

Profiling Risk for Language Impairment in Late Talking Toddlers

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Specific Language Impairment

- The existence of Specific Language Impairment (SLI) is now well established.
- SLI is characterized by extreme difficulty in language acquisition in the presence of otherwise typical development (cf. Leonard, 1998).
- Children with SLI demonstrate *asynchronous* patterns of development.
 - Production is poorer than comprehension abilities.
 - Morphosyntax is poorer than expected for MLU.

Identification of SLI

- SLI affects approximately 7% of kindergarten children tested (Tomblin et al., 1997).
 - SLI is a **high incidence** condition.
- However, 70% of the kindergarten children “identified” had never been diagnosed or treated for language impairment.
 - Need for **improved approach** to early identification to enhance children’s opportunities for school success.

Current Research Criteria for SLI

(Leonard, 1998)

- Nonverbal IQ
- Hearing
- Neurological Dysfunction
- Oral structure
- Oral motor function
- Physical and social interactions
- Performance IQ of 85 or higher
- Pass screening at conventional levels.
- No evidence of seizure disorders, cerebral palsy, brain lesions
- No structural anomalies
- Pass screening using developmentally appropriate items
- No symptoms of impaired reciprocal social interaction or restriction of activities
- Language ability
- Language test scores of -1.25 SD or lower; at risk for social devalue

Operationalizing Language Impairment

- Tomblin, Records, & Zhang (1996)
 - performance of -1.25 standard deviations or poorer on at least two of five composite language measures

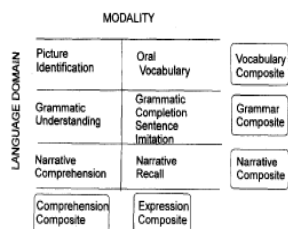
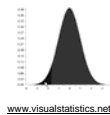


FIGURE 1. The specific areas of language measured in the EpiSLI system and the composite scores derived from these measures.

Psychometric Approach

(Tomblin, Records, & Zhang, 1996)

- Traditional approach; still dominant today.
- Assumes aptitude is distributed normally.
- Employs norm-referenced interpretation, assuming individuals with language impairments will fall at the low end of the normal distribution.
- Most appropriate for traits that vary among individuals (e.g., vocabulary knowledge).

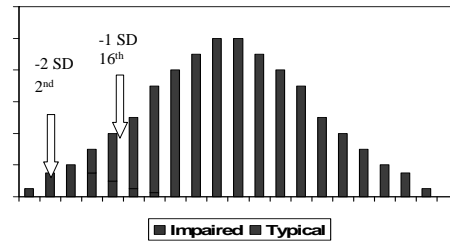


Concerns for Clinical Practice

- Use of performance IQ of 85 may be too restrictive
 - not comparable to children on caseloads (Plante, 1998)
- Over-reliance upon tests and norm-referenced cut-offs as primary means of identification
 - How sensitive and specific are our tests? (Spaulding et al., 2006)
- Little room in operational definitions for clinical judgment
 - language performance in natural contexts (Dunn et al., 1996)
- Little agreement regarding the magnitude of discrepancies required for identification in clinical practice
 - (range: -1.00 to -2.00 sd)

Psychometric Approach

Where do we draw the line?

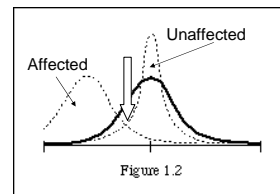


Clinical Marker Approach

(cf. Bishop & Snowling, 2004; Rice, 2003; Rice & Wexler, 2001)

- Identification of a specific symptom that can accurately identify individuals **affected** with a condition as well as those who are **unaffected**.
 - Used in dysphagia, autism, stuttering
 - Can it be used for some aspects of language?

Clinical Marker Approach



- The distributions for these two “groups” should be as distinct as possible; *not overlapping*.
- The less overlap between the two distributions, the more certain we can be that a given score indicates membership in a specific group.
- Cut-offs are empirically derived based on cut-offs that maximally separate groups.

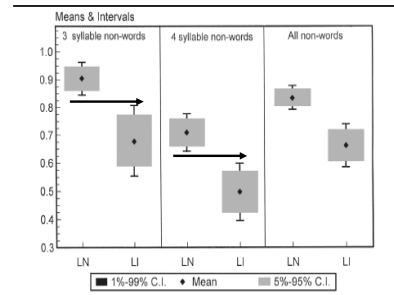
Promising Clinical Markers of Language Impairment

(cf. Bishop & Snowling, 2004; Tager-Flusberg & Cooper, 1999)

- Nonword Repetition
 - The percentage of phonemes repeated correctly in 3- and 4- syllable nonsense words is very sensitive to the diagnosis of LI (Dollaghan & Campbell, 1998)
- Mastery of Tense Marking
 - Children’s non-mastery of grammatical tense is especially sensitive to the diagnosis of SLI between the ages of 5 and 6 (Rice, Wexler, & Cleave, 1995; Rice & Wexler, 1996; Rice et al. 1998)

Nonword Repetition (Dollaghan & Campbell, 1998)

Figure 1. Means and confidence intervals (95% and 99%) for percentage phonemes correct for three-syllable (3NPC) and four-syllable (4NPC) nonwords, and for the entire nonword repetition task (TOTNPC) in the group with language impairment (LI) and the group developing language normally (LN).

