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**„Firing activities of auditory cortical neurons
during categorical task performance in behaving monkeys“**

Abstract:

The goal of the present study was to examine whether the firing of auditory cortical neurons reflected actually the category membership of tone steps (rising versus falling) and not merely the physical characteristics of the single tones. The study was divided into two parts. First two monkeys (*macaca fascicularis*) were trained to categorize falling and rising frequency contours in variable sequences of pure tones. A positive-reinforcement behavioral procedure was used and only the responses to falling frequency contours were reinforced. After the monkeys had learned this task, the recording of the neuronal activity from the auditory cortex was performed simultaneously with the task performance. Then the neuronal responses to falling frequency contour and the neuronal responses to rising frequency contour were analyzed with sets of tone sequences such that for the same neuron responses to identical tones could be compared in the two cases.

Both on the level of individual units and on the population level, phasic responses at short latencies were stronger to falling frequency contours than to rising frequency contours. The preference of falling frequency contours was independent of frequency, i.e., categorical. No difference was found between neuronal responses to falling frequency contours between successful and unsuccessful trials.

Many neurons in auditory cortex fired also during non-acoustic events of the behavioral procedure, i.e. responded transient or slow modulated their firing to the cue-light and to the touch and the release of the bar.

The present study demonstrates that the firing of auditory cortical neurons reflects the category membership. The selective increase of neuronal responses to only one category (falling frequency contours) are due to the behavioral salience of this feature. Generally, the preference of falling frequency contour and the modulations of firing to the non-auditory events are task-related and reflect the highly adaptive character of auditory cortex.