Extensive research on noun activation in NP-anaphoric sentences suggests:
- Immediate activation of lexical representation following presentation
- Activation of representation decays over next 700-1000ms
- Immediate re-activation at corresponding anaphor

**QUESTION:** Is verb activation in VP-anaphoric sentences similar?

**How Nouns and Verbs are Different**
- Verbs play larger role in sentence than nouns
- Verbs are more complex than nouns, reflected in several types of processing effects
  - Later first language acquisition (e.g. Bassano, 2000)
  - Slower lexical decision times (e.g. Rösler et al., 2001)
  - Worse memory for verbs than nouns (e.g. Earles et al., 2005)
  - Differential impairment in certain atypical populations (e.g. Kim & Thompson, 2000)
  - Possible differential engagement of cortical regions (e.g. Perani et al., 1999)
- Interpretation of verb dependent to some extent on its arguments
  - c.f. The chauffeur drove the limousine. vs. The cowboy drove the cattle.

**Previous Research on Verb Processing in Sentences**
- Presentation of verb immediately activates:
  - Core Meaning (e.g. de Goede, 2006)
  - Argument Structure (e.g. Shapiro et al., 1987)
  - Thematic Role Information (e.g. Ferretti et al., 2001)
- Comprehenders use this information to generate expectations and resolve ambiguity (e.g. Aitmann & Kamide, 1999)
- Verb might be activated throughout entire clause related to it (de Goede, 2006)

**Previous Research on Processing Verbal Anaphors**
- Processing VP and NP anaphors involves same mechanism (Martin & McElree, 2007)
- Verb is immediately activated at verb anaphor, i.e. elided verb (Kaan et al., 2004) or trace of movement (de Goede, 2006)
- Internal arguments of verb are activated at VP anaphor (Shapiro et al., 2003)

**METHODS**

**GOAL:** Investigate verb processing in sentences involving VP anaphors

**PARTICIPANTS:** Right-handed unpaired native English speakers with no exposure to a second language before age 6 (Exp. 1, PP1c, PP2; n = 31; Exp. 2, PP1a, PP1b; n = 33)

**TASK:** Cross-modal naming task- Participants listen to uninterrupted auditory sentences for comprehension and name aloud as quickly as possible a visual probe that appears at some point

**STIMULI:** Two sentences conjoined by “and” involving an antecedent verb in the first conjunct and VP anaphors of various types in the second conjunct (see Sample sentence in Results section)

**PROBES:** Either semantically related to the antecedent verb (Related) or matched on length and frequency, but semantically unrelated (Control) (see Sample probes in Results section)

**RESULT:** The secretary chatted on the telephone at the desk in 1a the front office all day long, and 1b the Vice President in the ad 1c joining office did too2 because his assistant was on vacation.

**Probe Point**

<table>
<thead>
<tr>
<th>Probe Type</th>
<th>1a</th>
<th>1b</th>
<th>1c</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related</td>
<td>631</td>
<td>591</td>
<td>616</td>
<td>594</td>
</tr>
<tr>
<td>Control</td>
<td>630</td>
<td>614</td>
<td>643</td>
<td>619</td>
</tr>
<tr>
<td>Difference</td>
<td>1ns</td>
<td>-23*</td>
<td>-27*</td>
<td>-25*</td>
</tr>
</tbody>
</table>

**CONCLUSIONS**

**Verb Processing in Sentences**
- In keeping with previous research on nouns, activation of verb decays relatively quickly after initial presentation (at least by 1600ms later)

**Processing Verbal Anaphors**
- In keeping with previous research on nouns and verbs, antecedent verb is activated at corresponding VP anaphor

**Early Reactivation Following Conjunction?**
- The current study tested coordinate structures because they are natural environments for VP anaphors
- Previous research has demonstrated facilitation for the second conjunct of a coordinate structure when it has the same phrasal category and internal structure as the first conjunct (e.g. Frazier, Munn, & Clifton, 2000)
  - This facilitation is not due simply to priming, but rather to an expectation of parallel structure following the conjunction
- In the current study, this facilitation is reflected in the reactivation of information from the first conjunct.
  - Thus, the early reactivation is related to the processing of coordinate structures rather than the processing of verbs or VP anaphors

**Parallelistem Explanation for Early Reactivation Predicts:**
- Early reactivation would be observed:
  - In non-anaphoric coordinate structures or coordinate structures involving other types of phrases
- Early reactivation would NOT be observed:
  - In VP-anaphoric two-sentence passages or VP-anaphoric sentences conjoined by “but”

**REFERENCES**


**ACKNOWLEDGMENTS**

During the completion of this study, the first author was supported by an NSF Graduate Research Fellowship as well as a traineeship awarded by NIH to the Center for Research in Language at the University of California, San Diego. This research was also funded by NIH-DC00094.