

COURSE INTRODUCTION

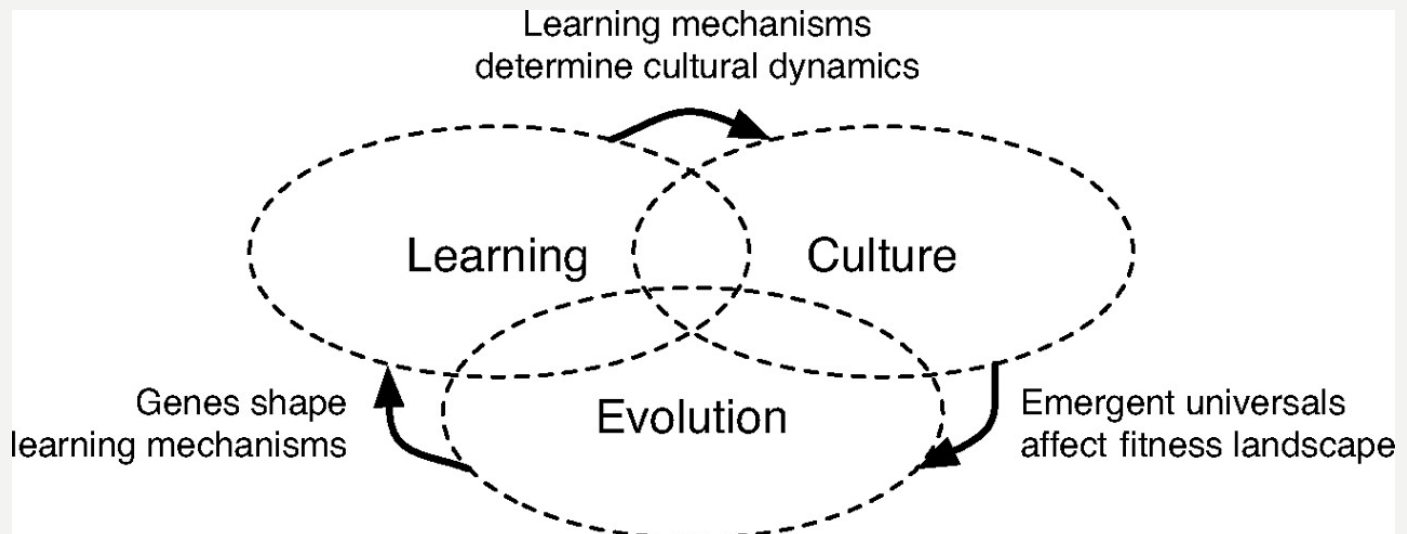
ORIGINS AND EVOLUTION
OF LANGUAGE 2021

TODAY

- Introduction to me
- Platforms
 - Course page, Learn, TopHat
- Course components
 - About the Course
 - Lectures, readings, tutorials, assessment, timeline
- Introduction to the field
 - A brief history of language evolution
 - What is language?
 - Is language unique?

WHO THE HELL IS MATT SPIKE?

- I work on **language evolution**:
 - The origins of language and communication
 - How languages themselves evolve
 - The relationship between these things
 - I use computational and mathematical models and behavioural experiments
 - I also do some philosophy...
- Did my MSc & PhD here
- Also worked in Australia at the ANU



ABOUT THE COURSE: PLATFORMS

- Because nothing is perfect, we'll be using several corners of the internet:
 - Course Website
 - TopHat
 - Learn (minimally)

WEBSITE

URL will be emailed and posted
today or tomorrow

- This site has a lot of information, including:
 - most of what I will tell you in the first half of today, but in prose
 - important links to course materials
 - an overview of the course
- You will need to visit this site often. Bookmark it!

LEARN

- The only thing you will *need* Learn for: submitting the assessments.
- Learn is also the only way *I* can contact all of you, so you may receive announcements.
 - If you can't access the Learn page for the course, let me know immediately
- In case you like Learn, I will also post slides and any other PDF material (e.g., stray readings) there - but all of this will also be available from the main course website.
- Any stray stuff on learn will be under the Readings button (slides will be under lecture notes)

TOPHAT

- Joinup details will be emailed & posted on Learn
- Go to tophat.com, jump through the hoops to sign up/login (will involve EASE)
- Reading quizzes will open and close here automatically (under Assignments tab)
- You need to signup for Tophat for the reading quizzes
 - We will also use it in class, but this is optional (you might not have or want to use your phone/laptop)



