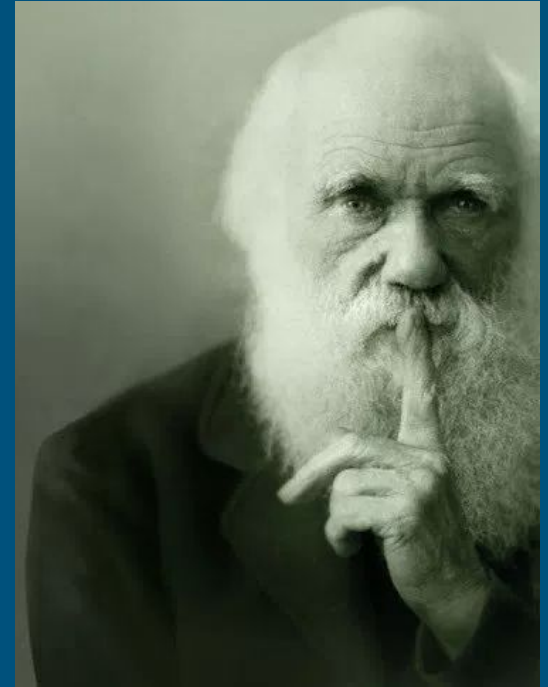
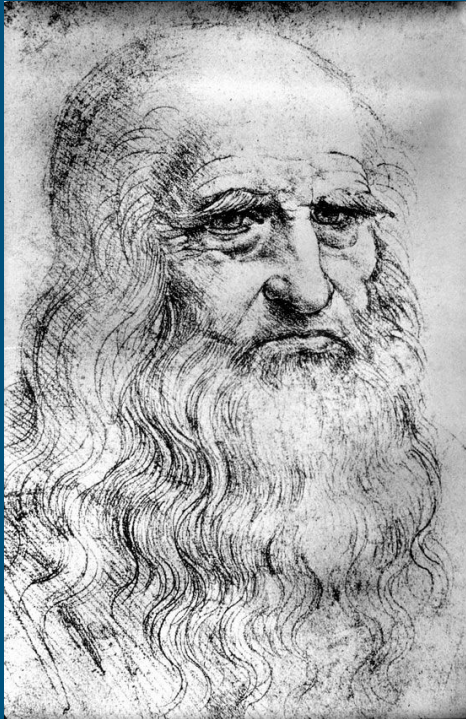


¿Qué tienen en común?



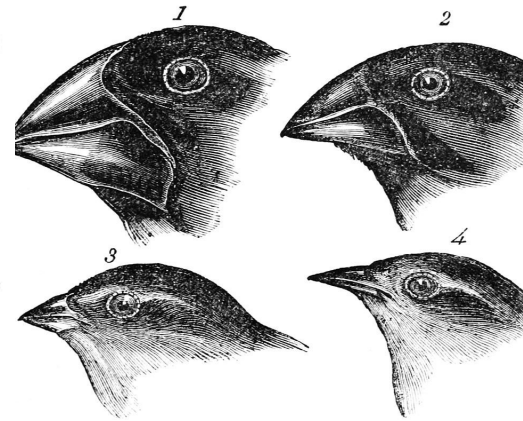
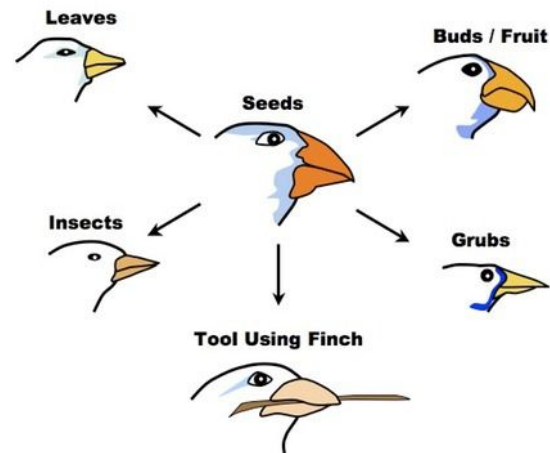
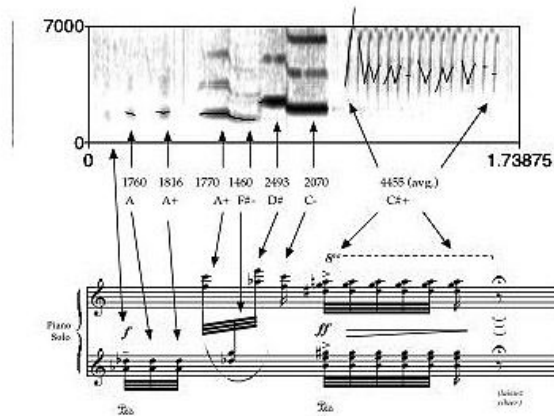
LEONARDO DA VINCI'S

Codex on the Flight of Birds *Codice sul volo degli uccelli*

Smithsonian's National Air and Space Museum
Washington, DC

SEPTEMBER 13, 2013 - OCTOBER 22, 2013

Wood thrush, spectrogram and *Oiseaux exotiques*, p. 5



1. *Geospiza magnirostris*.
3. *Geospiza parvula*.

