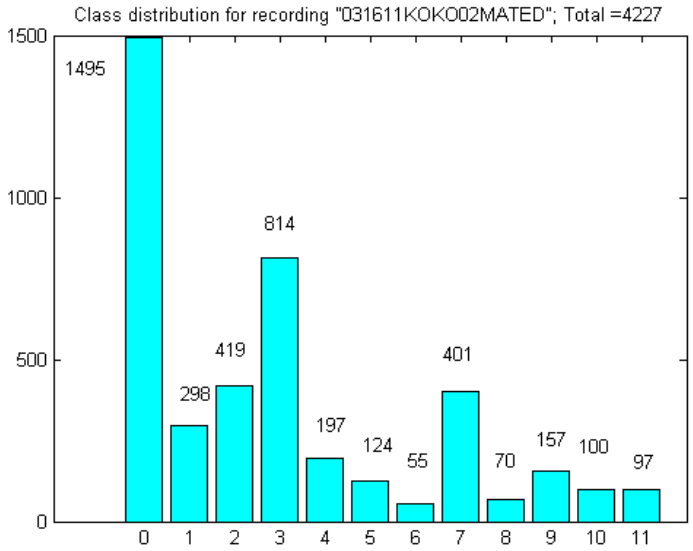
Addition results of Mining Mouse Vocalizations

