Predictions in bilingual children with developmental dyslexia

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Introduction
Developmental Dyslexia (DD): A specific learning disorder manifested by persistent problems in reading accuracy, fluency, and/or comprehension, despite sound learning opportunities (American Psychiatric Association, 2013)

Background
- DD children have difficulties with rhythmic anticipation (non-language-specific) (Muneaux & al, 2004; Pagliani, 2015)
- Some DD children also have morphosyntactic (MS) difficulties (language-specific) (Arosio & al, 2016; Arosio & al, 2017; Cantiani & al, 2015)
- Correlation found between MS abilities and rhythmic abilities (Pagliani & al, in prep)

Research questions
- Prediction abilities (linguistic and non-linguistic) = clinical marker of DD in bilinguals?
  - DD bilinguals vs DD monolinguals
  - DD bilinguals vs TD bilinguals
  - TD bilinguals vs TD monolinguals

Hypotheses & predictions
- Reading involves anticipation/prediction abilities
- DD children have impaired rhythmic abilities

Predictions
- In both language-specific (MS) and non-language-specific (rhythm) prediction tasks:
  - DD bilinguals = DD monolinguals
  - DD bilinguals < TD bilinguals
  - In the language-specific task:
    - TD bilinguals < TD monolinguals (might vary depending on L2 exposure)
  - Reading abilities should correlate with the performance on both tasks

Methods
Participants
Children 8-12 years old, Italian speakers
  - At least 3 years of exposure to Italian for bilinguals
  - Medium SES
  - 4 groups:
    - DD bilinguals (L2 = Italian, whatever L1) - experimental (n = 25)
    - DD monolinguals (Italian) - control (n = 25)
    - TD monolinguals (Italian) - control (n = 25)
    - TD bilinguals (L2 = Italian, whatever L1) - control (n = 25)
  - Recruitment in Carlo Besta Neurological Institute (DD) and in schools (TD)

Control measures
- Non-verbal skills
  - Non-verbal IQ (Raven’s Colored Progressive Matrices – Raven, 1976)
- Auditory reaction time
- Go-NoGo

Reading skills
- Word and non-word reading (DDE-2 - Sartori, Jo & Tressoldi, 2017)
- Text reading (DD only)

Methods
Experimental tasks
- Language-specific task: predictions abilities based on MS cues (eye-tracking experiment)
  - Prediction based on the article
  - 3 conditions: gender (1), number (2), no prediction (3)
  - Measure: proportion of looks to target at the onset of the article (should increase if prediction)

- Non language-specific task: rhythmic prediction (warning imperative)
  - Ability to predict the upcoming beat: press the key in synchrony with the imperative beat

Parallel studies
- Same DD population

1. Prediction abilities in the Rapid Automated Naming task
  - RAN = predictive of reading abilities in monolinguals, sensitive for DD diagnosis
  - Is the RAN predictive of reading abilities in bilinguals? Sensitive to DD?
  - Hypothesis: Performance to the RAN relies on anticipation/predictive abilities
  - Experimental tasks: RAN (figures), warning Imperative, Tapping in rhythm (extraction of rule)
  - Predictions: DD bilinguals = DD monolinguals; DD bilinguals < TD bilinguals

2. Screening study: Non-Word Repetition (NWR) and Sentence Repetition (SR) as tools for diagnosing DD
  - Studies suggest an overlap between SLI and DD
  - NWR and SR are used to assess respectively phonology and morphosyntactic skills in monolinguals and bilinguals and are sensitive to SLI
  - NWR & SR, tools for DD diagnosis?
  - Predictions: DD bilinguals = DD monolinguals; DD bilinguals < TD bilinguals; TD bilinguals < TD monolinguals

References