



# Neighborhood Density and Finiteness Marking: Understanding Omission Errors in Typical Development and SLI



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## Background and Research Questions

### OPTIONAL INFINITIVES

- Interchanging finite forms with bare verb stems
  - \*She play with me vs. She plays with me

### •Optional Infinitive (OI) Stage:

- Typically developing children can use optional infinitives up to **4-years** (Wexler, 1994)

### •Extended Optional Infinitive (EOI) Stage:

- Children with SLI use optional infinitives for an extended period of time, up to **8-years** in production with receptive difficulty up to **15-years** (e.g., Rice et al., 1995, 2009)

• Optional infinitives are regarded as a byproduct of incomplete/emerging knowledge for finiteness in the child's grammar (e.g., Rice et al. 1995; Wexler, 1994)

• A recent extension of this research shows that word form variables (i.e., components of a word's representation) might be involved in *predicting* optional infinitives (e.g., Leonard et al., 2007)

### RESEARCH QUESTIONS

1. Does neighborhood density (i.e., number of similar sounding words) of verbs predict optional infinitives by children in the OI and EOI stages?
2. Is the pattern of effects the same for children in the OI and EOI stages?

## Participants, Stimuli & Methods

### PARTICIPANTS

- Typical Development (TD) and Specific Language Impairment (SLI) in the OI & EOI stages
  - English speaking, normal nonverbal cognition & hearing, otherwise healthy

	Group Differences						Group Matching	
	Age	TEGI Composite	TEGI 3rd Singl.	Spont. 3rd Singl.	PPVT-4 SS	GFTA-2 SS	MLU (in words)	PPVT-4 Raw Score
TD	3;3	61%	53%	63%	114	104	3.7	65
	(0;4)	(9)	(15)	(20)	(10)	(12)	(.74)	(12)
	2;11 - 3;11	49 - 83	20 - 78	33 - 100	100 - 138	85 - 124	2.2 - 5.8	52 - 93
SLI	4;9	30%	32%	35%	96	90	3.7	74
	(0;8)	(15)	(22)	(24)	(11)	(13)	(.67)	(20)
	4;0 - 6;1	12 - 59	0 - 70	0 - 81	76 - 118	64 - 110	1.8 - 4.8	45 - 105

### STIMULI

• 30 early acquired verbs chosen based on neighborhood density (Storkel & Hoover, 2010)

• **Dense:**  $M = 15$  neighbors ( $n = 15$ )

• **Sparse:**  $M = 7$  neighbors ( $n = 15$ )

• **Dense and sparse** verbs were matched on:

- Phonotactic probability, word frequency, syllable shape, argument structure, final 3rd person singular allomorph

### METHODS

1. Sentence Imitation: Children repeated 30 sentences
  - 15 **DENSE:** The woman **kicks** the ball  
Kick: 21 neighbors
  - 15 **SPARSE:** The woman **moves** the ball  
Move: 5 neighbors
2. Spontaneous Elicitation: Children generated 30 sentences in response to a pre-recorded script
  - 15 scripts with a **dense** verb
  - 15 scripts with a **sparse** verb

**DENSE**

Here is a woman and this is a ball.  
The woman's job is to **KICK** the ball. Now you tell me what the woman does everyday at her job. Everyday she \_\_\_\_\_

**SPARSE**

Here is a woman and this is a ball.  
The woman's job is to **MOVE** the ball. Now you tell me what the woman does everyday at her job. Everyday she \_\_\_\_\_

Sentence Scoring:

Correct: Use of subject, target verb, and third person singular

Incorrect: Use of subject, target verb, but omitted third person singular

## Results

**Dependent variable:** Third person singular accuracy

**Independent variables:** Neighborhood density, task, group

**Analysis:** 2 x 2 x 2 (neighborhood density x task x group) mixed ANOVA

### •Significant main effects:

- Neighborhood density,  $F(1, 38) = 27.83, p < .001, \eta_p^2 = .423$
- Group:  $F(1, 38) = 11.7, p < .01, \eta_p^2 = .235$