ABOUT THE COURSE: GOALS

After the course, students should be able to speak and write informedly and responsibly about the **origins of language**, know how to

- a) keep track of fresh developments in the field,
- b) think critically about new work in the field
- c) put new work in the subject context and perspective



(sort of)

ABOUT THE COURSE: FORMAT



Weekly 2hr Online Lecture (Mondays, 2pm-4pm)



Weekly Tutorial (starts in week 2) - time and place depends on your group



Weekly reading (for lecture and tutorial)



Weekly reading quizzes (on lecture reading)



Exception: **Nothing** in week 6 or 7 (to be decided) - independent reading for assessment

LECTURES



2 hours, will start promptly at 14:10. Break sometime in the middle (max 10 mins)

optional time for questions




Feel free to interrupt with questions at anytime (though might continue discussion elsewhere to move along)

LECTURERS

- Dr. Matt Spike
 - Contact: mspike@ed.ac.uk
- Dr. Frank Mollica



READINGS

- There's a lot of reading for this course (yes, you should do all of it)
 - The reading is interesting and engaging, but the subject matter is also difficult
 - To help you with this, each reading has a “pre-reading” linked on the course website. As the name implies, read this *before* the main reading, it will help.
 - Each week's reading **preps** for the following week's lecture - lectures are designed for an audience that has already done the reading
- 

READINGS

- The main course text is Fitch, T. (2010). *The Evolution of Language*, Cambridge University Press. (Available in library HUB, online via EASE, Blackwell's)
- All other readings will be either:
 - Available from the Google
 - available from a paywalled journal you can access through EASE login
 - OR
 - pdf posted on Learn



The Evolution of Language

W. Tecumseh Fitch

CAMBRIDGE

READINGS

- You should know how to use EASE/DiscoverED/Google Scholar to find literature when you have the full reference
 - This is a general extendable skill you will need in order to find literature for your essays
- Readings not available in this way (e.g., paywalled, from a book) are already posted as PDFs under readings on Learn
- There is also a resource list on Learn, but this isn't live yet

READING QUIZZES

- Each week (this one too!) there will be a reading quiz to
 - Help you assess your understanding of the material
 - Help me assess your(pl) understanding of the material
- Format:
 - multiple choice, fill in the blank, match, or similar
 - will generally be 6-8 questions
 - space for feedback - I will look at this and use it!
- Quizzes are compulsory. They will automatically open on TopHat at 6pm after each lecture, and close at 1pm before the next lecture.

TUTORIALS

Your tutors are:

- Vittoria Moresco
- Amir Bin Mustaffa
- Lauren Fletcher

Tutorials **start in week 2**; from week 3 sometimes in “debate” style:

- you will be assigned a team (1 or 2)
- do your team’s reading and be prepared to defend it

Tutorial readings are separate from class readings. Do both.

- Attendance will be taken at tutorials, and attendance is **compulsory**.

ASSESSMENT

- Trying to do something **a little different**
 - Focus on **collaborative, meaningful work**
1. **Collaborative annotation**
 2. **Wiki creation**
 3. **Not just essays: podcasts, videos, free-form avant-garde videogames, cross-modal synaesthetic art odysseys, you name it (if I give it the OK)**
 4. **You can still do an essay if you want**

ASSESSMENT

- **Honours Students:**
 - Essay (2000 words) **due Thurs Nov 28th at 12 noon**
 - Exam, date TBD - 2 hours, 12 short answer questions (8pts each, a generous 4pt bonus for showing up)
- **MSc Students:**
 - Essay 1 (1500 words) **due Thurs Oct 31st at 12 noon**
 - Essay 2 (1500 words) **due Thurs Nov 28th at 12 noon**
- Full essay guidelines (and list of questions) can be found on the website and on Learn (under Readings)

**(ABOUT
THE
COURSE
OVERVIEW
WE JUST
DISCUSSED)**

QUESTIONS?



