Neural Systems That Underlie Clinical Decision Making: An Electroencephalographic Investigation

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Poster Session E
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INTRODUCTION

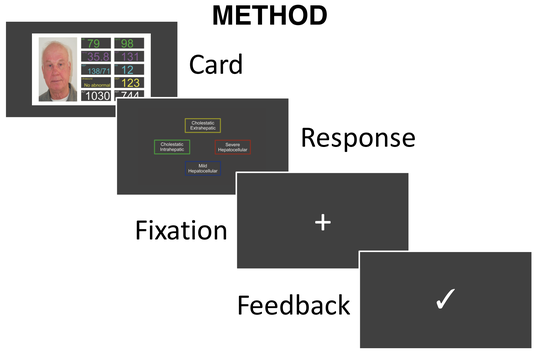
Background

- Clinicians must sort and process an abundance of information when diagnosing medical conditions
- Automatic and reflexive decisions reflect system one functioning; slow and analytical decisions reflect system two functioning

Hypotheses

- Participants would be able to learn to diagnose clinical cases
- Accuracy and response times would serve as indicators of decision making systems
- Feedback would evoke a reward positivity
- There would be increased medial-frontal theta activity early in learning relative to late in learning

METHOD



16 university students with no medical training

Participants were presented with "cards" containing ten physiological readings and used this information to diagnose clinical cases

Learning occurred by utilizing feedback (correct or incorrect) of the decisions made

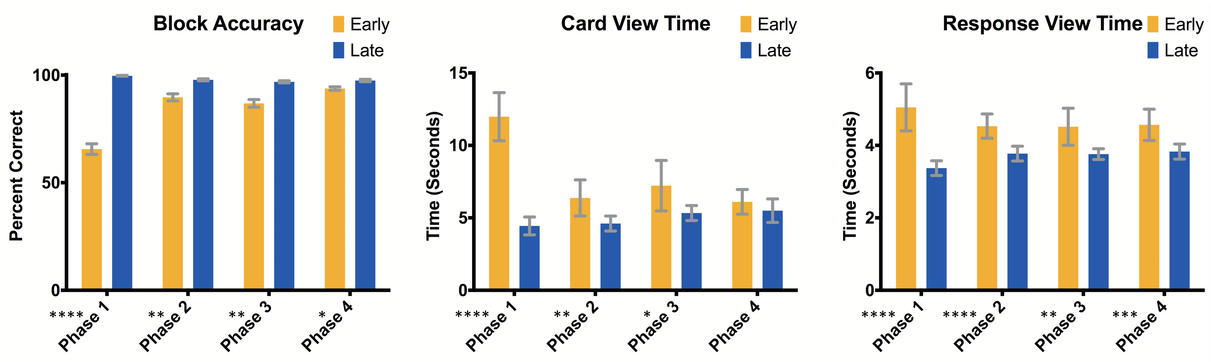
In the first phase, participants were to learn to diagnose between two medical cases

Proceeding phases included an additional medical case which resulted in five cases

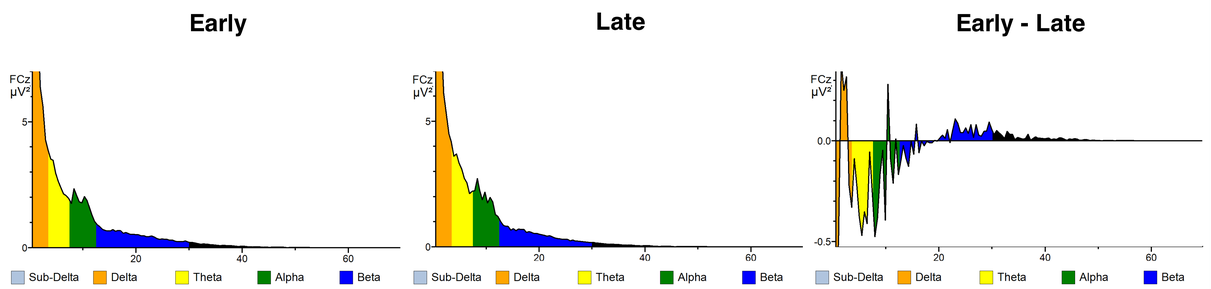
To proceed to the next phase, participants must have an accuracy rate of 90% or higher in two consecutive blocks each containing 20 trials

RESULTS

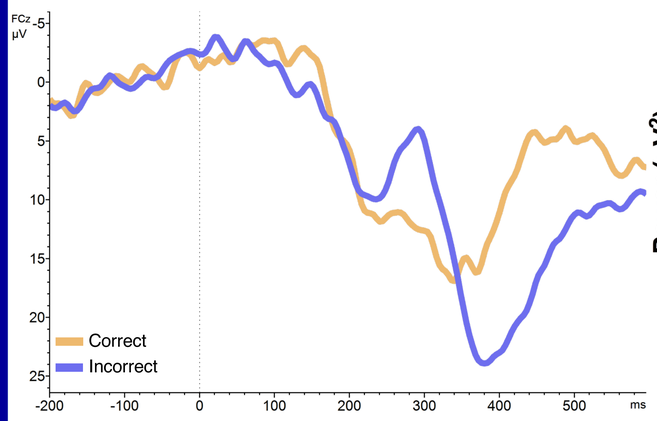
Behavioural Results



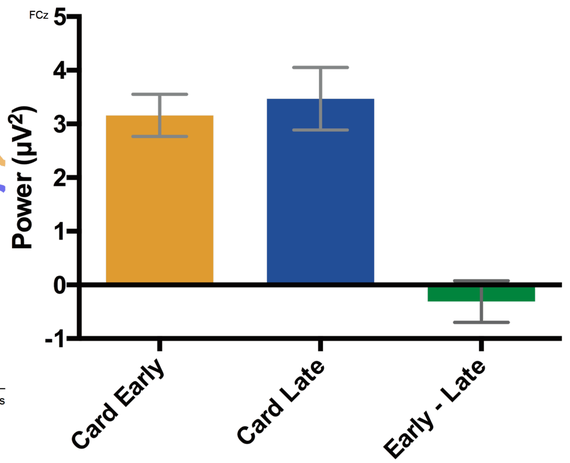
Card View Time Fast Fourier Transform



Reward Positivity



Theta Activity



CONCLUSIONS

Behavioural

- Participants were able to learn to diagnose clinical conditions
  - Post Test Accuracy: 93% [89% 98%]
- Furthermore, they were able to optimize their decision making strategies
- Accuracy rates and response times can be used as behavioural indicators to classify decision making systems

Electroencephalographic

- As reinforcement learning theory would predict, feedback stimuli indeed produced a reward positivity
- Interestingly, theta activity was not larger early in learning relative to late in learning

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