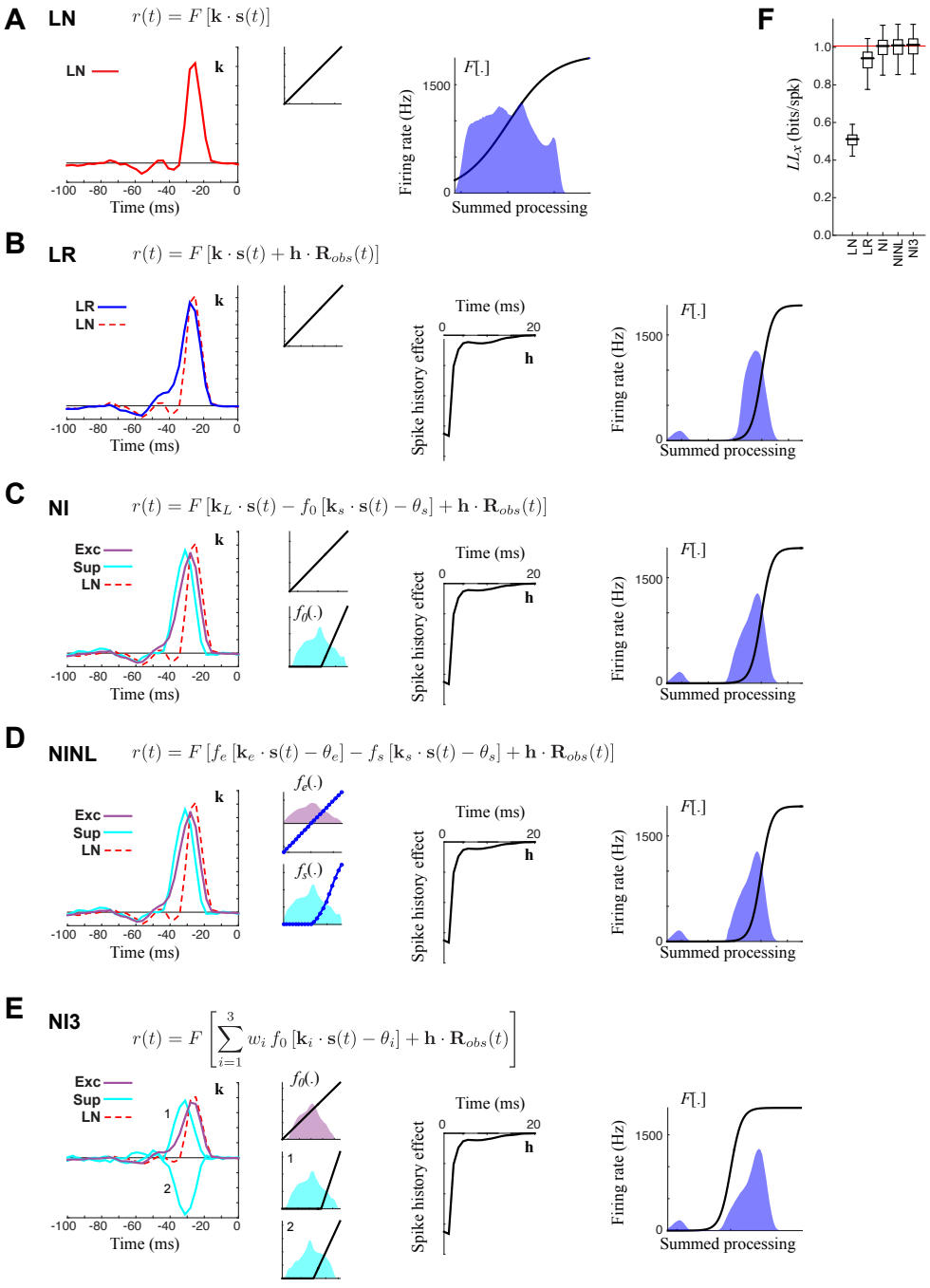
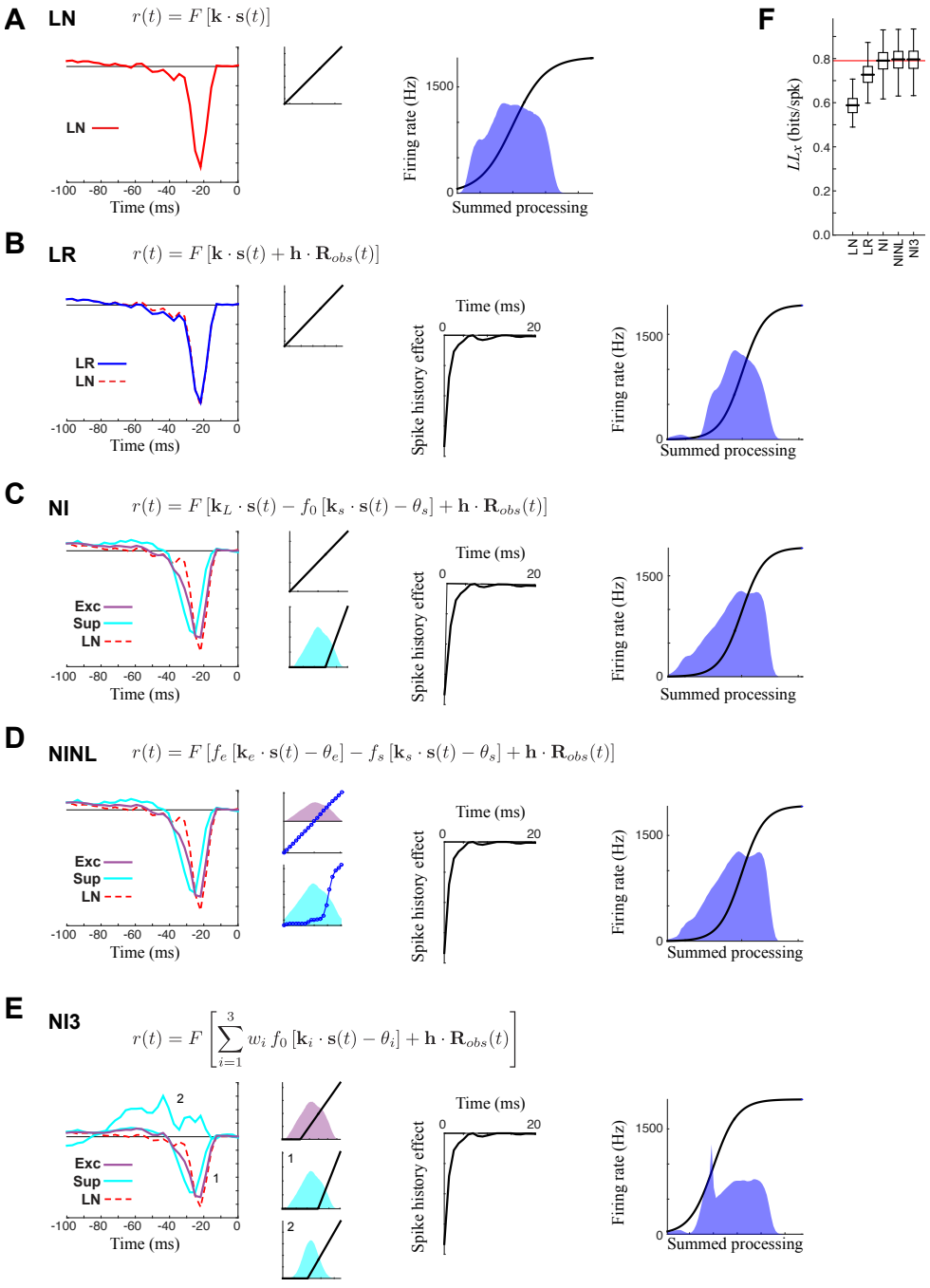
Supporting Figure, Part 1 (ON RGC Example)



