Lessons Learned in Spike Sorting: The $n = 1$ Perspective

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June 21, 2013

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- March 2013–June 2013: Improving merge deliberation

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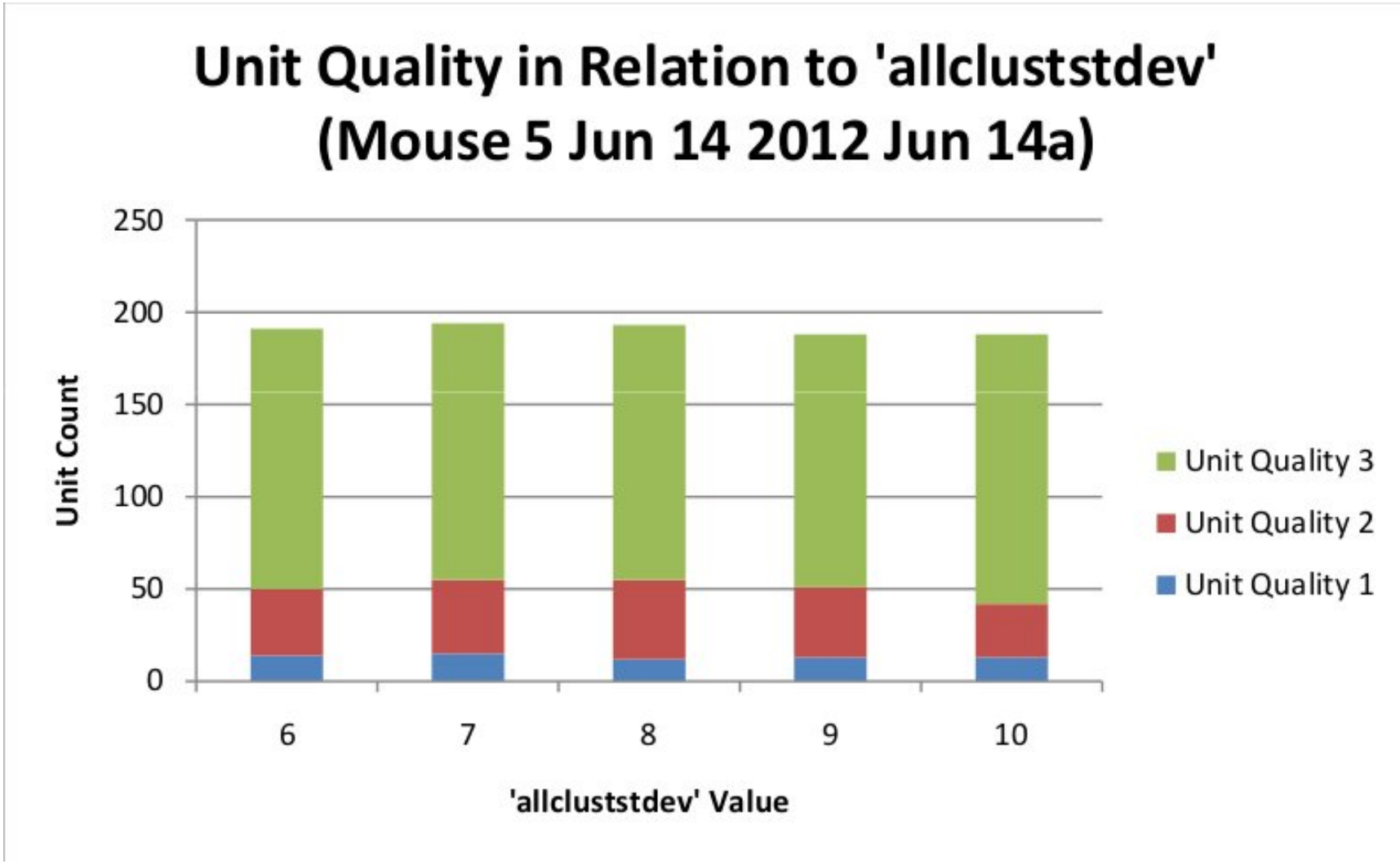
- Doing unit quality by hand on the same dataset again and again is tedious and prone to inconsistency

This Figure is Really Old (Mouse 5 Jun14a)



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   - Qualifier that works well: restricting consideration to points near the peak of the spike