2. *Geospiza fortis*.
4. *Certhidea olivacea*.





La música de la naturaleza



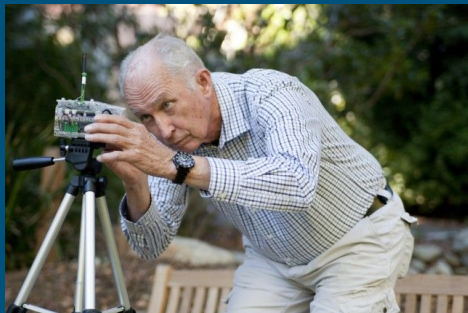
Bioacústica computacional



Investigación



Dr. Edgar Vallejo (Asesor)
Profesor Investigador del Tec de Monterrey
Bioinformática, lingüística computacional, Vida Artificial

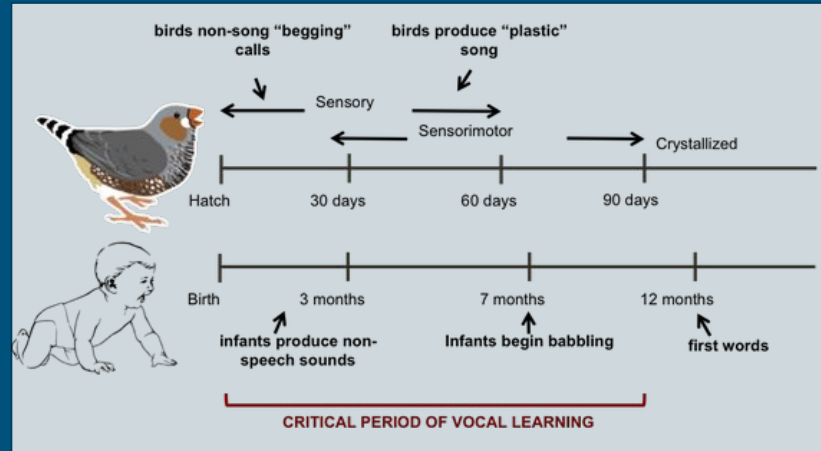
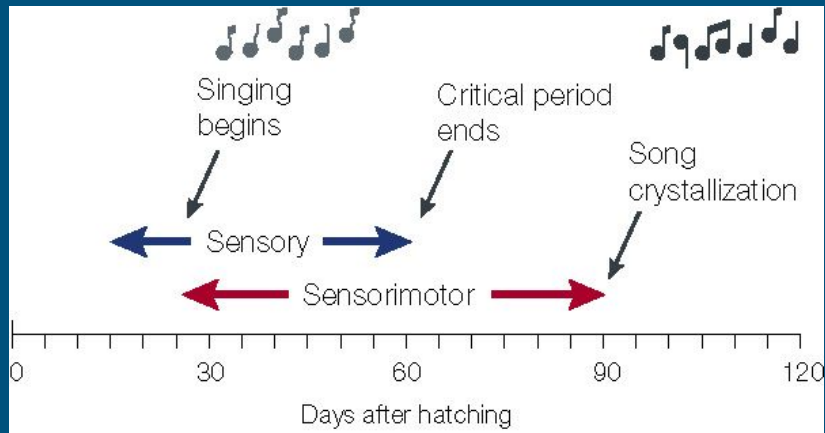


Dr. Charles Taylor (Co-asesor)
Profesor Emérito de UCLA
Vida Artificial y complejidad del canto de las aves

Unsupervised Birdsong Phrase Segmentation using Recurrent Neural Networks

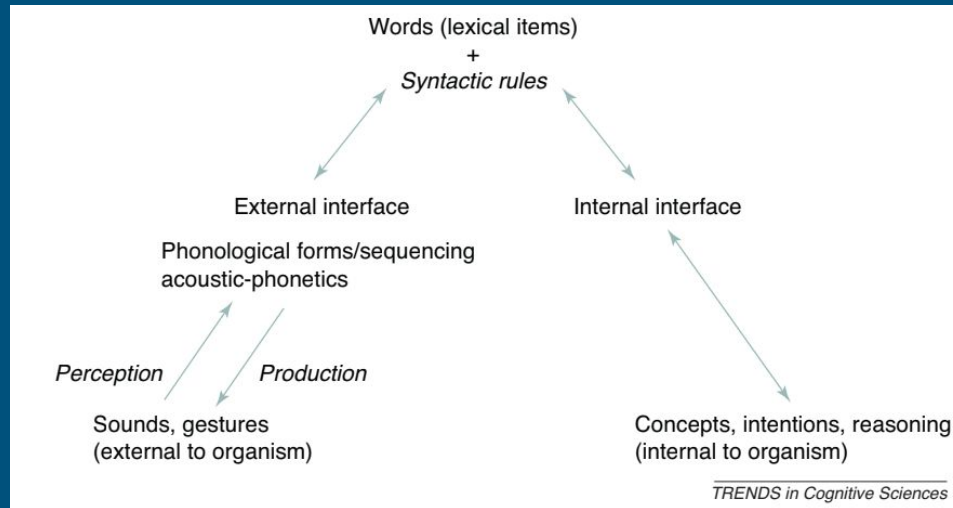
¿Por qué estudiar el canto de las aves?

