Presuppositions and Motor Response
The Case of Factive Verbs

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The research question

- In decontextualized root sentences, presuppositions (PP) are entailed.  
- *Paul stopped smoking* entails *Paul has been smoking before.*  
- Does that mean that PPed content and at-issue (AI) content are strictly on a par?  
- Empirical and experimental literature suggests that in discourse AI content and PPed content are different (wrt common ground, accommodation, QUD relevance, etc.).  
- All observations use discourse-sensitive settings (Ducrot, Stalnaker, Beaver and colleagues, Masia et al. a.o.). What happens with decontextualized sentences?  
- Two possibilities.  
  - No trace of a difference (NO DIFFERENCE).  
  - The PP retains something of its specific discourse status (e.g. it might be less salient or more difficult to process) (DIFFERENCE).  
- How to probe the processing of PP in decontextualized sentences?
The motor response

- We used the **motor response** to hand-related action verbs.
- Action verbs involving certain body parts (arm, hand, mouth and leg) trigger a motor-response (Aziz-Zadeh et al., Tettamanti et al., Pulvermüller et al., etc.).
- For hand-related action verbs, a special sensor (the *grip force sensor*) can detect tiny modifications of the thumb-index pressure (Frak et al., Nazir et al.)

  *Paul throws the ball* $\rightarrow$ motor cortex response $\rightarrow$ grip force modification

- The idea in 4 points:
  1. use action verbs with PP triggers,
  2. compare to bare action verbs,
  3. use action verbs in non-PP environments,
  4. Prefer constructions with **explicit** PP ( $\rightarrow$ factive verbs, *know*, *see*, etc.).
Experiment structure and method (exp. 1 and 2)

<table>
<thead>
<tr>
<th>Expe1</th>
<th>Expe 2</th>
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<tbody>
<tr>
<td>Paul throws the ball</td>
<td>Paul throws the ball</td>
</tr>
<tr>
<td>John knows that Mary throws the ball</td>
<td>John believes that Mary throws the ball</td>
</tr>
<tr>
<td>Susan dreams</td>
<td>Susan dreams</td>
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</tbody>
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- Stimuli controlled for hand-relatedness, frequency, word length.
- 37 **auditory** stimuli by condition for each participant.
- Baseline for grip force = 1.5 Newtons.
- Grip force measured from the onset of the action verb.
- Participants with negative deviation from the baseline on all conditions removed.
- Outliers (< 150 mN or > 200 mN) removed.
- Analysis by maximal mixed-effects models + Wilcoxon tests + Fisher tests.
- Large variation across participants and items (usual with grip force data, why? See conclusion).
Results (exp. 1 and 2)

<table>
<thead>
<tr>
<th>Expe1 motor activation</th>
<th>Expe 2 motor activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paul throws the ball = John knows that Mary throws the ball</td>
<td>Paul throws the ball ≠ John believes that Mary throws the ball</td>
</tr>
<tr>
<td>John knows that Mary throws the ball ≠ Susan dreams</td>
<td>John believes that Mary throws the ball = Susan dreams</td>
</tr>
<tr>
<td>Paul throws the ball ≠ Susan dreams</td>
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</tr>
</tbody>
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Conclusions and follow-up

- Non-embedded action verbs and action verbs embedded under factives trigger the same motor response.
- Both are different from non-action verbs.
- Is the mere mention of an action verb sufficient?
- No, because, otherwise, the results for know- and believe-types would be similar.
- Compare to Aravena et al.: no activation for negative and volitional sentences (Paul does not/wants to throw the ball).
- Aravana et al. suggests: action descriptions have to be integrated into an event model to trigger a motor response.
- Same here with know (forces integration) vs. believe (doesn’t force integration).
- Interim conclusion: PPed action verbs in factives are processed as asserted verbs, NO DIFFERENCE wins.
- What about projection?
- Some evidence that projection is costly (Schwarz & Tiemann).
Follow-up and conclusion

- Exp. 3: uses negated factives (X doesn’t know that ...).
- Results apparently similar to exp. 2: negated factives = non-factives \((\text{believe})\) = non action.
- But visual difference in the ‘late’ window (1300-2000 ms after onset).
- 11 participants out of 22 show a rise or high plateau in the 1000-2000 region.

\[\text{11 responsive part.}
\text{orange = projection}
\text{red = root action sentences}
\text{blue = non-action}\]

- participant tend to relax their pressure around 800-900 (standard collapse for blue and red).
- Unexpected late surge for orange (projection).
- Statistically: projection \(\neq\) non-action and \(\approx\) root action for in the 1300-1700 window.
- Suggests a \textit{late} and \textit{non-uniform} integration of the projected info.

- No evidence of a specific ‘semantic’ status of PP in decontextualized sentences.
- PP trigger a motor response when they are integrated into an event model .
- Integration is a \textit{process of representation construction, even in a decontextualized sentence}.
- As such it is open to the generally observed variation across participants and items.
References


