





**Early Childhood Syntax and Theory of Mind: Intervention Development and Implementation**

Beth M. Phillips  
Florida State University  
Florida Center for Reading Research  
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### OVERVIEW

- Language Primer
- Developmental Processes
- External influences
- Instructional Goals
- Design Studies
- Efficacy Trial



**LANGUAGE IN MOTION** 

SYNTAX & LISTENING  
COMPREHENSION  
SUPPLEMENTAL INTERVENTION

Development Team:

Beth Phillips, Karli Willis, Jennifer Ebener  
Melanie Fitzpatrick, Kelly Shepherd, Felesa  
Oliver and others

### LANGUAGE ACQUISITION

**Where does language come from?**

- Most children acquire language at a rapid rate without much direct teaching of language. So, how do they learn it?
- Children need to hear language to acquire language.
- Children need to use language to grow their language skills.

## LANGUAGE ACQUISITION

### Where does language come from?

- Two basic natural processes:
  - Fast-mapping (receptive focus)
  - Incidental teaching (expressive focus)
- Instruction (vocabulary and syntax focus)
- To understand the developmental process and how we might frame instructional goals, we need to learn a bit more about what we mean by 'language'

## DEFINING THE COMPONENTS OF ORAL LANGUAGE

- **Semantics:** Understanding the meaning of words (vocabulary, synonyms, definitions).
- **Morphology:** Understanding the different variations of words (e.g., suffixes, affixes).
  - A **morpheme** is the minimal meaningful unit of a language.
- **Syntax:** Putting words together to form larger meaning units (e.g., grammar).
  - Use of increasingly complex (longer) phrases and use of correct morphosyntax (e.g., plurals, past tense)
- **Hierarchical** in development (later developing components made possible by earlier components)

## DEFINING THE COMPONENTS OF ORAL LANGUAGE

- Linguists typically divide oral language into five categories:
  - Phonology
  - Semantics
  - Morphology
  - Syntax
  - Pragmatics

## SEMANTIC ACQUISITION

- Around 18 months, language changes in two ways:
  - (a) Vocabulary growth increases. A typical child begins to learn words at a very fast rate and will keep learning that rate or faster through adolescence; and
  - (b) primitive syntax begins, with two-word strings.
- Preschool is a time of rapid vocabulary development.
  - A typical 2-1/2-year-old knows ~450 words
  - A typical 3-year-old knows >1,000 words
  - A typical 5-year-old knows > 5,000 words
- On average, school-age children add 2,000–4,000 words a year to their vocabularies.

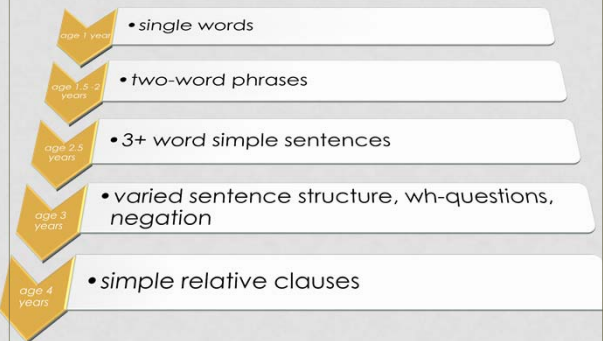
## COMPREHENSION & PRODUCTION OF SYNTAX

- Both production and comprehension follow a developmental sequence of increased complexity
- Just like with vocabulary, receptive comprehension of syntax in speech begins earlier and is usually stronger than productive capacity