Las aves son uno de los modelos más utilizados para comprender las bases neuronales del **aprendizaje**, la **audición** y el **control motor** en **animales**.



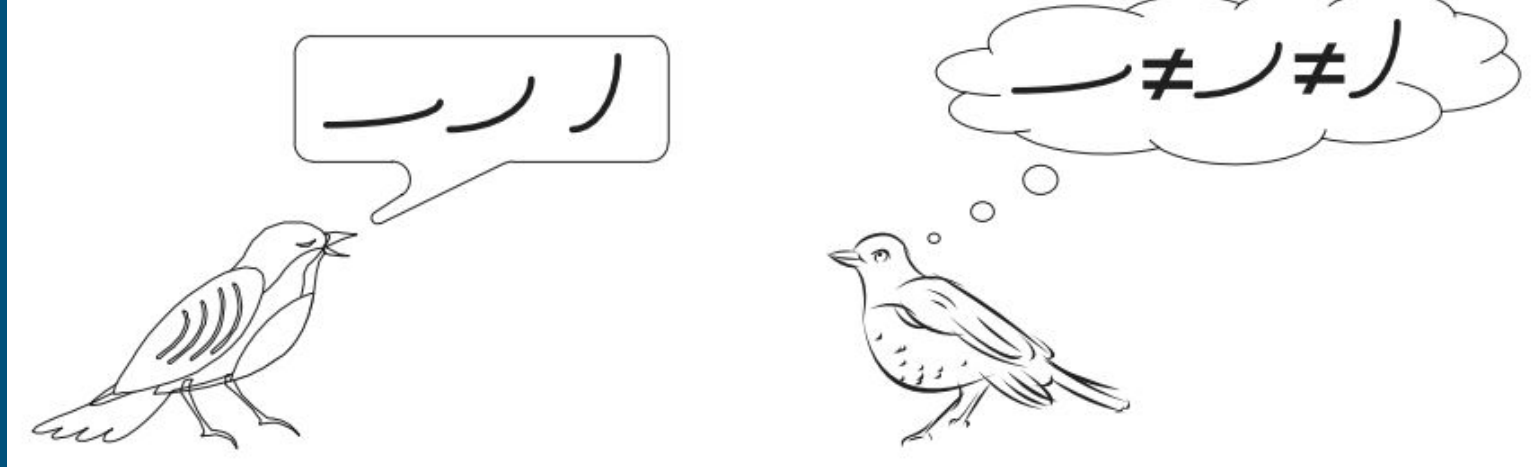
¿Por qué estudiar el canto de las aves?

El estudio de la estructura del canto permite entender cómo el **cerebro codifica** y produce **vocalizaciones aprendidas**. Esto podría ayudar a detectar **trastornos del habla** / lenguaje en los seres **humanos**.



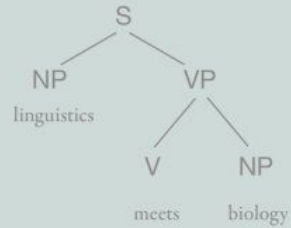
¿Por qué estudiar el canto de las aves?

La distribución geográfica de las sílabas ofrece la oportunidad de estudiar la **evolución del lenguaje** en los animales.



Birdsong, Speech, and Language

EXPLORING THE EVOLUTION OF
MIND AND BRAIN



edited by
**Johan J. Bolhuis and
Martin Everaert**

foreword by
Robert C. Berwick and Noam Chomsky



The Origins of Musicality

edited by Henkjan Honing

THE LANGUAGE INSTINCT

How the Mind
Creates Language
STEVEN PINKER



Nature's Music

The Science of Birdsong



Peter Marler
Hans Slabbekoorn

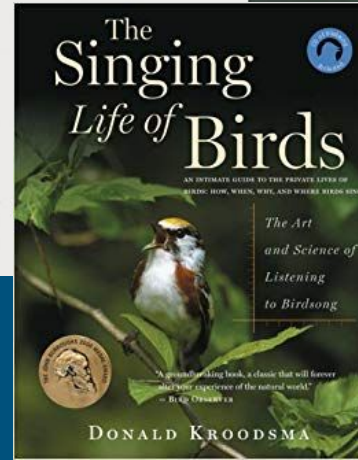
The Singing Life of Birds

AN INTIMATE GUIDE TO THE PRIVATE LIVES OF
SINGING BIRDS, WHEN, WHY, AND WHERE SINGING BIRDS

*The Art
and Science of
Listening
to Birdsong*

"A ground-breaking book, a classic that will forever
change your experience of the natural world."
— **Billie Jean King**

DONALD KROODSMA



¿Por qué cantan?

