Bayesian binning beats approximate alternatives:
estimating peri-stimulus time histograms.

Poster ID W13

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The alternatives

Ours

spiketrain #

bar-PSTH
line-PSTH

P(spike)

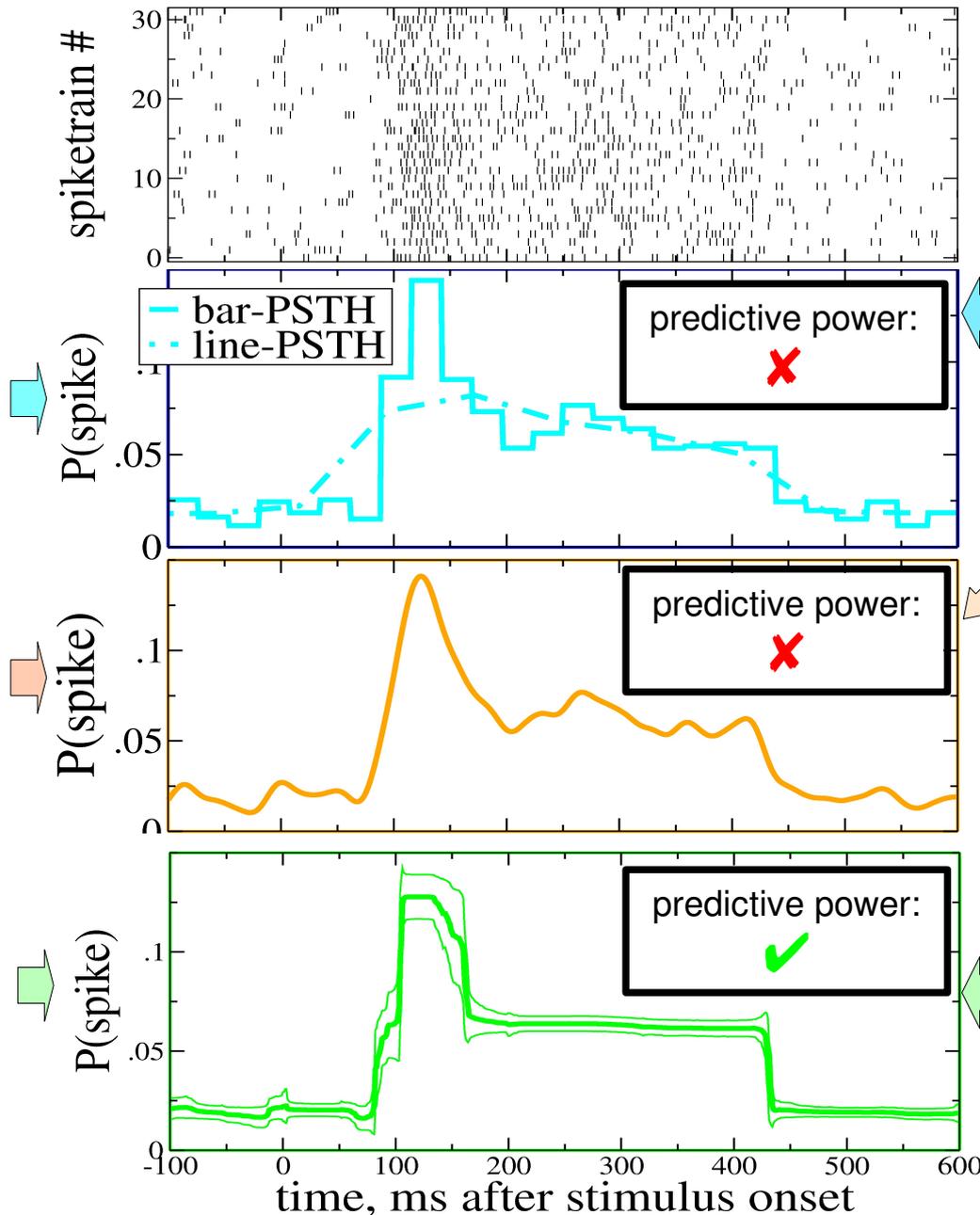
predictive power: ✗

P(spike)

predictive power: ✗

P(spike)

predictive power: ✔

time, ms after stimulus onset

Objective: model *instantaneous firing rates* from *neural spike trains* as a function of time.

Fixed boundary histogram approach
(Shimazaki & Shinomoto, *Neu. Comp.,* 2007)

Spike density function by **smoothing spike trains** with a **Gaussian kernel.**

Bayesian binning for **peri-stimulus time histogram (PSTH):** iterates over *all* possible binnings.
• Computes *Bayesian expectations*
• Yields *error bars* on predictions
• Provides *complexity control* via model comparison,
• *Only* cubic effort for *exact inference* !!
• *Better predictor* of *real neural data* than alternative approaches above.