

Implicit and Explicit Learning of Sound Categories by Preschoolers With and Without Specific Language Impairment



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Motivation

What makes children with specific language impairment (SLI) struggle to learn language compared with their typically developing peers?

SLI: Highly prevalent developmental language disorder (Ref. 1). Characterized by delays in learning the grammatical rules of language, with auditory deficits sometimes co-occurring. A recent proposal argues that implicit/procedural learning is the core deficit in SLI (Ref. 2).

Purpose: To compare implicit and explicit learning of sound categories across preschoolers with and without Specific Language Impairment (SLI), to test the Procedural Deficit Hypothesis (Ref. 2).

Hypothesis: We predicted that children with SLI would show impaired learning of sound categories in an implicit task—but not in an explicit task—relative to their typical peers.

Participants

26 preschool children with SLI
26 preschool children without SLI, age and gender matched
Half tested in Explicit-pitch & Implicit-duration
Half tested in Explicit-duration & Implicit-pitch

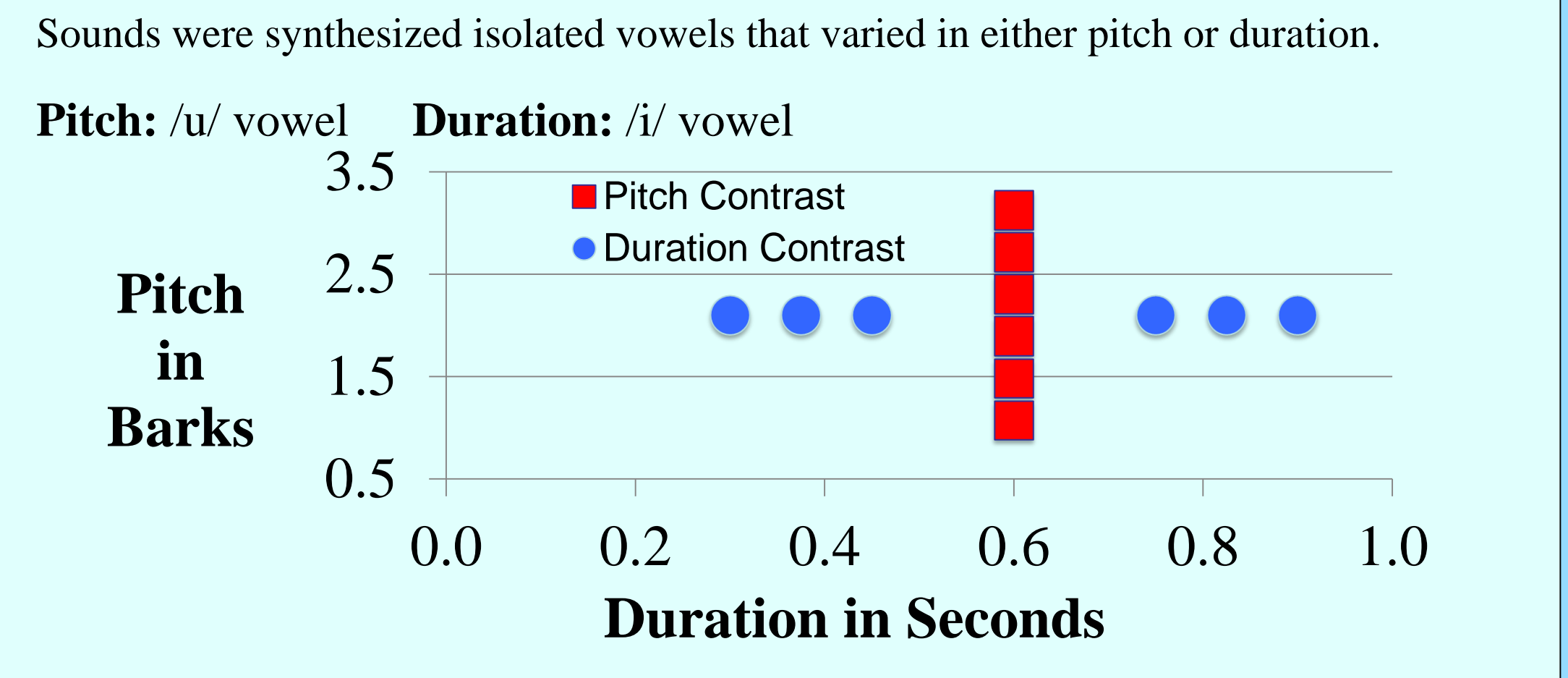
Participant selection based on results from:

- Hearing Screening
- Kaufman Assessment Battery for Children (KABC-II)
- Structured Photographic Expressive Language Test Preschool: 2nd Edition (SPELT-P2)
- Goldman-Fristoe Test of Articulation (GFTA)
- Peabody Picture Vocabulary Test (PPVT-4)

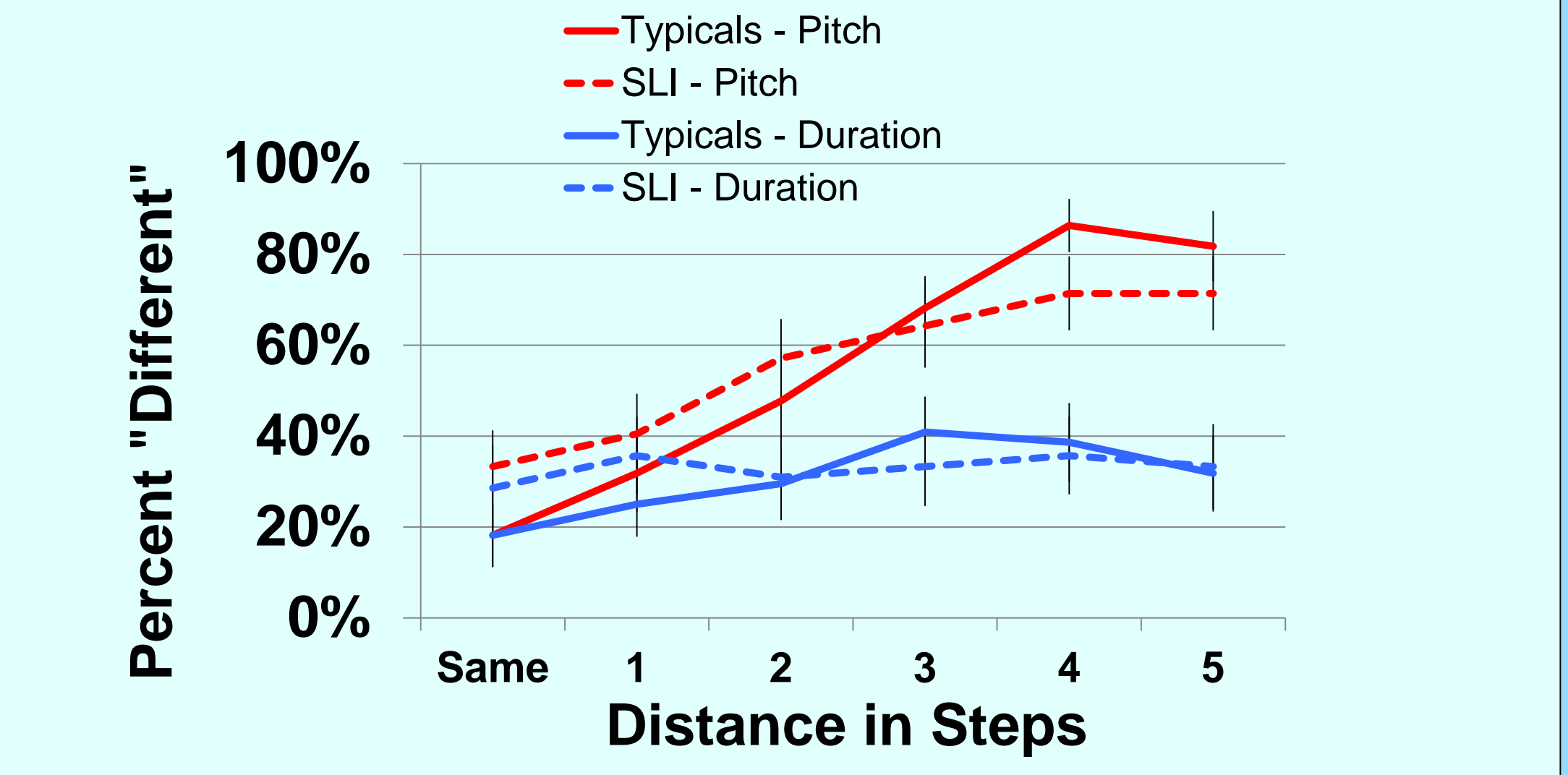
Children also completed a “same” / “different” sound discrimination pre-test before each implicit or explicit learning task, for the sounds used in that task.