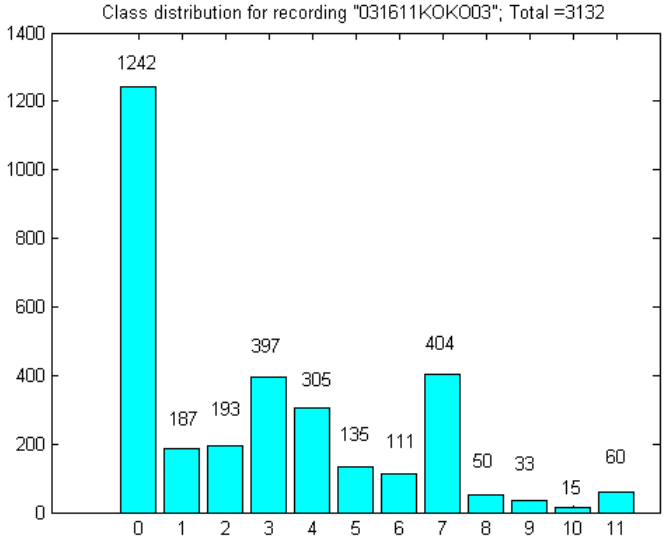
Prepared by

Jesin Zakaria and Eamonn Keogh

Class Distribution of Syllables from different vocalizations

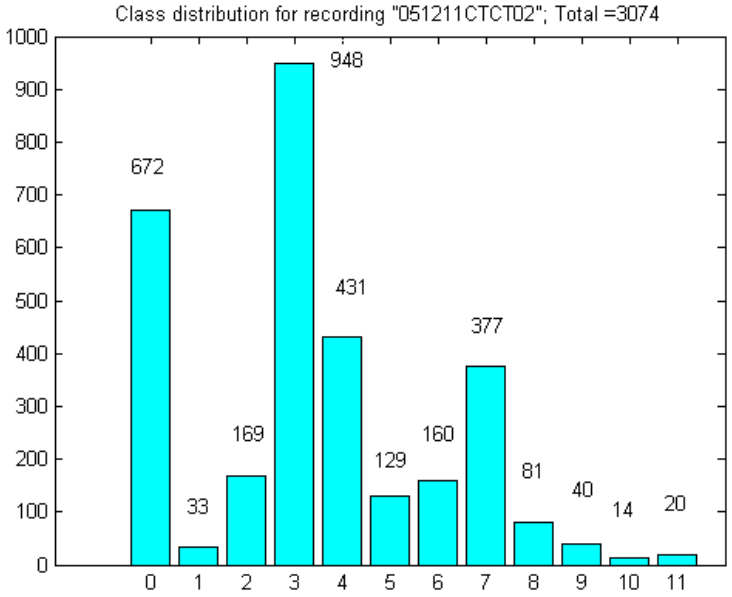
Examples from **knockout** mice

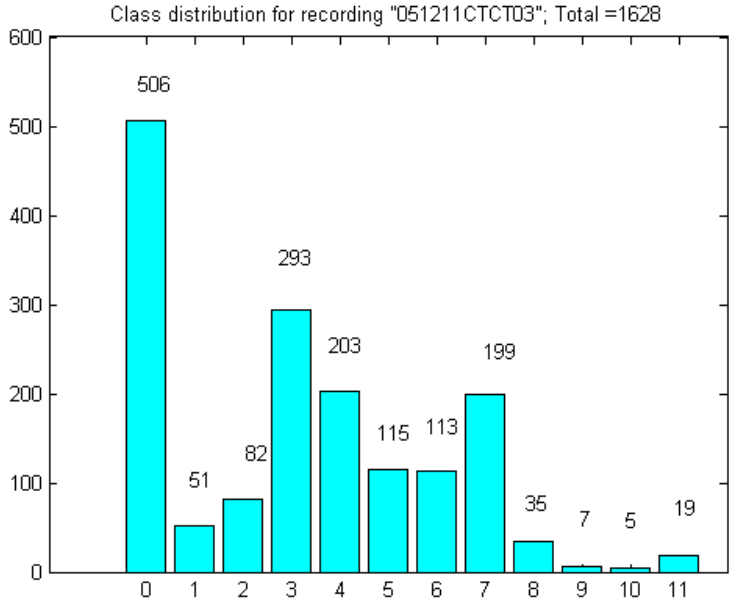




Class Distribution of Syllables from different vocalizations

Examples from **control** mice



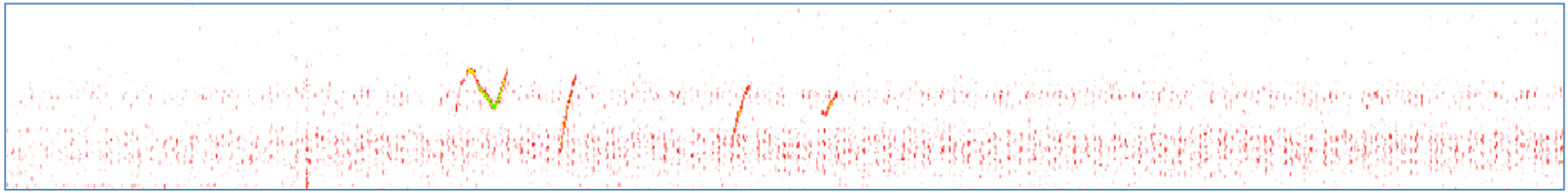


Reduce Spectral Space

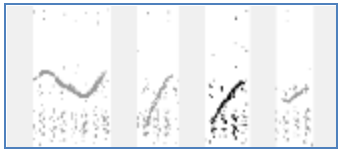
- Domain experts search for interesting and meaningful patterns in the spectrogram of a mouse vocalization.
- It would be convenient if the spectral space is reduced.
- Since syllables generated from ultrasonic vocalization of a mouse comprise only a small fraction of a recording, we can easily reduce the original spectrogram.

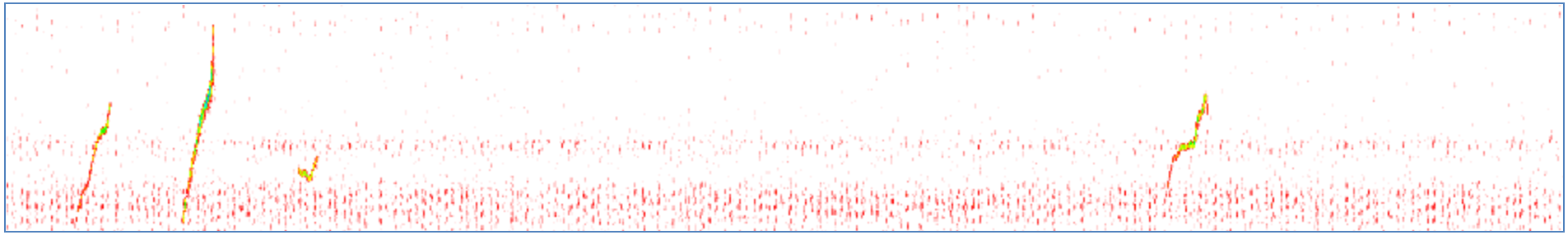
See the **examples** in the next slide.