INTRODUCTION

A BRIEF HISTORY OF...
LANGUAGE EVOLUTION,
DEFINING LANGUAGE,
THE UNIQUENESS OF
LANGUAGE

LINGUISTS AND NON-LINGUISTS

- If you are an honours student, this lecture includes some review, consider it a refresher.
- If you are an MSc coming from outside linguistics, you might want to read Cuskley (2017), which is a broad primer on linguistics (available on Learn)



Triassic

Permian

Pennsylvanian

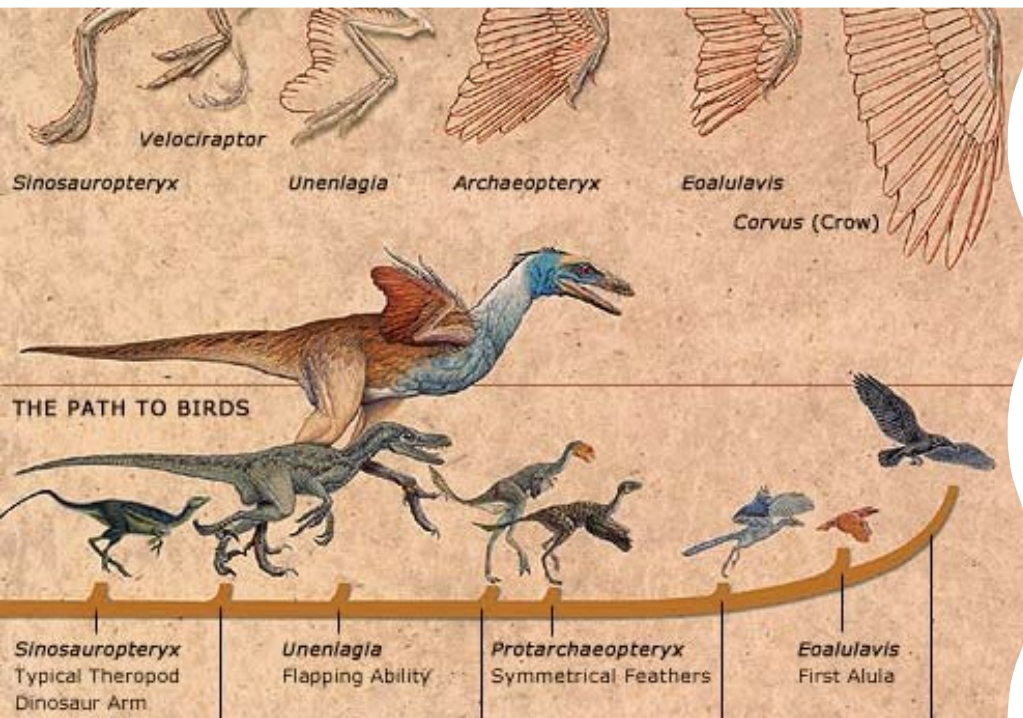
Mississippian

Devonian

Silurian

HOW TO STUDY EVOLUTION?

- How we study anything:
 - look for (physical) evidence
 - organise the evidence
 - create model(s) which explain the evidence
 - if possible, test the model(s)





Language is an adaptive feature, just like any other feature found in any organism's biology



Language is an innate feature of the human mind



Language evolved by natural selection under pressure for communication

A BROAD (POTENTIAL) MODEL



Language is an **adaptive** feature, just like any other feature found in any organism's **biology**



Language is an **innate** feature of the human **mind**



Language evolved by **natural selection** under pressure for communication

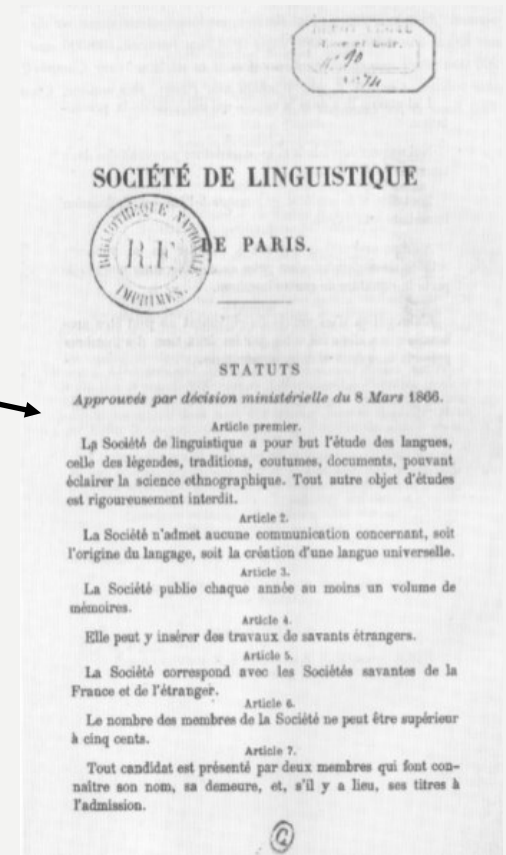
A BROAD (POTENTIAL) MODEL

HOW (NOT TO) STUDY LANGUAGE EVOLUTION

“The society will accept no communication dealing with either the origin of language or the creation of a universal language” (1866)

