

# SeqPeelSort: a spike sorting algorithm for single sensillum recordings

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## Software

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## Summary

*SeqPeelSort* is a spike sorting algorithm for single sensillum recordings (SSR).

Single sensillum recordings are a standard technique in insect neuroscience. In such electrophysiological recordings, a single electrode is inserted into a sensory sensillum and the transepithelial potential is recorded. This technique is extensively (but not only) used in *Drosophila* olfaction studies (see for example Hallem, Ho, and Carlson (2004) or Lin and Potter (2015) and citations therein).

Since insect olfactory sensilla can house multiple sensory neurons, the action potentials of all those neurons are recorded with the single electrode simultaneously. The individual units usually display different spike shapes and amplitudes. Additionally, the amplitudes of some units is substantially decreased when the unit exhibits a high firing rate.

As any spike sorting algorithm, *SeqPeelSort*'s goal is to detect spikes and based on their waveform, assign them to a unit. Different to most recording situations for which current spike sorting algorithms are designed, the recording configuration of SSR leads to specific constraints: The number of electrodes is only one, the number of units is known and low, but their spike shapes are quite variable. *SeqPeelSort* is designed to handle these specific constraints while being lightweight and simple.

## References

- Hallem, Elissa A, Michael G Ho, and John R Carlson. 2004. "The Molecular Basis of Odor Coding in the *Drosophila* Antenna." *Cell* 117 (7). Elsevier:965–79.
- Lin, Chun-Chieh, and Christopher J Potter. 2015. "Re-Classification of *Drosophila* *Melanogaster* Trichoid and Intermediate Sensilla Using Fluorescence-Guided Single Sensillum Recording." *PloS One* 10 (10). Public Library of Science:e0139675.