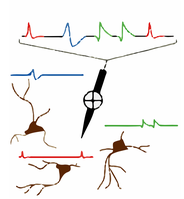
Assessing cross-contamination in spike-sorted electrophysiology datasets

Jack Vincent[1, 2], Michael Economo[1, 2, 3]

[1] Biomedical Engineering, Boston University, Boston, MA
[2] Biomedical Engineering, Boston University, Boston, MA
[2] Neurophotonics Center, Boston University, Boston, MA
[5] Center for Systems Neuroscience, Boston University, Boston, MA

Motivation

0 What is spike sorting?

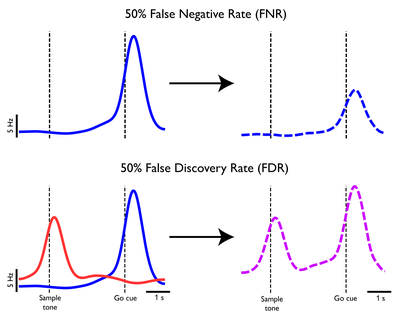


1 What is "good" spike sorting?

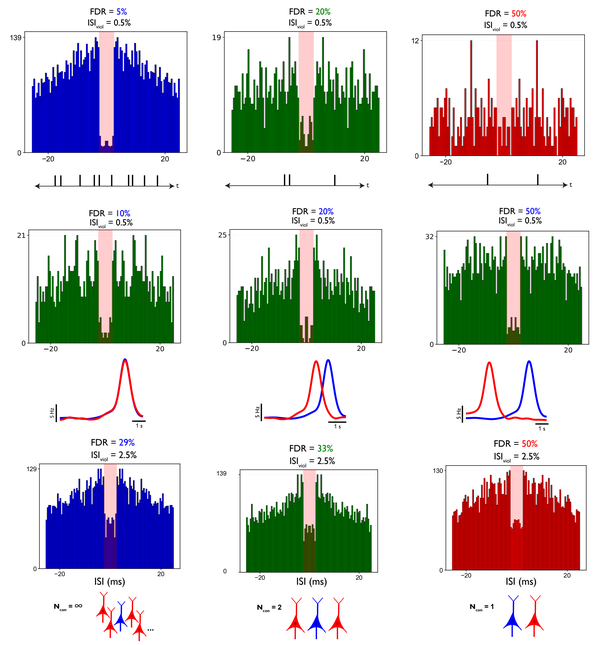
- The avoidance of false negatives and, most critically, **false positives** in sorted units

False Negative Rate (FNR) = $\frac{FN}{FN+TP}$ = fraction of true spikes missed

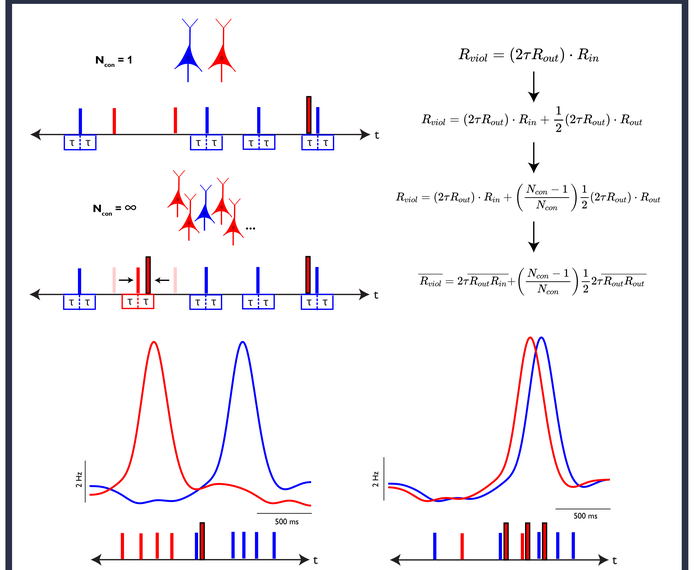
False Discovery Rate (FDR) = $\frac{FP}{FP+TP}$ = fraction of misassigned spikes



2 The danger of using ISI violations as a spike sorting quality metric

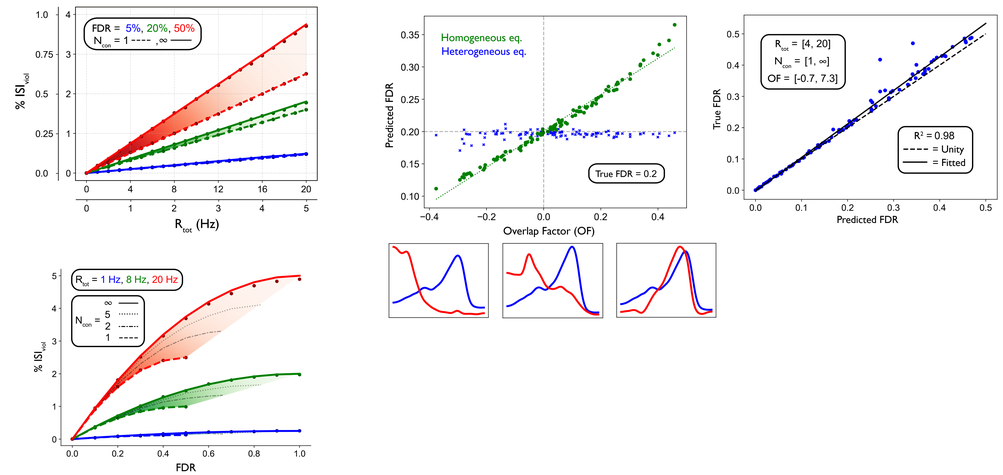


3 Derivation of the relationship between ISI_{viol} and FDR

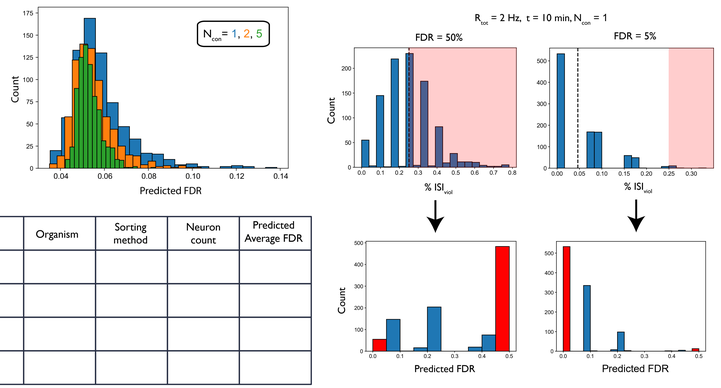


Conclusions

4 Characterization and validation of the relationship between ISI_{viol} and FDR



5 Prediction of FDR in real data



	Organism	Sorting method	Neuron count	Predicted Average FDR

References

1. Musall et al. *Nature Neuroscience* (2019).
2. Stringer et al. Science (2019).
3. Kaufman et al. Nature Neuroscience (2014).
4. Elsayed et al. Nature Communications (2016).

Economo Lab