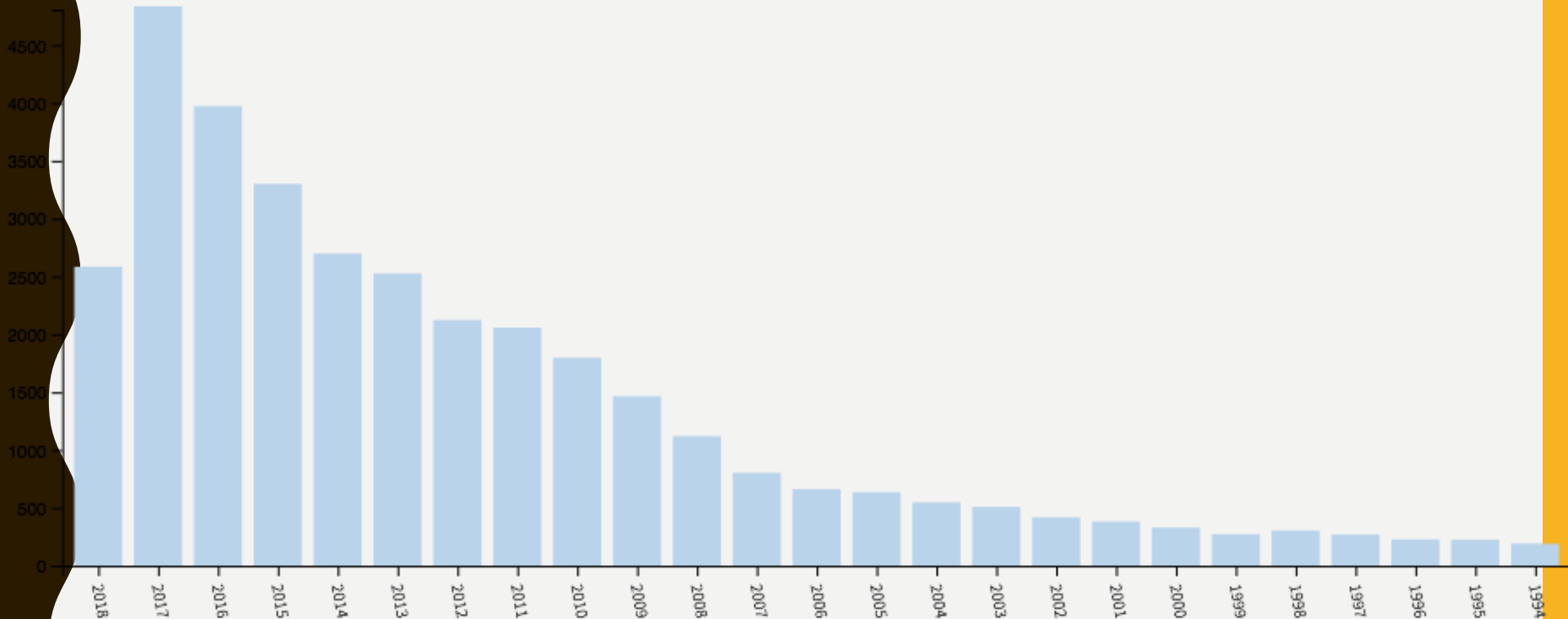
“Evolution has little to say, as of now, about such matters as language” (Chomsky, 1986)*

*though see <https://www.nybooks.com/articles/1996/02/01/language-and-evolution/>



THE (SERIOUS) STUDY OF LANGUAGE EVOLUTION

- Only seriously studied by a coherent community in the last ~30 years
 - though many more isolated efforts earlier on
- Arguably taken off a bit





Inherently of popular interest => weird, uninformed lay theories



Inherently interdisciplinary (linguistics, psychology, biology, computer science, mathematics, anthropology, archaeology...)



