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Relationship between changes in cerebral activity and personality traits in rating personality

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What's prefrontal cortex activity ?

The prefrontal cortex is related to a high-level emotion, motivation, a decision-making and the various functions such as the social behavior. When doing personality self-rating, What kind of alteration occurs for our body or brain? It's possible to measure cerebral blood flow by electroencephalography(HEG) at the personality rating. In research on the experiment study of relationship between physiological index and personality traits, it was indicated that physiological individual difference affects the result of experiment (Eysenck, 1967; Sato & Matsuda, 2009; Álvarez, F.P, Sala M.S, Gallart C.T, 2016).

Does the change in frontal blood flow at the time of personality rating be related to personality traits?

Purpose

This experiment examined the relationship between changes in cerebral activity and personality traits in performing personality self-rating.

Method

Here

Participants The participants were 21 graduate students (13 males, 8 females)

Experiment period May-December 2014

Equipment ProComp TM7500(Thought Technology Ltd, Canada) was measured electroencephalography(HEG), a laptop computer (Dell-Vostro 3360), E-prime 2.0 (psychology software tool), and headphones., Saliva amylase (NIPRO;27B1X00045000073)

Experiment Stimulus By referring to a manual of Big5 (Murakami and Murakami, 2008), we selected each four terms for five personality traits.

Table1. The stimuli terms of personality self-rating

Practice Stimuli	sincere	amenable	philosophical	
Extraversion	active	sociable	passive	restrained
Agreeableness	kindly	affable	headstrong	tightwad
Conscientiousness	capable	conscientious	sloppy	unreliable
Emotional Stability Stimuli	easygoing	sedate	irascibleness	worrier
Openness to experience	intelligent	clever	conservative	naivety

Procedure

1. Interview & Big5 inventory.
2. Practice trial（15trials）
3. Simple response condition
4. personality self-rating condition by term.
5. personality self-rating condition by sentence.
6. Inventory: BIS/BAS, Lie scale by MMPI .

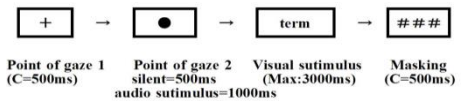

Figure1. Simple response session

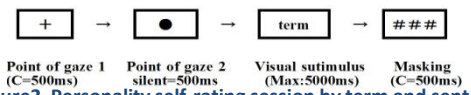

Figure2. Personality self-rating session by term and sentence.

ANALYSIS:

We examined the cerebral activity mean of each condition measured by electroencephalography(HEG). We performed cluster analysis and *ANOVA of* cerebral blood flow at the personality rating .

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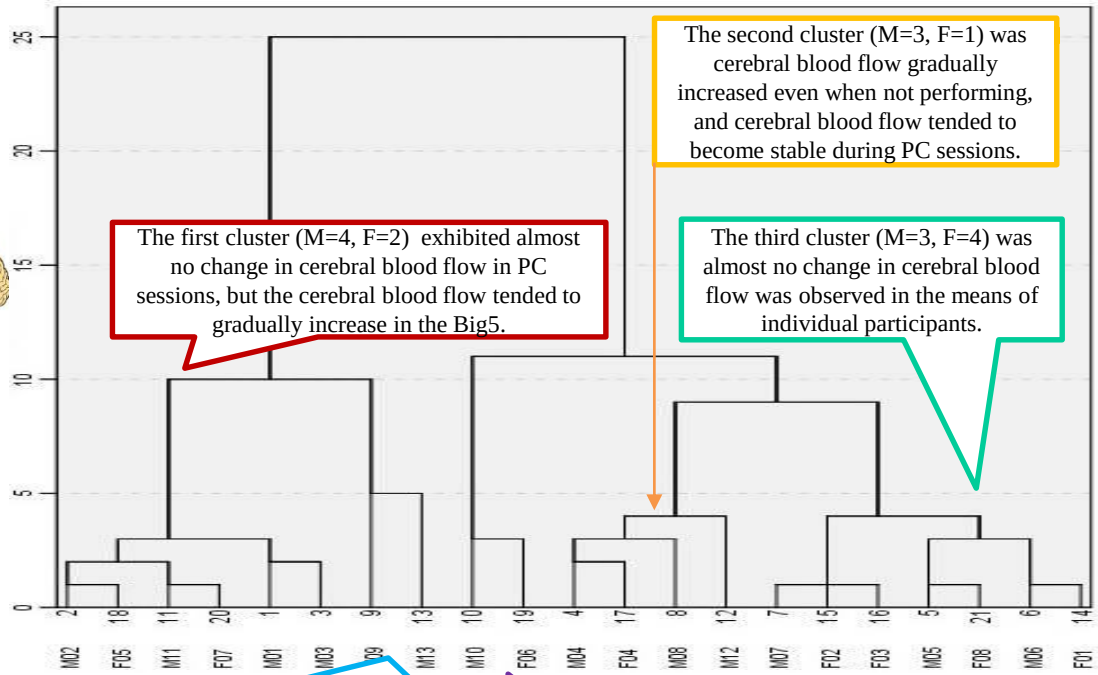
Result and Discussion

1. Behavioral responses and physiological responses time at personality self-rating

As a result of cluster analysis, the changes in cerebral activity were divided into five clusters as factors of intraindividual variability. The dendrogram of this cluster was shown below and the features wre described.



The second cluster (M=3, F=1) was cerebral blood flow gradually increased even when not performing, and cerebral blood flow tended to become stable during PC sessions.

The first cluster (M=4, F=2) exhibited almost no change in cerebral blood flow in PC sessions, but the cerebral blood flow tended to gradually increase in the Big5.

The third cluster (M=3, F=4) was almost no change in cerebral blood flow was observed in the means of individual participants.

The fourth cluster (M=2) was cerebral blood flow gradually increased at the beginning of the rating performance.

The fifth cluster (M=1, F=1) was a wide variety of cerebral blood flow during performance was caused by sneezing and sleepiness during the experiment.

2. Is there a relationship between physiological change and personality traits?

•As a result of *ANOVA*, Big5 scale: A significant difference was indicated in the amount of cerebral activity for Openness to experience ($F(4,16)=6.03$, $p<.01$). *BIS/BAS Scale:* A significant difference was indicated in the amount of cerebral activity for total score Behavioral Activation System ($F(4,16)=4.47$, $p<.01$) and BAS/Drive ($F(4,16)=4.10$, $p<.05$). No significance was found for BIS ($F(4,16)=1.06$, *n.s*).

Conclusion: Is there a relationship between frontal blood flow and personality traits?

As a result of cluster analysis, the changes in cerebral activity were divided into five clusters as factors of intraindividual variability.

This experiment clarified that cerebral activity in personality self-rating changed by some personality trait, especially BAS, BAS-Drive and Openness to experience (Big5).