Reduce Spectral Space

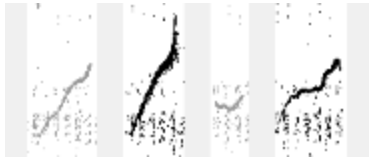


Reduced spectral space →



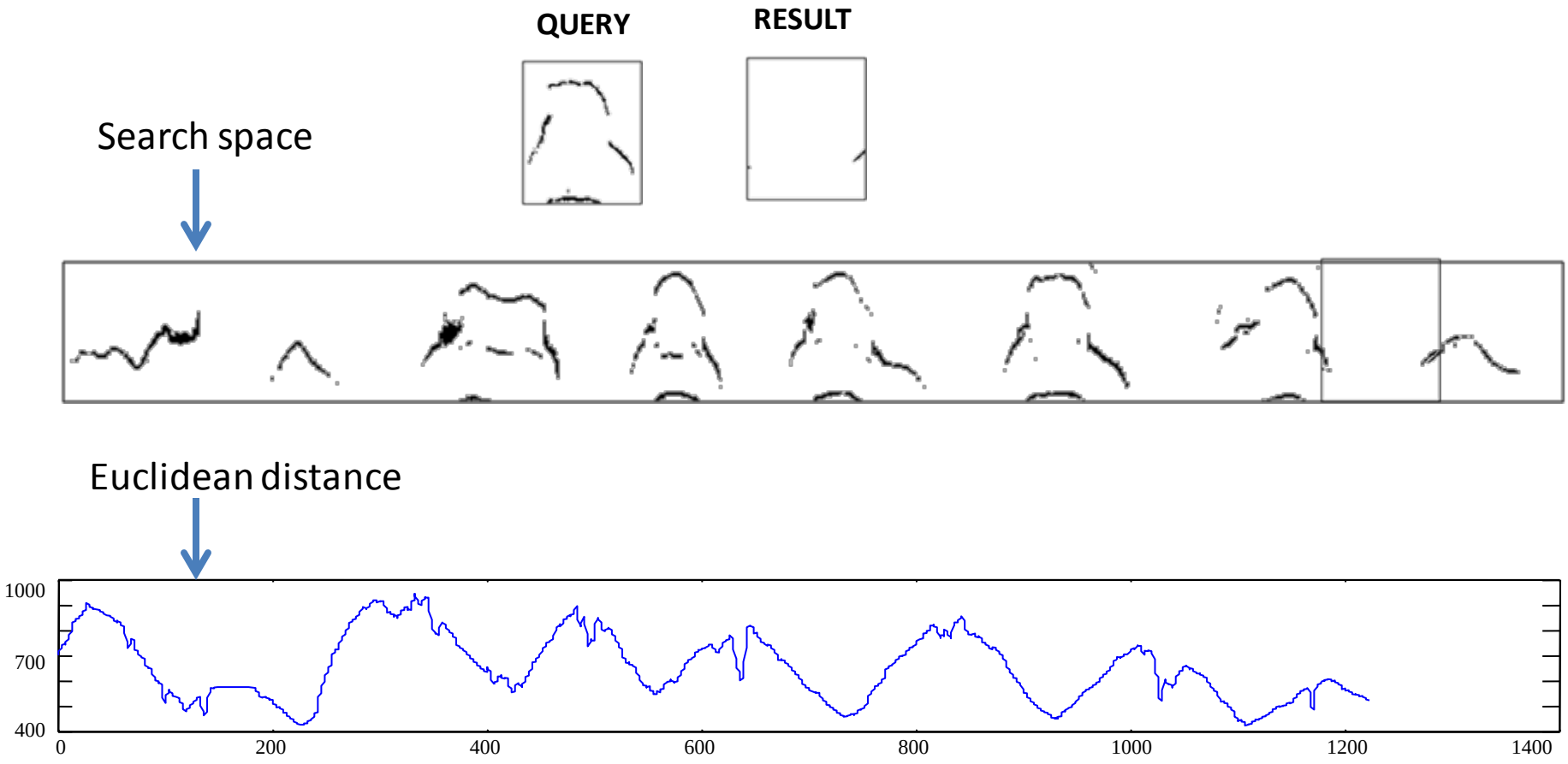


Reduced spectral space →

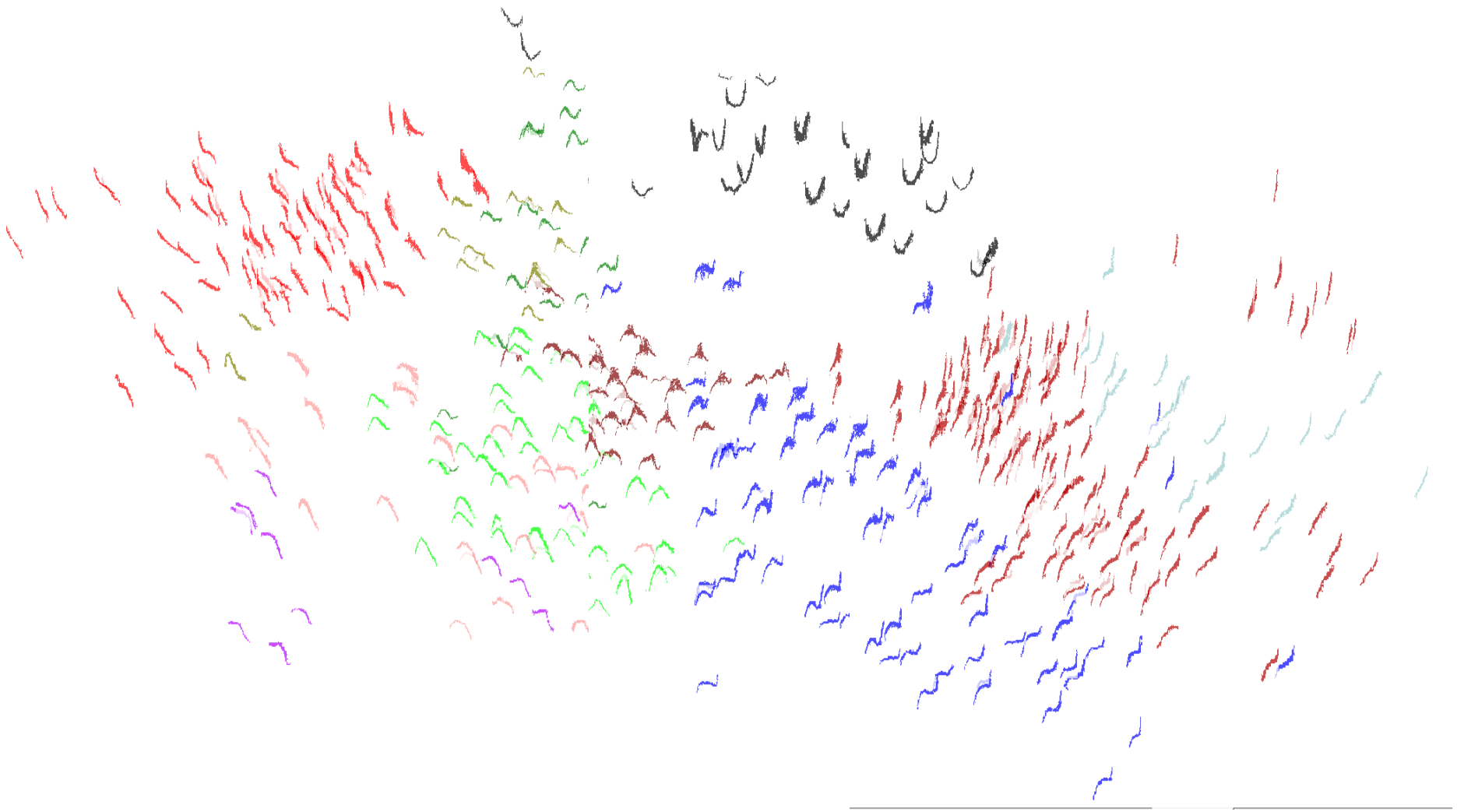


Example of correlation based method

- Slide a window equal to the size of **query window** across the search space and compute the euclidean distance between the **query window** and the **candidate window**.
- Report the **candidate window** with minimum euclidean distance