## LANGUAGE ACQUISITION

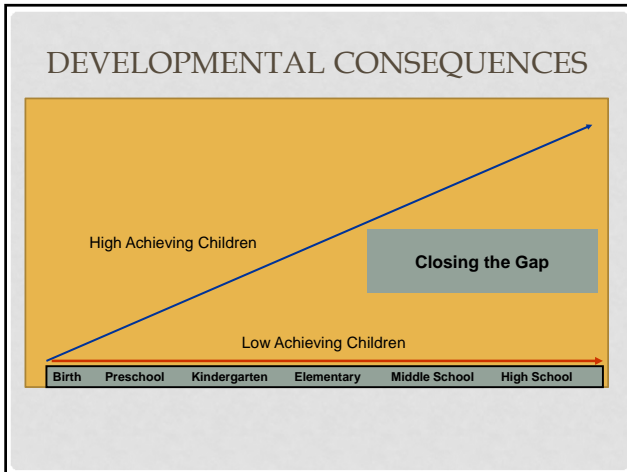
- Not all children receive the same high quality and quantity of language and vocabulary input
- This means children are often very unequal in their language development even by 2 years old (over and above the naturally occurring individual differences in approximate acquisition timelines)

## Syntax Development



## INDIVIDUAL VARIATIONS BEGIN EARLY

- Children have differing types of initial words
  - Referential focus on object labels
  - Expressive focus on interactions
- Sources of variability: internal
  - Gender
  - Memory skill
  - General cognitive ability
- Sources of variability: external
  - Frequency of input received
  - Timing of input received
  - Type of input received: complexity, expansions, specificity



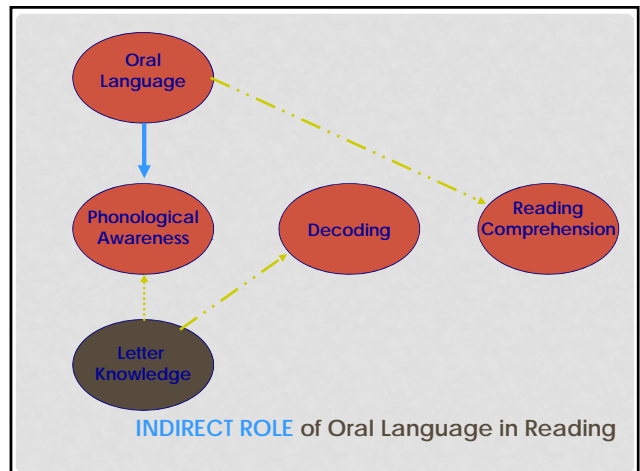
### FUTURE RISK

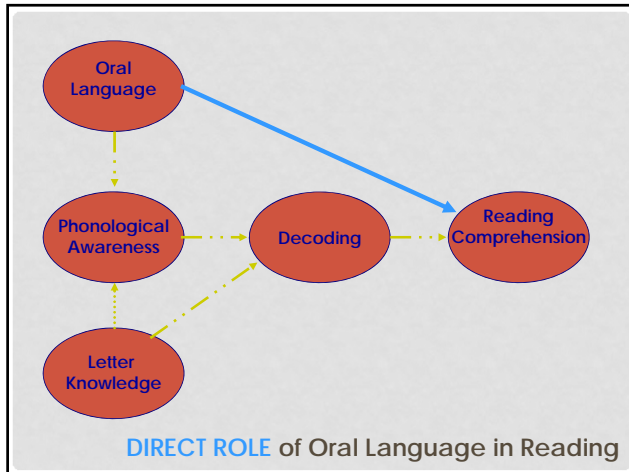
How Does Preschool Oral Language Skill Connect with Later Literacy Skills?...

A Model of the Role of Oral Language in the Development of Reading

### FUTURE RISK

- Early vocabulary and language skill is related to future reading and reading comprehension
- Early language limitations can impede further language growth
- Also related to overall academic success, including high school graduation and beyond





### LANGUAGE INSTRUCTION

- Children from at-risk backgrounds are already months or years behind average language and vocabulary levels
- Want to fill in the holes, and
- Want to try to teach generalizable content and skills that children can apply in many oral and written language contexts

