LEXICAL PROCESSING IN CHILDREN WITH TYPICAL AND DISORDERED LANGUAGE DEVELOPMENT*

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"ON-LINE" SENTENCE PROCESSING

- Lifespan approach 5 years through old age
  - Extensions to clinical populations
    - Children with focal brain injury
    - Children with LI
    - Adults with aphasia
  - Simulations of language disorders in normal children and adults under stress

"ON-LINE" SENTENCE PROCESSING: TWO TASKS

- Sentence Interpretation
  - "Mugshot" picture choice technique
  - "Push the button under the one who did it"
  - Works from 5 years of age and up
- Grammaticality Judgment
  - "Silly/bad" vs. "Happy/good" faces
  - Button press indicates judgments
  - Works from 5 years of age and up

- Sentence Interpretation
  - Devescovi, A., D'Amico, S., Carbonaro, M., Bureca, I., & Colombini, G. (1999). The development of sentence comprehension in Italian: a reaction time study. *First Language*.
  - Dick, F., Bates, E., Wulfeck, B., Utman, J., Dronkers, N., & Gernsbacher, M. (2001). Language deficits, localization and grammar: Evidence for a distributive model of language breakdown in aphasics and normals. *Psychological Review, 108*(4), 759-788.
  - Dick, F., Wulfeck, B., Bates, E., Naucler, N., & Dronkers, N. (1999). Interpretation of complex syntax by aphasic adults and children with focal lesions or specific language impairment. *Brain & Language*, 69:3, 335-337.
  - Von Berger, E., Wulfeck, B., Bates, E., & Fink, N. (1996). Developmental changes in real-time sentence processing. *First Language, 16*, 192-222.

- Grammaticality Judgment
  - Blackwell, A., & Bates, E. (1995). Inducing agrammatic profiles in normals: Evidence for the selective vulnerability of morphology under cognitive resource limitation. *Journal of Cognitive Neuroscience, 7*(2), 228-257.
  - Wulfeck B., Bates, E., & Capasso, R. (1991). A cross-linguistic study of grammaticality judgments in Broca's aphasia. Special issue on cross-linguistic studies of aphasia. *Brain and Language, 41*(2), 311-346.
  - Wulfeck, B., Bates, E., Krupa-Kwiatkowski, M, & Saltzman., D. On-line grammaticality sensitivity in children with early focal brain injury and specific language impairment. In B. Wulfeck & J. Reilly, J., (Eds). Plasticity and development: Language in atypical children. Special issue, *Brain & Language*. (in press).

LESSONS FROM "ON-LINE" SENTENCE PROCESSING: 5 Years & UP

- Probabilistic Behavior
  - Above-chance performance suggests that 'knowledge is there'
  - Developmental and pathological differences in processing efficiency
- "Knowledge" vs. "Processing"?
  - Distributed neural networks
  - Knowledge units = processing units
  - "Shaky representations"

LESSONS FROM "ON-LINE" SENTENCE PROCESSING: 5 Years & UP

- Speed/Accuracy trade-offs
  - "Good Speed"
    - Increases over development
    - Correlates positively with other indices
  - "Bad Speed"
    - Decreases over development
    - Correlates negatively with other indices
  - RT Plateaus & Task Consolidation

"ON-LINE" LEXICAL PROCESSING ACROSS THE LIFESPAN

- Ecologically valid tasks
  - Auditory language only
    - No reading component
  - No metalinguistic judgments
  - Familiar response modalities
    - Picture Naming (3 years and up)
    - Repetition/Imitation (3 years and up)
    - Preferential looking (12 months and up)

"ON-LINE" LEXICAL PROCESSING

- Studies of lexical processing in a sentence context
  - Lifespan approach 3-100 years
  - Extensions to clinical populations
  - Simulations of language disorders in normals under stress
- Infant studies of lexical processing
  - Preferential looking
  - Normal vs. "stressed" perceptual conditions