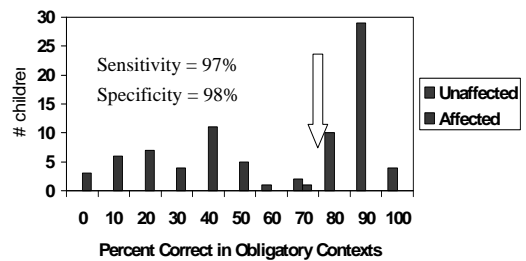


Tense Marking

- Tense markers are morphosyntactic forms that signal the relationship between speech time and event time.
- Primary tense markers in empirical research:
 - Third person singular present /3s (fit/3s)
 - Past tense /ed (jump/ed)
 - Copula forms of BE (My shoe *is* lost).
 - Auxiliary forms of BE (The baby *is* crying).
 - Auxiliary forms of DO (This *does*/n't fit).
- Test of Early Grammatical Impairment (TEGI; Rice & Wexler, 2001)

Mastery of Tense Marking

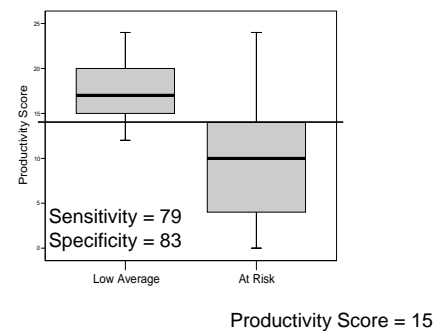
(Rice & Wexler, 1996)



Tense Mastery and *Early* Identification

- Mastery is not likely to be as sensitive at younger ages because there is too much normal variability in mastery of tense marking under the age of 4.
- This led me to the development of measures that could capture the onset of tense marking in toddlers that could differentiate
 - children at-risk for language impairment from
 - SLOW typically developing children.

Tense Onset as a Clinical Marker (Hadley & Short, 2005)



Dual Discrepancy Approach

(Fuchs & Fuchs, 1998)

- Borrowed from pediatric medicine
 - Physical growth monitoring focuses upon not only height at one point in time, but growth velocity over time.
 - Concern is raised when, given an adequately nurturing environment, an individual's growth trajectory is flatter than that of comparison group
- Assumptions
 - Genetic variations underlie normal development
 - Short stature does not reflect a pathological condition, but the lower end of the normal distribution

Dual Discrepancy Approach

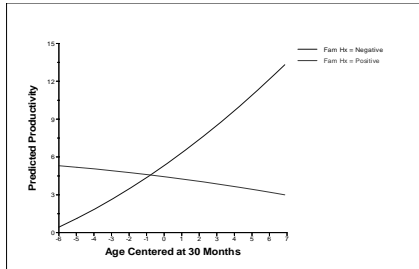
(Fuchs & Fuchs, 1998)

- Applied growth framework to learning disabilities and mental growth
- Argued that comparable growth trajectories indicate similar benefit from regular instruction.
 - Lower performance but expected growth
 - Reflect low end of normal distribution
 - Growth is commensurate with capacity to learn
 - Lower performance AND slower growth
 - prime candidates for intervention. Without it, children with dual discrepancies will fall further and further behind.
- This approach to identification requires longitudinal data that characterize the nature of growth over time.

Dual Discrepancy Approach

(Hadley & Holt, 2006)

- Growth in Tense Productivity by Family History
 - Controlling for MLU, Gender, Language Comprehension, and Maternal Education



Bishop's (2008) Risk Factor Model

- Genetic Risk Factors
 - Weak phonological short term memory
 - Characterized by deficits in nonword repetition
 - Morphosyntactic deficits
 - Characterized by deficits in tense marking
- Additive Model
 - Each marker provides evidence for biological vulnerability
 - Biological vulnerability increases risk for persistent language impairment
 - One marker may result in weakness, but not clinical manifestation of LI
 - Two markers increase likelihood of LI and greater severity of expression

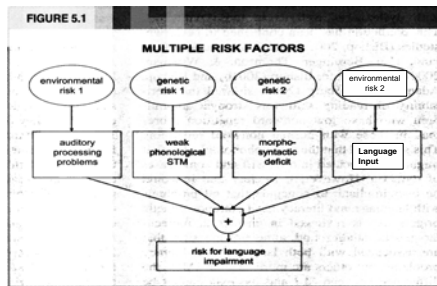


FIGURE 5.1
BISHOP, D. V. M. (2008). Specific language impairment, dyslexia, and autism: Using genetics to unravel their relationship. In C. F. Norbury & J. B. Tomblin & D. V. M. Bishop (Eds.), *Understanding developmental language disorders: from theory to practice* (pp 67-78). Hove: Psychology Press.