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- The process can be confused by high-SNR artifacts/non-units that would be caught by a human
- Best use case for auto-unit quality?
  - Consistent scoring of different sorting algorithms

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- Observations
  - get_penultimate merges are usually not very significant
  - bulk of merges are done in get_final_units

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  1. ~~Mahalanobis Distance~~
  2. Principal Component Analysis

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- Principal component analysis (PCA) allows us to transform each spike into 47 data points of decreasing significance, so a comparing e.g. only the first three dimensions becomes reasonable (we go from $\mathbb{R}^{47}$ to $\mathbb{R}^3$)

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  5. Consider the distance between the clusters to decide if the two units should be merged (the smaller the distance between the clusters of two units, the more likely they should be merge)

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- The PCA merge process is more sensitive to "garbage units" than the old Euclidean-distance based merge process
  - Use intensive garbage-discarding/"sanity-checks"—`get_sane` before the merge process

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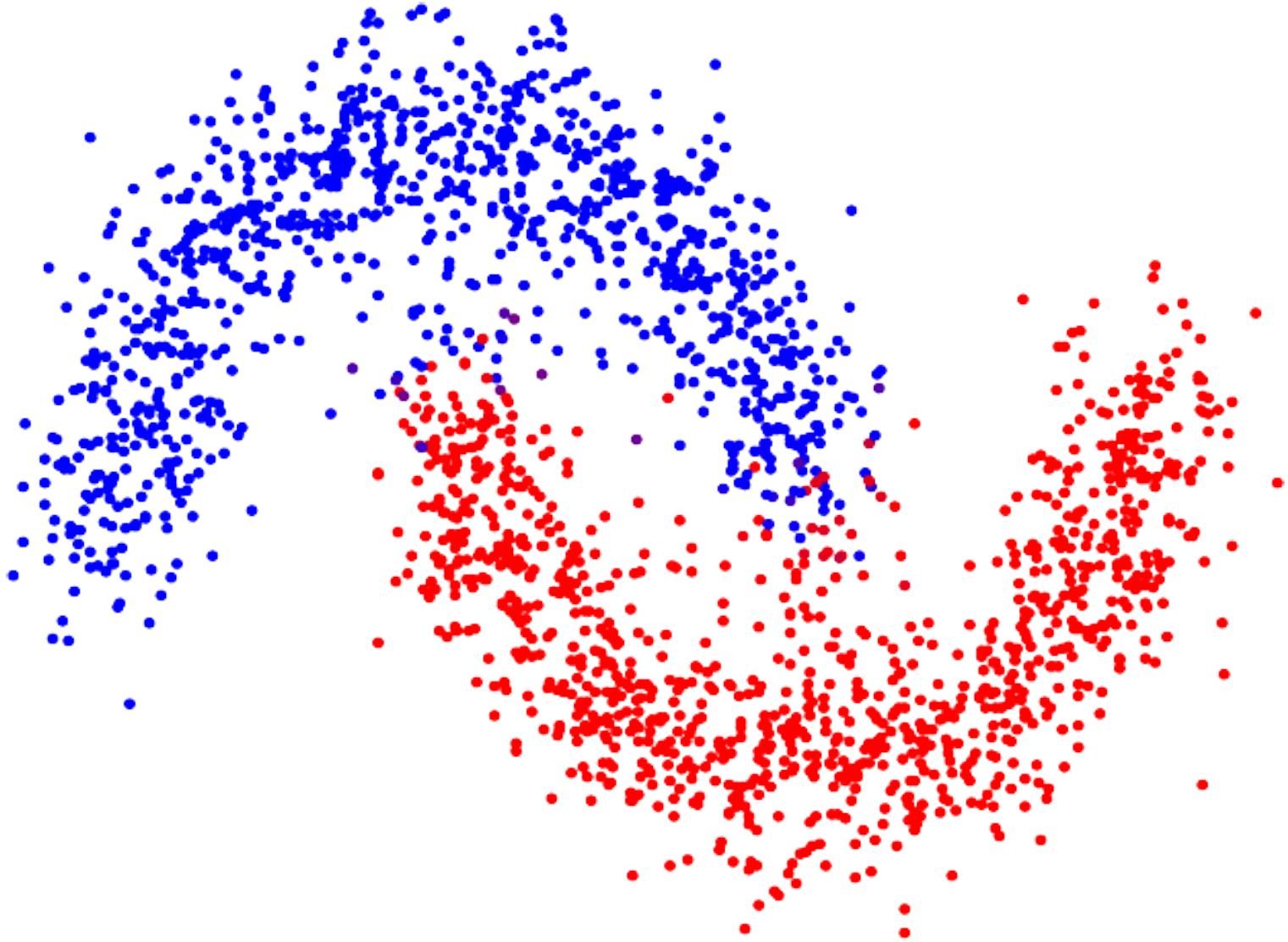