692 Annotated syllables in two dimensional space

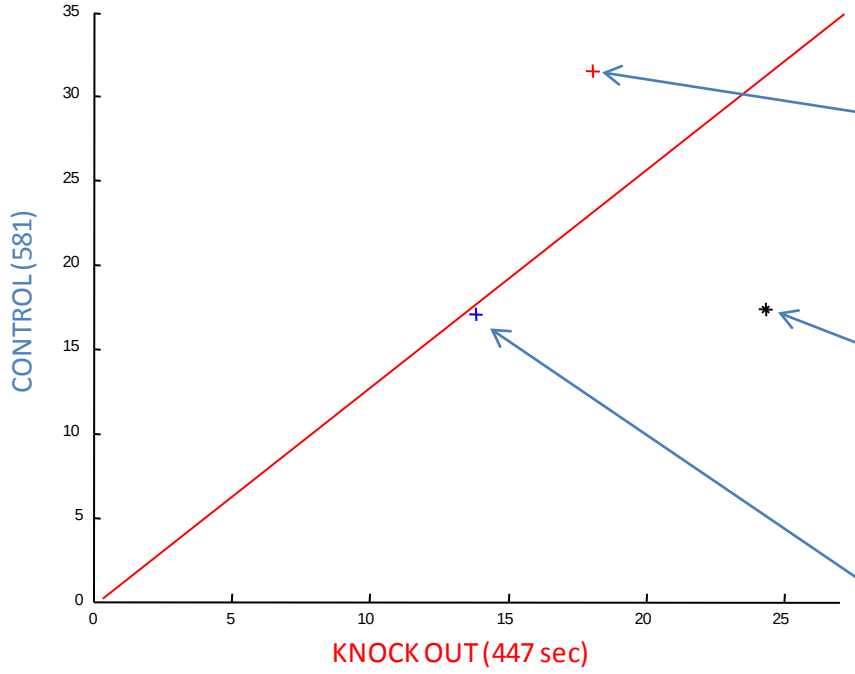


Correlating vocalization with behavior

How to read plots I

We are looking at behavior X (where X is 1 to 8)

BX



This motif is far *above* the red diagonal line, suggesting that this motif happens a lot more in control during this behavior

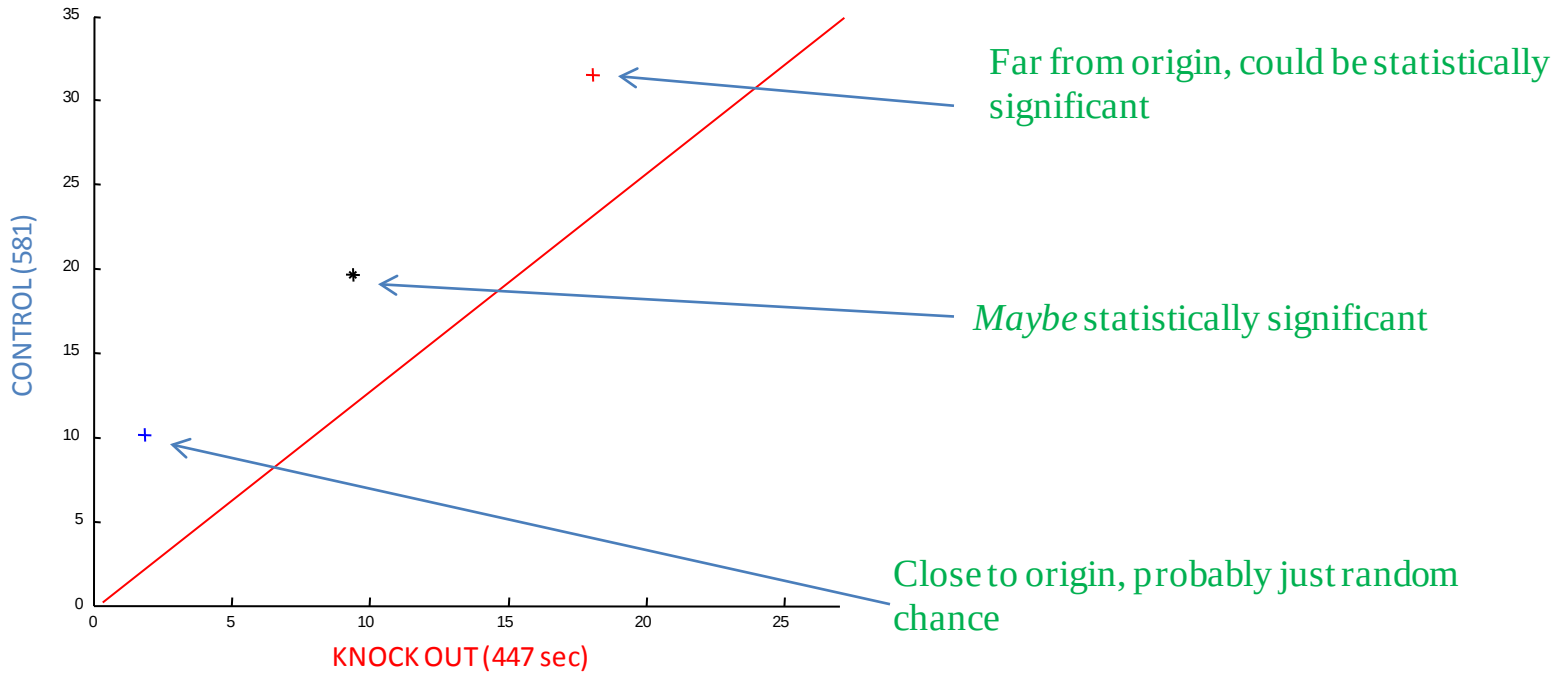
This motif is far below the red diagonal line, suggesting that this motif happens a lot more in KO, during this behavior