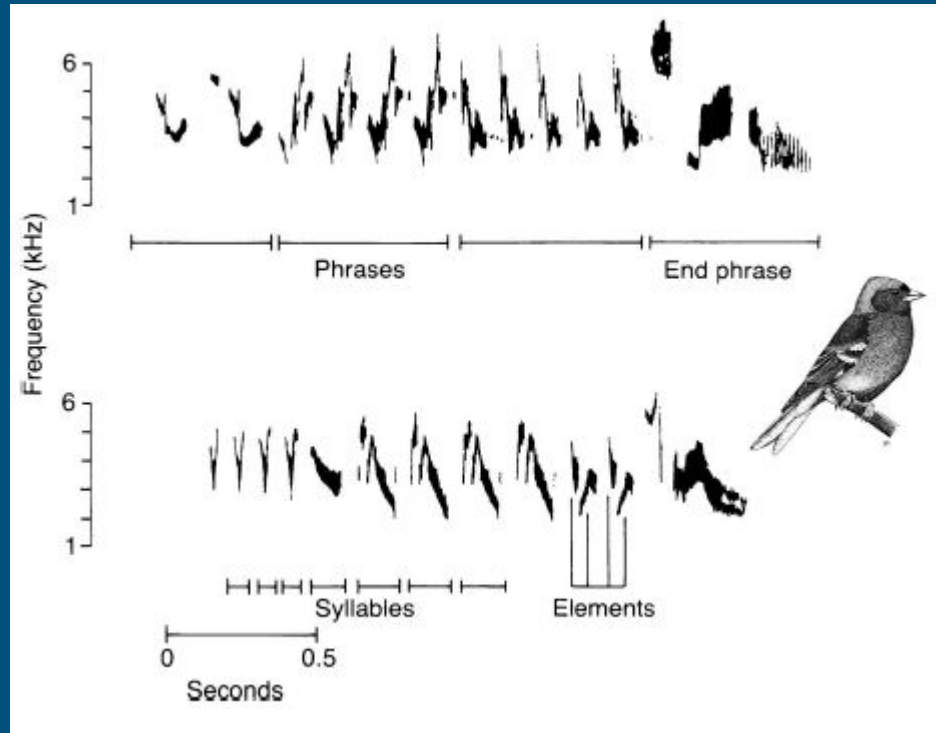
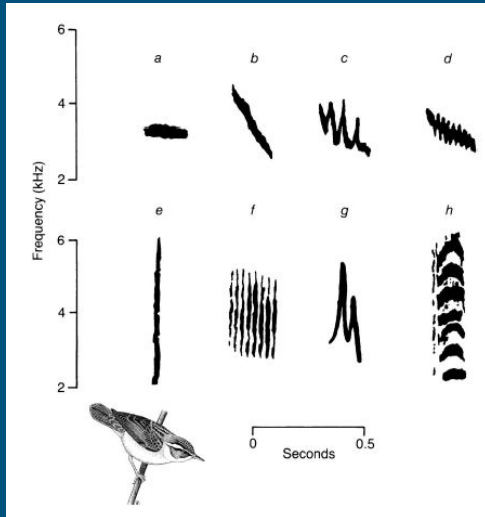
- Defensa de territorios
- Alarma
- Selección sexual (Cortejo): Cantar bien demuestra aptitud
- Placer



