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Presentation Abstract

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| Program#/Poster#: | 435.12/GG9 |
| Presentation Title: | Temporal certainty about stimulus presentation differentially affects response dynamics in dorsal premotor and primary motor cortex |
| Location: | WCC Hall A-C |
| Presentation time: | Monday, Nov 17, 2014, 1:00 PM - 5:00 PM |
| Presenter at Poster: | Mon, Nov. 17, 2014, 4:00 PM - 5:00 PM |
| Topic: | ++D.04.t. Visual cognition: Decision making |
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| Abstract: | In a dynamic environment subjects often integrate multiple samples of a signal and combine them before reaching a categorical decision. The combined information can be interpreted as a time-varying decision variable reflecting the current decision-state of a subject. We have previously reported that during a visual motion discrimination task dorsal premotor cortex (PMd) activity reliably predicts choice on single trials within 200ms of stimulus presentation (Peixoto, et al., SfN 2013). Moreover, prediction accuracy varies parametrically with stimulus difficulty as expected for decision-related signals. Here we ask: 1) how choice |

predictive activity in primary motor cortex (M1) compares to PMd, and 2) how the dynamics of choice-related activity in each area are affected by temporal uncertainty about stimulus duration. We addressed the first question by using 'Utah' arrays to record simultaneously from several dozen neurons in PMd and M1 in two monkeys performing the discrimination task. We addressed the second question by comparing neural dynamics in a fixed duration task (1 s stimulus viewing period) vs. a variable duration task in which the stimulus duration was randomly varied between 0.1 and 1 s. The fixed duration task included a delay period after stimulus offset, which was eliminated in the variable duration task, thus placing a premium on quick, accurate decisions as soon as the stimulus was turned off. We assessed neural choice prediction by applying a logistic classifier to a 150 ms sliding window containing the activity of simultaneously recorded neurons in each area in both tasks. In the fixed duration task, choice prediction accuracy surpassed chance levels ~200 ms after stimulus onset for both PMd and M1. However, choice predictive activity in PMd soon exceeded that in M1 and remained greater for the rest of the stimulus presentation interval. At the time of the Go cue choice prediction accuracy was well above 90% and did not differ significantly between the two areas. In contrast, choice-predictive activity was faster and stronger when the duration of the stimulus was unpredictable, reaching 90% correct less than 500 ms after stimulus onset for both areas. This acceleration of choice-predictive dynamics was more striking for M1 than for PMd, raising the possibility that action signals are mixed with decision-related signals under conditions of temporal uncertainty. Future analysis of psychophysical kernels combined with stimulus coherence effects in PMd and M1 may enable us to pull these signals apart.

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Keyword (s): DECISION MAKING

PREMOTOR

MOTOR CORTEX

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