



Figure 2 – figure supplement 1. An NL model (*static* input nonlinearity followed by a linear filter) cannot reproduce context-dependence of LFP responses to similar-sized whiffs.

Input nonlinearity (a) and filter (b) fit to ab2 LFP responses to 2-butanone naturalistic stimulus. The input nonlinearity is a Hill function $S/(S + K_D)$ where S represents the input, and K_D the half maximum value). The nonparametric filter and parametric nonlinearity are fit simultaneously in an iterative manner (see **Methods**). (c) Comparison of ab2 LFP responses and NL model predictions. (d) Linear filter extracted from the stimulus and the NL model prediction. Note that the filter is not the same as in (b); a filter extracted from an NL model is not guaranteed to be an unbiased estimate of the true one. (e) NL model responses vs. naturalistic stimulus projected through filter in (d), showing that the NL model shows deviations from linearity similar to what is observed in the data (cf. **Fig. 1c**). (f-g) Context dependence of response in the ab2 data and model. (f) ab2 LFP responses to whiffs of similar size (same data as in **Fig. 1h**). Note that the responses to isolated whiffs (purple, yellow) are *larger* than the responses to repeated whiffs (red, blue). (g) NL model responses to these whiffs. Note that the responses to isolated whiffs (purple, yellow) are *smaller* than the responses to repeated whiffs (red, blue), the opposite of the trend visible in the data.