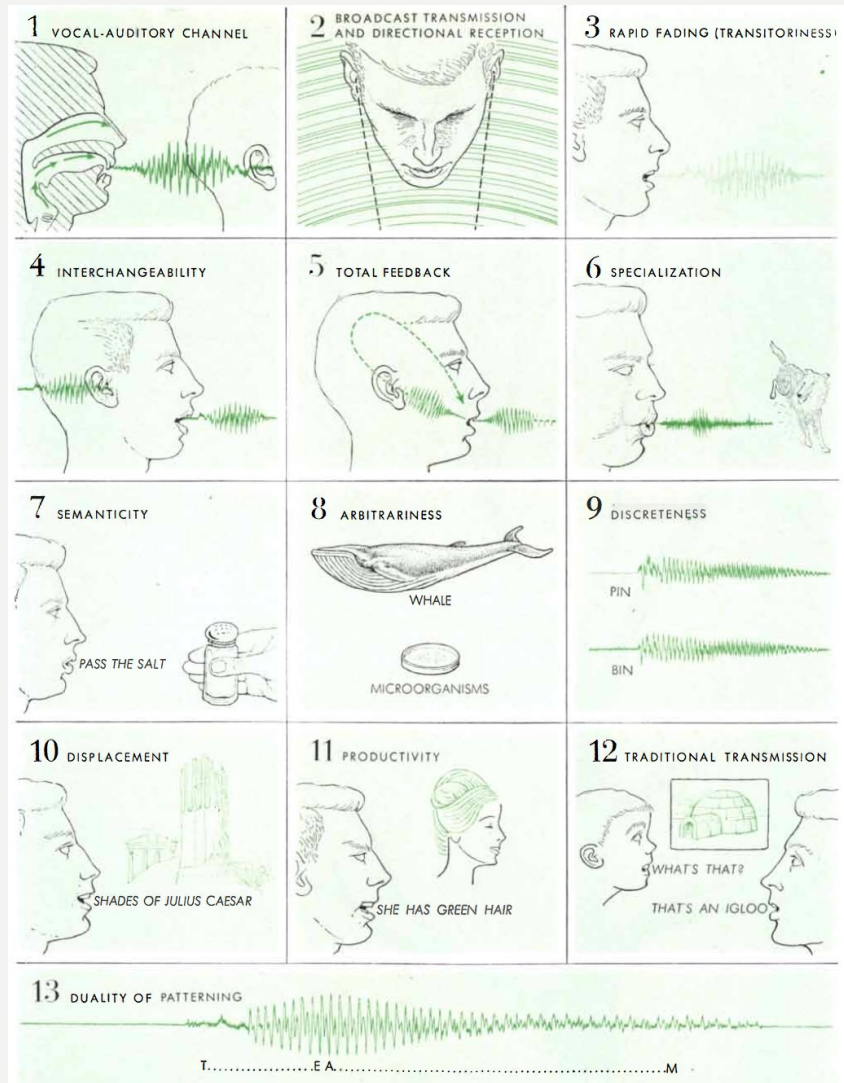
Language doesn't fossilise - requires creative methodology

LANGUAGE EVOLUTION: CHALLENGES

WHAT IS LANGUAGE?



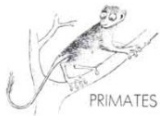







DEFINING LANGUAGE



Hockett, C. (1960). The Origin of Speech, *Scientific American*, 203(3).

DESIGN FEATURES

 MAN	DISPLACEMENT PRODUCTIVITY DUALITY OF PATTERNING	TOOL-MAKING AND CARRYING LARYNX AND SOFT PALATE SEPARATED HUMOR VOWEL COLOR MUSIC
 HOMINOIDS	DISCRETENESS TRADITIONAL TRANSMISSION	BIPEDAL LOCOMOTION, NOT UPRIGHT OCCASIONAL TOOL USING
 PRIMATES	SPECIALIZATION SEMANTICITY ARBITRARINESS	HANDS HAND-EYE COORDINATION BINOCULAR VISION MOBILE FACIAL MUSCLES OMNIVOROUS?
 (LAND) MAMMALS	BROADCAST TRANSMISSION AND DIRECTIONAL RECEPTION INTERCHANGEABILITY RAPID FADING TOTAL FEEDBACK VOCAL-AUDITORY CHANNEL	SOCIAL BEHAVIOR "PLAY" WARM BLOODEDNESS
 REPTILES		LAND EGG BREATHING WITH THORACIC MUSCLES
 AMPHIBIANS		LEGS SLEEPING VERSUS WAKING EXTERNAL EAR
 VERTEBRATES		VISION HEARING (INTERNAL EAR)
 CHORDATES		MOTILITY BILATERAL SYMMETRY FRONT AND REAR ENDS

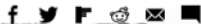
ALIEN LANGUAGE

SCI-TECH / LEER EN ESPAÑOL

Alien languages might not be that different from ours

ETs may share a kind of 'universal grammar' with us, say leading linguists like Noam Chomsky.