Vireo cassinii

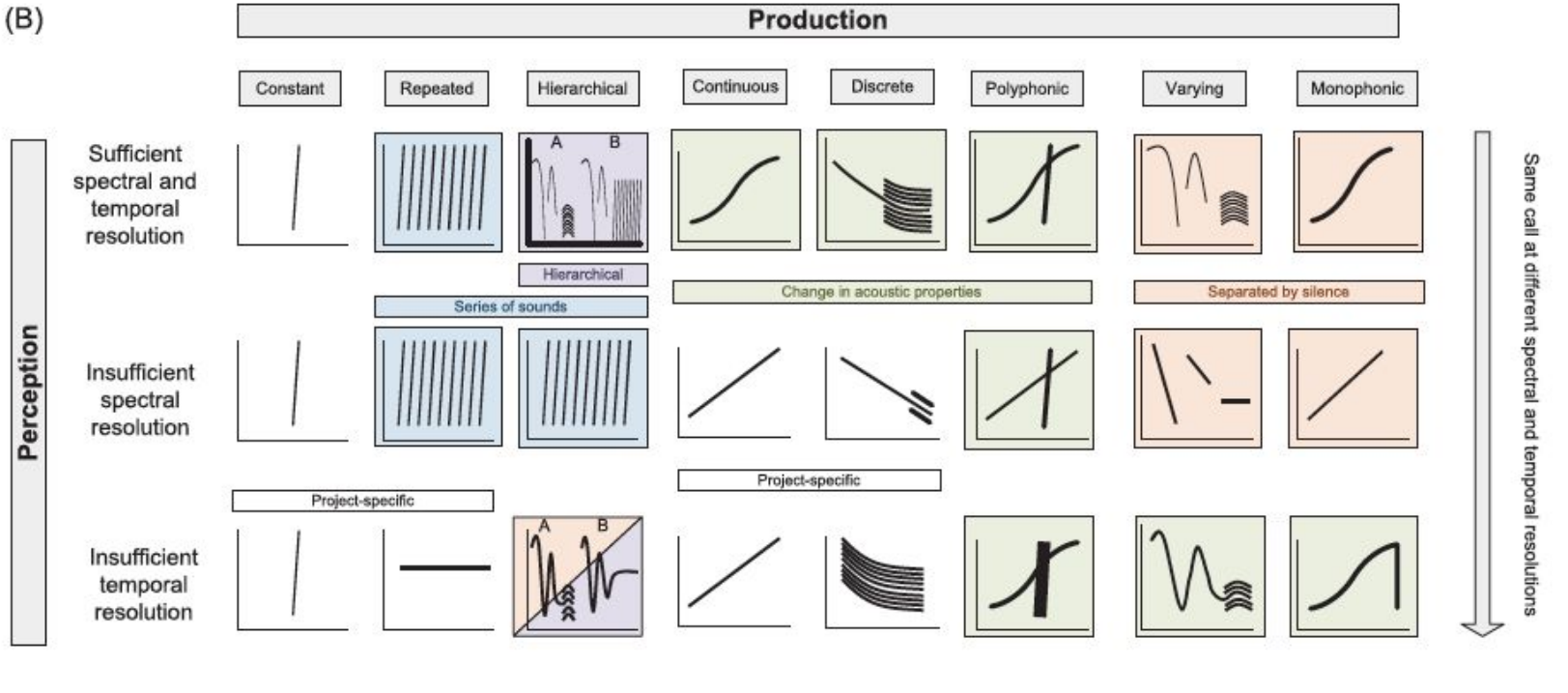
Estructura del canto

- Canciones (Songs)
- Llamados (Calls)



Estructura del canto

(B)



Estructura del canto

(A) Repetition



(B) Diversity



(C) Combination



Estructura del canto

(D) Ordering



(E) Overlapping



(F) Timing



Estructura del canto

(D) Ordering



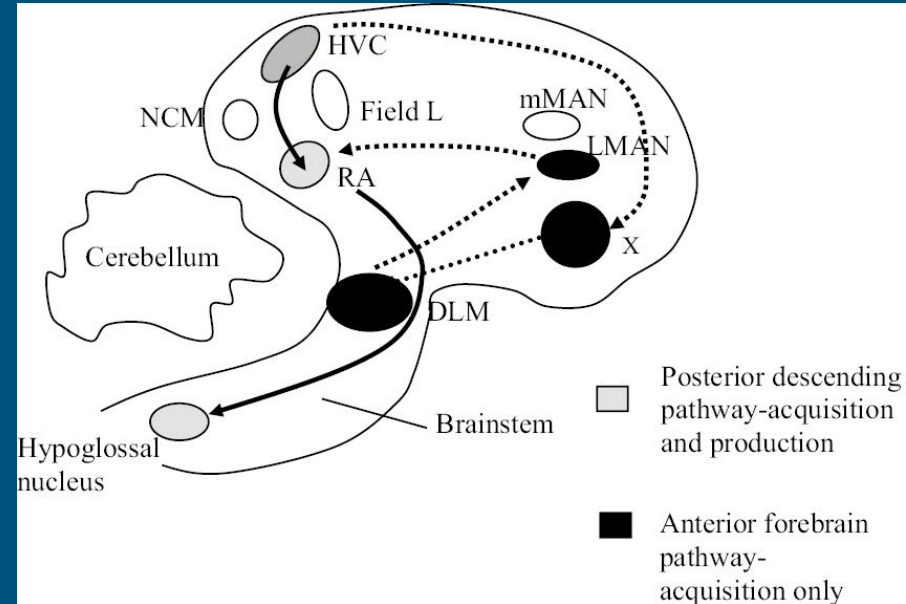
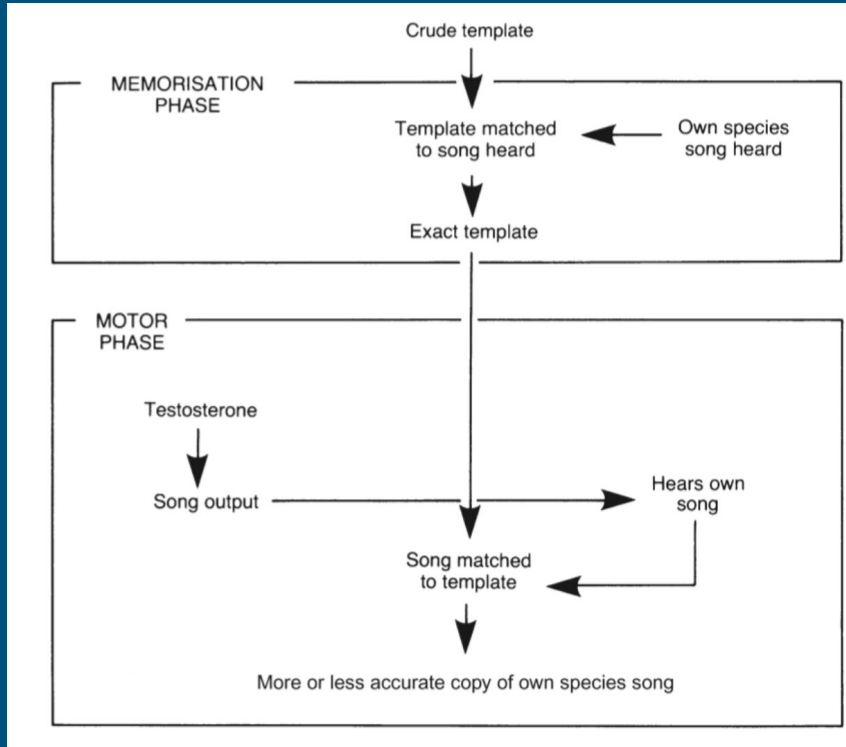
(E) Overlapping