Environmental Support / Risk

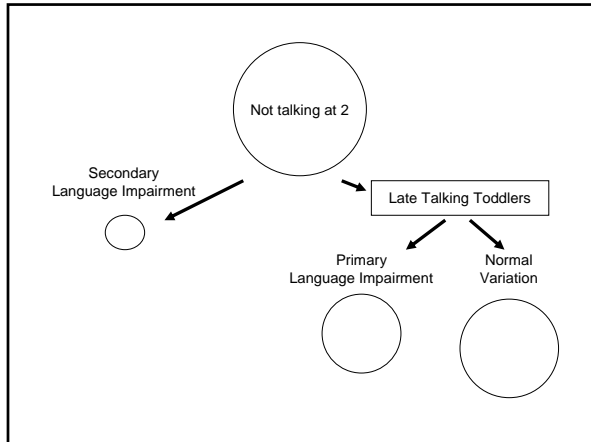
- Pressing questions about language learning environments for research and clinical practice
 - To what extent can the presence of an enriched environment moderate the expression of a language impairment?
 - To what extent can a less optimal environment exacerbate the expression of a language impairment?
 - Can response to parent-implemented interventions be used to improve early identification of language impairment?

Summary of Identification Approaches

- | | |
|---|--|
| <p>Static Approaches
single measurement point</p> <ul style="list-style-type: none"> ▪ Psychometric <ul style="list-style-type: none"> – Low end of normal distribution ▪ Clinical Marker <ul style="list-style-type: none"> – Identification based upon on specific symptoms that differentiate affected from unaffected individuals | <p>Dynamic Approaches
Multiple measurement points</p> <ul style="list-style-type: none"> ▪ Dual Discrepancy <ul style="list-style-type: none"> – Lower performance and slower growth increases likelihood of language impairment |
|---|--|

The Time Course of Language Impairment

- By age 5, children with SLI demonstrate deficits in grammatical development relative to 3 year old language-matched children.
 - These deficits do not just spring up.
 - We believe it is possible to detect grammatical difficulties *very early*.
 - Thus, we have been building a set of *growth expectations* for relevant aspects of language development.



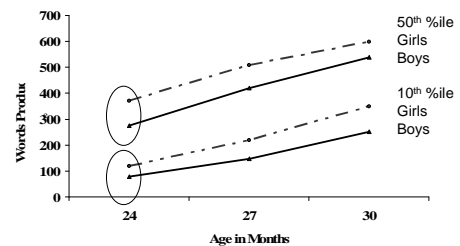
Influences on Vocabulary Development

- Increases in vocabulary are tied to the expansiveness and richness of the child's experiences.
- We should expect environmental effects on the rate of vocabulary growth.
- "Talkativity" has been linked to SES (Hart & Risley, 1995)
- Lexical diversity and use of complex syntax also varies by levels of parental education (Huttenlocher et al., 2007)
- As such, SES/parent education accounts for vocabulary differences in children (Hoff-Ginsberg, 2003)

Assessing Vocabulary Development

- The MacArthur Communicative Development Inventory provides expectations for vocabulary development in boys and girls from 12 to 30 months
- Assessing vocabulary development is relatively easy: count the number of words the child understands/produces

Expected Vocabulary Growth (CDI 1993 Norms)

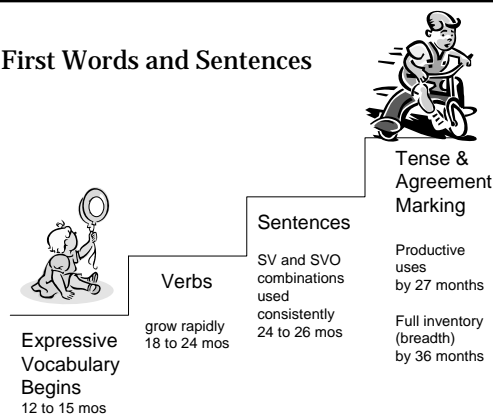


50th percentile vocabulary size: 276 boys & 371 girls
 10th percentile vocabulary size: 79 boys & 119 girls

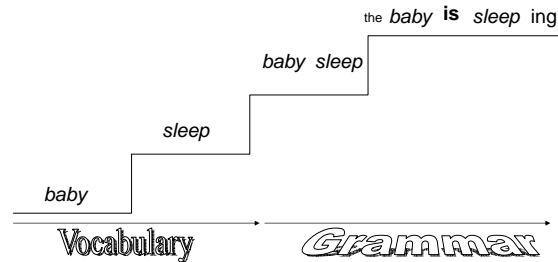
Assessing Grammatical Development

- Why is it particularly important to measure early grammatical development?
 - Grammar is a clinical marker of specific language impairment, whereas vocabulary growth is not.
 - Vocabulary delays may arise from language impairment AND also from limited exposure to words in the language learning environment.
 - So, what are our early expectations for grammatical development?

