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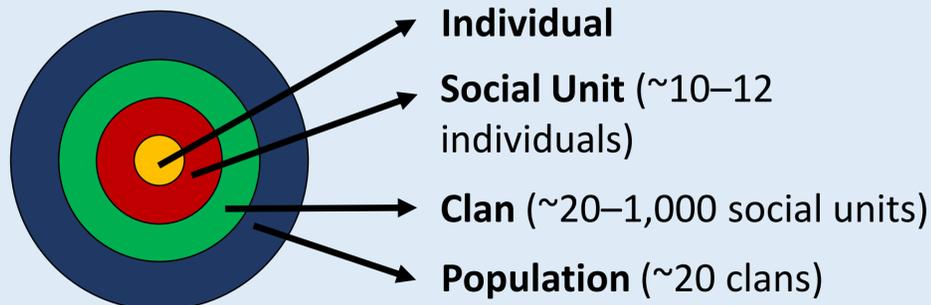
# Sperm Whale (*Physeter macrocephalus*) Acoustic Evolution: A Cultural Perspective

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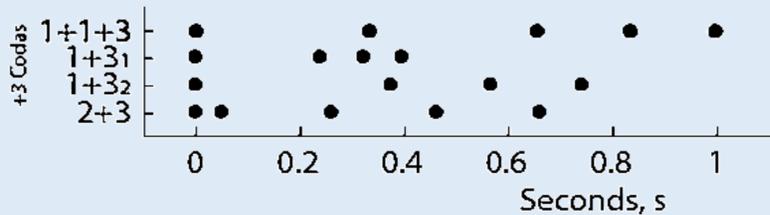
## Background

- Sperm whales have a hierarchical social structure.<sup>1,2</sup>



**Figure 1:** Sperm whale population structure is hierarchical and complemented by an intricate vocal culture.

- In social situations, sperm whales use codas (stereotyped combinations of 3–12 clicks) to communicate.<sup>3</sup> Approximately 30 different coda types are assembled into socially-learned dialects that vary by social unit and clan.<sup>3</sup>



**Figure 2:** Part of a rhythm plot from Gero et al. (2016) that shows mean timing of clicks in four different coda types.<sup>4</sup>

- Despite the apparent influence of cultural dialects on population structure, management is typically based on geography.<sup>5</sup>
- Delineating culturally-defined subgroups is difficult without a full understanding of the sperm whale vocal repertoire and **there is a deficit of data on how codas evolve over time.**<sup>6</sup>

## Acknowledgements

I would like to sincerely thank Hal Whitehead for providing invaluable guidance and data for this project. I would also like to thank Shane Gero for his immensely helpful proposal edits. Funding is provided through an Izaak Walton Killam Pre-Doctoral Scholarship and a Nova Scotia Graduate Fellowship.

## References

[1] Whitehead & Rendell (2014). [2] Weilgart & Whitehead (1997). [3] Cantor et al. (2015). [4] Gero et al. (2016). [5] NOAA Fisheries SARs (2014). [6] Whitehead (2010).

## Research Objective

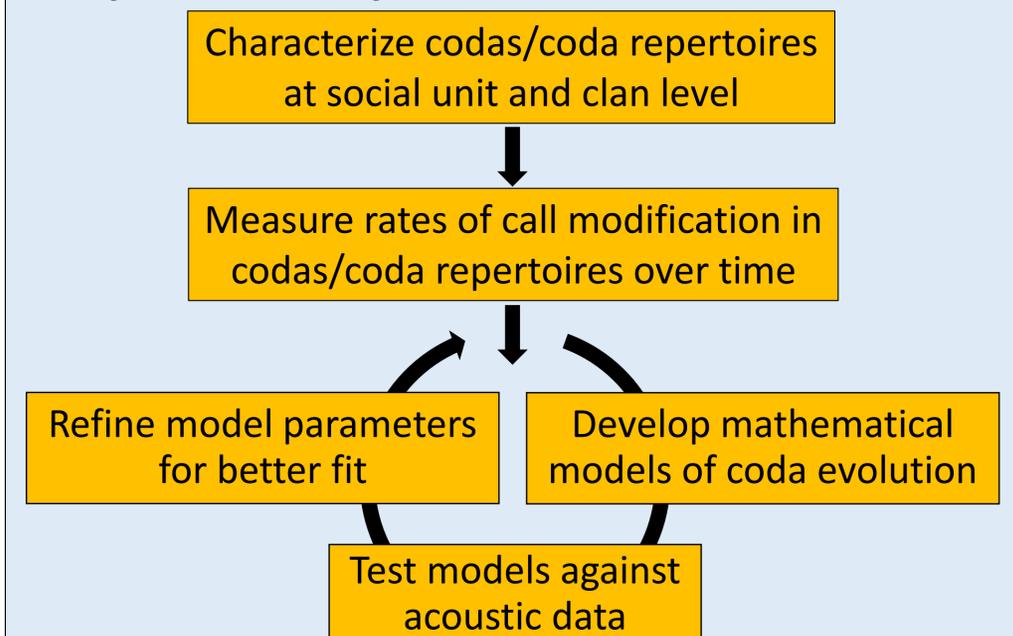
The goal of this research is to determine how coda dialects originate, evolve, and are transmitted on both a social unit and clan level.

## Methodology

### Dataset

- 29 years' worth (1985–2013) of Pacific Ocean sperm whale coda recordings from 12 social units and 4 clans.

### Analytical Pathway



**Figure 3:** Proposed analytical pathway to develop coda evolution models from Pacific Ocean sperm whale data.

## Significance

- This study will improve our understanding of how sperm whale cultural dialects change over time which, in turn, will allow us to investigate how population structure changes over time.
- Additional insights into how cultural changes influence population structure will likely facilitate improved management.
- This project also probes deeper into several fundamental scientific questions, including how vocal and social learning evolved in mammals.
- Lastly, this research is well-equipped to engage the public and facilitate a new marine ethic.