Atypical visual processing in ASD as a global deficit or local bias: A meta-analysis

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Introduction

Background:
- What is perceived (first); the forest or the trees?
- Atypical visual processing, such as enhanced local visual processing or impaired global visual processing, is often reported in individuals with ASD
- Widespread variety of often contradictory research findings

Objectives:
- Test whether the existing empirical data favor a local processing bias or a global processing deficit
- Analyze which possible moderators rule the local vs. global visual processing diversity in ASD

Methods

Literature search:
- Web of Science database (1983-2011)
- Reference -and citations lists of ten key papers

Requirements:
- English published article
  - Local-Global visual processing in ASD
    - Experimental design
      - Behavioral outcome data

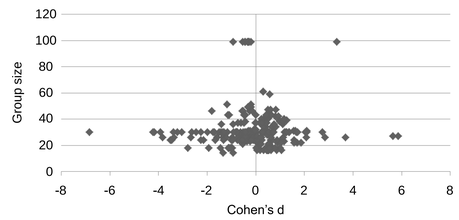
Study selection process:

Records screened N=1059 → Full-text assessed N=86 → Full-text eligible N=53 → Full-text included N=44

Analysis:
- Cohen's d using CMA
  - Note: negative d indicates disadvantage for ASD (less accurate or slower)
- Three-level random effects model using SAS 9.3

Results

Funnelplot:
- Effect sizes as a function of group size

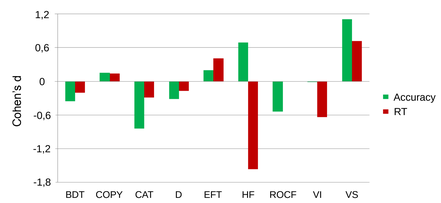


Single moderator analyses:
- Moderator effect for:
  - Local vs global task demands (p<.005)
  - RT vs accuracy measure (p<.005)
  - Gender (p<.005)
  - Age (p<.005)
- No moderator effect for:
  - Task
  - IQ
  - Type ASD nor type CC

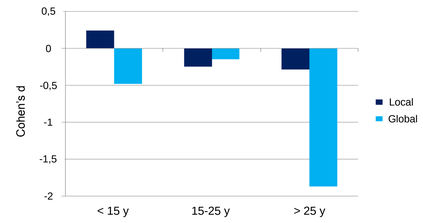
Multiple moderator analyses:
- Several interesting combined influence effects:

Measure vs Local Global

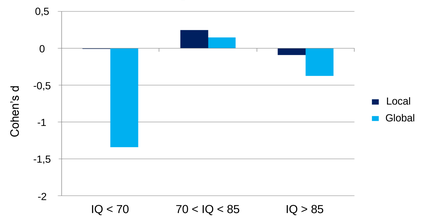
Measure vs Task



Age effects



IQ effects



Conclusion

Summary:
- Is there a local bias or global deficit in ASD?
  - No evidence for a local bias, inconclusive evidence for a global deficit
  - No difference in accuracy, solely slower global processing
- Influence of moderators:
  - Clear influence of type of measure (RT vs accuracy)
  - Influence of task differences, gender, age or IQ is less clear-cut
  - Difficult to assess due to missing information in many cases
- Constructs underlying local and global visual processing:
  - Inconsistently operationalized
  - Lack of clear theoretical and empirically founded conceptualizations

Theoretical implications:
- Atypical global visual processing:
  - Due to a less automatic, time consuming type of processing?
  - Diminished preference or disinclination rather than global processing deficit?
- Focus on specific age categories, i.e. young children
- Attention on other moderators, i.e. schooling and handedness
- Rethink conceptualization of local-global visual processing

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