First Words and Sentences



First Words and Sentences



Verb Lexicon Size

(per parent report)

- The "average" child should use
 - 10 common verbs by 21 months of age.
 - 37 common verbs by 24 months of age.
- Only the lowest 25% use fewer than
 - 3 common verbs by 24 months of age
 - 28 common verbs by 27 months of age

cf. Hadley, 2006

Combining words vs producing sentences

- Although expectations for word combinations are more prevalent, **sentences** are the critical foundation for the development of grammar.
- Word combinations
 - Average = 20 months
 - Cut-off = 24 months (Rescorla, 1989; Zubrick et al., 2007)

First Sentences

- The simplest "sentences":
S = NP VP
- The earliest sentence types
 - SV (e.g., *baby cry*)
 - *Subject NP + intransitive verb*
 - SVO (e.g., *I want snack*)
 - *Subject NP + transitive verb + direct object*

Self Test

- Which of the following word combinations are not sentences?
 - (a) hi mom
 - (b) byebye daddy
 - (c) daddy go byebye
 - (d) mommy go
 - (e) elmo airplane
 - (f) baby wake up
 - (g) brown bear

Expectations for First Sentences

- The majority of children produce at least 2 SV and SVO sentences per 100 utterances between 24 and 26 months of age.

Klee et al., 2002

- An agreed-upon milestone or criterion-referenced cut-off for "first sentences" has not been empirically established.

Tense Marking

- Tense marking is a property of English sentences.
 - Indicates the relationship between the speech time and the event time.
 - present vs. past
 - We follow the linguistic analysis which treats future as a modality in English grammar, rather than a tense
- The first tense morphemes appear shortly after children beginning producing sentences. Typically developing children show productive use of at least one tense morpheme by 27 months.

The Tense System

Copula	-3s	-ed	Aux Do	Aux Be
Enables predication of Adjective, Noun and Prepositional phrase. Encodes tense and agreement features	Marks third person singular in the present tense. It is the only verb suffix encoding agreement	Marks past tense on regular verbs	Marks tense and agreement with sentence negative, in yes/no questions or has special affirmation	Marks tense and agreement when the verb is in the progressive aspect
My shoe is gone	This fits here	I looked everywhere	Who wants a cookie? I do , but he doesn't	Daddy is coming
Bigbird was in China	He looks funny		Who hit you? He did!	Elmo was driving a tractor

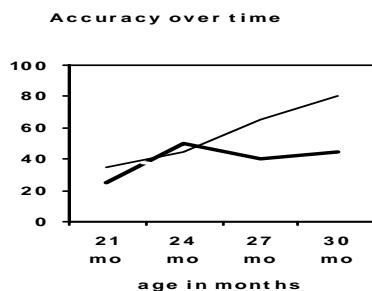
Measuring Tense Marking

- Measuring progress in the development of tense in children under the age of 36 months has traditionally used Brown's method of computing *accuracy*.
- The major problem with measuring *accuracy* is:
 - accuracy measures do not distinguish rote production and limited scope formulae from truly productive marking (Rispoli, Hadley & Holt, 2008)

Problems with Accuracy

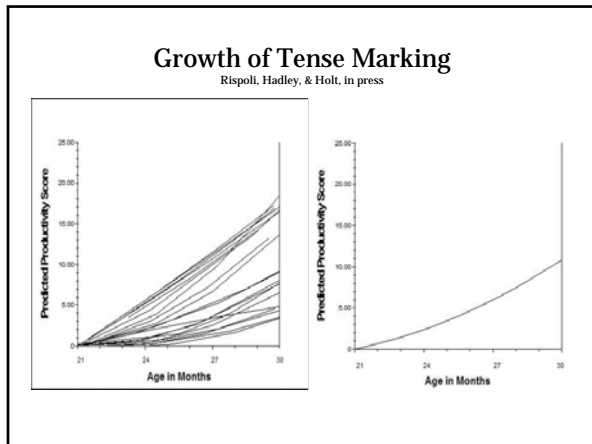
- Accuracy measures bobble and backtrack over developmental time
- Accuracy measures fail to find a true starting point in development
- Accuracy measures vary greatly depending in sentential context:
 - Pronoun subjects with contracted 's very accurate
 - *He+ 's, It+ 's that+ 's*
 - NP subjects The baby # happy gives rise to lots of omission

Problems with Accuracy: A Close Look



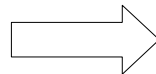
Origins of the Productivity Score

- We developed an innovative measure of *productivity* to measure progress in the development of tense & agreement with children under the age of three (Hadley & Short, 2005; Hadley & Holt, 2006).
 - It avoids pronoun subjects, contracted auxiliaries and copula, high frequency combinations like *don't*
- **Productivity** is very conservative, crediting the child when sentences are very unlikely to be produced by rote or limited scope formulae.
 - The productivity score credits unique *types* rather than *tokens*



- ### Tense Marking: Expectations and Concerns
- The first productive forms are evident by 27 for typically developing children (Rispoli, Hadley, & Holt, in press).
 - Delayed productivity is evident in children at high risk for specific language impairment (Hadley, 2006; Hadley & Holt, 2006)
 - In our current research, we will document the relationship between these productivity trajectories and the Test of Early Grammatical Impairment (Rice & Wexler, 1996; Rice, Wexler, & Hershberger, 1998).

