

Preferential Looking Tests of *Wh*-Questions in Children with Specific Language Impairment

I. Introduction

- Specific language impairment (SLI): presence of language difficulties in the absence of related factors (Leonard, 1998)
- Comprehension difficulties in children with SLI may be result of limited linguistic processing ability
- *Wh*-question comprehension tasks used to assess processing limitations (Deevey & Leonard, 2004)

Structural Distance

- Subject question: *What* [*x* was hitting the flower]?
- Object question: *What* was [the apple hitting *x*]?
- Location of gap (e.g., *x*; argument position to which the *Wh*-word is related) must be identified before *Wh*-question can be interpreted
 - Greater distance between *Wh*-word & gap = delay in interpretation = higher processing demands
 - Subject questions: shorter distance (gap: subject position)
 - Object questions: greater distance (gap: object position)
 - Greater structural distance in object questions may result in higher processing load (Deevey & Leonard, 2004)

Syllabic Distance

- Long subject question: *What* [only just now *x* was hitting the flower]?
- Long object question: *What* was [the apple only just now hitting *x*]?
- Adverb padding (e.g., *only just now*) increases length in # of syllables without changing structure
 - Long questions should be more difficult than short

Linguistic Processing Limitation Account

- Predicts that *long object* questions are the most difficult to understand because structural & syllabic distance increase processing demands

Current Study

We used *preferential looking* (PL) to examine the extent to which preschool-age children understand *Wh*-questions

- Eye movements may provide more detailed account of language processing (Tanenhaus, 2000) than pointing or naming tasks
- Research using PL revealed simple *Wh*-question comprehension at 15-months of age (Seidl, Hollich, & Jusczyk, 2003)
- We used PL to examine effects of structural (e.g., subject vs. object) & syllabic (e.g., short vs. long) distance on children with SLI as compared to typically developing (TD) children

We predict:

- 1) SLI < TD group performance
- 2) Object < subject questions
- 3) Longer (e.g., padded) < shorter (e.g., unpadded) questions
- 4) SLI group will demonstrate the greatest difficulty with *long object* questions where processing demands are the greatest

Denise A. Finneran, M.A., George Hollich, Ph.D.,
Amanda Seidl, Ph.D., Laurence Leonard, Ph.D.

Purdue University, West Lafayette, Indiana

II. Methods

Participants:

- 11 children with SLI (*M* age = 5;3; SPELT-II < 10th %ile) & 11 TD children (*M* age = 4;6; SPELT-II > 17th %ile) matched for receptive vocabulary raw scores (PPVT-III); All participants: age appropriate nonverbal ability & oral structure/function, passed hearing screening, appeared neurologically unimpaired



Visual Stimuli:

- Saw movie of object hitting another object on LCD projection display

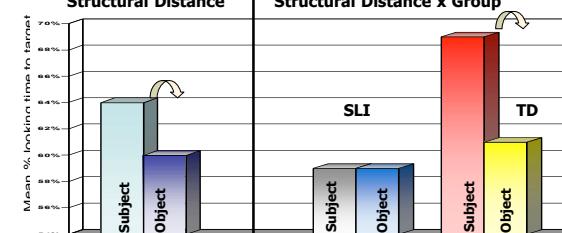
Verbal Stimuli:

- Heard variety of pseudo-randomized questions (after action) manipulated for structural (e.g., subject, object) & syllabic (e.g., +/- padding) distance

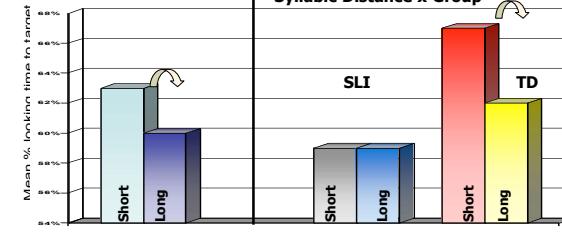
Data:

- Eye movements recorded during study and later coded frame-by-frame
- Analyzed eye movements conducted after question presentation; calculated % looking time to target (vs. non-target)
- Mixed-model ANOVA: group (e.g., SLI, TD), structural distance (e.g., subject, object), syllabic distance (e.g., short, long)

Structural Distance



Syllabic Distance



III. Results

- In preliminary task (e.g., identify objects shown on screen), demonstrated above-chance looking behavior (TD: 75%; SLI: 71%)
- Supports assumption that eye movements reflect comprehension

Significant Main Effects

- Structural Distance ($F(1, 20) = 5.27, p = 0.03$)
- Syllabic Distance ($F(1, 20) = 4.70, p = 0.04$)

Significant Interactions

- Structural Distance x Group ($F(1, 20) = 4.64, p = 0.04$)
- Syllabic Distance x Group ($F(1, 20) = 3.73, p = 0.068$) * marginal

IV. Discussion

Main effect for structural distance

- Deterioration in performance on object questions
- Interaction of structural distance x group : TD group is creating subject/object asymmetry

Main effect for syllabic distance

- Deterioration in performance on long (e.g., padded) questions
- Interaction of syllabic distance x group (marginal): TD group is creating short/long asymmetry
- SLI group: variability in distance does not create variability in performance
- Increased processing demands should = reduced performance

We propose that the children with SLI were using a non-grammatical strategy to answer the *Wh*-questions.

Overt Strategy: look for the object *not* named in the question

Question: *What was the apple hitting?*

Overt Strategy: not apple, must be flower

To test Overt Strategy:

- Introduce ambiguity by using 3 objects in visual stimuli (instead of 2)
- Overt Strategy not sufficient because 2 objects not named in question
- Predict SLI group performance < TD group performance

Contact

Denise Finneran (dfinnera@purdue.edu), Dept. of Speech, Language, and Hearing Sciences

Acknowledgements

Supported by grant NIH R01 DC00458 (Laurence B. Leonard, PI) and a NIH pre-doctoral traineeship in communicative disorders. Many thanks to Dr. Pat Deevey, Dr. Amanda Owen, and to the Purdue Baby Labs including Jessica Brand, Megan Brown, Kelly George, Elizabeth Raggio, Leann Schwartz, and Poole Shambhu.

References

- Deevey, P., Leonard, L. (2004). The comprehension of *Wh*-questions in children with specific language impairment. *Journal of Speech, Language, and Hearing Research*, 47, 802-815.
Leonard, L. (1998). *Language impaired children: language and learning impairments*. Cambridge: MIT Press.
Seidl, A., Hollich, G., Jusczyk, P. (2003). Early understanding of subject and object *Wh*-questions. *Infancy*, 4(3), 423-436.
Tanenhaus, M., Magnuson, J., Dahan, D., Chambers, C. (2000). Eye movements and lexical access in spoken-language comprehension: evaluating a linking hypothesis between fixations and linguistic processing. *Journal of Psycholinguistic research*, 29(6), 557-580.