BY ERIC MACK / MAY 26, 2018 10:00 AM PDT



In the first of a series of articles on how science fiction is influencing research in linguistics, Hannah Little focuses on aliens.

Babel-on

hlittle.com



HOW TO LEARN MARTIAN

By CHARLES F. HOCKETT

Once upon a time, people thought that a vocabulary and the grammar rules were the whole story on learning a language. But modern linguistics finds it's both more complicated, and also somewhat simpler than that . . .

Illustrated by Fress

PNAS

Cumulative cultural evolution in the laboratory: An experimental approach to the origins of structure in human language

Simon Kirby^{1*}, Hannah Cornish², and Kenny Smith²

¹School of Philosophy, Psychology, and Language Sciences, University of Edinburgh, Edinburgh EH8 9LL, United Kingdom; and ²Division of Psychology, Northumbria University, Newcastle-upon-Tyne NE1 8ST, United Kingdom

Edited by Dale Purves, Duke University Medical Center, Durham, NC, and approved June 6, 2008 (received for review August 20, 2007)

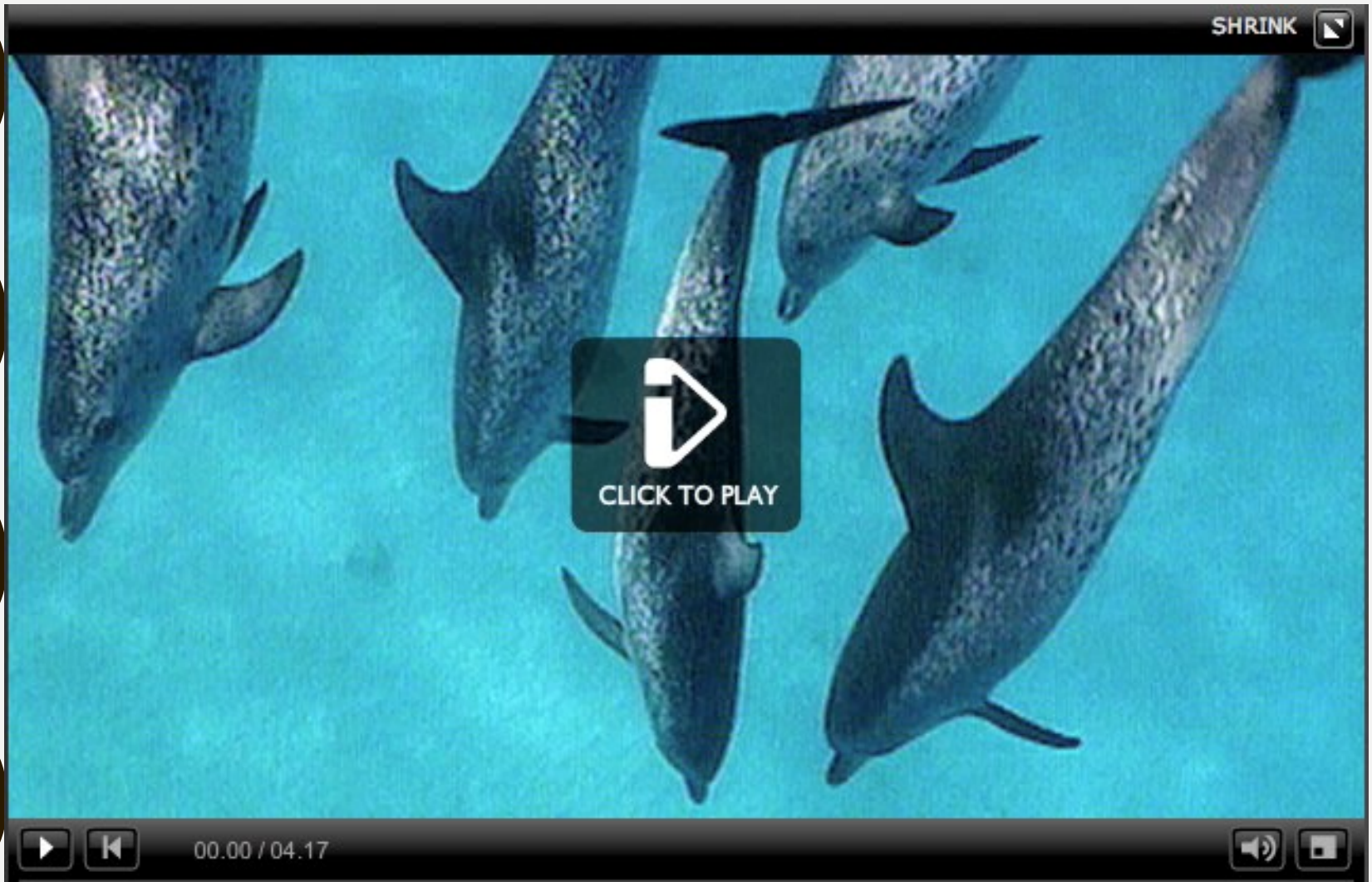
Design of Experiment 1. Participants are asked to learn an “alien” language made up of written labels for visual stimuli. The stimuli are pictures of colored objects in motion, and the labels are sequences of lowercase letters (see Fig. 1 for an example and the *Methods* section for more details).