- ### Sequential Pattern of Tense and Agreement Development in Typical Children
- An *Anchor Point*: a small set of morphemes that form opposing exponents accessible to the child
 - *Directionality*: productivity expands outward from the anchor point.



Slow	COP	/s/	/ed	DO	AUX
1	27, 30	27, 30, 33	33	33	
2	30	33		33	
3	30	33			
4					
5					

Med	COP	/s/	/ed	DO	AUX
1	27, 30	27, 30, 33	27, 30, 33	27, 33	33
2	27, 30	27, 30, 33	27, 33		
3	27, 30	27, 30, 33			
4	27, 30	27, 30, 33			
5		33			

Fast	COP	/s/	/ed	DO	AUX
1	27, 30	24, 27, 30, 33	24, 27, 30, 33	27, 30, 33	27, 33
2	27, 30	24, 27, 30, 33	24, 27, 30, 33	27, 30, 33	27, 33
3	27, 30	24, 27, 30, 33	27, 33		33
4	27, 30	27, 30, 33	33	33	
5	27, 30	27, 33	33	33	

Conclusions

- General developmental expectations for the growth of tense:
 - Absence of tense morphemes at 21 months of age.
 - Emergence of first productive forms by 27 months.
 - Average productivity score of 12 by 30 months of age.
- Differences between children in rate of growth are significant:
 - Importantly, these differences are predictive of later progress towards obligatory tense marking.
- However, there is a uniform sequence of development.
 - This pattern was evident regardless of differences in developmental rate.

Applications

- Improve early identification of children at-risk for SLI
- Utilize developmental sequence in identifying appropriate treatment objectives
- Use productivity approach when measuring progress on grammatical objectives
- Time intervention to fit underlying growth trajectory

Assessing Genetic Risk: Family History

- Method
 - Case History Questionnaire / Checklist
 - Direct interview (Lewis & Freebairn, 1993)
 - Direct Testing
- Family members to consider
 - Immediate family (Rice, Haney, & Wexler, 1998)
 - Extended family

Appendix A
Family History Interview Lewis & Freebairn, 1993

All information in this section pertains to the child and his or her nuclear family.

Family	Name	DOB	Hand	Grade	SpLang	Read	Spell	LD
Client								
Mother								
Father								
Sister: 1								
2								
3								
4								
Brother: 1								
2								
3								
4								

Children are characterized as having a positive family history if one or more nuclear family members are reported to have a history of a speech, language, or learning disability for which special services were received (Rice, Haney, & Wexler, 1998).

Parental Characteristics & Concern

(Olswang et al., 1998)

- Parent Characteristics
 - Socioeconomic status:
 - *Children from lower SES homes are at higher risk for less optimal outcomes*
 - Interaction style:
 - *More directive/less responsive style less optimal*
 - *Excessive talkativity and complexity less optimal*
- Parent concern
 - Improves positive predictive value of LDS screenings on 3 year old outcomes (Klee, Pearce, & Carson, 2000)
 - Greater heritability of LI for children who with SLP contact by age 4 (Bishop & Hayiou-Thomas, 2008)

Parental Characteristics: Input and Vocabulary

- Multiple studies have demonstrated a relationship between the caregiver's number of words and/or diversity of words and children's later vocabulary abilities.
 - Huttenlocher et al. (1991)
 - Hart & Risley (1995)
 - Hoff (2003)
 - Pan et al. (2005)
- Input characteristics are strongly associated with levels of SES.
- Much less is known about how parental input affects grammatical development.

Parental Concern and Contact with SLP

- Speech intelligibility (Bishop & Hayiou-Thomas, 2008)
- Family history – personal experiences with language impairment (see Schuele & Hadley, 1999)
- Knowledge of child development (Rowe, 2008)
 - perceived mismatch between language input provided/effort expended and language growth observed

Assessing Parent Knowledge

- Knowledge of Infant Development Inventory (KIDI, MacPhee, 2002; used by Rowe (2008)
 - Mediating factor influencing use of child-directed speech
 - Differences in CDS related to education/income were DUE to differences in parents' knowledge of child development.
 - Parents who knew more about child development produced CDS characterized by more lexically diverse speech, longer utterances, and used a smaller proportion of directives.

Assessing Parent Concern

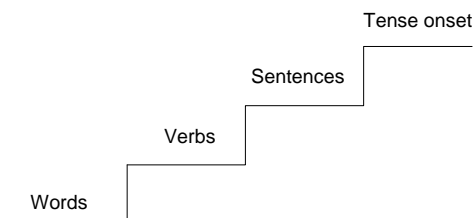
- Self referral as indicator
- Population screening
 - Response to open ended question (LDS, Rescorla, 1989)
 - “Do you have any concerns about your child's language development?”
 - ability to hear? (Klee et al., 2000)
 - ability to communicate? (Klee et al., 2000)
- Once receiving services, changes in parental concern should be monitored
 - On a scale of 1 to 5, where 1 = no concern and 5 = very concerned, how do you rate your level of concern today?

