**COMPOUNDING MATTERS: THE P1 AS AN INDEX OF SEMANTIC ACCESS TO COMPOUND WORDS**

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**BACKGROUND**

- **PREMISE** Word retrieval from lexical and semantic memory involves a series of cascaded processes.
- **UNKNOWN** Timing, degree of overlap, and nature of these processes.
- **RECENT WORK** Shows that lexical-semantic variables (e.g., lexicality—whether the item is a word or not, word frequency) modulate event-related potential (ERP) components as early as the P100 (~100 ms).
- **A COMPLICATION:** Early ERP components (P100, N170) can be the product of multiple underlying generators.
- **COMPONENT WORDS:** With two constituents—both real independent words—permit assessing the timing of access to lexical/semantic stores.
- **CURRENT STUDY**: Examined the timing of the P100 ERP component to lexical semantic access as a function of morphological composition.

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**METHODS**

- **PARTICIPANTS**
  - 22 undergraduate students (15 women, M
  - 20.5 y, 3 left-handed).
- **DATA COLLECTION & PROCESSING**
  - EEG acquired with EGI 128-channel sensor-nets.
  - Preprocessing performed with EEGlab toolbox functions, with SHARCGIN plugin for artifact removal and periods of non-stationary ERP ANALYSIS.
  - ERPs segmented by word (averaged over participants) to analyze effects of word frequency. Each ERP had 132 averaged trials per word.
  - Average amplitudes were extracted from 20 ms windows with 10 ms overlaps.

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**STIMULI**

- **Transparent—transparent (TT)**
  - e.g., bedroom
  - Schoolboy
  - Sailboat
  - avg: 8.2 letters
- **Opaque—transparent (OT)**
  - e.g., straw
  - Chopstick
  - Nickname
  - avg: 8.4 letters
- **Transparent—opaque (TO)**
  - e.g., staircase
  - Jailbird
  - Heatwave
  - avg: 8.3 letters
- **Opaque—opaque (OO)**
  - e.g., deadline
  - Stalemate
  - Fleabag
  - avg: 7.3 letters

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**TASK**

- Lexical decisions on 80 real and 80 novel English compounds, each presented 6 times.
- Target stimuli: 40 real words varying on semantic transparency (overlap between word meaning and constituent meaning).
- Because the “head” (carrying the word’s semantic properties) is typically to the right in English, an OT word is “more transparent” than a TO word.
- Non-words: novel English compounds, which could plausibly be words (e.g., sodacorn, watchpanic).

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**PEAK ANALYSES**

- Regression analyses predicted ERP amplitudes from whole-word frequency (WF) and 1st and 2nd constituent transparency (C1 and C2).
- WF and C2 each accounted for unique variance in P100 amplitude (R² = .361).
- C2, but not WF, uniquely predicted differences in P200 (R² = .238), P300 (R² = .211), and N400 (R² = .205) amplitudes.
- Conclusion: the expected head facilitates early semantic access.
- All significant values are for left-sided sites (P7, PO7). Right-sided differences only significant at N400, localized at sites P1, P2, and Pz.

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**P100 “SPREAD” ANALYSIS**

- The P100 was scored at the earliest occurring peak (“leading”) and the latest occurring peak (“trailing”), following work by Klimesch and colleagues on “traveling alpha waves”.
- Only P100 latency scored for earliest peak was significant: Whole-word frequency predicted differences (R² = .116, r = .340, p = .032); more frequently occurring words have earlier leading P100 peaks.
- P100 spread and trailing latency did not relate to word type or whole word frequency.

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**ERP RESULTS**

- **PEAKS:**
  - The waveform displayed is concordant with independent component analysis (ICA) research.
- **METHODS:**
  - All significant values are for left-sided sites (P7, PO7).
  - Right-sided sites (P1, P2, Pz) were responded to with more frequent occurring words have earlier leading P100 peaks.
  - P100 spread and trailing latency did not relate to word type or whole word frequency.
  - Above figure illustrates a latency difference between the early lateral-occipital peak (O1) and the later medial-parietal peak (P2). The waveform displayed is averaged across all words.
- **Right figure shows topographical maps demonstrating the time-lapsed change in the balance of underlying generators of the P100.

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**REFERENCES**


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