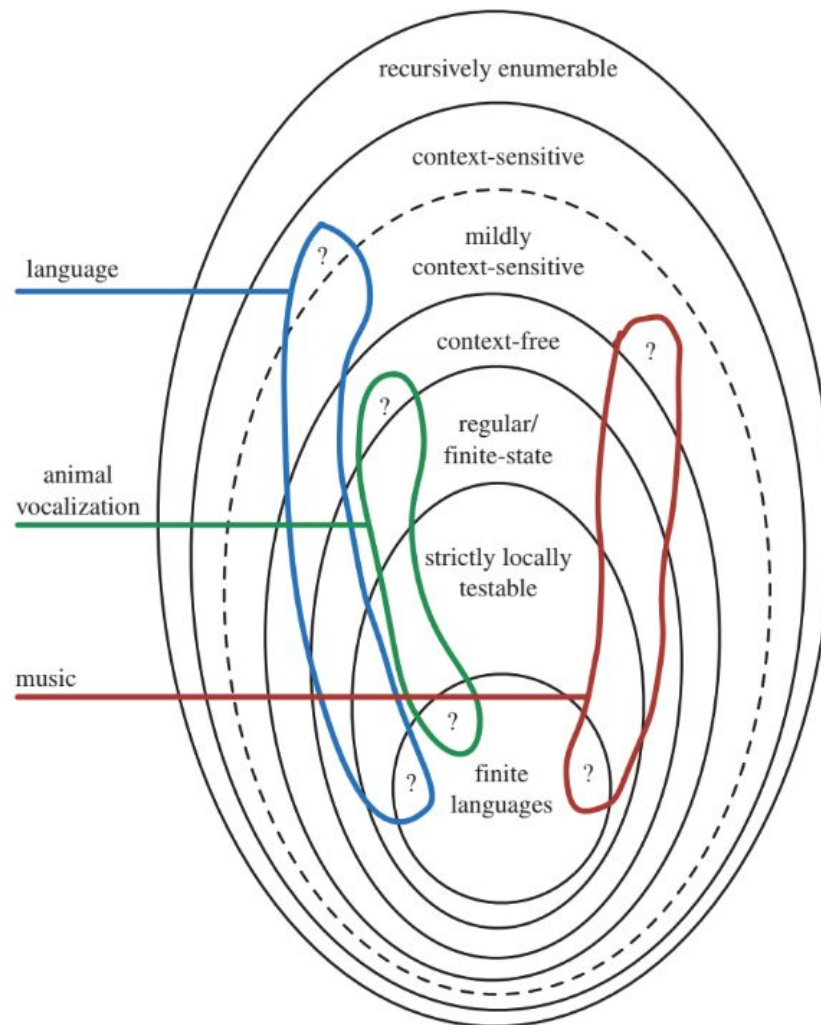


(F) Timing



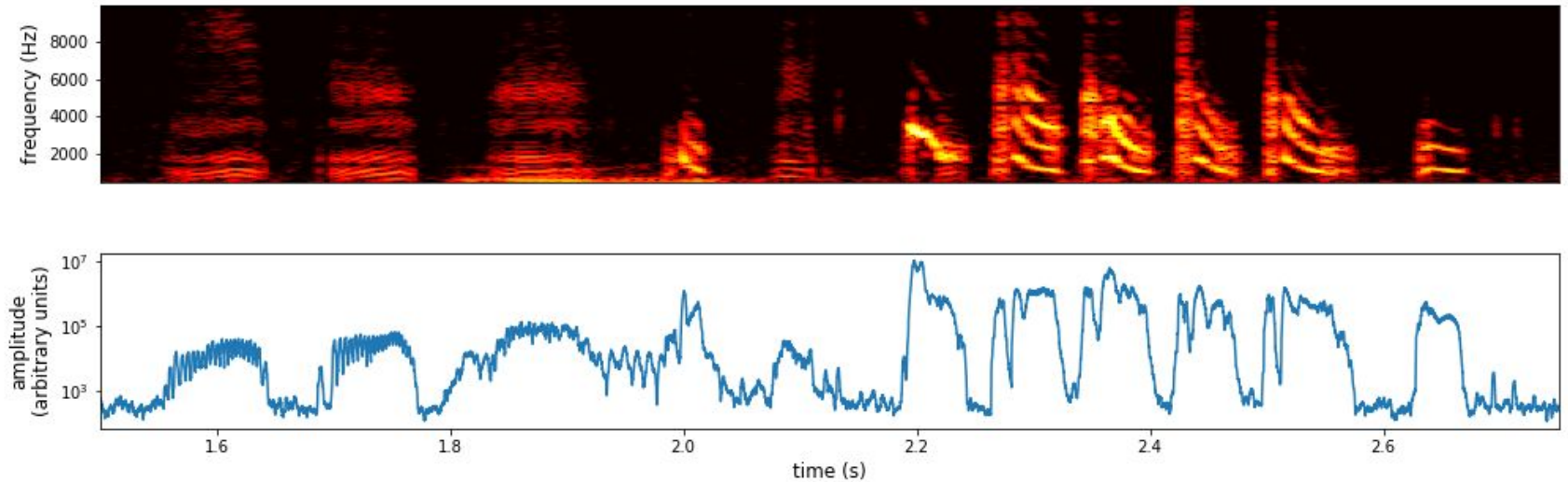
¿Cómo aprenden a cantar?

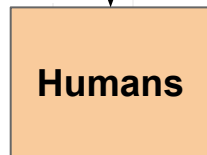
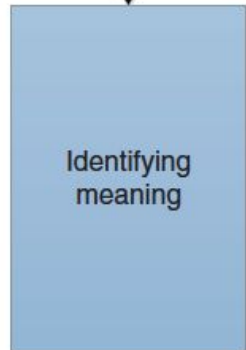
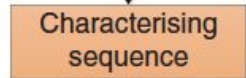
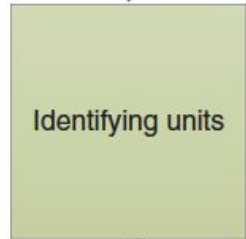
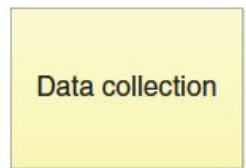




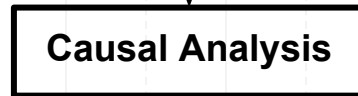
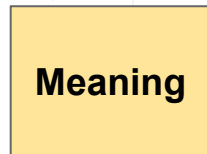