Range of models for example ON RGC. A. The LN model for an example ON RGC, organized as follows: *Left*: temporal filter; *Center:* upstream nonlinearity, in this case there is no upstream nonlinearity, so a linear function is pictured; *Right*: spiking nonlinearity (black), shown with respect to the underlying range of summed processing of the model components (blue). **B.** LR model, involving linear stimulus processing and refractoriness implemented by a spike-history term. Same organization as (A), except a column 3 now shows the spike-history term. **C.** NIM with a linear "excitatory" term and nonlinear suppression, which is the form used to fit RGCs throughout the paper. The suppressive upstream nonlinearity $f_0(.)$ is parametric (rectified linear) and specified by a single threshold parameter. **D.** The NIM where the upstream nonlinearities are non-parametric and both fit (NINL model). The resulting form of the non-parametric nonlinearities is what motivates the parametric form used in this paper. **E.** Models could be fit with more nonlinear terms, in this case NIM3 shows the best model fit to the data with 3 nonlinear terms. **F.** Cross-validated log-likelihoods of all models shown on repeat data. This shows the NIM (C) has nearly identical performance as the more complex models, motivating its use throughout the paper.

Supporting Figure, Part 2 (OFF RGC Example)



Range of models for example OFF RGC. A. The LN model for an example OFF RGC, organized as follows: *Left*: temporal filter; *Center:* upstream nonlinearity, in this case there is no upstream nonlinearity, so a linear function is pictured; *Right*: spiking nonlinearity (black), shown with respect to the underlying range of summed processing of the model components (blue). **B.** LR model, involving linear stimulus processing and refractoriness implemented by a spike-history term. Same organization as (A), except a column 3 now shows the spike-history term. **C.** NIM with a linear "excitatory" term and nonlinear suppression, which is the form used to fit RGCs throughout the paper. The suppressive upstream nonlinearity $f_0(.)$ is parametric (rectified linear) and specified by a single threshold parameter. **D.** The NIM where the upstream nonlinearities are non-parametric and both fit (NINL model). Note that here the form of the suppressive nonlinearity is more complicated than simply threshold-linear, but this has negligible effect on model performance (see below) relative to the threshold-linear assumption of the NIM (C). **E.** Models could be fit with more nonlinear terms, but in this case adding a third term does not yield a clean filter, nor contributes to model performance. **F.** Cross-validated log-likelihoods of all models shown on repeat data. This shows the NIM (C) has nearly identical performance as the more complex models.