The Relationships Between Hearing, Speech, Language, and Cognition in Typically Developing Children: First Steps in Understanding the Causes of Listening Difficulties

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Children with Listening Difficulties

- Poor listening skills in noisy environment
- Difficulty with phonics and reading
- Frequent asking for repetition
- Keeping up with the rapid speech
- Localization of the source of signals

Challenges in Diagnosing Listening Difficulties

- **Lack of Standardized Diagnostic Criteria**
  According to different diagnostic criteria and test batteries, the estimated prevalence of auditory processing disorders in children varied widely from 0.2% ~ 10% (Silman et al., 2000; Bamiou et al., 2001; Nagao et al., 2016).

- **Overlap with Other Conditions**
  Symptoms of children with listening difficulties may also occur in children with other developmental disorders such as AD(H)D, DLD, dyslexia and learning disorders (de Wit et al., 2017).
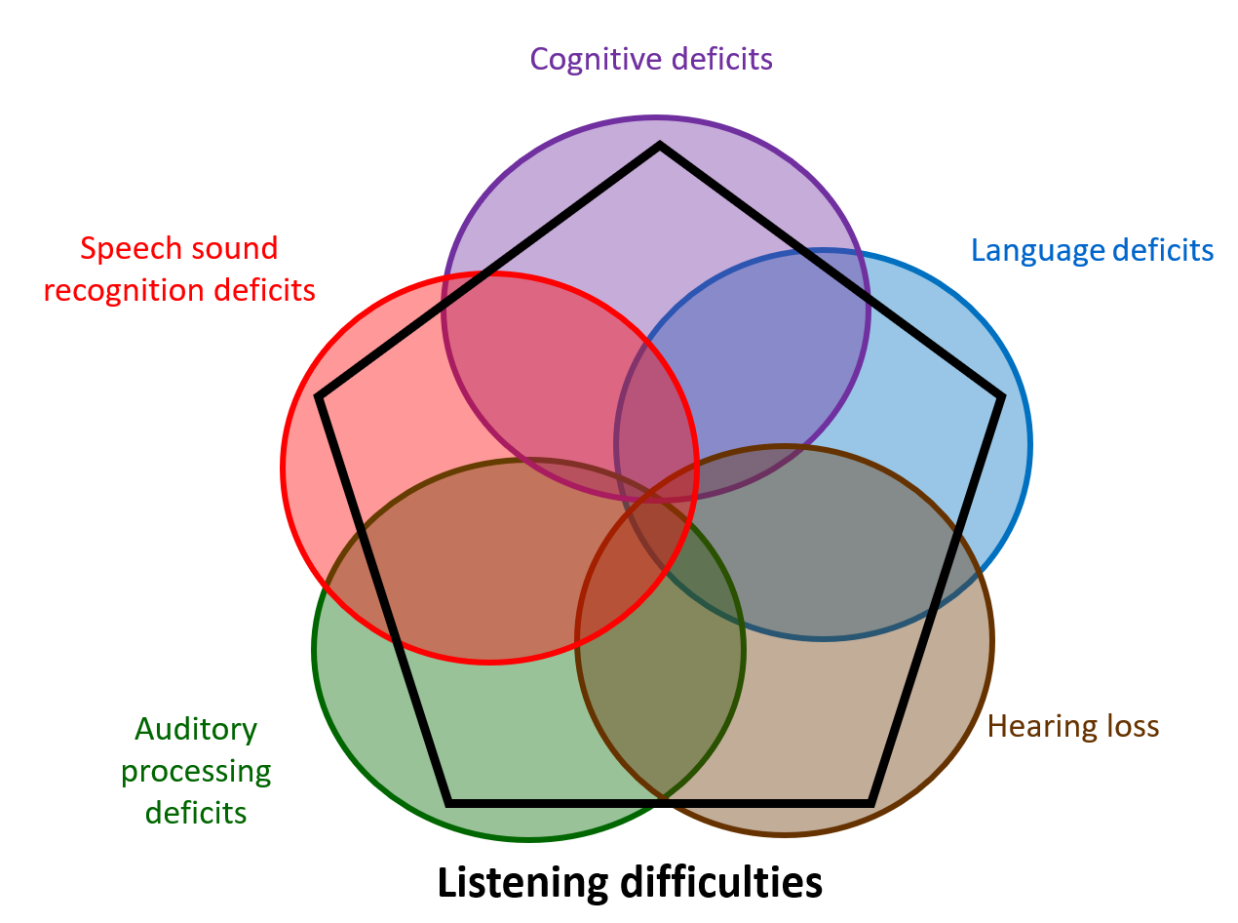
How to Separate the Causes? Tri-structured Test battery
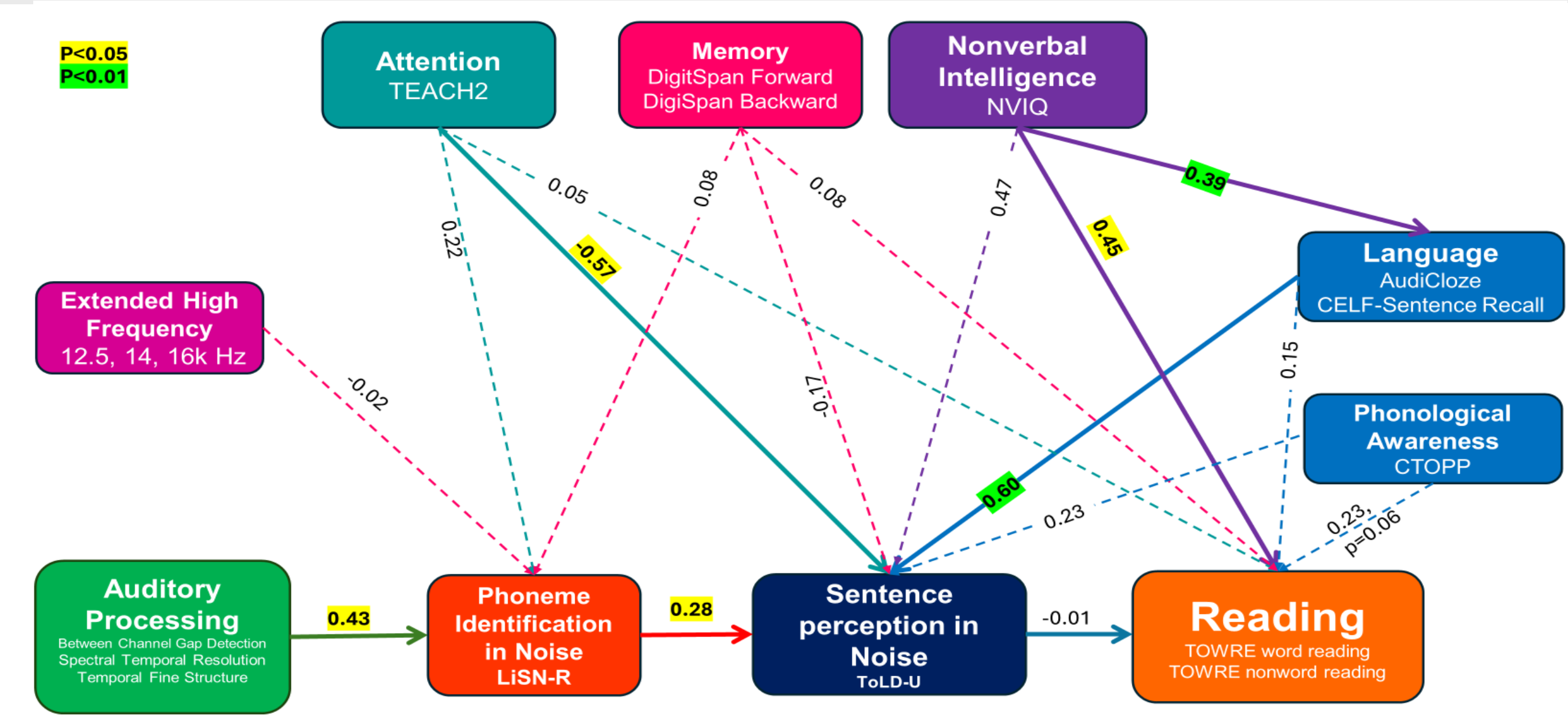