Assessing Early Grammatical Growth

- Two primary strategies that can be used to monitor GROWTH over time
 - Parent Report
 - MacArthur-Bates Communicative Development Inventory (CDI; Fenson et al., 1993, 2006)
 - Structure-Specific Language Sampling

Assessing Early Grammatical Growth

Hadley, P. A. (2006). Assessing the emergence of grammar in toddlers at-risk for specific language impairment. *Seminars in Speech and Language, 27*, 173-186.



The Verb Step: Parent Report

- Size of Verb Lexicon
 - 103 “action words” on CDI: Words and Sentences vocabulary checklist.
 - ADD *want, need*
- Composition of Verb Lexicon
 - Examine 12 early developing action/state verbs that reflect diversity of transitivity classes

	State	Action	
Transitive	Want Need	Bite Hug	Kiss Help
Intransitive	Go Fit	Go Sleep	Fall Walk
Ditransitive		Eat	Open

The Verb Step: Language Sampling

- Assess children's use of verbs through real-time language samples.
 - Characterizes what children can "do" with what they know.
 - Typically, measures from parent report and language sampling will complement one another (Brinkmeier, 2002)
 - however, some children may rarely produce the verbs they "know" under the real-time pressures of conversational speech.

The Verb Step 24 to 27 Months Case Examples

Slow Typical (1226)

- CDI Verb lexicon size
10 to 37 verbs
- Composition/LSA at 27

	State	Action
T		Bite Help
I	Go	Go Fall Sleep Walk
D		Eat Open

12 combos with *go*
I help you too.

At-Risk (1122)

- CDI Verb lexicon size
8 to 24
- Composition/LSA at 27

	State	Action
T	want	Kiss Hug Help
I	Go	Go
D		Open

want more

The Sentence Step: Parent Report

- Mean 3 Longest
Please list the three longest sentences you have heard your child say recently.
 - At 30 months, an M3L of
 - 8.00 ~ 50th percentile
 - 6.00 ~ 25th percentile
 - 4.00 ~ 10th percentile
 - Is the child reported to produce sentences or just combine words into phrases?
 - Are there diverse sentence types (SVO, SV)?
 - Are there third person sentence subjects?

The Sentence Step: Language Sampling

- Unique Sentence Types
 - Are there at least 2 different SV sentences?
 - Are there at least 2 different SVO sentences?
 - Criteria is that "different" subjects and verbs are combined. The more diversity the better.

The Sentence Step: SV and SVO

2115 30 months

LSA

- I want *clown/soap/that/bubbles/milk/blanket*.
- Him eating.
- I try, mom.
- I get that.
- I fight you.
- I want baby too.
- I want milk go.
- I want off.

Day 1 (20 min, 189 utterances)

1 different SVO, 2 SV

Day 2 (20 min, 174 utterances)

3 different SVO, 0 SV

2221 30 months

LSA

- You do it.
- It had the firetruck.
- Hand going in.
- It can go right there.
- You shut door.
- You did it.
- It go down.
- He not working.
- The bubble have go on slide.
- The swing go really high.

In contrast, this child produces two different SV and SVO types in 2 consecutive sessions.

Day 1, 12 min, 83 utterances

Day 2, 9 min, 55 utterances

The Sentence Step: 3rd person subjects

2115 30 months

LSA

- I get that.
- I try, mom.
- I want *clown/soap/that/bubbles/milk/blanket*.
- I want off.
- I want baby too.
- I want milk go.
- Him eating.

Parent Report M3L = 4 (10thile)

- I wanna watch Tarzan&Jane.
- I want out mommy.

2221 30 months

LSA

- You do it.
- People talking.
- He want out.
- Hand going in.
- It go right there.
- I get more stuff.
- The bubble have go on slide.
- The swing go really high.

Parent Report M3L = 6.67 (25thile)

- I want to go outside to ride my bicycle.
- I need to see dada everyday.
- Gigi needs a bath.

The Tense Onset Step: Parent Report

- Parent Report Tense Composite (Bryant, 2003)

Vocabulary Checklist, Helping Verbs (5 items)
Mark the words you have heard your child use.
am, is, are, was, were

Part II: Complexity (4 items)

Mark the one that sounds MOST like the way your child talks right now.

- Daddy pick me up. Daddy picked me up.
- Doggie kiss me. Doggie kissed me.
- Baby crying. Baby is crying.
- Where mommy go? Where did mommy go?

Tense Onset Step: Language Sampling

Use	COP	/3s	/ed	Aux DO	Aux BE
1 st	Dad is	go/3s	look/ed	did dog..?	baby is
2 nd	dog is	fit/3s			
3 rd	baby's	eat/3s			
4 th	shoes are	need/3s			
5 th		want/3s			

Productivity score = 12 (total number of different uses)
Hadley & Short, 2005

The Tense Onset Step: Case Example

1123 36 months
Noncumulative
Productivity Score = 4

	COP	/3s	/ed	Aux DO	Aux BE
1 st	Is that ..?	fit/3s	drive/ed		
2 nd	That guy's				
3 rd					
4 th					
5 th					

- Is that at name for my baby brother?
- That guy's locked in he car.
- And her fit/3s in there good.
- Mom, who drive/ed that?

