Bypassing time-frequency uncertainty in the detection of transient communication signals in weakly electric fish

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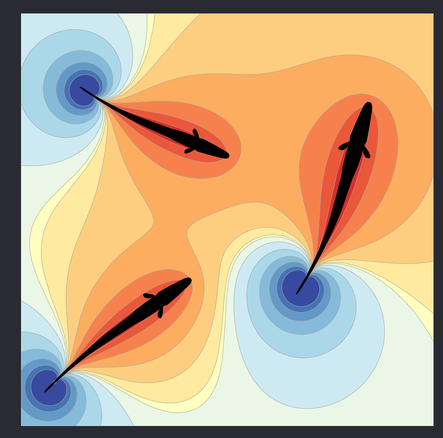
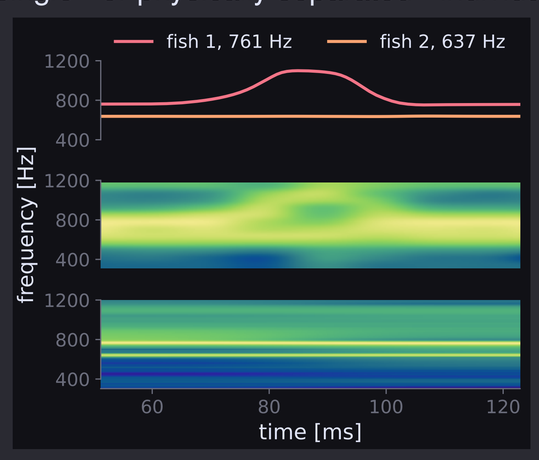
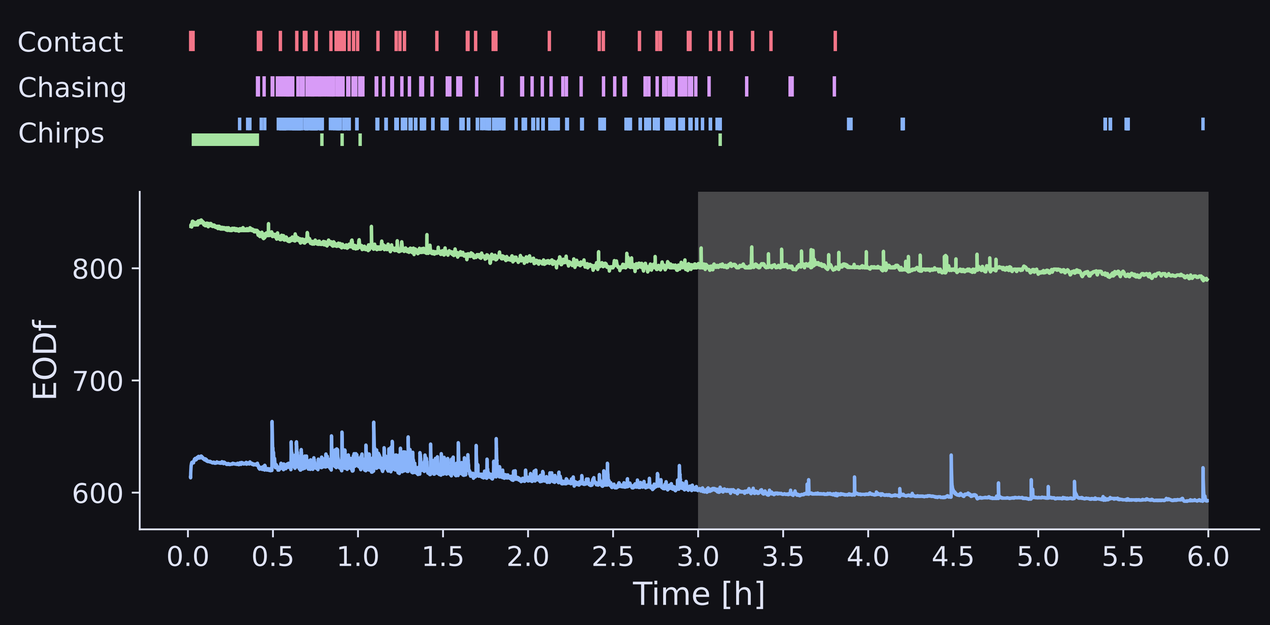