LIFESPAN STUDIES OF LEXICAL PROCESSING IN SENTENCE CONTEXTS

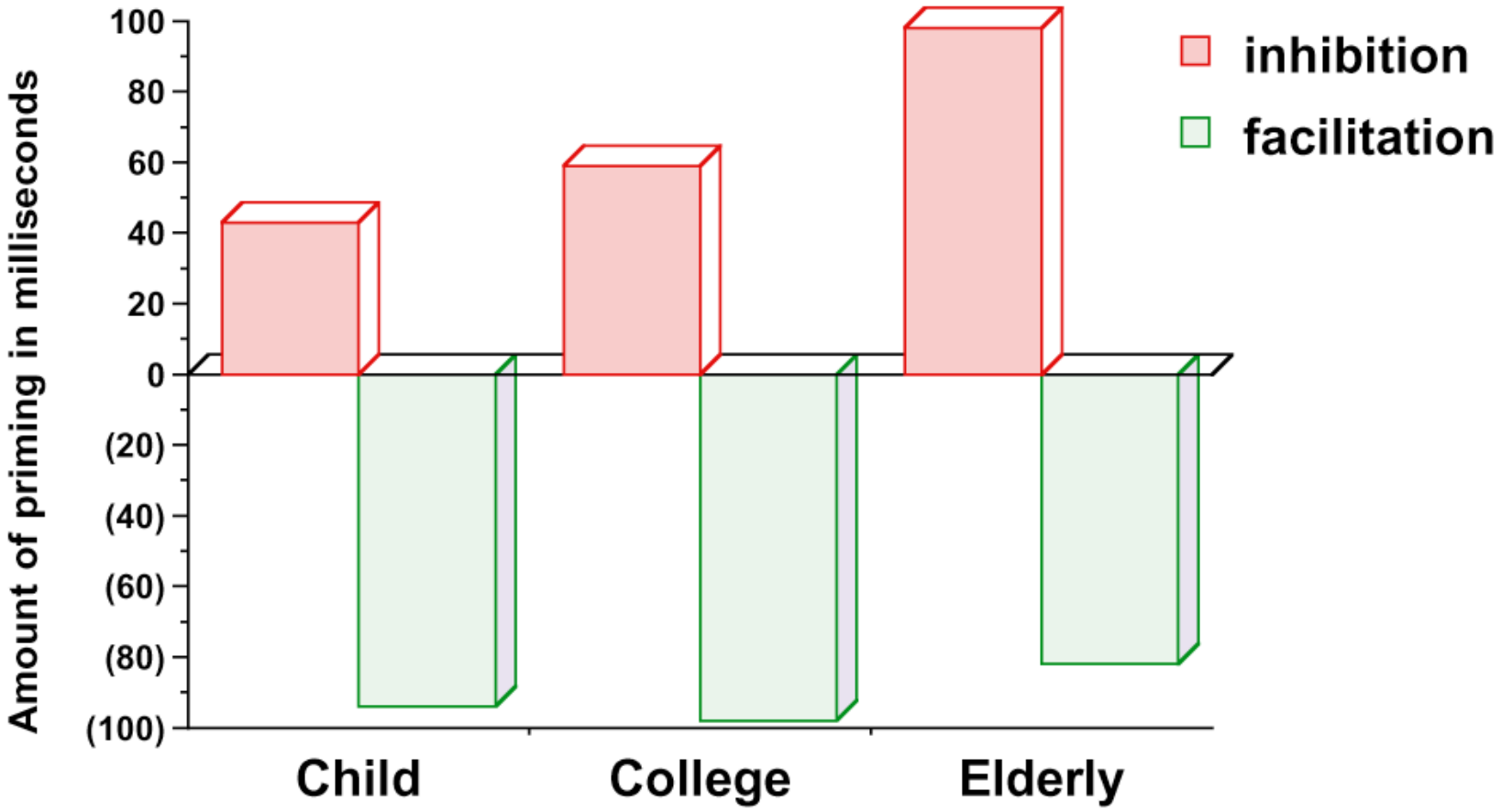
- Cued shadowing (CS)
  - 7-81 years
  - Repeat target word signaled by a voice shift
- Picture naming (PN)
  - 3-100 years
  - Name picture following sentence context
- Within-Subjects comparison of CS & PN
  - 3-8 year controls
  - 7-8 year old focal lesion & SLI