Yet ample opportunities

- That ___ her firetruck.
- Her ___ at firestation.
- This ___ a daddy.
- (I I) we ___ all done with him.
- Everybody need ___ placemat.
- He eat ___ there.
- Mom, that guy ___ going up there.
- I ___ joking.
- I ___ putting gas in the car.
- That girl ___ going in that.
- How ___ the helicopter drive?
- ___ he come up?
- Hotdog ___ come/ing.

The Tense Onset Step: Case Example

1218 36 months
Noncumulative
Productivity Score = 16

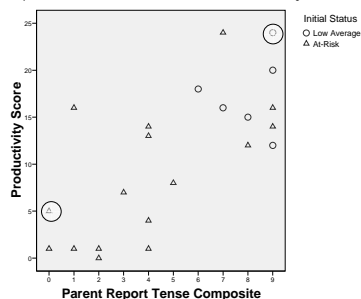
Productivity alongside omissions

	COP	/3s	/ed	Aux DO	Aux BE
1 st	Him is		Dump/ed	They do	I am
2 nd	Who is		Pop/ed	It did	He is
3 rd	Is michael		Reach/ed	Did the rubber	We were
4 th	Are we			It doesn't	
5 th	Who was			I did	

- I ___ a bad boy.
- I ___ hungry.
- What ___ that?
- She ___ dirty.
- More people ___ in here.
- It scare ___ me.
- I pop ___ one.
- I ___ gonna hammer.
- I ___ blowing the bubble.
- He ___ going in the dryer.
- And this one ___ gonna be there.

Can parents recognize these differences too?

(Frauenfelder-Block, 2006; Block & Hadley, 2008)



Red Flags for Grammatical Development

- 0-2 verbs at 24 months (per parent report)
- < 20 verbs at 27 months (per parent report)
- Limited diversity of SV and SVO sentences at 30 months (per structure-specific sampling)
- Limited productivity for copula BE at 30 months (per structure-specific sampling or parent report).
- Limited tense morpheme inventory ≤ 3 at 36 months (per structure-specific sampling or parent report).

Self-Assessment

- Identify factors associated with biological risk for persistent language impairment and environmental risk for slow language development
- Summarize developmental growth expectations for vocabulary and grammar between 24 and 36 months of age
- Describe ways of using existing clinical tools to assess and interpret patterns of language growth

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- Past and current students who have worked tirelessly in our lab
- Child participants and their families

If time permits...

Variation in Language Input

and implications for writing treatment objectives and modifying input

Input Informativeness: A Computational Account

Legate & Yang (2007)

- Punishes [-Tense]**
 - Imperatives (e.g., push it up the hill)
 - Modals (e.g., it can go there)
 - Zero-marked (e.g., there you go)
 - Omissions (e.g., you want one?)
- Rewards [+Tense]**
 - All copulas
 - All auxiliaries (*be, do, have*)
 - All 3rd person singular verbs
 - All past tense (regular & irregular)

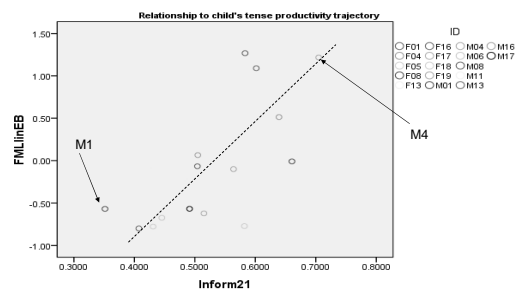
Input Variation

- | | |
|--|---|
| <p>M1</p> <ul style="list-style-type: none"> M there. M now it's stuck on there [+T]. M there. M is that enough [+T] ? M want more [-T] ? M there. M wanna put it together [-T] ? M you want help [-T] [-T] ? M hmm? M you want help [-T] [-T] ? M ok. M there you go [-T]. M push it up the hill [-T]. M oops. M push it up the hill [-T]. M <uhoh>. M it broke [+T]. M yes, it did break [+T]. M there. M play with the cars [-T] ? | <p>M4</p> <ul style="list-style-type: none"> F this is a towtruck [+T]. F and then you put the truck on there, in this case a helicopter [-T]. F and let's try this one [-T] [-T]. F nope, towtruck doesn't work that well, does it [+T] [+T] ? F elmo is be/ing towed away [x2] [+T] [+T]. F put her in here [-T]. F elmo's be/ing towed away [+T]. F elmo, look [-T]. F you press this button down and it push/3s up [-T] [+T]. F let's see how this work/3s [-T] [-T] [+T]. F oops. F doesn't work well [+T]. F daddy's just not use/ing it correctly [+T]. F you try it [-T]. F uh this is, a ladder of some sort [+T]. F shovel. F shovel ? F this go/3s like this [+T] ? |
|--|---|

-T = 10 / +T = 4
Inform = .29

-T = 9 / +T = 12
Inform = .57

Parental Informativeness at 21 months



[-Tense] slows development

- When we consider the individual contribution of the [-Tense] and [+Tense] utterances,
- The relationship between [-Tense] and children's rate of morphosyntactic development is driving the correlation
 - Not [+Tense]
- [-Tense]
 - Imperatives (e.g., push it up the hill)
 - Modals (e.g., It can go there)
 - Zero-marked (e.g., there you go)
 - Omissions (e.g., you want one?)

