

ERP measures of material specificity for crossmodal relational memory

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The issue

Unilateral brain disorders can show *material specificity* on memory testing:

- verbally-mediated testing reliably assesses left hemisphere (LH) memory problems
- "nonverbal" testing assesses right hemisphere (RH) memory problems
- BUT : nonverbal findings are not reliable, posing problems for neuropsychologists, neurosurgeons, and ultimately, patients

Specific problems

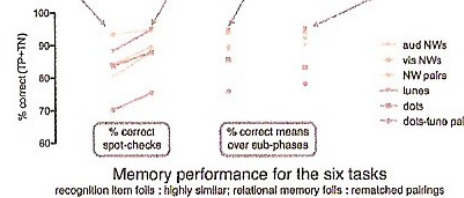
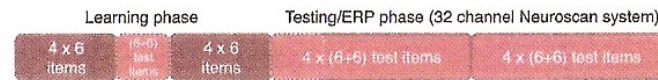
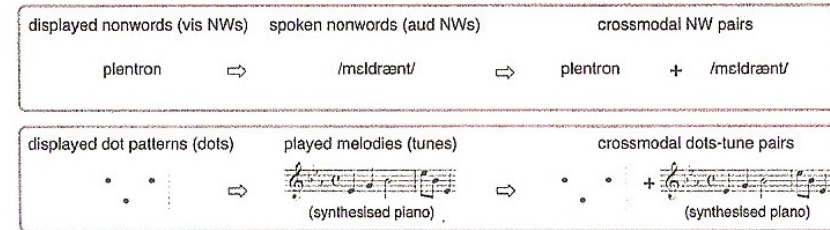
- Conceptually:
- what counts as *nonverbal* test material?
 - designs, faces most commonly used
- Methodologically:
- nonverbal tests can be *verbalised*
 - verbal/nonverbal tests are not *matched*
 - known vs novel content
 - auditory vs visual mode of presentation
 - recall vs recognition mode of response

Specific solutions?

- Conceptually : appeal to cognitive models
- RH: spatial location, melodic contour
 - LH: orthographic/phonological processing
- Methodologically:
- use nonverbal materials which *can't be verbalised*; use verbal materials which aren't imageable
 - match verbal/nonverbal subtests
 - make all items novel
 - use *both* visual and auditory modes
 - use Yes/No recognition responses only

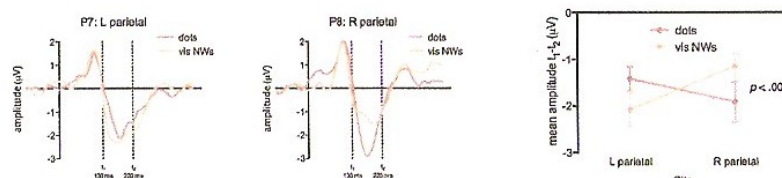
Methods

24 healthy Ss; 6 subtests: verbal/nonverbal versions of visual, auditory, and crossmodal pairings



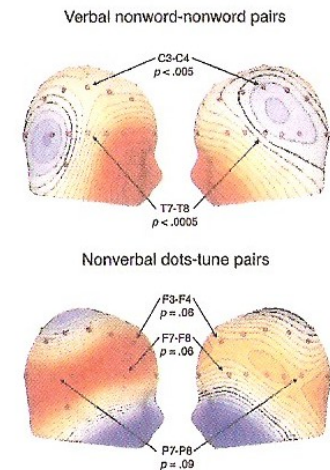
Temporal analyses

N1 responses : verbal-nonverbal differences only at bilateral parietal sites (P7, P8)
Material specificity : LH responses larger for nonwords, RH responses larger for dots



Spectral analyses

Gamma (35-45 Hz) activation for crossmodal pairings showed *material specificity* : LH activation larger for nonword-nonword pairs, RH responses larger (trend) for dots-tune pairs



Conclusions

- ERPs showed material specificity in recognition memory for both verbal and nonverbal materials, matched for novelty, presentation modality, and testing mode
- Singleton and relational paradigms both show material specificity
- Clinical memory tests should contain well-matched verbal and nonverbal subtests; nonverbal subtests could usefully incorporate spatial patterns and melodic stimuli