Meaning (Mis-)Match in the Directionality of German Particle Verbs

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1. Motivation

Spatial Meaning of German Particle Verbs

- **German particle verbs (PVs):** highly productive compositions of particle prefixes and base verbs (BVs)

  - *schieben* (‘push something’): + an + schieben (‘push something forward’)
  - *auf* + schieben (‘postpone’)
  - *nach* + schieben (‘continue pushing’)

- Focus: investigate the spatial meaning of particles:
  - AN: horizontal directionality (↔)
  - AUF: vertical directionality (↕)
- PVs often trigger (regular) meaning shifts with respect to their BVs

Hypothesis

- **Match** between particle direction (AN ↔) and base verb direction (schieben →): literal PV meaning (‘push something forward’)
- **Mismatch** between particle direction (an ↑) and base verb direction (schieben →): meaning shift (‘postpone’)

Prediction

Mismatches may be reflected in longer reaction times (inhibition process) during language comprehension

2. Item Generation

Classification of Base Verbs

- **Human annotators** (15 per BV) selected one or more directions that best represent the meaning(s) described by the BV

<table>
<thead>
<tr>
<th></th>
<th>↑</th>
<th>↓</th>
<th>↔</th>
<th>→</th>
</tr>
</thead>
<tbody>
<tr>
<td>schieben</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>setzen</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Selection of Experimental Items

- 22 German BVs with a strongly preferred direction
  - 11 with horizontal preference (e.g., *schieben*)
  - 11 with vertical preference (e.g., *setzen ‘put’*)

3. Experimental Design: Go/No-Go Priming Study

- **Task:** go/no-go lexical decision (press a button if the target is a word)
  - Prime: particle (an, auf, other)
  - Target: base verb

```
100ms

500ms

50ms

200ms

\[\star\]

50ms

100ms

\[\text{AN} + \text{SCHIEBEN}\]

\[\text{AUF} + \text{SCHIEBEN}\]

\[\text{SETZEN}\]

\[\text{AUF} + \text{SETZEN}\]

\[\text{AN} + \text{SETZEN}\]

\[\text{NACH}\]
```

- **Design:** 2 x 2 (Particle x Direction of Base)

<table>
<thead>
<tr>
<th></th>
<th>Horizontal</th>
<th>Vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>an</td>
<td>MATCH</td>
<td>MISMATCH</td>
</tr>
<tr>
<td>auf</td>
<td>MISMATCH</td>
<td>MATCH</td>
</tr>
</tbody>
</table>

- Items (22 targets, 78% fillers): words/non-words controlled for frequency and distributional semantic similarity
- Participants: 66 (12 females, 23yo ± 3 )

4. Analysis

Regression Model

\[
\log RT \sim \text{Condition} + \text{Frequency} + \text{Semantic Similarity} \\
(1 + \text{Condition} | \text{Subject}) + (1 + \text{Condition} | \text{Item})
\]

**Matching** condition (an ↔ + schieben →) processed significantly faster ($\beta_{\text{an-schieben}} = 0.05, p < 0.001$) than **mismatching** condition (an ↑ + schieben →)

5. Qualitative Analysis by Item

Horizontal Base Verbs

- **Abstractness**
  - AUF > AN
  - AN > AUF

Vertical Base Verbs

- **Abstractness**
  - AN > AUF
  - AN < AUF

Differences in RTs (AUF - AN)

Differences in RTs (AN - AUF)

6. Discussion

**Finding**

- **Mismatch** in the directionality of particles and base verbs results in longer processing time (inhibition process) with respect to the **matching** condition (facilitation process)

**Conclusions**

<table>
<thead>
<tr>
<th>MATCH</th>
<th>MISMATCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>literal</td>
<td>meaning-shifted</td>
</tr>
<tr>
<td>‘push something’</td>
<td>‘postpone’</td>
</tr>
<tr>
<td>‘begin’</td>
<td></td>
</tr>
</tbody>
</table>

- The particles an and auf show a predominant direction
- Typically, the inhibition effect can be attributed to **meaning-shifted senses** of PVs