



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: $F(1, 38) = 11.7, p < .01, \eta_p^2 = .235$

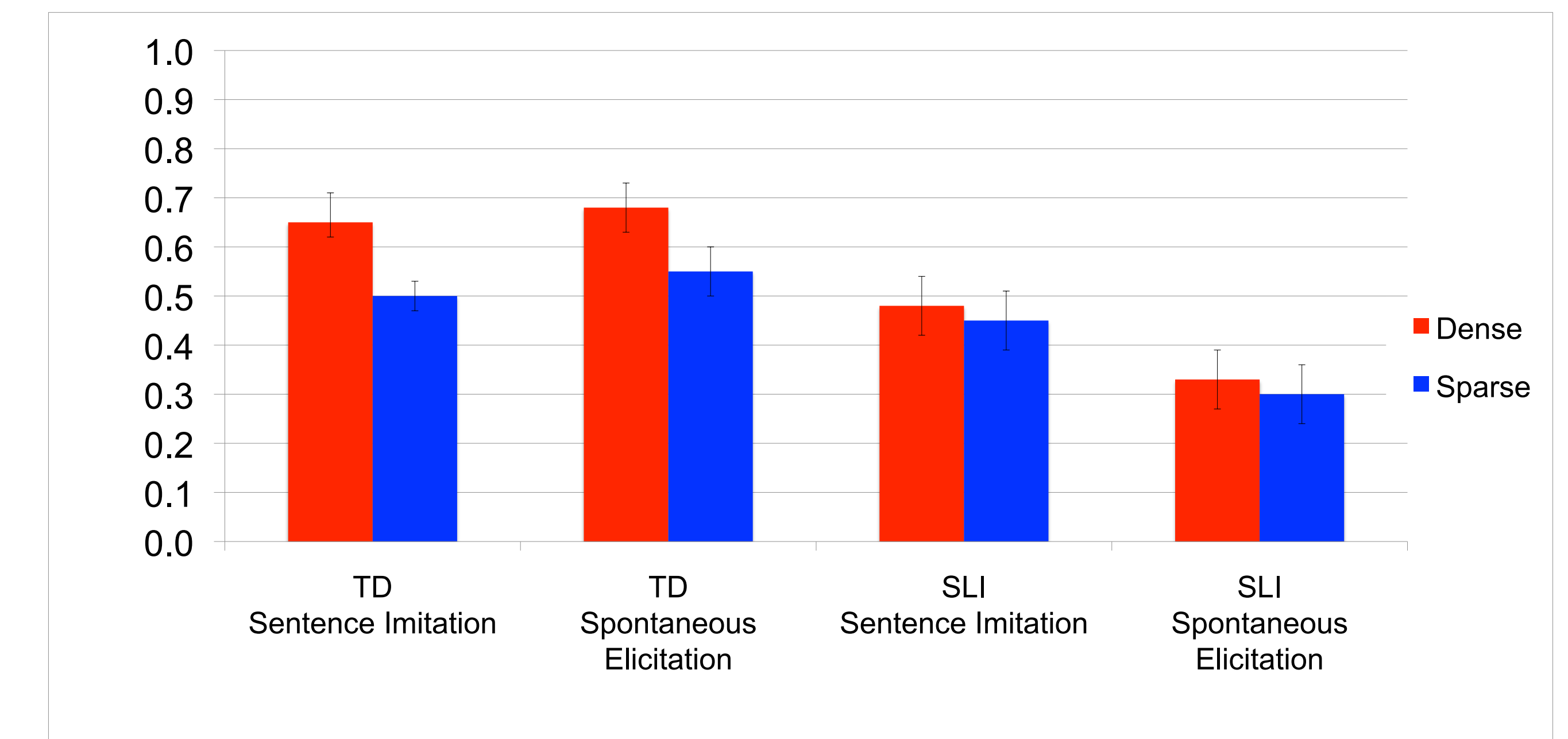
•Significant interactions:

- 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
Dense Advantage	70% (n = 14)	25% (n = 5)	70% (n = 14)	25% (n = 5)
Sparse Advantage	15% (n = 3)	10% (n = 2)	15% (n = 3)	5% (n = 1)
No Difference	15% (n = 3)	65% (n = 13)	15% (n = 3)	70% (n = 14)

Floor Effects

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

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

¹ts > 3.4, ps < .01

²ts < 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)

This research was conducted at the University of Kansas. The following NIH grant support is acknowledged: DC009135 (F31 to Jill Hoover), DC08095 (RO1 to Holly Storkel), DC000012 (T32 to David Pisoni), DC001694 (RO1 to Judith Gierut).