

(high), 360 (medium), and 720 ms (low motor requirements), each one causing the dot to jump to the right. As a secondary task, a sum of numbers with a mean presentation time of 2.4 s was calculated mentally (high), or the last number was kept in memory (low-mental load).

Confirming the results of a previous study, cardiovascular and electrodermal measures were affected only by high motor activity. At medium and low motor activity, any physiological effects were related to the respective level of mental load. The study supports the assumption that physiological effects of motor activity can be neglected in typical computer work unless extensive typewriting is required.

Trajectory feedback: Implications for movement representation and control

S.K. Kolodzie

Department of Cybernetical Psychology and Psychobiology, Heinrich-Heine-University of Düsseldorf, Germany

In a previous paper trajectory feedback (TFB), the presentation of the movement trajectories of both the target and the subject's trajectory as the result of a random tracking task with no other external feedback source, could be shown to have positive effects on movement learning, even when limiting the display time of TFB to less than a second.

The TFB-paradigm forces the subject to memorize the target trajectory in order to make the trajectories congruent in the course of the learning phase. Thus, the subject attains an internal and complete representation of the target, since the whole trajectory must be preplanned in advance of the movement. The success of the learning procedure is assessed with a test phase lacking any kind of feedback. A sequence of test blocks within half an hour after the learning phase may reveal the motor memory effects. It was hypothesized that a parameter shift will result, i. e., the shape of the trajectory will be preserved while amplitude and phase lags deviate gradually.

The results are discussed with regard to the motor control perspective with possible relations to cortical mechanisms.

Stroop performance, dietary habits and self-ratings under field conditions using an electronic diary

J. Kos, I. Höfer, & K. Bättig

Behavioral Biology Laboratory, Swiss Federal Institute of Technology, Zürich, Switzerland

Our method of assessing data under field conditions uses a small pocket computer. The PSION II Organiser LZ 64 (142 × 78 × 29 mm, 250 g) offers 32 Kbyte of working memory and up to 256 KByte of storage capacity using 2 EPROM cartridges. Programs and data can be transferred to a PC/AT and vice versa. The software so far consists of 3 program modules: a numerical version of the Stroop task, assessment of dietary habits, and presentation of questions using analog-like scales. Reaction times during the Stroop task are measured with a resolution of 2 ms. Food can be recorded with self-estimated amounts by picking out food items from a list of about 170 entries.

In a field study with 80 smokers and non-smokers, differences between the two groups and effects of a one-day smoking abstinence among the smoking group on cognitive performance (Stroop Task), dietary habits, self-ratings, blood pressure, heart rate, and motor activity were investigated. Dietary habits were recorded for all 6 days, the other parameters only during the last 2 days of the 6-day period. Self-ratings were assessed intermittently 6 times a day. Four times per day the subjects had to do the Stroop task.

The method has been well accepted by the subjects and appears to deliver reliable data. Results will be presented focusing on the PSION data.

Effects of noise-induced stress on eating behavior in food deprived laboratory rats

H. Krebs, W. Janke, M. Macht, H.-G. Weijers, & P. Weyers

University of Würzburg, Germany

An important role for stress in the pathogenesis of hyperphagia is postulated by several authors. Animal research investigating the effects of stress on eating behavior led to conflicting data which may result from the use of inadequate experimental designs and dependent variables. In most studies only the acute effects of a single stress exposure were investigated and just one possible indicator of eating behavior (mostly food intake) was measured.

In our experiment variables of eating and non-

eating behavior were measured in 36 food deprived rats on 15 consecutive days during 20-min test sessions under stressful and non-stressful environmental conditions.

On days 1 to 5, the animals were habituated to the test boxes with white noise of 55 dB. After these sessions the animals were randomized in two groups ($n = 18$ each). No significant differences between these groups were detected before the start of the experimental manipulation.

On days 6–10, noise intensity was increased to 90 dB for the experimental and to 60 dB for the control rats. Defecation rate of the experimental rats was higher on all treatment days. Their pellet consumption was decreased only on the first treatment day. Behavior analysis of treatment days 1, 3, and 5 showed reduced duration of eating behavior and increased duration of exploration, grooming, and resting for the experimental group on all days although eating behavior had increased and non-eating behavior decreased from treatment days 1–5. Eating speed of the experimental rats was higher on all treatment days and did not decrease during the treatment period.

On days 11 to 15, animals were again tested under the stimulus conditions of the training period (55 dB) to assess after-effects of the noise manipulation. Significant differences were not detected.

The stress-induced modification of eating behavior seems to be adaptive and should not be interpreted as dysregulation. Although stressed rats spent less time eating under stressful noise conditions, they were able to normalize their food intake by increasing their speed of eating. Furthermore, the results demonstrate that research on the relationship between stress and eating should include the measurement of different indices of eating as well as other behaviors.

The influence of quality of sleep on contingent negative variation: Findings in headache patients

P. Kropp, T.M. Wallasch¹, T. Weinschütz¹, & W.-D. Gerber

Departments of Medical Psychology and ¹Neurology, University of Kiel, Germany

Contingent negative variation (CNV) is a slow cortical, negative potential recorded over the scalp within the so-called "two-stimulus-paradigm": subjects have to react immediately to an imperative stimulus (IS) which is announced by a warning stimulus (WS) 3 s earlier. Between WS

and IS CNV occurs after averaging the trials. The negativity between WS and IS is correlated with expectancy and preparation, and regarding the course after IS with depressive state. In particular the post-imperative negative variation (PINV), an unexpected negativity after presenting the IS, is often correlated with BDI scores. It is well known that patients with sleep disorders often suffer from depression. The question arises whether there are differences in CNV parameters between subjects with good sleep and subjects with sleep disorders.

Ninety-nine headache patients (migraine with and without aura or tension-type headache, aged 40.0 years) took part in the CNV session. The recording of CNV consisted of 32 trials. IS was a 75 dB(A) sine-wave sound with a frequency of 2000 Hz. CNV parameters were total-CNV-amplitude, early-CNV-component, late-CNV-component, and PINV, which were calculated according to standardized criteria. Quality of sleep was assessed by a questionnaire. According to this we divided all patients into two groups: group I ($n = 64$ subjects) had no problems with sleep, group II ($n = 35$) had difficulty getting to sleep or frequent awakenings.

Differences between groups occurred in total-CNV: (group I/group II: $-4.5 \mu\text{V}/-6.4 \mu\text{V}$; $P = .021$), in late-CNV-component: ($-4.6/-7.7$, $P = .021$ and in PINV ($-0.2/-4.2$, $P = .003$). The data suggest that quality of sleep influences CNV-parameters in headache patients. In future studies of CNV disturbed sleep must be taken into account.

Effects of menstrual cycle on creativity

R. Krug, R. Pietrowsky, H.L. Fehm, & J. Born
University of Lübeck, Germany

Seventeen healthy women (21–31 yrs) not taking oral contraceptives were tested at 3 phases of their menstrual cycles distinctly differing in their hormonal patterns (menses, preovulatory phase, and midluteal phase). Phase detection was assured by determination of blood hormone concentrations. On each test occasion, aspects of creativity were assessed by a battery of 6 tests measuring *semantic* and *figural* abilities of divergent thinking. Alternate versions of the tests were given in a counterbalanced fashion on the 3 occasions. Additionally, a test of motor perseveration (Mittenecker-Zeigeversuch) was presented.

During the preovulatory phase creativity was in general improved compared with the other two phases ($P < 0.01$), i. e., on all 6 tests women per-