RELIABILITY OF THE MISMATCH NEGATIVITY IN A KINDERGARTEN POPULATION OVERSAMPLED FOR DYSLEXIA RISK

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Background
- The mismatch negativity (MMN) is an automatic ERP response to a deviant within a series of standard stimuli¹
- MMN can easily be measured in infants and children, is correlated with later reading, and has been suggested as a biomarker of language and reading disorders²,³
- Test-retest reliability of MMN in the early time window ranges from .3 to .7, but the later time window has not been studied⁴

Research Questions
- How reliable are the early and late MMN?
- Does reliability differ by dyslexia risk?

Methods
- N=147 children age 4-6 years
- 65% at risk for dyslexia, (score <25%ile on composite standardized measures of phonological awareness, RAN, letter knowledge, or with family history of dyslexia)
- EEG recorded with BioSemi ActiveTwo, 64 electrode cap
- Oddball paradigm with natural speech /da/ and /ba/, 90% standards
- Referenced offline to mastoids, LP filtered at .01Hz, epoched, artifact rejected, HP filtered at 30Hz, scalp referenced
- Final sample includes n=120 with >100 accepted deviant trials

Determining Even vs. Odd and 1st vs. 2nd half reliability
1. Run 1 Run 2
   2a. Split by Even vs. Odd Trials

   OR

   2b. Split by 1st half vs. 2nd half of each run

3. Even or 1st half of each run’s standards and deviants
   Odd or 2nd half of each run’s standards and deviants
   Average all standards together, and all deviants together. Completed separately for Even, Odd, 1st Half, and 2nd Half trials.

4. Create Difference Wave (Dev – Std)
   Create Difference Wave (Dev – Std)
   Subtract average deviant from average standard with equal numbers of each

5. Correlate Even vs. Odd and 1st vs. 2nd Half

Even vs. Odd correlations are higher than 1st vs. 2nd half for both early and late MMN across 9 fronto-central electrodes. This indicates that the response changes over time, perhaps due to habitation, fatigue, or non-neural sources.

Even vs. Odd and 1st vs. 2nd Half Reliability: Early and Late MMN

Future Directions
- Investigate the effect of paradigm length on habitation and fatigue
- Investigate the effect of number of trials on reliability

Conclusions
- Reliability of the late MMN assessed by even-odd comparison is slightly higher than the early MMN
- The early and late MMN change over a short time period (~20 minutes)
- Dyslexia risk status does not seem to affect reliability
- The MMN is likely not reliable enough to use as a screening tool for language or reading disorders on its own at this age

References

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