

Is extraversion
related to lower
baseline levels of
cortical arousal essay



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The experiment aimed to determine whether extraversion could be related to low baseline levels of arousal in cerebral cortex. Hypothetically, bigger, more widely spread alpha waves- lower cortical arousal classifies a person as more extroverted.

The experiment that has been carried out consisted of the participant, the instructor and the recorder (the positions were assigned randomly and changed with each new participant). The main goal of it was to measure participant's cortical arousal in brain- record the four of the rhythms- alpha, beta, delta, theta, under these conditions: relaxed, with eyes closed/opened, performing mental (mathematical) tasks and hyperventilating. The results were obtained after correlating Eysenck's " E" score and Alpha RMS mean with participant's eyes closed (in a relaxed state). No significance between the two variables was found, therefore the hypothesis was rejected.

Taking everything into account, low cortical arousal does not result in a person being highly extroverted. Introduction: Extraversion is one of the personality traits; it is defined as ' the state of having thoughts and activities satisfied by things outside the self'. It could be explained in a way that an extravert person is outgoing, sociable, active but relaxed and confident, stimulation in a company of others is essential. Hans Eysenck was first to relate the extraversion to a person's genetics or biological traits.

" Information from the environment is transmitted from the sense organs along neural pathways to the brain, where excitatory and inhibitory cortical processes result in either the facilitation or inhibition of behavioural and cognitive responses" (Eysenck, 1965, p. 70). Eysenck relied upon a theory

that extraverts have strong nervous system that allows them to highly tolerate the stimulation. Therefore, he came into conclusion that “ the brains of extraverts react more slowly and weakly to stimuli, thereby creating a stimulus hunger, or desire for strong sensory stimulation, which causes them to seek excitement by approaching the environment, attending parties, making friends, taking risks, and so forth” (Ryckman, 2004, p. 347).

A similar experiment on the topic of personality- resting regional brain activity relation has been carried out by Tran et al. in 2004. The experiment concentrated on association between brain activity and personality among mentally healthy adults, therefore, only participants over eighteen were selected to analyse. Firstly, all participants completed NEO-FFI (a five factor model that measures Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience) personality test and took EEG session. The way that the inventory was carried out: “ The NEO-FFI Scale consists of 60 items in which respondents decide whether they agree or disagree with each question, on a 1 (strongly disagree) to 5 (strongly agree) Likert scale. Responses are then summed to determine the scores for five personality constructs” (Tran et al, 2006).

The process of carrying out the experiment: “ Participants were seated in a sound and light attenuated room, set at an ambient temperature of 24. EEG magnitude data was taken from fixed EEG frequency bands during 3 min of eyes closed relaxed condition. In order to normalize the magnitude data from the EEG bands, all data was log(e) transformed before statistical analysis” (Tran et al, 2006). Taking everything into account, the findings could be

described like that: “ Results showed mild and consistent associations
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between some of the NEO-FFI personality traits and resting regional brain activity" (Tran et al, 2006).

In addition, " Greater amounts of low frequency activity, such as delta and theta activity during resting condition were shown to be associated with higher levels of extraversion in males. In contrast, greater amounts of delta and theta activity during resting condition were shown to be weakly associated with lower amounts of consciousness in females" (Tran et al, 2006). By the experiment, which has been carried out, it was tried to relate extraversion as a personality trait to a person's biological nature- level of the arousal in brain's cerebral cortex. On the basis of already described Eysenck's personality theory, lower baseline levels of cortical arousal- bigger alpha waves indicates a person as more extroverted.

Thus, the null hypothesis before carrying out the experiment was that if the participant in a relaxed state (having his/hers eyes closed) would attain big, highly spread alpha waves, he would be considered as an extrovert and vice versa. Methods: A within-subjects type of study design was used for the experiment that has been carried out. The purpose of it was to find out if there is a relation between extraversion and the variability of cortical arousal by recording brain's activity in cerebral cortex. The dependant variable was the extraversion score by Eysenck's Personality Inventory. Independent variable was the level of general arousal-alpha amplitudes with eyes opened/closed and performing mental-mathematic tasks. Three classes carried out the experiment, the process of carrying it out included dividing each class in a several groups of four or five.

Each member of the group allocated their position as a 'subject', 'director' or recorder and swapped their places with each new participant. In addition, each group did two to three participants. The allocation of the roles was completely randomised. The results might slightly be influenced by a few factors: the variation of the participants' age, nineteen to twenty five years, gender distribution, a total number of female participants in a class were thirty four, male-twelve.

A few of the participants were non-native English speakers. The equipment, needed to carry out the experiment, included the 'Biopac' system- electrode lead set- to record cerebral cortex's arousal and a computer system- to represent and track the data- brains activity- raw EEG (electroencephalogram) signal and four of the brain rhythms: alpha, beta, delta, and theta. The software, used for the experiment was the 'Biopac' analysis software. In addition, Eysenck's Personality Inventory was used to estimate the extraversion score. Firstly, after assigning the positions for each member of the group, the participant was placed in a seat; three vinyl electrodes were attached to participants' scalp.

The results were collected, having the participant to perform tasks under these conditions: relaxed with eyes closed, performing mental arithmetic tasks with eyes closed, hyperventilating with eyes closed and finally, relaxed with eyes opened. The participant was asked by researcher to remain still- trying not to make any movements in order not to affect the reliability and validity of the results; and relax for about five minutes. Firstly, the participant was asked to relax with eyes closed for ten seconds, then

opened- not blinking for the next ten seconds and lastly, relaxed with eyes
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re-closed for the last ten seconds. At the same time, the data was recorded with the ' Biopac' software.

The process of analysing the data included selecting some data areas (eyes opened/closed or re-opened) with I-Beam cursor, then for each stage, selecting an area that represents one cycle in the alpha wave. After recording the results, EEG, Alpha and Alpha RMS mean standard deviation (it is needed to measure the variability of data points) under each condition were observed. Results: As opposed to the hypothesis, the results that were obtained using ' Pearson correlation' showed no significant relationship between the means of Eysenck's " E" Score and Alpha RMS mean with participant's eyes closed (significance level . 05). ' Pearson correlation' results: $r = -.111$.

(negative relationship between the variables); $N = 45$ (number of the participants (there were 46 participants originally, however, one of the results were stated as an outlier)); $p = .468$ ($p > .05$, not significant). Having the fact that there was no significance of correlation coefficient, the two variables can be said to have no cause and effect type of relationship.