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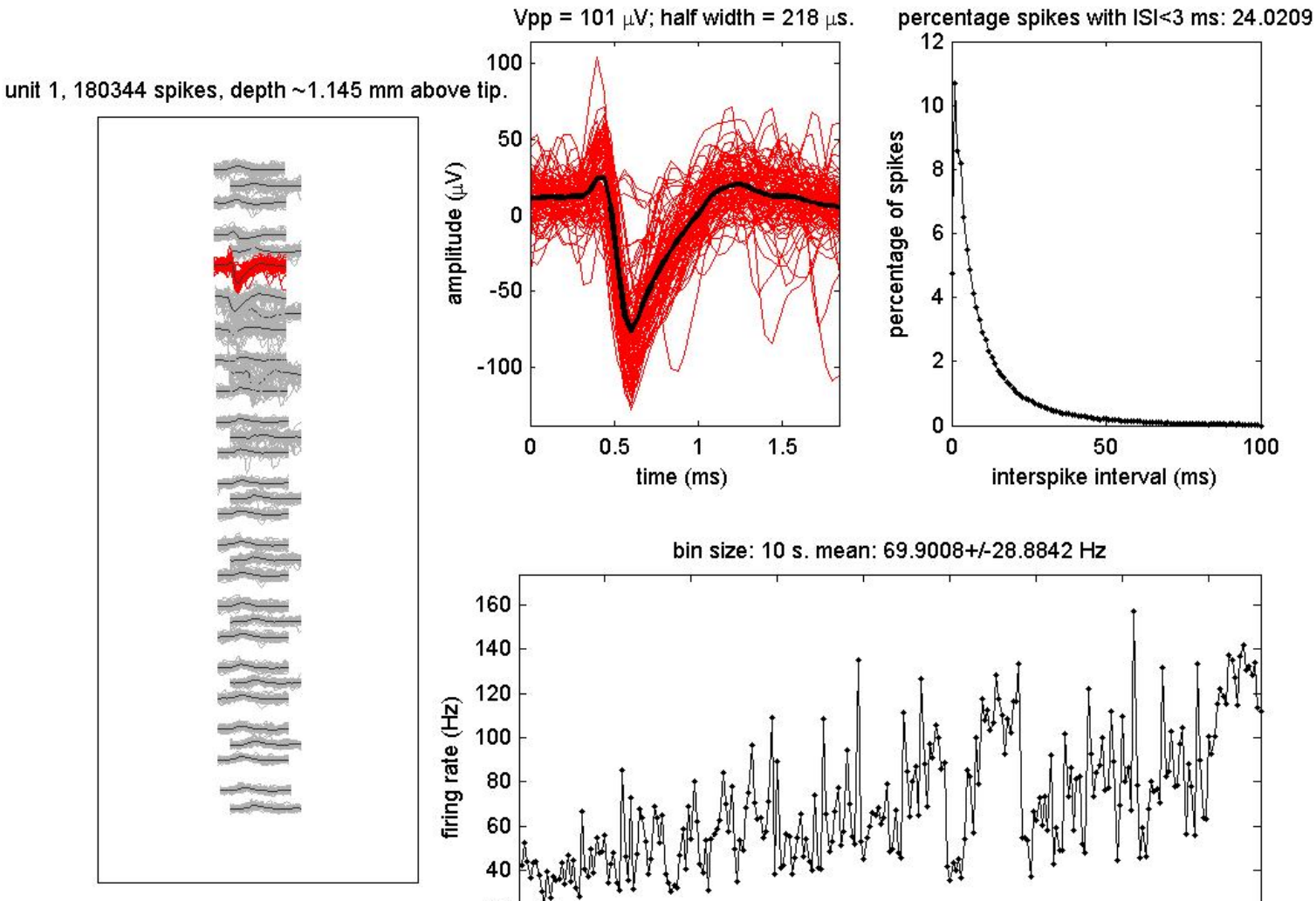

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