This motif is close to the diagonal, suggesting that this motif does NOT discriminate KO and control, during this behavior

Correlating vocalization with behavior

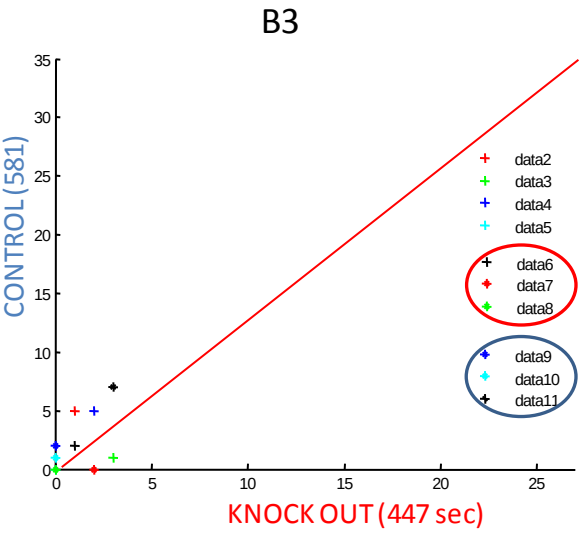
How to read plots II

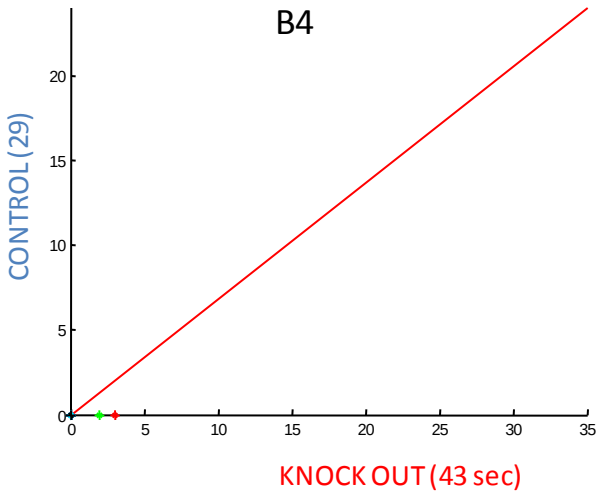
If the point is close to the origin, there is a greater chance that the result is random chance

