

analysis of stimulus information rather than response-related processes. Although this point of view was recently questioned by Falkenstein et al. (1993, 1994), their main argument that the second P3 subcomponent is strongly time-linked with the overt response is not enough. Even a high P3 latency/response speed correlation may be explained if only stimulus-related processes are reflected in the P3 wave. Evidence for a possible connection between P3 and response-related processes might be found if other response parameters, besides speed, prove to co-vary with P3 measures.

In the present study, subjects had to respond to one of two imperative stimuli by pressing the corresponding key with a force of 2 Newton (N). Two seconds after the stimulus, subjects were presented with a feedback signal that informed them whether the key had been pressed with the "exact force," or "too strong," or "too weak." The limits of the acceptable deviation from the force of 2 N were reset online after each trial in such a way that, for every subject, about 25% of the trials were in the category "strong," and 25% of the trials were in the category "weak." ERPs to imperative stimuli and feedback stimuli were recorded. Additionally, the mean baseline amplitude (200-ms interval immediately before stimulus presentation) was analyzed in comparison to a remote baseline (another 200-ms interval 2 s before the trial).

Subjects demonstrated rather good performance, the mean absolute deviation from the required force in "exact" trials being only 0.06 N. Mean force employed was 2.33 N, 1.96 N, and 1.65 N in "strong," "exact," and "weak" trials, respectively. The P3 amplitude to imperative stimuli was significantly larger in "strong" trials than in "exact" ones, where it was, in turn, significantly larger than in "weak" trials. Both RT and the P3 latency were slightly larger in "strong" than in "exact" and "weak" trials, the last two kinds of trials not differing in this respect. In addition, the P3 amplitude to feedback stimuli was smaller in "exact" trials than in both "strong" and "weak" ones; this latter effect may have resulted from the higher probability of the positive feedback signal.

As RT differences between trials with different force were smaller than the differences in the P3 amplitude, the latter cannot be explained by a possible covariation between P3 and the response speed. Further, the P3 amplitude variation was not caused by a baseline artifact, nor did it result from the overlapping motor potential. Indeed, the negative baseline shift before the imperative stimulus correlated directly with movement force, but only at frontal and (surprisingly)

occipital sites, while the largest P3 changes were observed over parietal and central areas. If the motor potential immediately before the response played a role, the P3 differences would be opposite to those obtained in the experiment, i.e., a larger P3 would be found in "weak" trials. Thus, the fact that P3 can vary as a function of force may indicate a possible role of response-related processes (e.g., response selection or activation of motor program) in the origin of the P3 wave.

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First evidence for a deviance related negativity in the olfactory evoked potential

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Näätänen showed that the presentation of a deviant infrequent auditory stimulus within a sequence of homogeneous standard stimuli elicits a negative deflection of the event-related potential 150–200 ms after stimulus onset, the N2. Recent studies indicate that the occurrence of the early subcomponent of the N2, the mismatch negativity, is independent of attention but that its amplitude can be modified by, e.g., the proportion of cognitive resources invested in a distractor task.

The aim of this study was to determine whether the detection of a deviant odor within the olfactory evoked potential (OERP) is also reflected by a negative deflection following the N1. To investigate in what ways attention influences olfactory information processing, the odors were presented under "ignore" and under "attend" conditions. In the "ignore" condition the subjects were instructed to ignore the odors and to concentrate on a distractor task. In the "attend" condition subjects were asked to lift their index finger every time they detected the deviant odor.

Five male subjects (aged 21–25 years) attended four sessions, two under "ignore" and two under "attend" conditions. Within each condition each odor was employed once as the standard and once as the deviant stimulus to control odor-specific artifacts. The odors were presented within a constantly flowing airstream (method according to Kobal, 1981) in blocks of five stimuli. Each block contained one deviant stimulus that varied on the last three positions. The presentation of the stimulus lasted 200 ms, the inter-stimulus interval was 8 s. EEG data were collected from Fz, Cz, and Pz referred to linked mastoids.

First results showed that under the "ignore" condition linalool deviants elicited a significant negative deflection of the OERP following the N1 (450 ms). Further analyses indicated that the negative deflection for both odors is more pronounced in the second "ignore" session.

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Conceptual representation versus imagery during ultra short-term cognitive processes in human thinking and non-averaged EEG topography

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Interaction of conceptual representation and imagery in human thinking could be a source of mental creativity. In order to verify this assumption we investigated a new method.

Due to the shortness of the crucial time intervals of concept activation a dynamic spectral analysis is necessary. We used an ARMA model with time-varying parameters which allows the calculation of spectral band power and coherence at every point in time.

Subjects were shown two letters on a screen and had to decide as quickly as possible whether the two letters were identical in pattern ("AA") or of the same category concept ("Aa").

The results showed that concept activation is accompanied by a highly increased local coherence (0.83) in the beta1 band over the left parietal, occipital and temporal cortex in contrast to pattern comparison (0.74). The average duration of concept activation is 220 ms. Additionally, the concept activation is accompanied by a reduction of the spectral band power in the beta1 band over P3/T5 in contrast to the pattern comparison during a 500 ms time interval.

Effects of stressful noise and frustration on impulsive and aggressive behavior in a modified Cherek aggression paradigm

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Stress is believed to increase aggressive behavior. Berkowitz (1989) describes stress-induced aggressive behavior as impulsive aggression because this effect may be mediated by an impairment in impulse control. There have been only a few studies, however, concerning the relationship of stress and impulsive behavior. The present experiment was conducted to investigate the effects of stressful noise and frustration on impulsive and aggressive behavior.

The study was designed as a 2 (frustration) × 3 (noise intensity) factorial experiment. Ninety-six male students (no psychology students) were randomly assigned to six different treatment conditions (n = 16 each). The experimental paradigm was a modified Cherek (1981) aggression paradigm. The subjects chose between non-aggressive (accumulating money) and aggressive response options (subtracting money from the other participant). Two subjects were tested simultaneously in one room to increase the plausibility of the cover story. In the high frustration condition the subject lost twenty points during the task and was led to believe that the other subject was responsible for these frustrations. In the low frustration condition only three accumulated points were subtracted. White noise of varying intensity levels (65, 90, 95 dB) was present during the task to induce stress.

Aggressive behavior was operationalized as the operant rate of the aggressive response option, the non-specific response rate by the frequency of accumulating behavior. Passive avoidance and reaction times in a stop-signal paradigm were measured as indicators of impulsive behavior. Evoked potentials were recorded during the stop-signal paradigm to calculate amplitudes of N100, P200 and SP. Subjective (e. g., mood checklists) and physiological variables (systolic and diastolic blood pressure, heart rate) were also recorded.

Aggressive behavior was higher in the frustration condition but only slightly modified by noise intensity. There were no significant effects of frustration and noise intensity on the measures of impulsive behavior. In general, few changes were observed in physiological and subjective variables.