Introduction

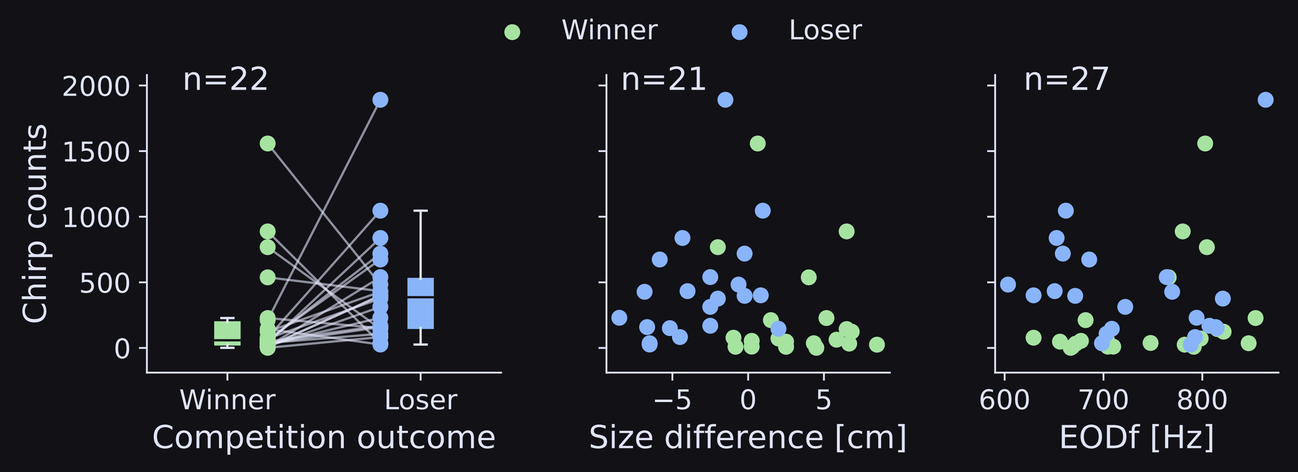
The time-frequency tradeoff makes reliable signal detecion and simultaneous sender identification by simple Fourier decomposition in freely interacting weakly electric fish impossible. This profoundly limits our current understanding of chirps to experiments with single - or physically separated - individuals.