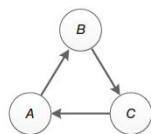
Rohrmeier et. al.
(2018)

Propuesta de Tesis

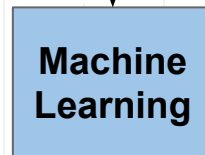




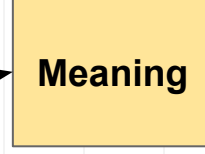
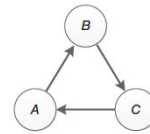
AB AB BCA

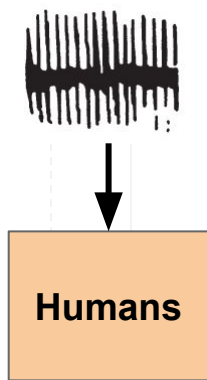
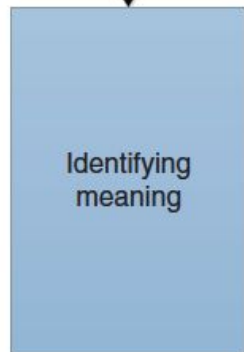
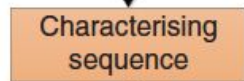
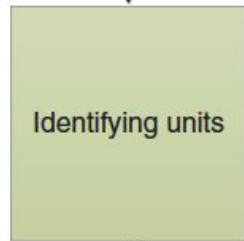
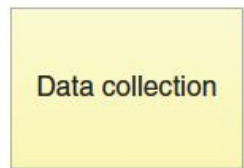


