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# Fast decoding of natural object categories from intracranial field potentials in monkey's visual cortex

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## Abstract

Object categorization involves very fast cognitive processes. Previous studies have demonstrated that both human and non-human primates can categorize natural scenes as containing animals very rapidly and accurately (Thorpe et al. 1996; Fabre-Thorpe et al. 1998). How such abstract categories could be accessed by visual processes remain an open question. Here two macaque monkeys were trained to perform such animal categorization using natural scenes. During task performance, we recorded intracranial EEG from intermediate areas of the ventral stream of the visual cortex. Unlike standard brain imagery techniques, electrocorticogram provides a good balance between time resolution and spatial coverage. Using multivariate pattern analyses, we quantified at millisecond resolution the amount of visual information conveyed by intracranial field potentials from 12 electrodes in one monkey and 16 in the other. As previously demonstrated in human epileptic patients (Liu et al. 2009) our analyses suggest that category information can be decoded as early as 100 ms post-stimulus. More importantly, we found that the readout performance of a linear classifier was significantly correlated with reaction times using single trial signals from V2 and V4. These results suggest that categorical decisions could be supported by the early information conveyed by relatively low-level visual areas.

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