

B-22 Individual Differences of Physiological Responses on Mental Workload

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The relationships were considered between psychological characteristics and the individual differences. To begin with the finding of the personality test, egograms, is that sixty two subjects (45 males and 17 females, aged 19 to 30-year-old) can be classified into four main groups by the importance of two factors: the first is active-passive factor; the second is positive-negative thought factor. Then about four subjects random sampled in each group performed Kraepelin test, even-odd-distinction of one-digit-addition test. Physiological responses: tempo, respiratory frequency, blood pressure, heart rate and heart rate variability were measured. The result of the experiment has shown each group's features of physiological responses. It was cleared that the group of passive and negative thought was the most sensibility and the mental workload, especially time pressure, had a lot of effect on them.

C-1 Comparison between The Evaluation of Real Space and Model Space

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It is the subject in this study to compare the spaciousness at the 4 points in the actual room and the 1/4 scale model of it, and to examine the effectiveness of experiments with model.

We used the lecture room which is equipped the obscured glass on the south side as comparative object. And we designed the study to compare the spaciousness at the 4 points (by the window, the central point of the room, just inside of the door, just outside of the door) in the actual room and the 1/4 scale model of it by experiments on using magnitude estimation. The summary of the results are as follows.

- (1) There is no difference of significance between the actual room and the 1/4 scale model of it. Therefore we are available to experiments with model.
- (2) According to this experiment on using comparative large model, it is possible to estimate the spaciousness at the inside of model.

C-2 The Influence of the Growing Old for Better Seeing of Colored Targets

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The purpose of this study is the influence of the growing old for better seeing of the colored targets by using the "Landolt's Ring visual targets" in nine colors. As the first test, the observers aged from 10's to 70's are given the colored targets printed with color ink on white paper, and the second, given the targets printed with color ink on black paper. It becomes clear that yellow is the most easy color to see for the aged person.

C-3 Effects of Lighting on Heart Rate Variability and Blood Pressure Variability

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The effect of color temperature on the 10-second-rhythm of R-R intervals has been described (Mukae and Sato: 1992). This 10s rhythm is said to concern with blood pressure vasomotor activity called Mayer Wave and respond to the mental load. In this study we calculated the blood pressure variability (systolic and diastolic) and the heart rate variability and evaluated the lighting condition from the aspect of the autonomic nervous activities. Five male students were volunteered as subjects. The subjects were asked to perform adding task. ECG, blood pressure signal and respiratory movement wave were measured under nine lighting conditions consisting of three illuminance levels (100, 300, 900lx) and three color temperature levels (3000, 5000, 7500K). Blood pressure was measured by a noninvasive method. The power between 0.07 and 0.10Hz in spectrum was integrated as the Mayer Wave related sinus arrhythmia component. The values of each measurement were analyzed by means of ANOVA. Heart rate on 300lx was higher than others ($p < 0.05$). No difference among three color temperature levels was shown in all measurements.

C-4 Changes in Catecholamine Excretion under Different Lighting Conditions

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It is said that the excretion of catecholamine is concerned with mental stress. In order to investigate the stress reaction related with lighting conditions, urinary catecholamine were evaluated in four male students, 21-23 years of age, under three different color temperatures of fluorescent lamps (3000K, 5000K, 7500K). The illuminance level was kept at 2000lx. The order of experimental conditions were at random. Subjects' urine were taken just before entering the room, at one hour later and three hours later. Subjects were at ease reading magazines under conditions involving minimal stress. Although data showed scattering and trends of changes inter subject, free epinephrine and norepinephrine excretion tended to decrease according as time passed on the whole, that seemed to be related with the circadian rhythm and quiet state of subjects. One subject showed considerable decrease of epinephrine and norepinephrine excretion at three hours later under the 3000K compared with other color temperatures. However in this study there were no significant correlation of catecholamine and lighting conditions.

C-5

Evaluation of lighting effects on living body by EEG topography

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This study's aim is to determine the most comfortable lighting condition during VDT task by EEG topography. Subjects are five male college students. The 13 channels EEG signals were obtained with plate electrodes on the scalp according to the international 10-20 system; the ear lobes were the reference. EEG was recorded on each of three different lighting conditions (color temperature 3000K, 5000K, 7500K) during the following situation:

(1) rest, eyes closed; (2) rest, eyes open; (3) VDT task, eyes open; (4) rest, eyes closed; and repeated (3), (4) five times.

We kept our eye on Fm-theta (Frontal midline theta activity) in this study. In this experiment, Fm-theta appeared only two subjects during VDT task. Fm-theta power is the smallest when color temperature is 7500K. And non-Fm-theta appearance subjects' alpha2 wave (10-12.9Hz) power in occipital during VDT task unchanged, compared with situation (2). But Fm-theta appearance subjects' increased significantly, the increase is the smallest when color temperature is 7500K, too.