CUED SHADOWING: AUDITORY TARGET WORD REPETITION

- "You are going to hear a lady talking. But sometimes a man will talk. Your job is to say what the man says, as fast as you can without making a mistake…"

- LADY: "When I am tired, I put on my…"
- MAN:
  - PAJAMAS (facilitative)
  - CAKE (inhibitory)
- LADY: "Now please say…"
- MAN:
  - PAJAMAS (neutral)
  - CAKE (neutral)

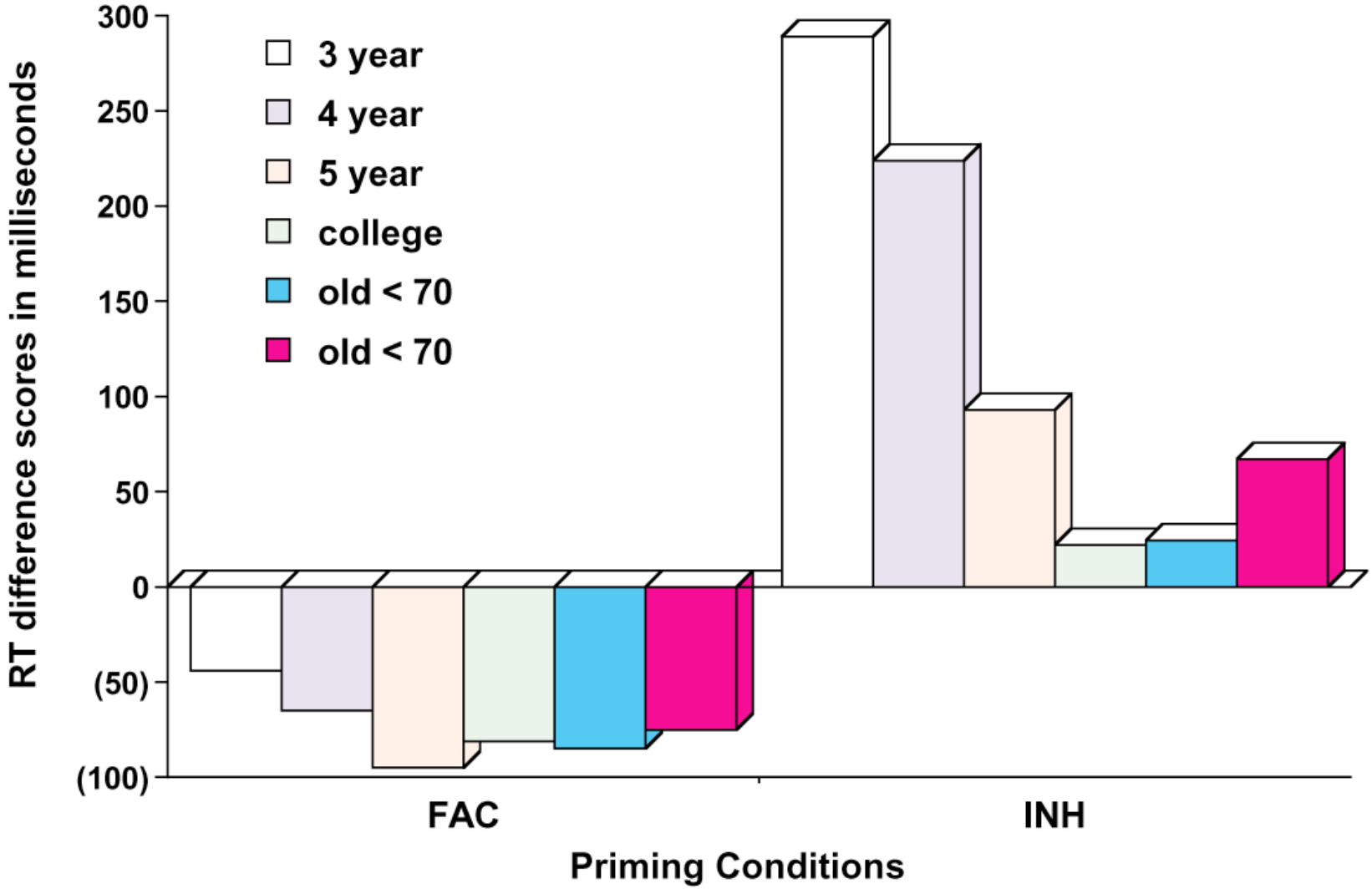
Liu, H., Bates, E., Powell, T., & Wulfeck, B. (1997). Single-word shadowing and the study of lexical access: a life-span study. *Applied Psycholinguistics, 18(2),* 156-180.



