

Perceptual and motor skills

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PERCEPTUAL AND MOTOR SKILLS

W.G.Koster

perceptual and motor behaviour

The studies on *stereotyped responses* as described earlier (Van Nes, 1970) have been continued, and several aspects have been investigated, viz. (a) Learning, by measuring reaction times and error score, (b) retention after two years, (c) influence of emphasizing response speed or error score, and (d) effect of order of learning one code and its reverse with various degrees of stimulus - response compatibilities (Van Nes and Van Schuur, this issue).

In a previous issue the effect of *advance information* in a visual *synchronisation task* (Koster and Boonstra, 1971) was studied. These studies have been extended to auditive stimuli. Two ways of presenting advance information have been tested, viz., a continuously increasing signal intensity that suddenly returns to its original value and then increases again, and the same procedure carried out with the pitch of the signal. These continuous ways of presenting advance information failed because they were very awkward for the subjects. Only a discrete way of presenting advance information appeared to be successful. Before the presentation of the stimulus to synchronize with, three weak and short signals were given with equidistant time intervals. The intervals I between the stimuli were varied (240, 480, 720, 960, 1440 and 1920 ms) as well as the intervals between the advance information signals (60, 120, 240, and 480 ms). As a control no advance information was provided. As with the visual signals, the help of advance information was greatest with maximum I . For I greater than 480 ms the best results were obtained with $I/i = 4$, i.e. the total interval is subdivided into four equal parts. As the best performance is obtained at $I = 480$ ms, a value of $i = 480$ ms will probably be the optimum value for interstimulus intervals greater than 2 seconds.

The studies on *handwriting* have been hampered by lack of an automatic device for analyzing displacement-time curves. A computer programme on the P 9202 computer which makes such an analysis possible, is nearly ready. In the mean time the study of writing-errors, as reported in the previous issue (Van Nes, 1971) has been continued by determining error frequencies for various letters of a written word and by making a comparative analysis of typing errors.

medical physics

In a previous volume (Rau and Vredendregt, 1970) studies on the M. biceps have been reported relating the *EMG* of the muscle to the *force* and the *endurance time*. As such measurements might have interesting applications, the studies have been extended to the back muscles (Vredendregt, this issue).

The development of a tremometer as described two years ago, has been the impetus for some basic studies on *tremor* (Rau and Vredendregt, 1971).

These have been continued, and extended to pathological tremor (Koster and Van Schuur, this issue).

In 1966 Schouten and Koster reported about high-frequency analysis (100-1000 Hz) of *electrocardiographic* (ECG) signals. In a more extended study, some years later, the ECG signals of a group of healthy subjects were compared with those of a group of patients with a myocardial infarction. No clear difference could be established. The ECG signals were picked up at the extremities. As the choice of the leads may

influence the high frequency components in the ECG, a new experiment was carried out. Three groups of eight subjects each participated.

- (1) Patients with a myocardial infarction. The mean age of the group was about 60 years.
- (2) Subjects of the same age without any diagnostic indication of an infarction.
- (3) A control group of subjects of about 25 years without any diagnostic indication of an infarction.

Again no clear differences in high-frequency activity could be established.

At the request of the Medical Systems Division of Philips an appliance has been developed and tested. On the basis of the actual *heart rate* of the subject, it enables information on the task performance to be *fed back* to the subject. This can be achieved either through an indication of the required speed of task performance, or, more directly, by altering the load of the task as a function of the heart rate. Such a device can be used for training cardiac patients (Van Schuur and Burema, this issue).

ergonomics

A highly important fact in the ergonomics practice is the moment within the development of a product or system at which the ergonomist is consulted. We have experienced that in an increasing number of cases the ergonomists of the IPO have been consulted at a very early stage of development. This is especially true for professional equipment and systems. Examples are the videophone project, telephone keying, and medical systems.

In the videophone project important contributions have been made to the trial network and its evaluation.

In behalf of the International Consulting Committee on Telegraphy and Telephony experiments have been carried out in various countries to study the effect of an additional column of four keys (for data transmission or facilities) next to the existing three columns of four keys each. In the Netherlands these experiments have been performed at the IPO and at the Netherlands PTT administration. The performance in *keying* conventional *telephone numbers* appears to be not adversely influenced by the four additional keys.

In 1972 a co-operation was established between the Medical Systems Division of Philips and the ergonomics team of the IPO. Studies have been made in co-operation with designers and clients. A simple technique that proved very useful is *video-recording*. In a hospital a recording is made of a system in operation. Comparison of the recordings of several existing systems often reveals various undesirable situations. This knowledge is used in the development of new systems.

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