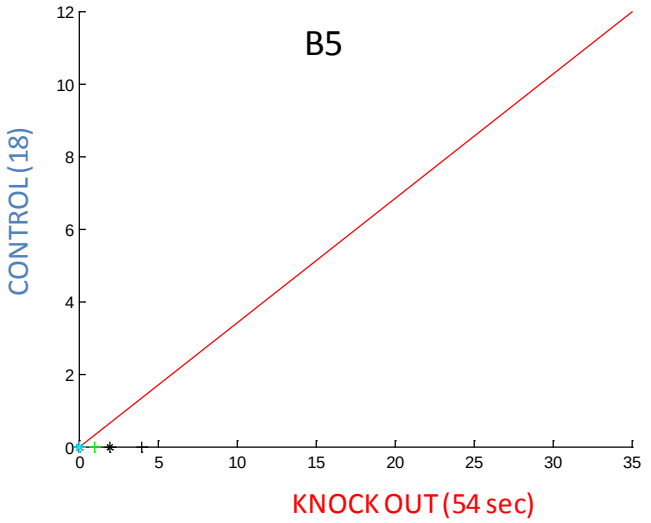


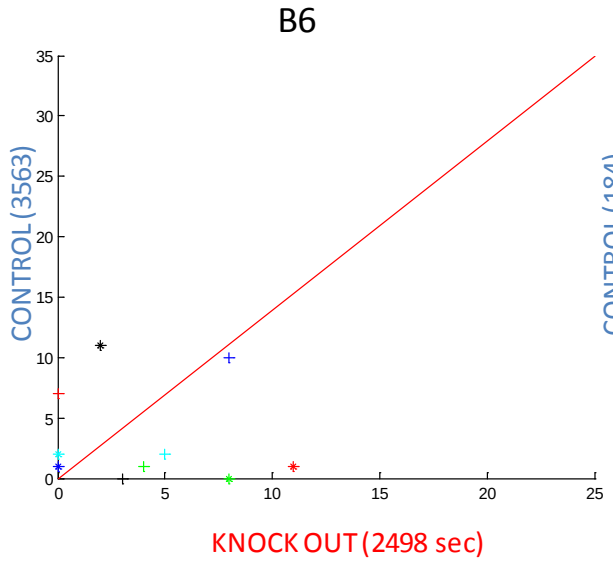
Here is the data without comment…

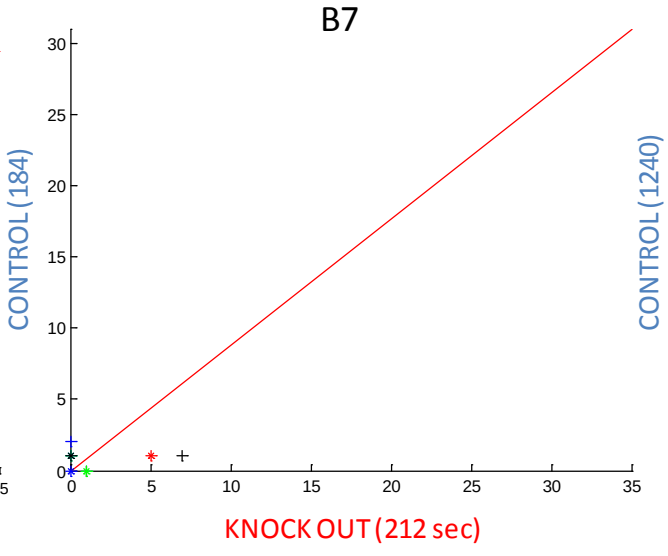
Frequency distribution of 10 motifs: RED marked are over represented in KNOCK-OUT & BLUE marked in CONTROL

