Changes in cerebral blood flow and Stress response when performing personality self-rating.

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What's prefrontal cortex activity ?

When performing personality self-rating, what kind of alteration occurs for our body or brain? The prefrontal cortex is related to a high-level emotion; motivation, a decision-making and the various functions such as the social behavior. Changes in blood flow in the prefrontal cortex indicate degree of concentration in learning and performance (Ridderinkh et al, 2004), and can examine the relationship between brain activity and performance.

Purpose

This experiment examined the changes in cerebral blood flow and stress response by salivary amylase monitor, when performing personality self-rating.

Method

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 software tool), and headphones., Saliva amylase (NIPRO;27B1X00045000073)
Inventory Big5(Murakami and Murakami, 2008), BIS/BAS, Lie scale for Japanese.
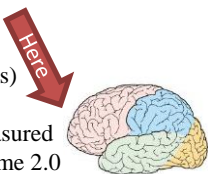
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Table1. The stimuli terms of personality self-rating

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. Saliva amylase 1
2. Questioner-condition1: Big5
3. Simple response session.
4. Personality self-rating session by trait term.
5. Personality self-rating session by sentence.
6. Questioner-condition2:
   BIS/BAS and Lie scale by MMPI.
7. Saliva amylase 2

+ → ● → term → ###

Point of gaze 1 (C=500ms) Point of gaze 2 silent=500ms audio sutimulus=1000ms Visual sutimulus (Max:3000ms) Masking (C=500ms)

Figure1. Simple response session

+ → ● → term → ###

Point of gaze 1 (C=500ms) Point of gaze 2 silent=500ms Visual sutimulus (Max:5000ms) Masking (C=500ms)

Figure2. Personality self-rating session by term and sentence

ANALYSIS:

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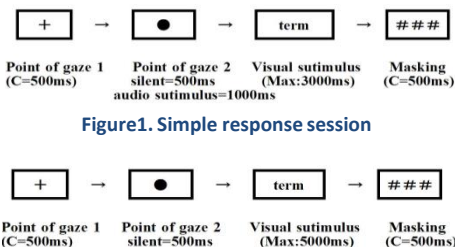We performed cluster analysis and *ANOVA of* cerebral blood flow at the personality rating .
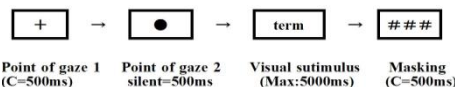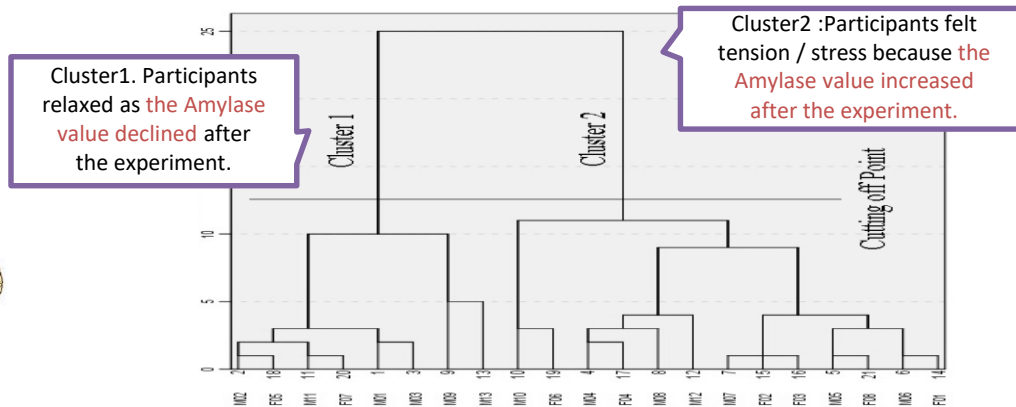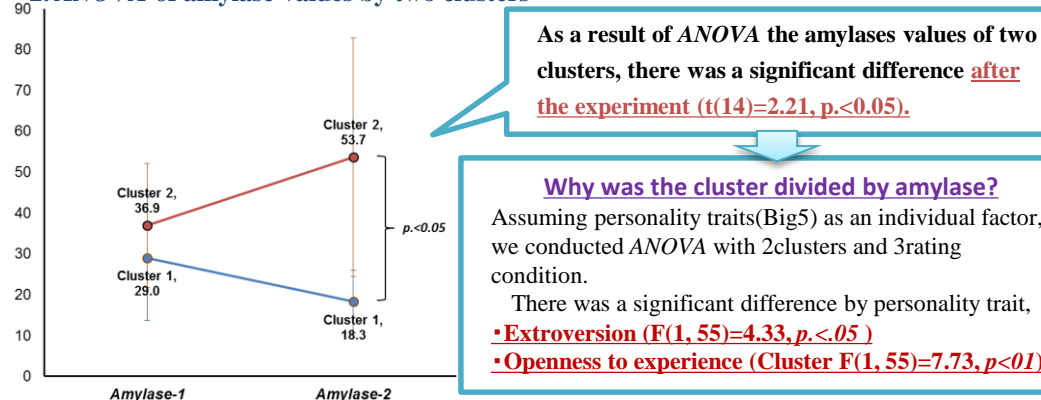
Result and Discussion

1. Cluster Analysis by cerebral blood flow

We performed cluster analysis based on casewise standardization with Euclidean distance as the index of similarity using the Ward method, This experiment was divided into two clusters.

Cluster1. Participants relaxed as the Amylase value declined after the experiment.

Cluster2 :Participants felt tension / stress because the Amylase value increased after the experiment.

2. *ANOVA* of amylase values by two clusters

As a result of *ANOVA* the amylases values of two clusters, there was a significant difference after the experiment (t(14)=2.21, p.<0.05).

Cluster 2, 53.7
Cluster 2, 36.9
Cluster 1, 29.0
Cluster 1, 18.3
p.<0.05
Amylase-1   Amylase-2

Why was the cluster divided by amylase?

Assuming personality traits(Big5) as an individual factor, we conducted *ANOVA* with 2clusters and 3rating condition.
There was a significant difference by personality trait,
· Extroversion (F(1, 55)=4.33, *p.<.05*)
· Openness to experience (Cluster F(1, 55)=7.73, *p<01*)

Conclusion

· The results showed that cluster2 of cerebral blood flow increased at the time of personality self-rating, which is easily strained, had increased amylase value, an indicator of stress.
· As a result of conducting *ANOVA* to examine the relationship between stress and personality traits, there was a significant difference by Big5; Extroversion and Openness to experience.

Action / Impact

· In order to examine the degree of stress at personality rating, the saliva amylase values could be used as an indicator. This result was suggested that there are a relationship between physiological change(the saliva amylase values) and personality traits.