Comprehension of sentences with ambiguous words is predicted by language-specific and domain-general abilities

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**Background**

Understanding semantically ambiguous words in context requires knowledge of, access to, and selection of the appropriate word meaning.

Previous research[1]:
- showed a positive correlation between semantic ambiguity resolution success and vocabulary but not non-verbal IQ measures.
- was limited by sample size and the ability measures taken.

Are individual differences in semantic ambiguity resolution success predicted by language-specific and/or domain-general abilities?

**Methods**

In a behavioural online study (jsPsych; Prolific) 67 volunteers (19-59 years, native British English) performed tasks to measure 3 types of abilities:

1. Ambiguity resolution ability
   Meaning Definitions Task

   122 sentences with ambiguous words resolving to subordinate meaning[2]
   - “Sally worried that the **ball** was going to be too **crowded**”
   - “A party with dancing"

   10 sentences with unambiguous control words
   - “Susie feared that the **pub** was going to be too **expensive”**
   - “A place to drink"

   Accuracy: Mean (SD) [range] = .84 (.12) [.52, .99]; split-half reliability, r=.82, p < .001

2. Language-specific ability
   i) Mill Hill Vocabulary Test
   1. **Rage**
      - crease
      - love
      - invite
      - anger
      - rain
      - hoist
   
   Accuracy: Mean (SD) [range] = .74 (12) [.52, .99]; split-half reliability, r=.82, p < .001

   ii) Spot the Word Test
   - kitchen
   - harrick
   - puma
   - lapless
   - plorinum
   - levyly
   - culicle
   - andrinand
   - flonty
   - xylophone

   Accuracy: Mean (SD) [range] = .72 (14) [.52, .99]

3. Domain-general ability
   i) Series Completion
   ii) Odd-one-out

   Accuracy: Mean (SD) [range] = .69 (.15) [.52, .99]

   iii) Matrices
   iv) Topology

   Accuracy: Mean (SD) [range] = .64 (.27) [.01, .82]

**Results**

**Principal Component Analysis (Varimax-rotated)**
A 2-factor solution accounts for 71% of variance (RC1=43%, RC2=28%)

<table>
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<tr>
<th>Factor</th>
<th>RC1</th>
<th>RC2</th>
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<td>Spot the Word</td>
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<tr>
<td>Loadings &lt;.4 not shown</td>
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Age has opposite correlations with domain-general & language-specific abilities

**Multiple Linear Regression**
Meaning definition task accuracy is predicted by domain-general and language-specific abilities

| Estimate | Std. Error | t value | Pr (>|t|) |
|----------|------------|---------|----------|
| (Intercept) | .8401 | .0117 | 71.545 | <2e-16 *** |
| Gen. abilities | .585 | .0121 | 4.831 | 9.52e-06 *** |
| Lang. abilities | .0573 | .0121 | 4.722 | 1.41e-05 *** |
| Age | .0125 | .0122 | 1.023 | 0.310 |
| Gen. abilities | .0019 | .0105 | 0.189 | 0.851 |
| * Age | Lang. abilities | .0126 | .0092 | -1.357 | 0.180 |
| * Age |                       |         |         |         |

**Conclusions**

Comprehension of spoken sentences with ambiguous words is predicted by language-specific and domain-general abilities

- An increase in age is associated with a decrease in domain-general abilities and an increase in language-specific abilities.
- Age does not predict semantic ambiguity resolution success.

**References**