For training purposes, the language to be learned (a set of string–picture pairs) is divided randomly into 2 sets of approximately equal size: the SEEN set and the UNSEEN set. A participant is trained on the SEEN set, being presented repeatedly with each string–picture pair in random order (see *Methods* for details). During subsequent testing, participants are presented with a picture and asked to produce the string they think the alien would give for that picture. Participants are tested on both the SEEN and UNSEEN sets in their entirety.

DESIGN FEATURES

- Observe some behaviours
- Focus on:
 - Displacement
 - Productivity
 - Cultural transmission
 - Arbitrariness/Semanticity

DOLPHINS



HONEYBEES



HUMANS



WHAT/WHERE IS LANGUAGE?

- Takeaways:
 - What if a behaviour is difficult to observe?
 - What if something which meets an operational definition conflicts with our intuitions?
 - What if a strong intuition doesn't meet operational standards?
- What/where is the data?

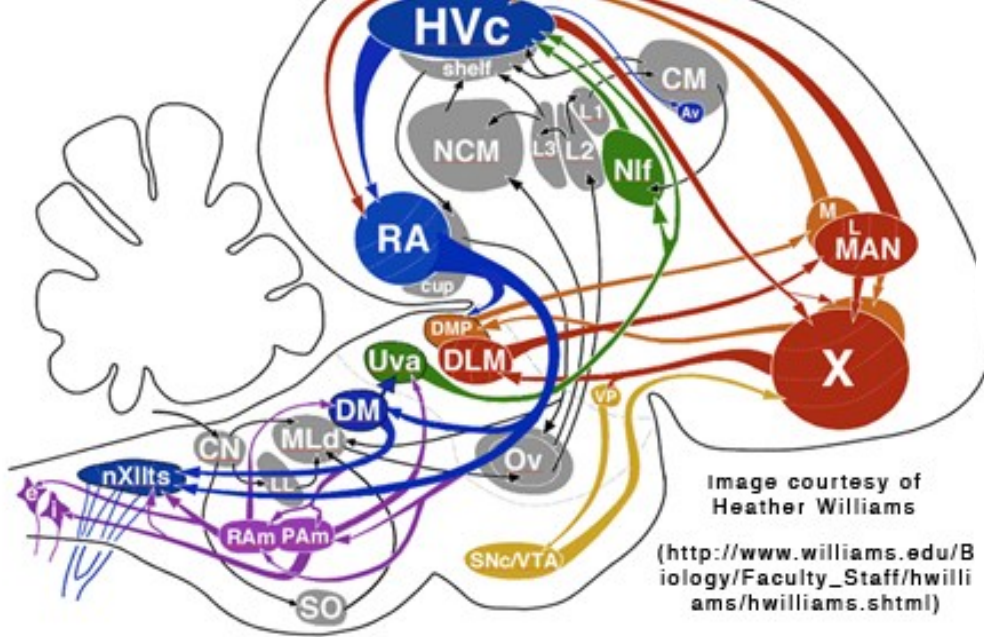
NIKOLAAS TINBERGEN, “ON THE AIMS AND METHODS OF ETHOLOGY” (1963)

- “It just is a fact that we still are very far from being a unified science, from having a clear conception of the aims of study, of the methods employed and of the relevance of the method to the aims.”
- Widespread disagreement between ethologists regarding **‘what their science is about’** and **description vs theory**
- Tinbergen outlines a solution





WHY DO MAGPIES SING?