### LANGUAGE ACQUISITION CONSEQUENCES

- Likely need to be more instructionally proactive to try to accelerate high risk children's growth and try to catch them up
- May require more intentional and explicit methods than would typically need to use
- But, the earlier the better because the gap may be at its narrowest point

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## EXAMPLES OF PRE-K SYNTAX GOALS FROM STATE STANDARDS

- Uses age-appropriate grammar in conversations and increasingly complex phrases and sentences.
- Child typically uses complete sentences of four or more words, usually with subject, verb, and object order.
- Connects phrases and sentences to build ideas
- Child uses sentences with more than one phrase.
- Child combines more than one idea using complex sentences.
- Child combines sentences that give lots of detail, stick to the topic, and clearly communicate intended meaning.

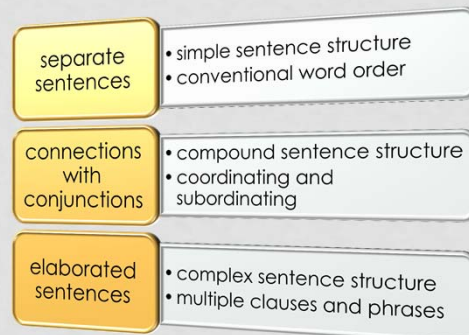
## CHALLENGES IN SPEECH & PRINT

- “in-between” words that can create potholes in understanding
  - Conjunctions: Would you like cake or ice cream?
  - Prepositions: The dog hid his bone beneath the tree
  - Adverbs: Malik slowly stretched his arms
  - Negation: Do not run into the street
  - Elaborated phrases: Molly wanted ride the big, twisty roller coaster
  - Combinations of these: I want ice cream but not with sprinkles
  - Complex phrases: Josh reached down for the shaggy dog, whose ears perked up again suddenly as he began to bark

## INSTRUCTIONAL FOCUS

- Sentence level syntactical features can be roadblocks to listening and reading comprehension, yet
- Few prior interventions – outside of special education/speech/language clinical work – have focused on these specific syntactical and semantic targets

## Increasingly complex text





### LATER COMPREHENSION & WRITING CHALLENGES



### INSTRUCTIONAL DESIGN

• Goal was to focus intervention on sentence level syntactical targets in both:

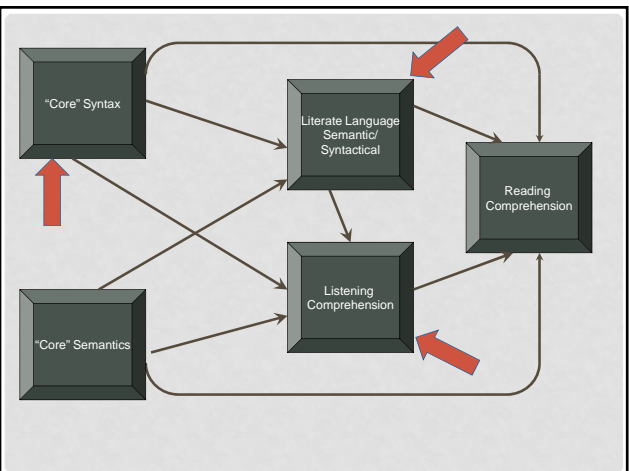
- receptive (behavioral response and listening comprehension)

And.....

- expressive (productive authentic utterances)

### LANGUAGE INSTRUCTION

DEVELOPING A NEW TIER 2 PROGRAM



### INSTRUCTIONAL DESIGN

- Additional focus on mental state vocabulary and complex complement sentence structure, as linked syntactic-semantic targets that are related to comprehension of academic language

*I think that it is raining outside*

*I know that candy is sweet*

### INSTRUCTIONAL TARGETS

	Unit 1	Unit 2	Unit 3	Unit 4
First grade	Conjunctions	Passive Structure	Quantifying Adverbs	Elaborated Noun Phrases
Kindergarten	Prepositional Phrases	Conjunctions	Modal Verbs	Adverbial Phrases
Prekindergarten	Prepositional Phrases	Conjunctions	Adverbial Phrases	Negative Structure

### INSTRUCTIONAL DESIGN

- 12 weeks of intervention
- 20 minutes per day for 4 days a week, pull-out instruction in small groups of 4 children
- Total of 16 hours of instruction

### INSTRUCTIONAL CONTEXT



First Question: How do we make Syntax....FUN???