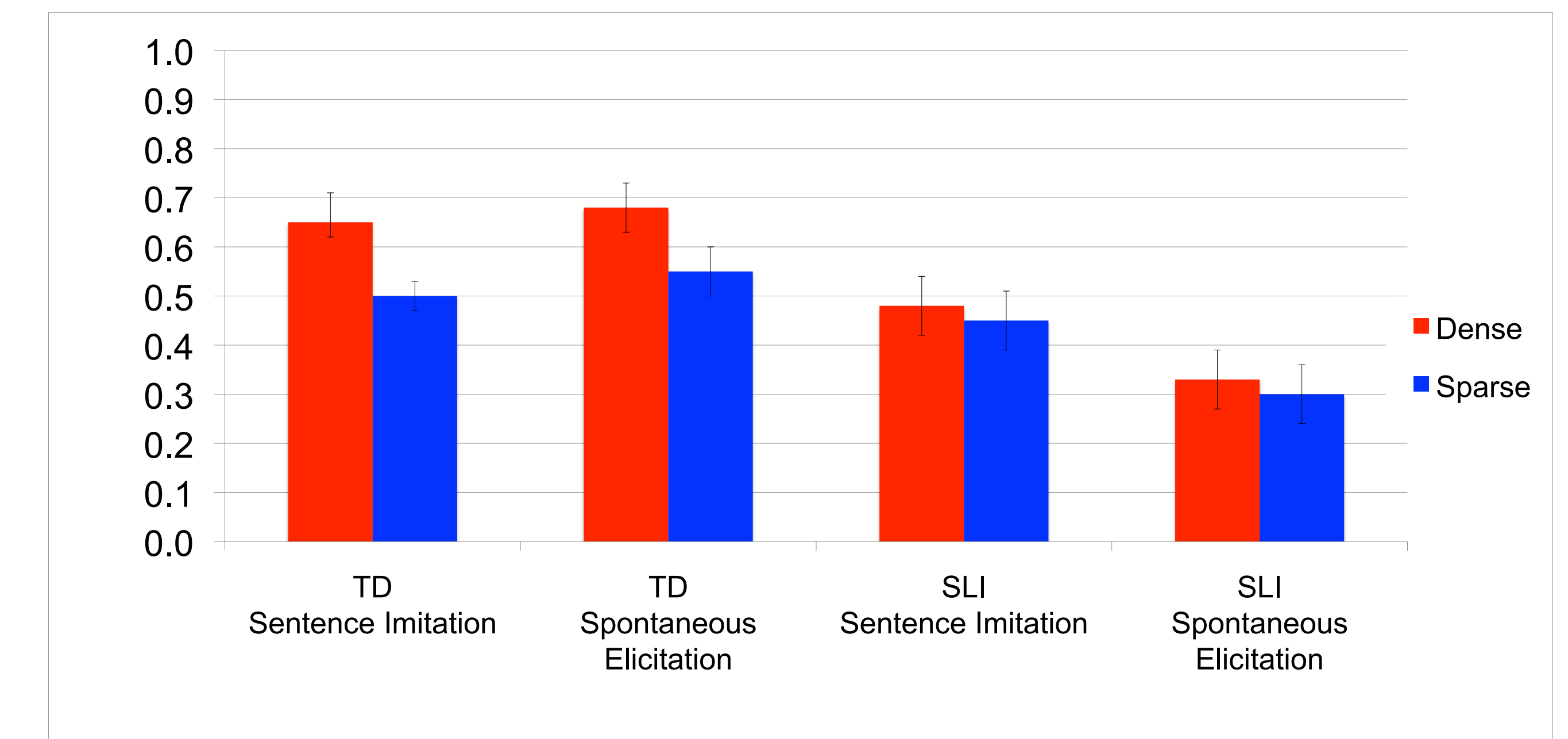
### •Significant interactions:

- Neighborhood density x group,  $F(1, 38) = 11.23, p < .01, \eta_p^2 = .103$
- Task x group,  $F(1, 38) = 4.4, p < .05, \eta_p^2 = .103$

### •Group Interactions Follow-Up

**TD group:** Main effect of neighborhood density,  $F(1, 19) = 28.64, p < .001, \eta_p^2 = .601$

**SLI group:** Main effect of task,  $F(1, 19) = 5.64, p < .05, \eta_p^2 = .229$



### Group Difference Exploratory Analyses

#### Individual Neighborhood Density Effects

	Sentence Imitation		Spontaneous Elicitation	
	TD	SLI	TD	SLI
<b>Dense Advantage</b>	70% (n = 14)	25% (n = 5)	70% (n = 14)	25% (n = 5)
<b>Sparse Advantage</b>	15% (n = 3)	10% (n = 2)	15% (n = 3)	5% (n = 1)
<b>No Difference</b>	15% (n = 3)	65% (n = 13)	15% (n = 3)	70% (n = 14)

#### Floor Effects

	Third Person Singular Accuracy > 30%	
	Sentence Imitation	Spontaneous Elicitation
<b>Sentence Imitation</b>	TD (n = 17)	SLI (n = 15)
	<sup>1</sup> Dense > Sparse	<sup>2</sup> Dense = Sparse
<b>Spontaneous Elicitation</b>	TD (n = 18)	SLI (n = 10)
	<sup>1</sup> Dense > Sparse	<sup>2</sup> Dense = Sparse

Note: Percentage of children in each group showing dense, sparse, and no advantage on both tasks

<sup>1</sup>ts > 3.4, ps < .01

<sup>2</sup>ts < 1.0, ps > .30

## Summary & Discussion

### I. Predictability of Optional Infinitives

- Children in the TD group used third person singular optional infinitives to a significantly lesser extent with dense verbs
- **What made dense verbs less vulnerable to optional infinitives?**
  - Dense verbs have been hypothesized to have more complete lexical representations (Storkel, 2002; Walley et al., 2003)
    - Complete lexical representations may provide a faster route to accurate finiteness marking
    - Word form characteristics might hold the key to *predicting* optional infinitives

### II. Population Differences

- Results did not converge for TD and SLI groups
  - Neither variable performance nor floor effects explained the null finding in the SLI group
  - Children with SLI were equally likely use optional infinitives with dense and sparse verbs
- **Why didn't neighborhood density predict optional infinitives for SLI?**
  - The presence of neighborhood density effects is dependent on exposure for younger children with SLI
    - Massed exposure induced neighborhood density effects in a single subject experiment designed to decrease optional infinitives in young children with SLI (Hoover, 2009)
    - Older children with SLI show neighborhood density effects in word recognition (Mainela-Arnold et al., 2008)

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