Context Information

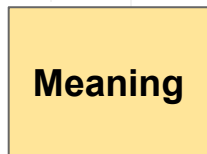
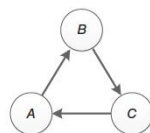


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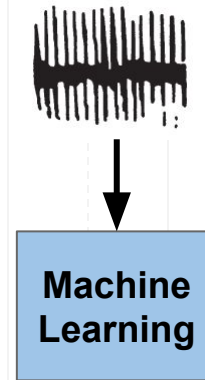




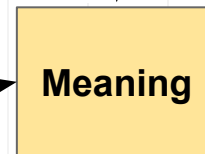
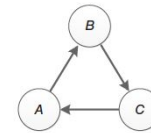
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Context Information



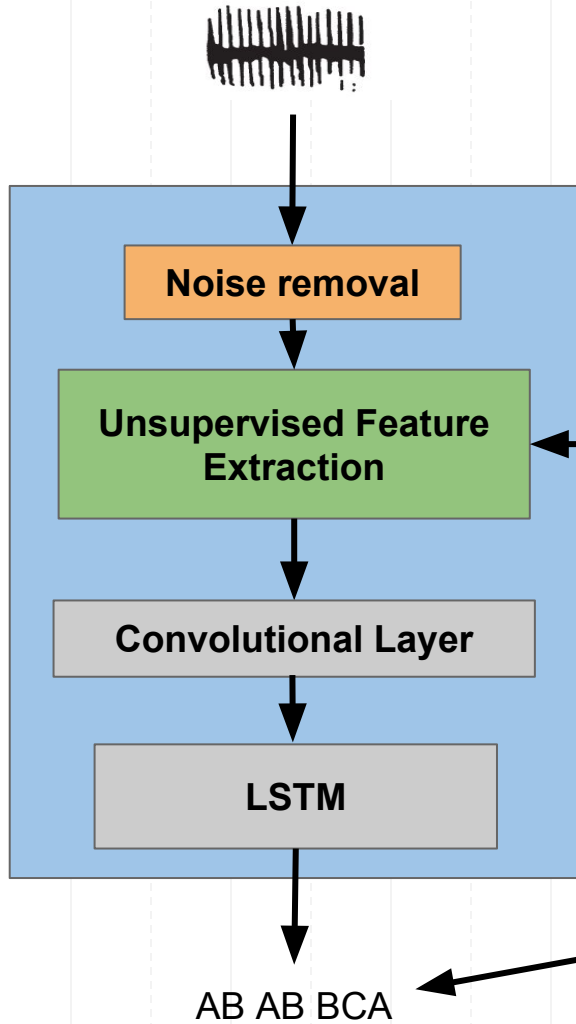
AB AB BCA



**Machine
Learning**

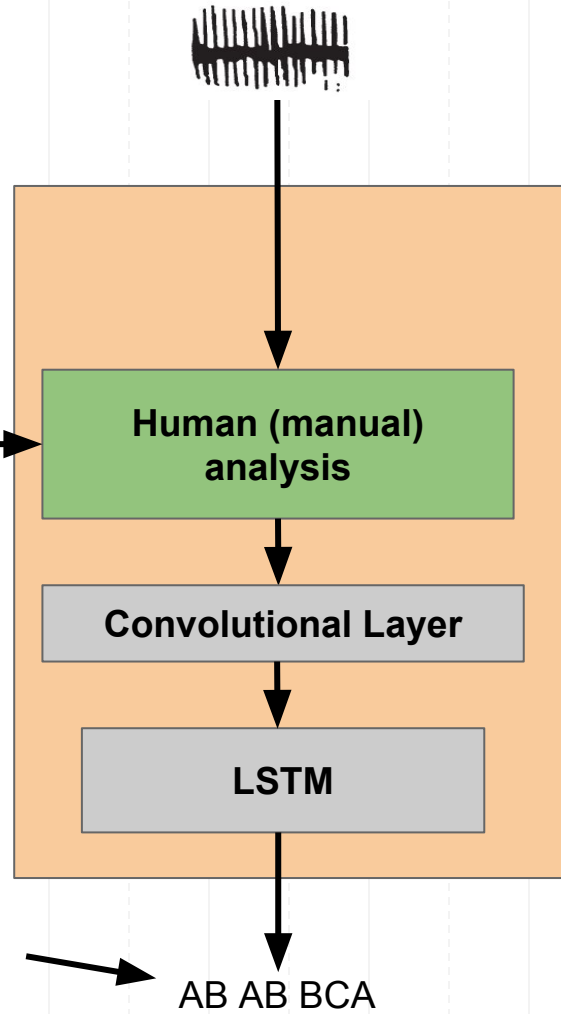
Humans

Unsupervised



Comparison

Supervised



¿Preguntas?

Santiago Rentería

www.santiagorenterialab.com // santiagorenteria25@gmail.com