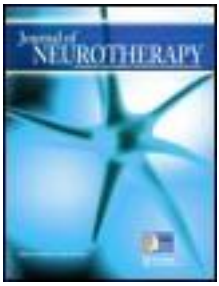

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Abstract

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Detection of Deception Using Evoked Potentials

J. P. Rosenfeld, PhD
Department of Psychology, Northwestern University, Evanston, IL

Does the profile or pattern of event-related brain wave (ERP) amplitudes across the scalp vary from deceptive to honest mind states? We mostly look at the P300 ERP in response to autobiographical information. There is an obvious application here to the field of detection of deception, but there are other more theoretical concerns: Is there a profile specific to deception (a "Pinocchio" effect)? Does the brain work in a unique way during deception? Does altruistic deception show a different P300 profile than selfish deception? Do the brains of psychopaths produce different P300 profiles than the brains of normals during deception? (The preliminary answer here is "no.")

What is the difference in brain function during retrieval of (a) real memories, versus (b) honestly believed, but false memories, versus (c) malingered false memories (which the subject knows are not real, but dishonestly claims are real)? This question is addressed by comparing P300 scalp profiles associated with the three kinds of memories. We also look at the latency of the P300 wave (time from stimulus to wave peak) and have so far found it is the best discriminator of (a) and (b) above. This suggests that P300 latency is a correlate of unconscious recognition.

The Effect of Music on Attention

Shana E. Sandford
Manchester Middle School (Center Based Gifted Program)
Richmond, VA

The IVA Continuous Performance Test was used to compare whether a particular type of music (i.e., classical or pop) or no music, quiet test conditions enhanced attention functioning. Many young people like to listen to music while they study and a number of studies were found in the research literature that reported music composed by Mozart enhanced visuo-spatial cognitive functioning. Other studies did not find any benefit in cognitive functioning from listening to Mozart's music. More research was clearly needed to find out if music can enhance a person's attention.

The first hypothesis was that a person would be better able to pay attention while listening to classical music than to no music. The second hypothesis was that a person would be better able to pay attention in a condition of no music than while listening to pop music. The third hypothesis was that a person would be better able to pay attention while listening to classical music than to pop music. The IVA CPT was utilized, as it assesses both auditory and visual attention and, thus, could help identify any effects in either sensory modality. Twenty subjects between the ages of ten and eighteen were used in this experiment. The subjects were tested in a counterbalanced, random order with half of the participants tested under both no music and pop music conditions. The remaining subjects were tested under both no music and classical music conditions.

The first hypothesis was not supported. Individuals, while listening to classical music, did not show improvement in their visual or auditory attention or in their visual or auditory response control. There was no significant difference between the pop music group and the no music group in visual attention, auditory response control or auditory attention. There was a significant difference ($p < .02$) for popular versus no music but not in the predicted direction. Pop music led to better visual response control than no music. There was no significant difference in auditory response control and visual attention between popular and classical music conditions. There was a significant difference ($p < .04$) in visual response control between pop and classical, but it was not in the predicted direction. A very strong trend was also found for auditory attention, ($p < .06$), which again was not in the predicted direction, with people performing better while listening to popular versus to classical music.

These results may be due to the fact that these subjects were used to listening to pop rather than classical music, so the classical music creates more of a distraction than the music they normally listen to. Another possibility is that classical music may be harder to listen to as background music because it is more complex than pop music. If this experiment were repeated, the scientist might want to try it with people who normally listen to classical music. The scientist also might want to try this experiment with different types of tasks such as reading comprehension or memory tasks. It would be interesting to try the experiment with some other kinds of classical or pop music and with a larger number of subjects.