All grades include Motion-Science concepts as context of stories and activities



### WEEKLY PLAN AND DAILY LESSONS

Day 1	Day 2	Day 3	Day 4
Introduce T.O.M. Vocab.	Review T.O.M. Vocab.	Story Scene Interactive Activity	
Preview Story	Interactive Story Activities	Model- Receptive- Expressive Motion Prop Activities	Board/Picture Games with Cumulative Review
Model- Receptive- Motion Prop Activities		Lightening Round Wrap Up	

**Differentiated Instruction:**  
 -Between grades: increased expressive expectations  
 -Within grade: built-in Up- and Down-Scaffolding



### PRE-KINDERGARTEN UNIT 1

**Objective:** By the end of the unit, students should be able to:

- Indicate location of prepositions
- Use primary target prepositions appropriately in a sentence
- Understand prepositions that are opposite in meaning (i.e., above and below)
- Correctly repeat back a sentence using a primary target preposition

**Primary Targets:**  
 Above, Below, Behind, Between

### PRE-K INSTRUCTIONAL FEATURES

- Explicit instruction in small number of syntactical features per week, with extensive opportunities for practice in multiple contexts
- Model → Receptive → Expressive lesson format with explicit scaffolding
- Highly interactive with two-dimensional images and three-dimensional manipulation of movement props

### PRE-KINDERGARTEN UNIT 2

**Objective:** By the end of the unit, students should be able to:

- Follow directions that include conjunctions to indicate appropriate pictures
- Complete a sentence containing a primary target conjunction
- Use primary target conjunctions appropriately in a sentence
- Correctly repeat back a sentence using a primary target conjunction

**Primary Targets:**  
 And, Or, But

In the beginning of the story, Jessica had a choice to make. What were Jessica's two choices?

## PRE-KINDERGARTEN UNIT 3

**Objective:** By the end of the unit, students should be able to:

- Answer questions about how the action in the sentence was completed
- Use adverbial phrases appropriately in a sentence
- Correctly repeat back a sentence using adverbial phrases
- Indicate pictures that are correctly depicting various -ly adverbs

**Primary Targets:**

- Quickly, Tightly, All, Only

## METHOD: OVERVIEW YEAR 1

- Small scale field design studies following a cycle:
  - Design → test → revise → test
- We did this independently for each of the 4 instructional units, so 8 total trials across the year with preschoolers
- 64 children participated. Each group of 16 children participated in two of the trials, but not the same unit twice
- 3 weeks of intervention, Pre- and post-test

## PRE-KINDERGARTEN UNIT 4

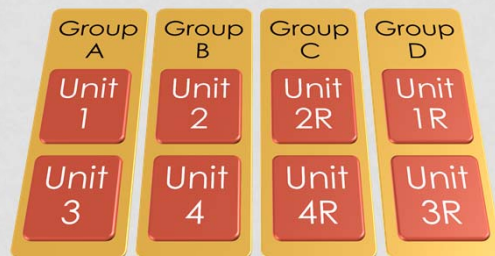
**Objective:** By the end of the unit, students should be able to:

- Indicate pictures that depict where a given action is not happening
- Complete a negative sentence
- Correctly answer a question about what is not true or incorrect in a sentence
- Answer questions about what one should "never" do
- Understand what actions are done always, never or sometimes