*Production data were also analyzed when available, for a subset of participants

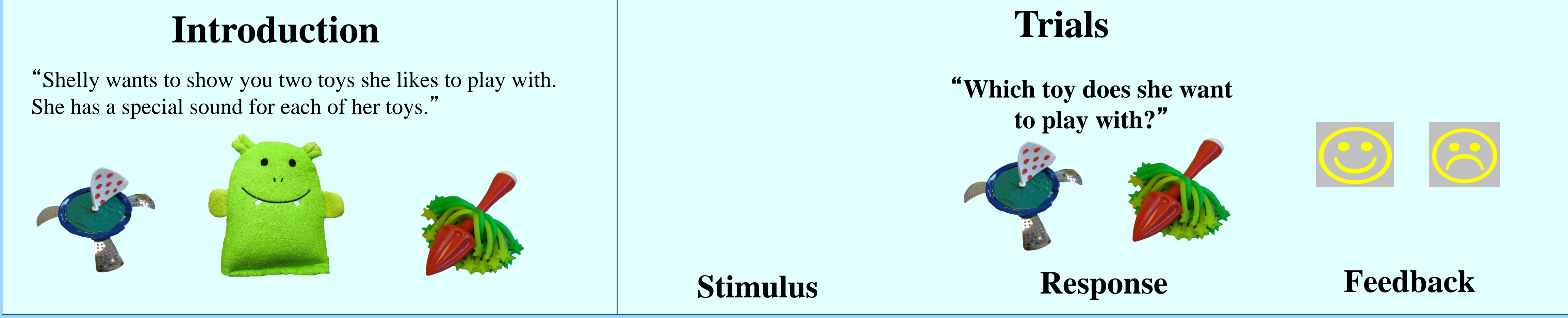
Auditory Stimuli



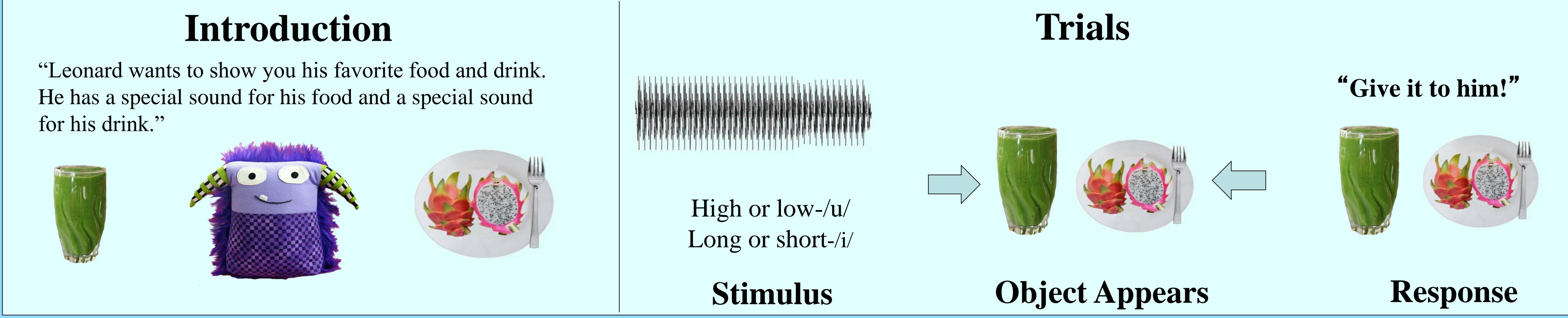
Discrimination Pre-Test



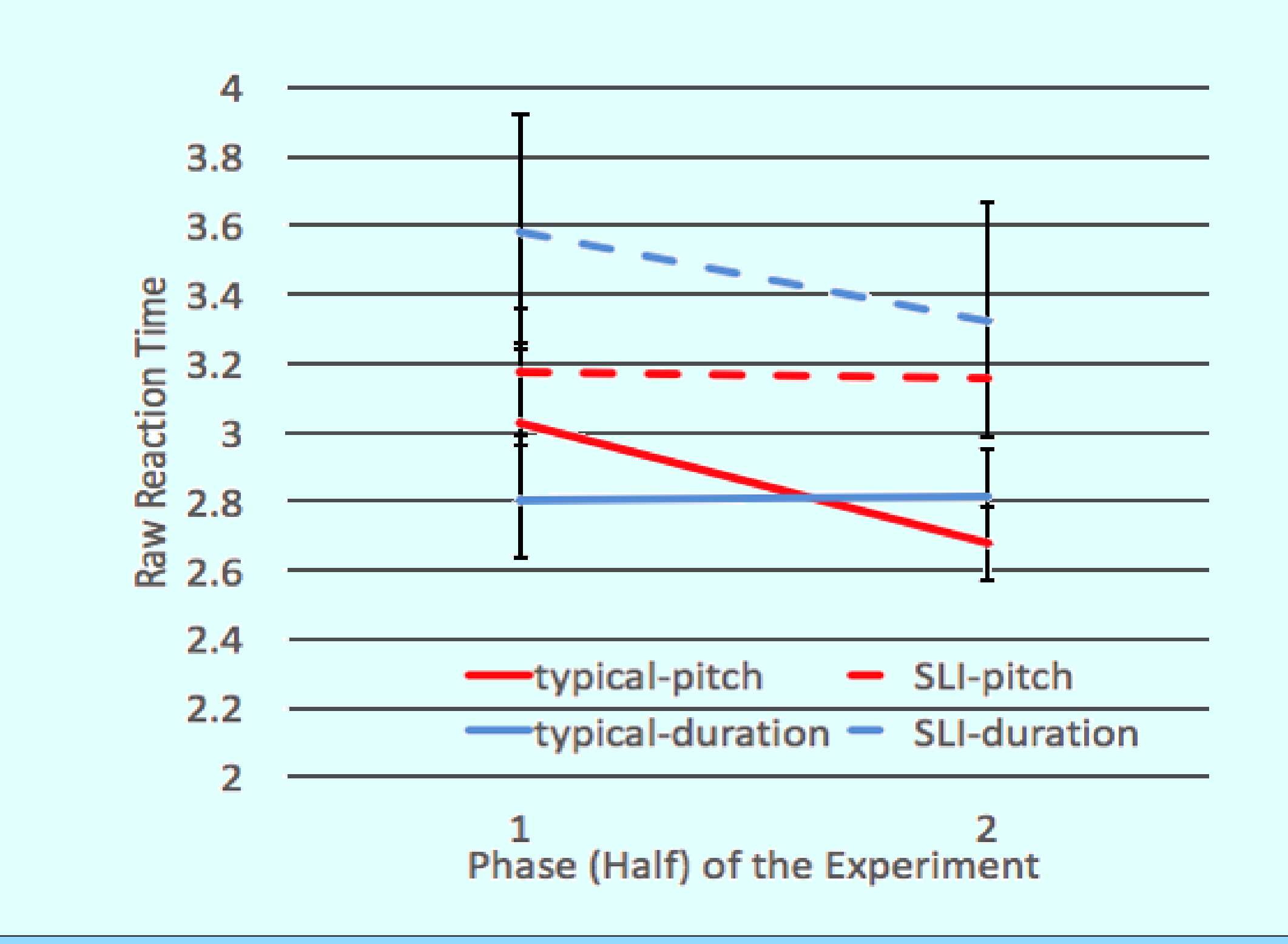
Explicit Task



Implicit Task



Reaction Times



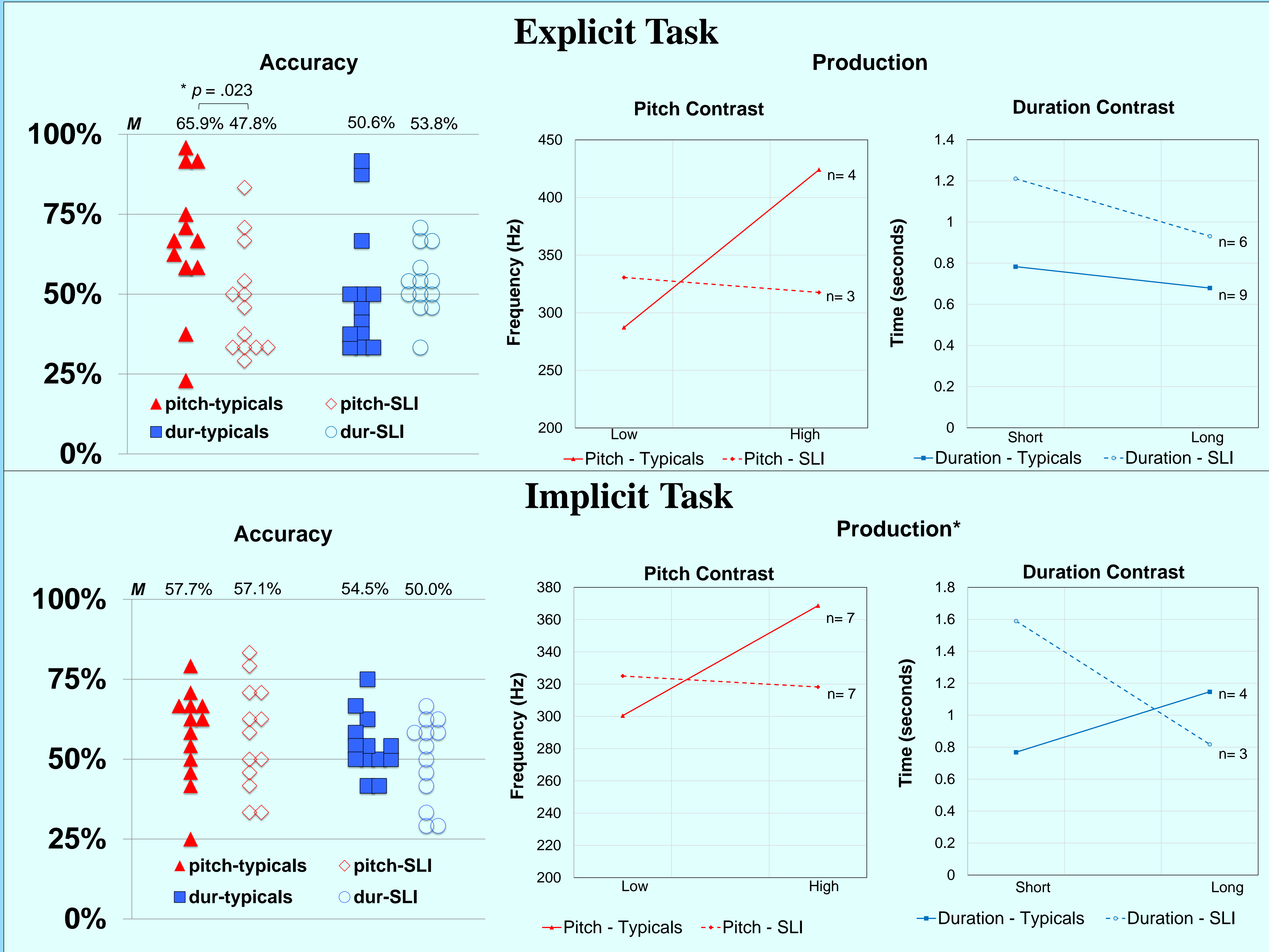
Discussion

Sound Discrimination: Both typically developing and language-impaired children showed robust pitch discrimination in the “same”/“different” pretest, but typically developing children performed significantly better. Children’s overall duration discrimination was less robust.

Learning Tasks: Typically developing children showed above-chance implicit learning overall. In the explicit task, they only learned pitch categories, not duration categories. This could reflect greater conscious accessibility of pitch vs. duration. Children with SLI did not reach significant learning in either task. However, typically developing children’s learning exceeded language-impaired children’s only when learning pitch categories explicitly. Production data converged with accuracy data. Children with SLI also showed slower RT.

Results mostly clearly indicate difficulty with pitch discrimination in children with SLI, with possible additional learning difficulties. The next study will teach visual categories to disentangle the relative roles of sound-discrimination vs. more general learning impairments in SLI.

Results



References

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- Lum, J. A. G., Conti-Ramsden, G., Page, D., & Ullman, M. T. (2012). Working, declarative and procedural memory in specific language impairment. *Cortex*, 48, 1138-1154.

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