In artistic perception, style elements are usually recognized and described on the basis of explicit knowledge. Interestingly, deviances among similar artistic stimuli can also be recognized implicitly (that is, without further explanation or overt responses) [7,8].

Studies on oddball paradigms have successfully shown that rare deviants evoke changes in ERP, specifically P300 [3], even if no detection instructions are given [12,4,6]. That means electrophysiological changes indicate automatic deviance detection while no overt responses occur.

So far, automatic recognition of deviant elements has been studied only for simple visual [2,6] and for more complex auditory material, i.e., musical cords [7]. This study investigates automatic recognition in complex visual stimuli, using stimuli derived from artistic paintings.

Since we were interested in the within-subject comparisons between hits and misses, only data from 10 subjects (with responses in both categories) were analyzed.

### RESULTS

**Conditions**

Stimulus types varied significantly at both electrode sites P3 (F=90.03, p<.001) and P4 (F=58.49, p<.001). Targets evoked the largest P300 amplitudes, followed by responses to novels, followed in turn by responses to standards (Fig. 4). Although there was no detection instruction on novels, these stimuli evoked significantly larger P300 amplitudes (P3 p<.01, P4 p<.014) than did standards, which is in line with our hypothesis.

### DISCUSSION

As proposed, both non-identified deviants (Miro pictures in Experiment 1) as well as task-irrelevant deviants (Novels in Experiment 2) evoked changes in P300 amplitudes while no overt responses occurred. P300 amplitudes in response to Miro paintings and novels were significantly larger than responses to the standard stimuli in both experiments (Kandinsky and Standards). The effects for both deviant types are comparable since deviants were implicitly recognized within a picture-sequence without any given detection instructions. Moreover, Experiment 1 showed similar P300 responses for identified as for non-identified Miro pictures. That means deviance recognition in means of P300 amplitude changes was independent of whether subjects responded to the stimulus or not.

### EXPERIMENT 2

#### Rationale

In experiment 2, we measured P300 amplitudes that reflect the automatic recognition of deviating artistic paintings while a detection instruction was given for a different class of deviating stimuli.

#### Methods

**Subjects**

24 students (14 male, 10 female; mean age=24.2, range=20-30)

**Task and Stimuli**

Subjects solved a novelty-oddball task by mentally counting the designated target stimuli. Stimuli were constructed from paintings by P. Klee (Fig. 3). 22 abstract paintings composed of chess-like color patterns were chosen as standard stimuli (20.7). Eight abstract paintings served as target stimuli (task-relevant deviants) and differed from the standards in the way that the color patterns were composed of at least 50% of all slanted lines as opposed to all horizontal and vertical lines (P0.15). Novel stimuli (task-irrelevant deviants) covered 40 non-repeating color paintings by P. Klee (P0.15). The experiment consisted of 300 overall stimulus presentations in the defined probability ratio.

#### Data analysis

EEG data were analyzed for the following three conditions: 1) Standards, 2) Targets, and 3) Novels. Statistical analyses were separately calculated at channels P3 and P4 with a repeated measures ANOVA for stimulus type, followed by planned pair-wise comparisons between Kandinsky, identified Miro, and non-identified Miro paintings.

### EXPERIMENT 1

#### Rationale

In experiment 1, we investigated P300 amplitudes related to the implicit recognition of deviating style elements in artistic paintings without providing any detection instructions.

#### Methods

**Subjects**

23 students (2 male, 21 female; mean age=25.6, range=20-39)

**Task and Stimuli**

Subjects repeatedly viewed a series of 10 artistic paintings. For each picture, they were instructed to decide whether it was a standard picture (i.e., in some way similar to the majority of the paintings) or a deviant picture (i.e., in some way deviating from the majority of the paintings). Identified deviants had to be marked by button press. Subjects did not receive any instructions or hints concerning the features, elements, strategies, etc. upon which to base their decisions. Throughout the experiment, subjects were free to change their detection behavior (i.e., to press the button after pictures they did not choose before).

The artistic paintings consisted of 8 pictures by W. Kandinsky, 2 paintings in similar style by J. Miro and W. Baumeister, with 270 overall stimulus presentations according to the defined probability ratio (Fig. 1).

#### Data analysis

EEG data were analyzed for the following three conditions: 1) Kandinsky (correct rejections), 2) Identified Miro (hits), and 3) Non-identified Miro (misses). For data analyses, only the picture by Miro served as a deviant, since the picture by Baumeister was rarely identified.

Statistical analyses were separately performed at channels P3 and P4 with a repeated measures ANOVA for stimulus type, followed by planned pair-wise comparisons between Kandinsky, identified Miro, and non-identified Miro paintings.

### References