Dillon and Cameron (2021)
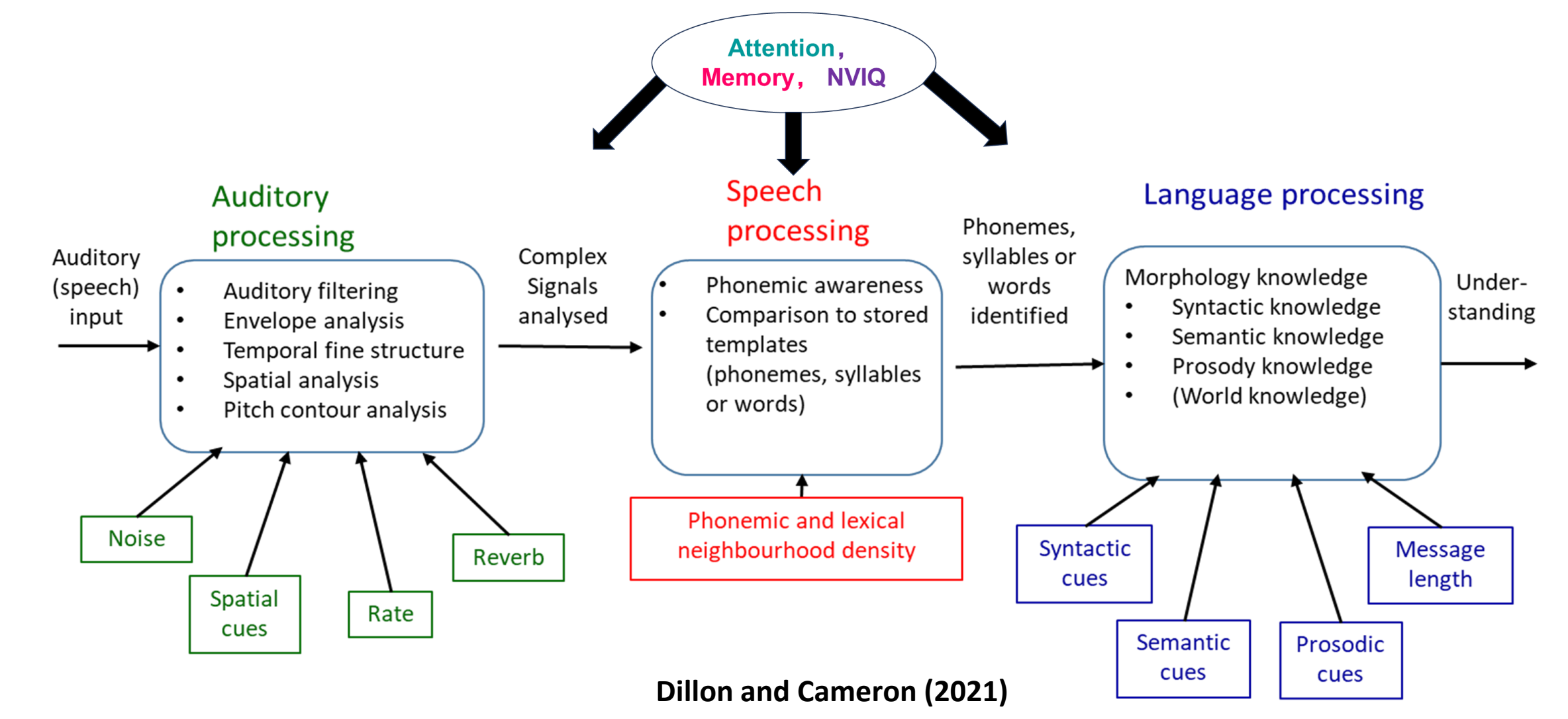
Our Questions

1. What are the correlations between each of the measures of non-speech auditory processing, phoneme identification in noise, sentence perception in noise, language and cognition in typically developing population?

2. What affects children's phoneme identification in noise, sentence perception in noise, language and reading abilities?

Method

- **Participants:** A total of 227 children, aged 5-12 years, from mainstream primary schools in Greater Manchester.
- **Hearing Status:** Normal peripheral hearing.

- **Testing Procedure:** Each child completed 7 of 12 randomly assigned tests in a comprehensive battery assessing auditory processing of nonspeech signals, phoneme identification in noise, sentence perception in noise abilities, teacher-rated listening ability in the classroom, cognitive abilities (memory, attention, and non-verbal intelligence), language and reading ability over 2-3 sessions.

Results

Conclusions

Phoneme Identification in Noise (LiSN-R): Positively influenced by Auditory Processing abilities (0.43, p < 0.05).

Sentence Perception in Noise (ToLD-U): Negatively impacted by Attention (-0.57, p < 0.05) and positively influenced by Phoneme Identification in Noise (0.28, p < 0.05) and Language (0.60, p < 0.01).

Language: Positively influenced by Nonverbal Intelligence (0.39, p<0.01)

Reading: Positively influenced by Nonverbal Intelligence (0.45,p < 0.05) and Phonological Awareness trending toward significance (0.23, p = 0.06).

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