INHIBITORY AND FACILITATIVE EFFECTS OF SENTENCE CONTEXT ON CUED SHADOWING (AUDITORY WORD REPETITION) IN 7-12 YEAR OLD CHILDREN, YOUNG AND ELDERLY ADULTS

PICTURE NAMING IN CONTEXT

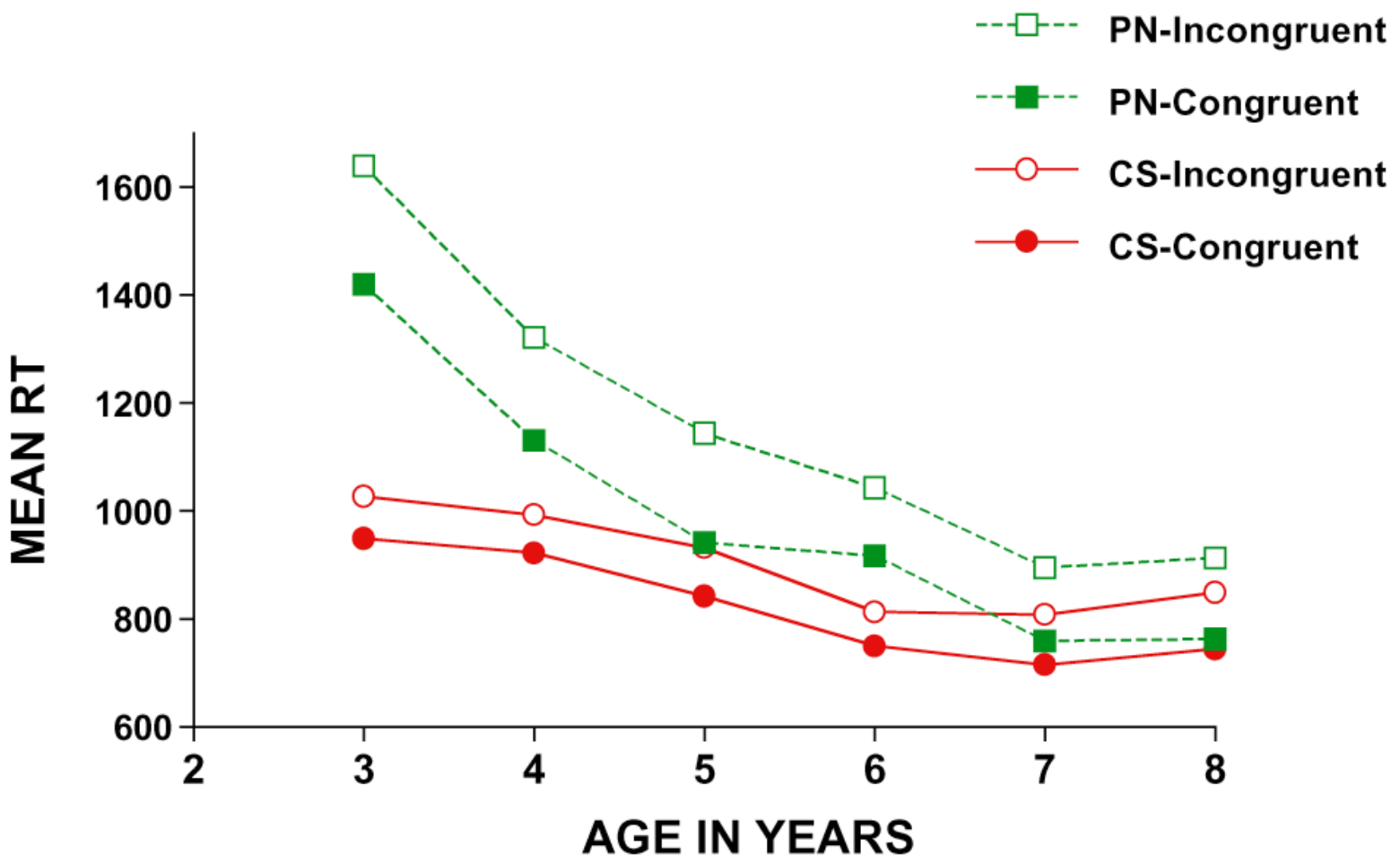
Roe, K., Jahn-Samilo, J., Juarez, L., Mickel, N., Royer, I., & Bates, E. (2000). Contextual effects on word production: a life-span study. *Memory & Cognition, 28,* 756-765.