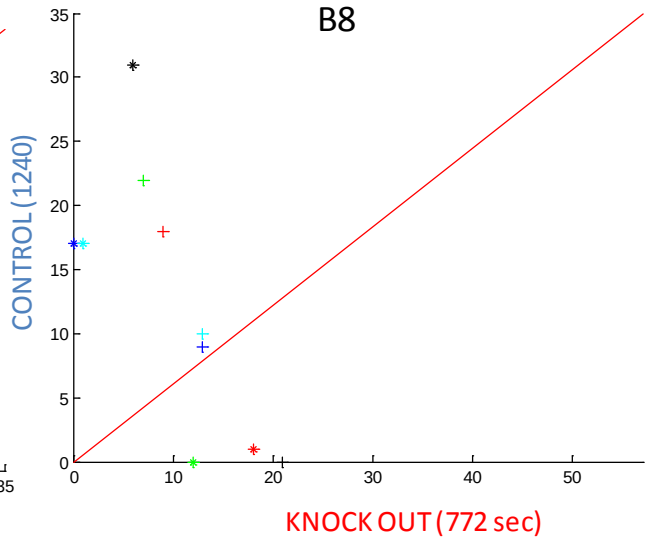






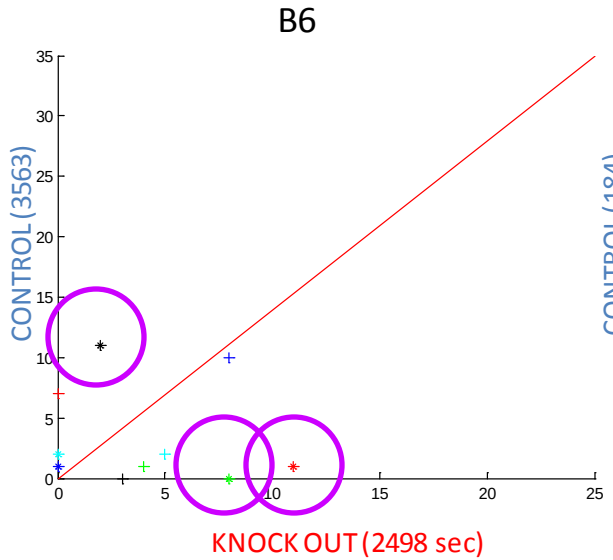


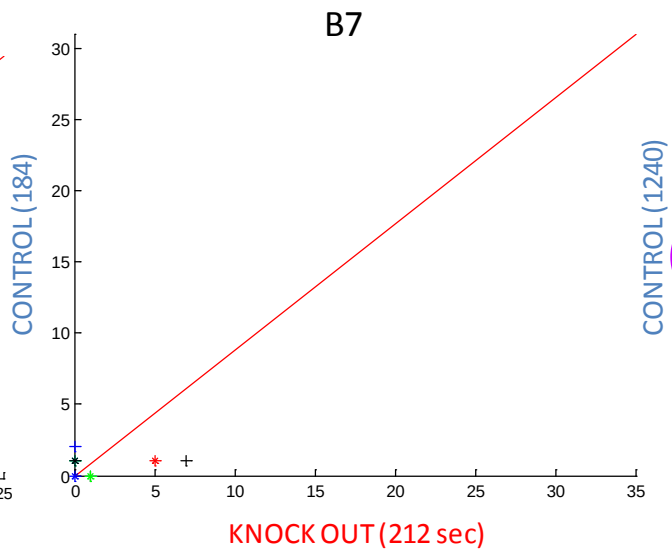


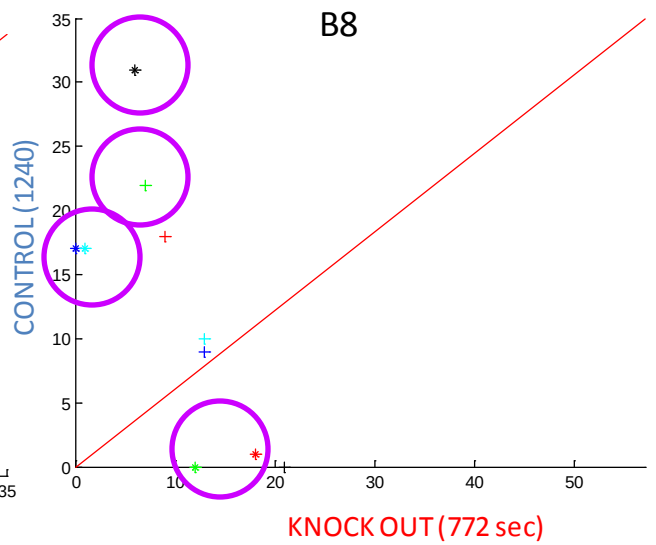


Here is my comment:

There are a handful of motifs that might really differ between control and knockout, depending on the behavior.







Question/ comment?

Email at, jzaka001@cs.ucr.edu