**Primary Targets:**

- Not, Don't, Can't, Isn't, Won't, Never, Un-

## DESIGN STUDY



### METHOD: YEAR 1 MEASUREMENT

- Screening: Listening Comprehension (OWLS), Syntax (CELF-P:2, CASL)
- Pre-Post Measurement
  - Listening Comprehension: stories with embedded syntactical targets and mental state verbs
  - Sentence Level Assessment: receptive and expressive items
  - PPVT -III

### METHOD: OVERVIEW YEAR 2

- Instruction on syntactical targets and mental state verbs
- 82 Pre-K children
- Children screened-in on CELF, CASL subtests
- Pre-, mid-, and post-test
- Interventionists: Researcher trained, experienced teachers

### EFFECT SIZES BY TRIAL

	Syntax CBM	Listening Comp. CBM
Unit 1 Trial 1	.21	.46
Unit 1 Trial 2	.02*	.30
Unit 2 Trial 1	-.07	.40*
Unit 2 Trial 2	.32	.30
Unit 3 Trial 1	.79*	.25
Unit 3 Trial 2	1.40**	.32
Unit 4 Trial 1	.86*	.59*
Unit 4 Trial 2	.30	.02

### METHOD: OVERVIEW

- Recruited from 11 schools in two cities in north Florida
- Children were screened on CELF Concepts & Following Directions and CASL Syntax Construction
- Qualifying Children scored at or below the 50th percentile on one or both measures

METHOD: PRE-POST ASSESSMENTS

- CELF: Sentence Structure
- OWLS: Listening Comprehension
- WJ: Picture Vocabulary
- Curriculum-Based Syntax Measures: receptive and expressive items
- Curriculum-Based Listening Comprehension: constructed passages with embedded syntactical targets and mental state verbs (a "distimal" measure)

PRETEST BY CONDITION

	Control		Treatment	
	Mean (SD)	Standard Score	Mean (SD)	Standard Score
Syntax CBM	9.26 (2.81)	---	10.69 (3.80)	---
Listening Comp. CBM 1	0.76 (0.83)	---	1.26 (1.09)	---
Listening Comp. CBM 2	0.51 (0.66)	---	0.63 (0.62)	---
CELF-P2 Sentence Structure	10.49 (3.51)	6.13	12.00 (3.98)	7.14
OWLS-LC	23.07 (8.11)	83.13	27.04 (10.89)	88.42
WJ- Picture Vocabulary	11.85 (2.49)	92.65	13.46 (2.56)	96.44

METHOD: PARTICIPANTS: PRE-K

- Screened 120 children from 5 schools, 10 classrooms, Title 1 public pre-k
- Qualifying Subgroup: 45% Female; 74.4% African American, 18.3% White, 7.3% other
- Qualifying Screening Scores:
  - Range from 2-11 for Scaled Scores on CELF-P2-CFD and from 61-99 Standard Scores on the CASL-SC
  - CELF-P2-CFD mean = 6.27, SD = 2.11
  - CASL-SC mean = 80.81, SD = 9.18

ADJUSTED POST-TESTS

	Control	Treatment	p	Effect Size
	Adj. Mean (SD)	Adj. Mean (SD)		
Syntax CBM	11.57 (3.59)	15.26 (5.36)	<.001	0.81
Listening Comp. CBM 1	1.37 (1.12)	1.79 (1.22)	>.10	0.36
Listening Comp. CBM 2	1.07 (0.88)	1.67 (1.04)	<.001	0.62
CELF-P2 Sentence Structure	13.34 (3.19)	14.33 (4.09)	>.10	0.27
OWLS-LC	28.1 (9.82)	30.31 (10.25)	>.10	0.22
WJ- Picture Vocabulary	14.92 (2.50)	13.97 (2.96)	>.10	-0.19

### DISCUSSION

- Strong impacts on curriculum-linked syntax and listening comprehension
- Although not significant, moderate, meaningful effect sizes for standardized test of syntax and promising findings for listening comprehension
- Suggests need to increase intensity of dose?
- Very promising initial data for the intervention

**THANK YOU!**

**STAY TUNED...**