Facilitation vs. Inhibition in Sentence Priming
of Picture Naming across the Lifespan (3 - 100 yrs)

PICTURE NAMING & CUED SHADOWING COMPARED

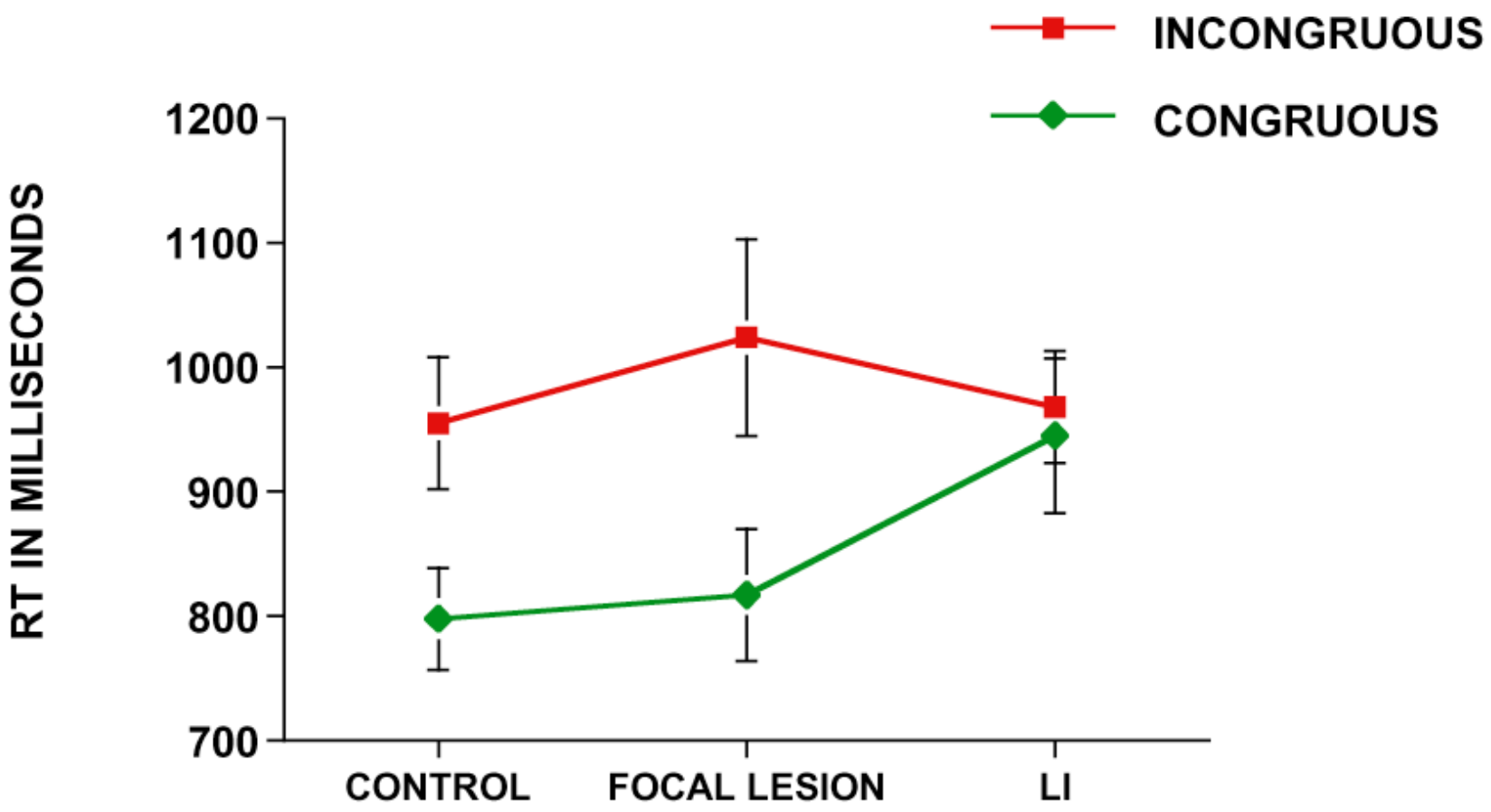
Klarman, L., Roe, K., Zangl, L. & Bates, E.
(in preparation)
On-line studies of word recognition and word production in a sentence context.



