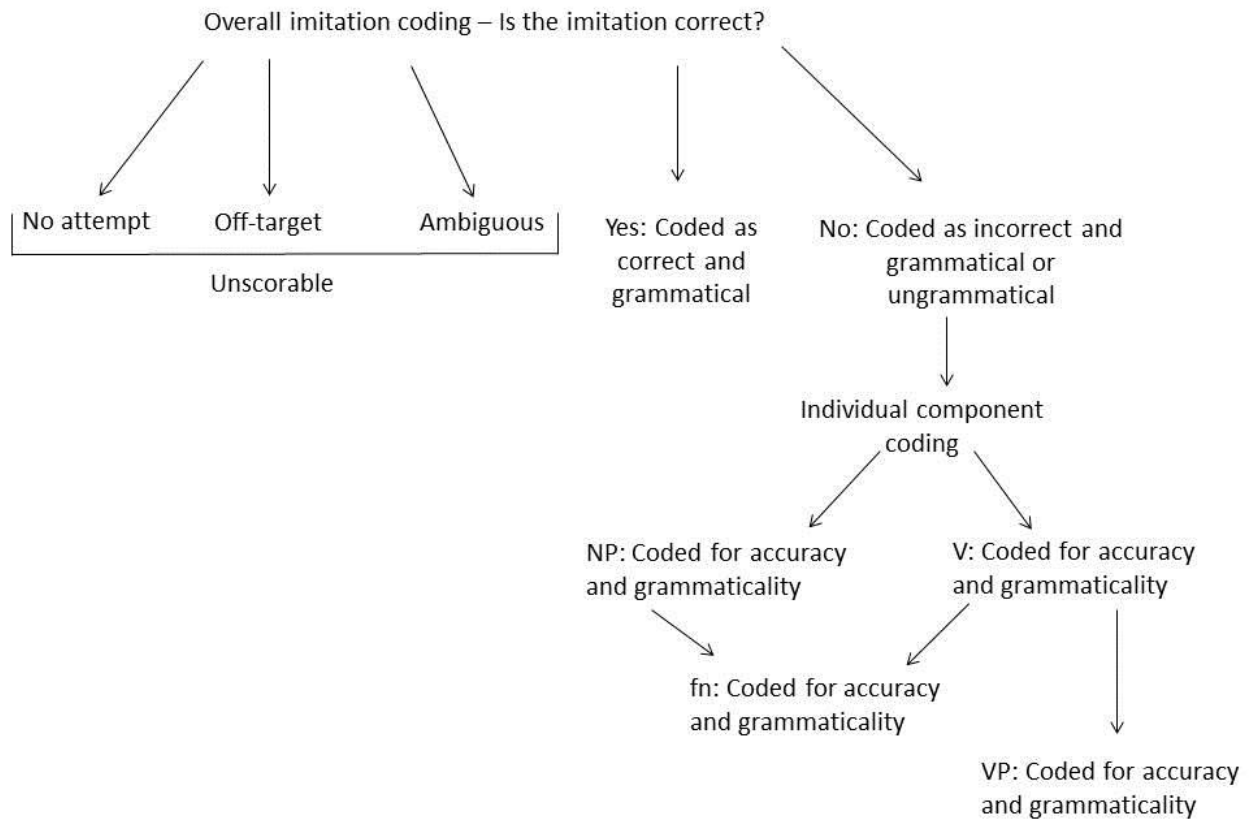
1. Overall imitation coding
  - a. Accuracy
    - i. Unscorable
      1. *No attempt* - no attempt at imitation made or response of “I don’t know”
      2. *Off-target* - imitation attempt deemed to be unrelated to the target (e.g., we don’t throw rocks)
      3. *Ambiguous* - imitation attempts that contained one or more unintelligible or ambiguous elements that rendered the clause uninterpretable (e.g., the girl xx kitchen, xx clean the kitchen)
    - ii. Correct - all components of the target item in the same sequence as the input clause
    - iii. Incorrect - any deviation from verbatim imitation, with the exception of the *a/the* adjustment
  - b. Grammaticality
    - i. Grammatical - the response, regardless of accuracy of imitation, constituted a grammatical clause based on the adult grammar
    - ii. Ungrammatical - at least one component varied from that which is considered grammatical were coded as an ungrammatical response (e.g., *\*the girl clean the kitchen*)
2. Noun phrase imitation coding
  - a. Accuracy
    - i. Correct - contained all elements of the target noun phrase in the same sequence as the target
    - ii. Incorrect - one or more deviations from the target noun phrase
  - b. Grammaticality
    - i. Grammatical - regardless of imitation accuracy, were grammatical based on the adult grammar
    - ii. Ungrammatical - one or more element of the component was incorrectly imitated resulting in an ungrammatical noun phrase (e.g., *\*womans* or *\*a girls*)
3. Verb root imitation - preceding noun phrase and finiteness marking accuracy were not considered
  - a. Accuracy
    - i. Correct – matched target verb root
    - ii. Incorrect – did not match target verb root
  - b. Grammaticality
    - i. Grammatical - constituted a real verb
    - ii. Ungrammatical - ambiguous or non-real verbs (e.g., *smide* for *hide*)
  - c. Familiarity
    - i. Familiar – target familiar verbs or substituted verbs (e.g., *love* for *lug*)

