Distributional learning of visual object categories in children with and without DLD

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Does Condition (1/2) influence stimulus choice of two stimuli? No evidence for or against a relationship between visual distributional learning in children with and without DLD. (e.g., Junge et al., 2018) Distributional DLD (8 minutes) at different continuum object positions. There seems to be an inherent preference for the combination S + D1. Perhaps visual organization contributes to the formation of novel visual object categories in infants. Does token D1 or D2 look more like token S? An 11-item familiarization continuum was constructed, with tokens S, D1, and D2. Children in Condition 1 were significantly more likely to choose stimulus D2 than children in Condition 2: z = 2.758, p = 0.006. However, there was no significant effect of Group: z = 0.007, p = 0.994. Familiarization condition significantly influences whether viewers prefer the combination S + D1 or S + D2. No evidence for a difference between children with and without DLD. Linear regression analyses showed no significant relationships between visual distributional learning and lexical knowledge in children with DLD.

**DLD AND DISTRIBUTIONAL LEARNING**

- Studies indicate that children with developmental language disorder (DLD) have difficulties with statistical learning (SL) (e.g., Siegelmam et al., 2017).
- Distributional learning, a type of SL, plays a role in the formation of phonetic categories. (e.g., Maye et al., 2002)
- Junge et al. (2018) found that distributional learning contributes to the formation of novel visual object categories in infants.

It is unknown whether children with DLD have difficulty with this type of visual distributional learning.

**RESEARCH QUESTIONS**

1. Are children with DLD less sensitive to distributional cues compared to typically developing (TD) children when learning novel visual object categories?
2. Does the ability of visual distributional learning contribute to lexical knowledge in children with DLD?

**METHOD: FAMILIARIZATION PHASE**

Based on Junge et al. (2018) and Chlädka et al. (2020).

- An 11-step novel object continuum was constructed.
- Participants were familiarized with tokens from the continuum (288 tokens in total, duration 1/2–8 minutes).
- Two learning conditions: distributional peaks at different positions in the continuum.
- Between-participant design: PPs did one of two familiarization conditions.

**METHOD: TEST PHASE**

- Eight 2A-FC test questions.
- Does token D1 or D2 look more like token S?

**Predictions**

- PPs in Condition 1 will choose token D1 more often than PPs in Condition 2.
- Children with DLD will show a weaker effect of Condition than TD children.

**RESULTS**

A generalized logistic linear mixed effect model in R was constructed to test:

- Is there an interaction between Condition x Group (DLD/TD)?
- Children in Condition 1 were significantly more likely to choose stimulus D2 than children in Condition 2: z = 2.758, p = 0.006. However, there was no significant effect of Group: z = 0.007, p = 0.994. Familiarization condition significantly influences whether viewers prefer the combination S + D1 or S + D2. No evidence for a difference between children with and without DLD.

**DISCUSSION**

- Familiarization condition significantly influenced our participants’ preference for the combination of S and token D1 or D2, indicating that distributional properties of the input influence the categorization of visual stimuli.
- No evidence for or against a visual distributional learning deficit in children with DLD (see also Lammertink et al., 2020).
- No evidence for or against a relationship between visual distributional learning and lexical knowledge in children with DLD.
- There seems to be an inherent preference for the combination S + D1. Perhaps the visual continuum should be changed in future studies.

**METHOD: PARTICIPANTS**

- 25 children with DLD and 25 TD children (7-9 years old).
- The children with DLD were tested on receptive/productive vocabulary size (PPVT, CELF), semantic knowledge (Word Classes CELF) and lexical-semantic organization (Word Associations CELF).

**REFERENCES**


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