Sentence Priming of Picture Naming vs. Cued Shadowing from 3 - 8 Years of Age

CUED SHADOWING & PICTURE NAMING IN DEVELOPMENTAL IMPAIRMENTS

Roe, K., Klarman, L., Zangl, L., Bates, E., & Wulfeck, B. (in preparation)
Context effects on lexical processing in children with language impairment and children with early focal brain injury



SENTENCE PRIMING OF PICTURE NAMING IN CONTROLS VS. CHILDREN WITH FOCAL BRAIN INJURY AND CHILDREN WITH LANGUAGE IMPAIRMENT

Aydelott-Utman, J. & Bates, E. (under review) Effects of acoustic degradation and semantic context on lexical access.

- Temporal compression of sentence contexts leads to **reduced inhibition** of word recognition in **incongruent sentences**
- Low-pass filtering of sentence contexts leads to **reduced facilitation** of word recognition in **congruent sentences**
- **Roe et al findings for children with LI resemble normal adults under low-pass filtering**

CONTRIBUTIONS OF WORKING MEMORY TO ON-LINE WORD & SENTENCE PROCESSING

Roe, Katherine (2002)
Working memory and language development in early childhood. Ph.D. Dissertation, University of California, San Diego

Zangl, R., Skinner, L., Thal, D., Fernald, A. & Bates, E. (submitted).

Dynamics of Word Comprehension in Infancy: Developments in Timing, Accuracy & Resistance to Acoustic Degradation

Zangl et al.: Preferential Looking

- 95 infants (12-31 months)
- CDI expressive vocabulary for all cases
- 24 target words (48 trials)
  - Each auditory word presented in unaltered form and in one altered condition
  - Three perceptual conditions
    - Perceptually unaltered (24 words)
    - Temporally compressed (50%) (12 words)
    - Low-pass filtered (1.5 Hz) (12 words)
  - Counterbalanced lists, side of presentation

Zangl et al.: Summary of Results I

- Accuracy & speed of target looks
  - Improve significantly from 12-31 months
  - Vocabulary (CDI) a better predictor than age
- Temporal compression
  - only affects children in the lowest performance range
- Low-pass filtering
  - Decreases performance at all levels
  - Above-chance looking only for children at the highest vocabulary levels

Zangl et al.: Summary of Results II

- Word comprehension and production are tightly yoked from 12-31 months when comprehension is assessed out of context
- Some RT measures show non-monotonic effects of age and/or vocabulary
  - Good vs. Bad RT
  - Consolidation
- Filtering > Compression as a model of endogenous developmental delays

ON-LINE STUDIES OF WORD & SENTENCE PROCESSING: TAKE-AWAY MESSAGES

- Reaction time studies yield new insights
  - Normal language development
  - Atypical language development
- Information-processing deficits can be simulated in normal children & adults
- Good RT vs. Bad RT
  - Speed/accuracy trade-off as a developmental phenomenon