- ii. Unfamiliar - target unfamiliar verbs
  - iii. Ambiguous - not recognizable as attempts at familiar or unfamiliar real verbs
- 4. Finiteness marking imitation - not conducted on verb roots that were coded as *ambiguous*
  - a. Accuracy
    - i. Correct - imitation attempts containing the target –s morpheme
    - ii. Incorrect – imitation attempts not containing the target –s morpheme
  - b. Grammaticality - considers the number of the subject produced in the same clause but not whether the subject was grammatical (e.g., *womans* for *woman* or *her* for *girl*)
    - i. Grammatical – presence or absence of the finiteness marker matches the requirement of the subject
      - 1. Third-person subject with overt finiteness marker (e.g., *the girl hides*); first-person, second-person or plural subject with a bare stem (e.g., *the girls hide*)
    - ii. Ungrammatical - presence or absence of the finiteness marker does *not* match the requirement of the subject
      - 1. Third-person subject with a bare stem (e.g., *\*the girl hide*); first-person, second-person or plural subject with an overt finiteness marker (e.g., *\*the girls hides*)
- 5. Verb phrase imitation - dependent on the verb root produced in the same clause
  - a. Accuracy
    - i. Correct - all elements of the verb phrase component in the same order as the target
    - ii. Incorrect - one or more deviations from the target verb phrase
  - b. Grammaticality - disregards the accuracy of the verb root imitation and accuracy of the verb phrase imitation
    - i. Grammatical - verb phrase correctly follows the verb root produced (e.g., *the girl hides her doll*)
    - ii. Ungrammatical – verb phrase does not correctly follow the verb root produced (e.g., *\*the girl gives her doll*)
  - c. Argument structure - based on the verb root produced in the same clause but disregards verb root imitation grammaticality
    - i. Correct - contained the correct number and type(s) of arguments as required by the verb root produced (e.g., *the girl gives her doll to her friend*)
    - ii. Incorrect – does not contain the correct number and type(s) of required arguments based on the verb root produced (e.g., *\*the girl gives the doll*)
- 6. Other factors influencing sentence imitation performance
  - a. Consistency with child grammar
    - i. Optional use of finiteness marking in obligatory contexts
    - ii. Grammaticality of overall imitations that were incorrectly imitated
  - b. Input processing/recall limitations
    - i. Out-of-order components
    - ii. Omitted components



Supplementary Figure 1

*Sentence imitation task coding flowchart*



## Supplementary Figure 2

*Syntactic tree demonstrating relationship between clausal components*