PLANNING Ahead: FORTIFYING the Linguistic Diet (Input)

- Involve Parents
- Select target words that include verbs and adjectives
 - Help parents move beyond names for things.
 - Provide alternatives to simple labeling (e.g., that's a X)
- Talk about the toys in the environment/pictures in the books.
 - Help parents move beyond self-talk and parallel talk
 - Encourage them to describe properties, states, and actions.
- Encourage use of lexical nouns (NPs) over pronouns.

Involving Parents

Parental involvement is critical for attaining the intervention intensity required for children with true language impairments.

Programs that increase parents' responsive interaction styles are aimed at reducing directiveness (i.e., imperatives)

- Indirect Service Delivery Models
 - *Target Words: The Hanen Program for Children who are Late Talkers*
- Mixed Service Delivery Models
 - *Parent Education & Direct Service Delivery*

Involving Parents

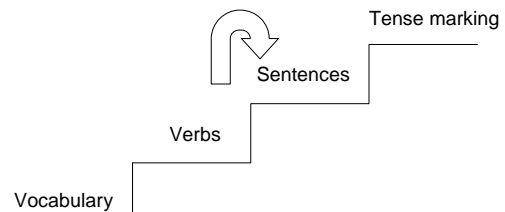
- Necessary to increase the "intensity" of treatment
- Leads to modification of linguistic input

Targeting Verbs

- Intermediate Goal:
 - Allison will increase her expressive verb vocabulary.
- Specific Objective:
 - Allison will demonstrate acquisition of 10 target verbs by producing them spontaneously in at least three different contexts as measured by communication samples and/or parental reports.
 - How will you identify the 10 target verbs?
 - What will you consider?

First Verbs and Sentences

A verb-focused intervention is intended to facilitate this transition.

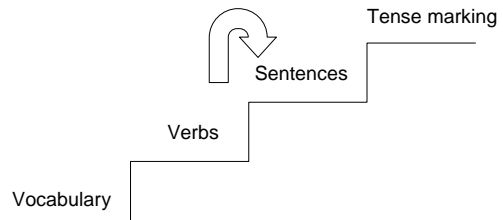


Targeting Sentences

- Intermediate Goal:
 - Allison will increase her rate of different sentences produced during parent-child interaction.
- Specific Objective:
 - Allison will combine 5 target verbs with at least 3 different sentence subjects as measured by communication samples and/or parental reports.
 - Should we be even more specific about the kinds of grammatical subjects?
 - How could we rewrite this? Why might we want to?

First Sentences

A focus on predication (instead of naming) results in to use more different types of sentences with more diverse verb forms.



Incorporate Verbs and Adjectives

After children have established their initial lexicon, we need to focus our efforts elsewhere.

- Help parents move beyond names for things.
- Provide alternatives to simple labeling

NOT	INSTEAD
Oh, here's the bottle.	The baby <i>is hungry</i> . She <i>needs</i> her bottle.

Talk about the toys

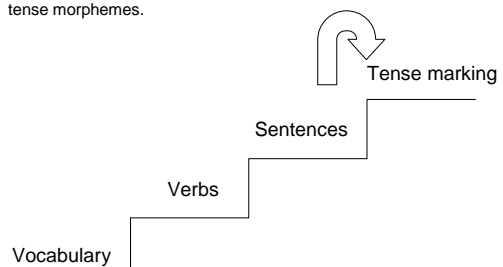
- When parents use verbs, the subjects are most often
 - I and you
- When parents use copulas, the subjects are most often
 - Pronouns: it's, that's, what's, here's, there's
- Help parents focus input on properties, states, and actions.
 - The kitty is soft.
 - That piece fits.
 - The baby is drinking her milk. She likes the juice.

Targeting Tense Marking

- Intermediate Goal:
 - Allison will expand her tense morpheme inventory.
- Specific Objective:
 - Allison will expand her tense morpheme inventory with the addition of 2 to 3 tense markers (i.e., /3s, does, auxiliary is, copula was) used in two or more sufficiently different contexts.
 - Can you explain why I used THIS list of tense morphemes?
 - How does this objective build DIRECTLY upon the prior sentence objective?

First Sentences and Tense

Use of lexical NPs (with copula BE in particular) provides better circumstance for identifying/analyzing anchor for acquisition of tense morphemes.



Encourage use of lexical nouns over pronouns

To facilitate analysis of copula and auxiliary forms as tense morphemes separate from sentence subjects, this is particularly important.

- | | |
|---|--|
| <ul style="list-style-type: none"> ▪ NOT – It's soft. – She's drinking . | <p>INSTEAD</p> <ul style="list-style-type: none"> - The kitty is soft. - The baby is drinking. |
|---|--|

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