**Introduction**

In 1962 Mednick\(^1\) proposed an idea of how creative ideas are formed and why creative individuals are better at producing original ideas. This theory assumed that reaching and merging uncommon associates helps form creative ideas. Building on this, he assumes that creative people have more remote information stored within semantic memory. This unique spread of information allows them to easily think outwardly and originally when solving a creative problem.

Previous studies have found that creative individuals produce more uncommon responses on word association tasks,\(^1\)\(^,\)\(^2\) and can make more connections between remote concepts.\(^2\)\(^,\)\(^10\) However, other studies suggest that these results are inconsistent. For example uncommon responses may be a product of increased response fluency resulting in uncommon responses to happen later on.\(^1\)

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**The Present Research**

The aim of the current study was to use electroencephalography as a method to investigate associative processing within creative individuals.

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**Stimulus Presentation**

- Participants were asked to try and form a association between related (rabbit – carrot), indirectly related (cat – cheese), and unrelated (nail – phone) word pairs. Participants then rated the strength of the association by pressing with their left hand 1 (no association) 2 (weak) 3 (moderate) or 4 (strong) association on a keyboard. After rating, participants verbalized their response. All verbal responses were recorded through an iPhone set in airplane mode.

- Word pairs were pseudo randomized and consisted of 30 trials per condition for a total of 90 trials (divided by 3 blocks).

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**ERP Recordings**

- EEG Data was recorded after the presentation of the last word, and was divided into 1000 ms epochs (100 ms baseline). Analyses focused on the N400 (400–600 ms) and Sustained Negativity (600–900 ms).

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**Results**

- A 9 electrode (Fz, Cz, Pz, F3, F4, C3, C4, P3, P4) x 3 condition (related x indirect x unrelated) x 3 group (creative x moderate x uncreative) repeated measures ANOVA was run on N400 latency, amplitude and sustained negativity.

- **N400 Latency:** For the related condition, over all electrode sites, moderately creative people had significantly smaller latencies ($M = .452, S.E = .011$) compared to uncreative individuals ($M = .504, S.E = .118$) and unrelated conditions ($creative = 1.61 > moderate = .192 > uncreative = -.118$) for group by condition ($t(29) = -3.0, p = .006$). In addition, creative people had trending smaller latencies ($M = .467, S.E = .015$) compared to uncreative individuals ($t(29) = -.8, p = .052$). For the indirectly related condition at electrode site P3 and P4, creative people had significantly smaller N400 amplitudes compared to uncreative individuals (all $p < .05$). In addition, creative people had significantly smaller N400 amplitudes for the unrelated condition at electrode sites Cz, Pz, C4, P3, and P4 compared to moderate and uncreative individuals (all $p < .05$).

- **Sustained Negativity:** No significant differences were seen for group by condition ($p = .186$). However, the general means are going in the direction we predicted for both indirect (creative = 1.943 > moderate = .192 > uncreative = -.118) and unrelated conditions (creative = 1.61 > moderate = .152 > uncreative = -.115).

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**Discussion**

The N400 is particularly sensitive to semantic violations.\(^6\) Creative individuals had smaller N400 amplitudes in the central and parietal areas for indirectly related and unrelated word pairs. These areas of the brain are typically where semantic information is processed and where the N400 shows its maximum effect.\(^7\) We provide preliminary results suggesting that creative brains do not respond as strongly to the unusualness of a distantly related or unrelated word pairs. This may indicate a unique spread of associative information stored within these people brains.