The classification of participants based on reaction time increase-decrease rate model on the personality traits word.

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Introduction

1. iIR-HEG and performing personality self-rating.

The prefrontal cortex plays an important role in brain activity and regulation during performance. Changes in blood flow in the prefrontal cortex indicate degree of concentration in learning and performance (Ridderinkh et al, 2004). It will be could examine the relationship between brain activity and performance.

2. Reaction time(RT) when personality self-rating

RT is indicative of it is a consciously time voluntary reaction to stimulation sense from giving stimulation to taking place of the reaction. Reaction time are objective rather than subjective indicators of cognitive performance (MacLeod,1993).

3. Inter-individual and Intra-individual difference

We considered that it is possible to identify personality traits common among individuals by dividing the RT of performance by the means of the simple response session of each individual. It is possible to indicate quantitative data about an individual by considering intra-individual differences in the RT during personality self-rating.

Therefore, in this research, we examined whether it is possible to identify a certain personality feature as the mental performance of personality self-rating by using the sRT model. The each sRT was calculated by the Equation 1 from the intra-individual means of simple RT and self-rating RT for each traits word.

sRT_k = (RT_k - mrt_k) / RT_k

Equation 1. the calculation of sRT

Where, mrt_k was an intra-individual means of simple reaction time RT_k in session 1 of each traits word k.

Purpose

The sRT was calculated for each participant by multiplying of each 5 factors of BigFive by 4 traits terms, the sRT per participant was 20 traits.

For these, intra-individual differences were used to detect and classify inter-individual differences, and to examine the relationship between each psychological and physiological dependent variable.

Procedure

1. Participants

21 university students, 13 males and 8 females.

2. Procedure

We measured the cerebral blood flow by HEG and reaction time in each 7 personality self-rating condition.

- 1. Saliva amylase 1
- 2. Questioner-condition1: Big5
- 3. PC condition1: Simple response session.
- 4. PC condition2: Personality self-rating session by trait term.
- 5. PC condition3: Personality self-rating session by sentence.
- 6. Questioner-condition2: BIS/BAS and Lie scale by MMPI.
- 7. Saliva amylase 2

Table 1. Stimulus terms.

Traits Factors		Stimuli Terms			
Big Five	Extroversion	active E11	sociable E12	passive E21	restrained E22
	Agreeableness	kindly A11	affable A13	headstrong A23	tightwad A24
	Conscientiousness	capable C13	conscientious C14	sloppy C21	unreliable C24
	Neuroticism	easygoing N12	sedate N13	irasciblensness N22	worrier N23
	Openness to experience	intelligent O11	clever O14	conservative O21	naivete O22
Practice Stimuli Terms		sincere	amenable	philosophical

Fig. 1. The sequence of stimulation.

Analysis

The index dependent variables used nIR-HEG and salivary amylase as a physiological, and used the scale values of BigFive as a psychological. Based on sRT, we calculated the squared Mahalanobis' distance as the similarity index between each participants. We performed hierarchical cluster analysis by ward method. The differences between classified clusters were compared for HEG, salivary amylase and BigFive as dependent variables.

Result

1. Cluster Analysis

The participants were classified by hierarchical cluster analysis based on ward method using sRT obtained from 20 traits words. The index of the distance between each 21 participants were the squared Mahalanobis distance. The dendrogram was obtained from this cluster analysis in Fig. 4.

The dendrogram showed that the participants were classified into two major clusters. The agglomerative coefficients of these two clusters were 1.33 times in ratio of standard deviation.

2. Classified RT by each personality trait term.

The 2-way ANOVA of RT with sRT clusters showed that significant differences in main effects were observed between cluster (F(1, 30) = 48.28, p.<.01), and between BigFive factor (F(4, 30)=11.31, p.<.01). However, no interaction between cluster and factor was. For self-rating RT, the main effect between clusters was observed (F(1, 30)=19.43, p.<.01), between BigFive factors (F(4, 30)=11.31, p.<.01) was not observed (F(4, 30)=0.28, ns.), no interaction between cluster and factor was observed (F(4, 30)=0.67, ns.).

Fig.2. The HEG and salivary amylase values as the clustered physiological indexes.

Fig. 3. The Big Five Personality Inventory scales as the clustered psychological indexes

3. Clustered physiological index

The significant differences were observed in salivary amylase after the task (t(19)=2.44, p.<.05), in Fig. 2. The participants included in cluster 1 had increased stress responses after the PC session and decreased in cluster 2.

Discussion

From this result, the variation rate of reaction time intra-individuals due to conditions was effective in detecting inter-individual differences. These two clusters clearly increased the judgment time by the trait words active, restrained, tightwad, sedate and intelligent. The RT measured as rating time to negative stimulus words increased.

The participants included in cluster 1 showed innovative dominance. The participants included in cluster 2 were obedient and conscientiousness.

This personality measurement method was considered effective in situations where respondent self-bias will not occur.

Conclusions

The result provided derived two unique clusters by sRT. Therefore, we suggested the possibility to classify personality traits from RT by using sRT based on the intra-individual differences.

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Fig. 4. The dendrogram of each participants