Chirps during competition

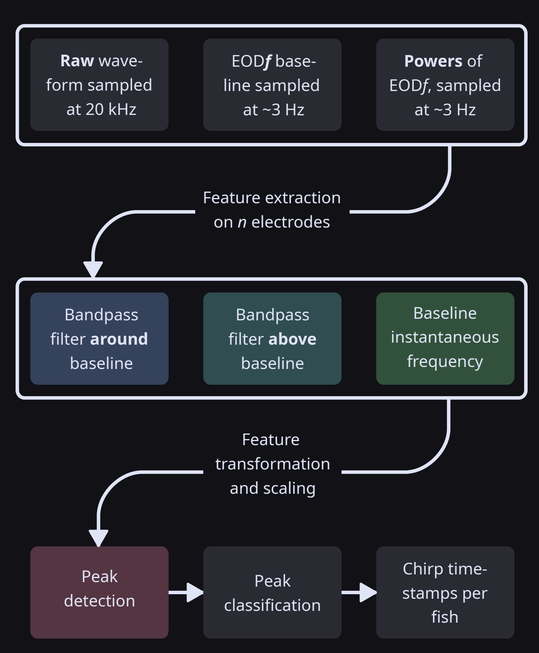


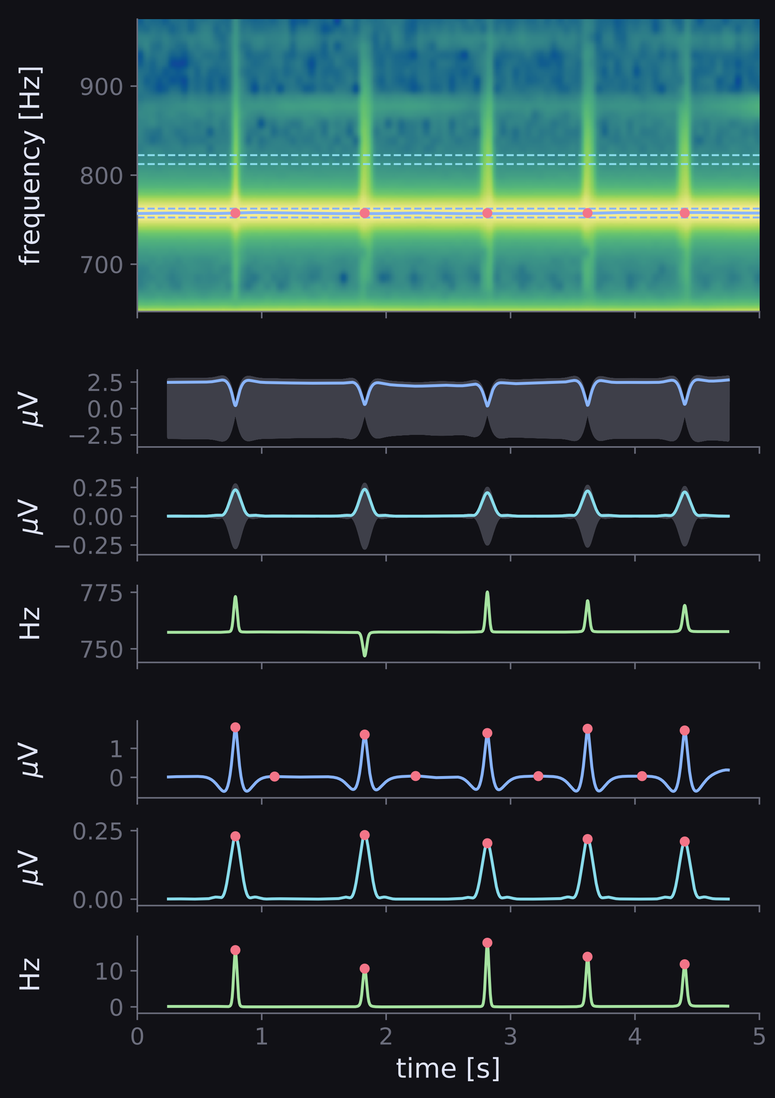
- Two fish compete for one hidding place in one tank.
- Experiment had a 3 hour long darkphase and a 3 hour long light phase.



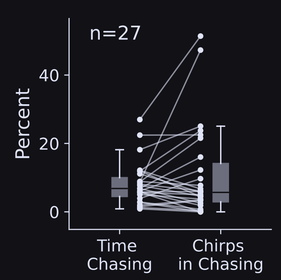
- Fish who lost the competition chirped more often than the fish who lost.
- Size has an effect on the Competition outcome, and the chirp count.
- Frequency of the fish has no effect on the competition outcome.

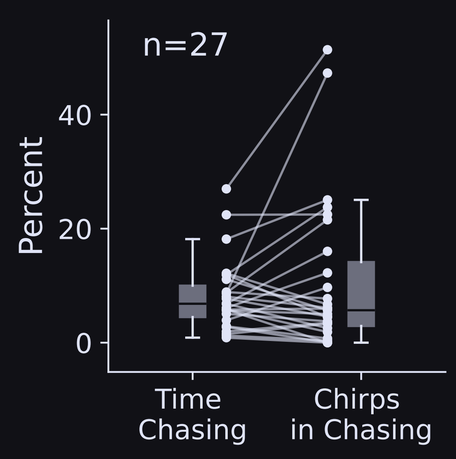
Chirp detection





Are Chirps coding for onset or offset of physical interaction?





Conclusion

- Our analysis is the first to indicate that *A. leptorhynchus* uses long, diffuse and synchronized EOD f signals to communicate in addition to chirps and rises.
- The recorded fish do not exhibit jamming avoidance behavior while close during synchronous modulations.
- Synchronous signals **initiate** spatio-temporal interactions.

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