Knowing You Know Before You Know : EEG Correlates of Initial Feeling-of-Knowing

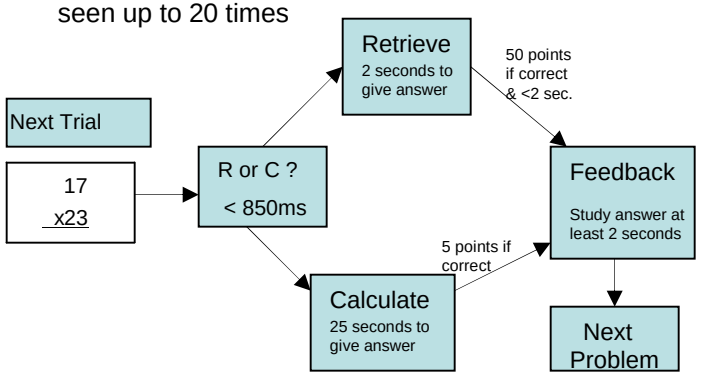
By Christopher Paynter[1], Lynne Reder[1], & Paul Kieffaber[2]

1 Carnegie- Mellon University
2 University of Pittsburgh Medical Center

What does it mean to "know you know before you know"?

- Tip-of-the-Tongue (James, 1890) => strong sense that answer is in memory although cannot retrieve it
- Feeling-of-Knowing (Hart, 1965) => accurately estimate whether answer is in memory when unavailable
- "Game-show" experiments (Reder, 1987; Reder & Ritter, 1992) => FOK occurs before search for answer
  - May influence QA strategy choice

Math "Game-Show" Experiment: problems seen up to 20 times



Reder & Ritter (1992)

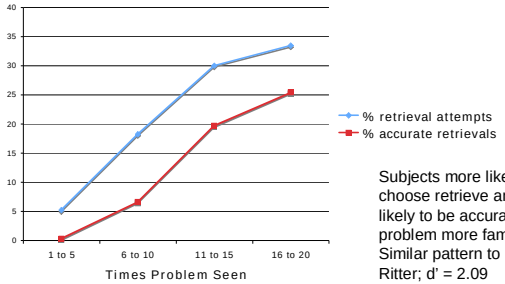
Subjects can make retrieve / calculate decision accurately in under 850 ms (*d'* = 2.04)

Selection of retrieval increases with problem familiarity

Current Study

- Used Reder & Ritter paradigm with EEG
  - 32 cortical sites using a Neuroscan ® SynAmps[2]
  - Recordings were made at a rate of 1Khz and with a band-pass filter of 0.1 to 100 hz
  - Trials segmented from -100 and 1000 ms, baseline-corrected over pre-stimulus interval, and averaged for each condition
- Can we find EEG correlates of feeling-of-knowing?
- How fast does the brain register indices of FOK ?
- Where will these FOK components appear on the scalp?

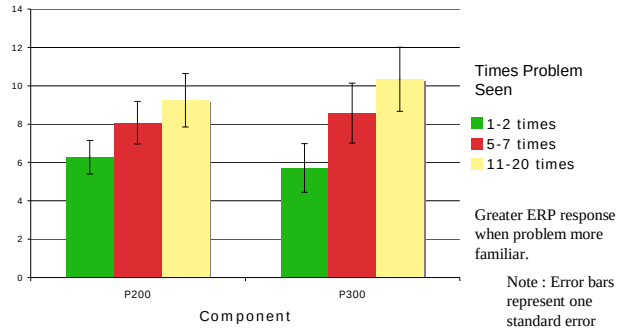
Retrieval Percentages Across Levels of Problem Familiarity



Subjects more likely to choose retrieve and more likely to be accurate when problem more familiar. Similar pattern to Reder & Ritter; d' = 2.09

Note: *d'* was determined as follows: Correct on-time retrieves were treated as hits. Trials for which retrieve was chosen on-time but then an incorrect answer was given (either on-time or late) were treated as false alarms.

ERP Amplitudes Across Levels of Problem Familiarity

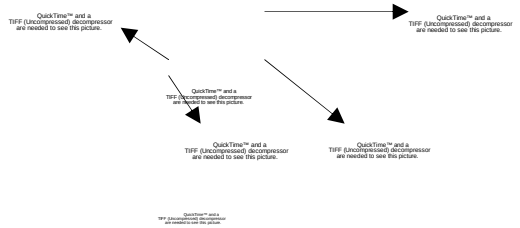


Greater ERP response when problem more familiar.

Note : Error bars represent one standard error

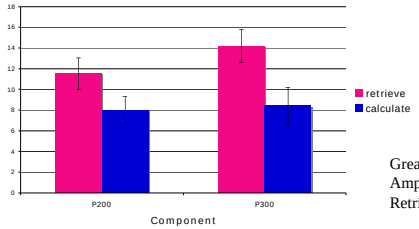
FCZ Waveform Following Problem Onset

Pink = Retrieve, Blue = Calculate



P200 epoched from 170-275 ms based on visual inspection of waveform. P300 epoched from 310-470 ms.

ERP Amplitudes Following Problem Onset For Different Strategies



Greater ERP Amplitudes when Retrieve Chosen

Conclusions

- FOK correlates emerge far earlier than expected - 200 ms after problem presented!
- P200 normally associated with perceptual processing - possible role for "perceptual fluency" in FOK
- Frontal lobes involved - suggests FOK uses similar networks as other metamemory processes

References and Acknowledgements

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•Reder, L.M. (1987). Strategy selection in question answering. *Cognitive Psychology, 19*(1), 90-138.
•Reder, L.M. & Ritter, F. (1992). What determines initial feeling of knowing? Familiarity with question terms, not with the answer. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 18,* 435-451.
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