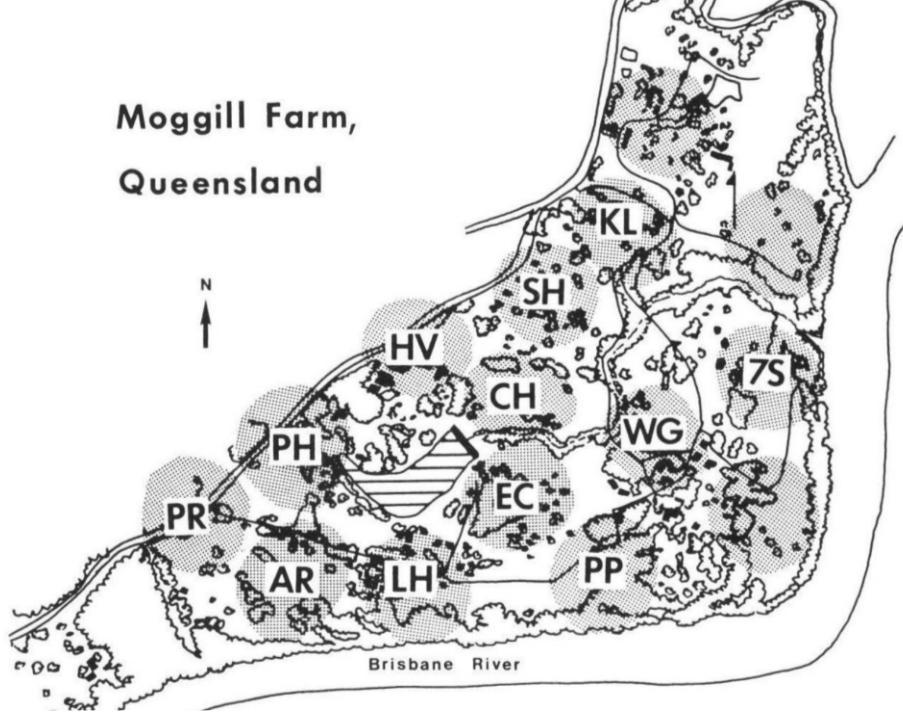


Q: WHY DO MAGPIES SING?

A: Dedicated neural circuitry

Songbird Circuit Diagram





**Q: WHY DO
MAGPIES SING?**

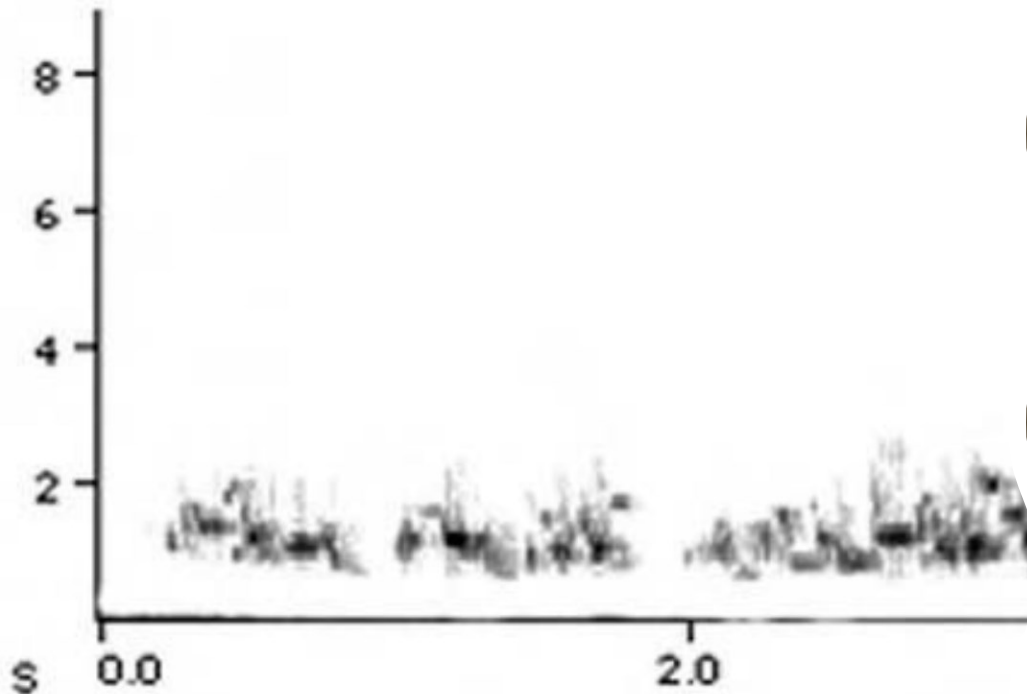
A2: They learn from each other





Q: WHY DO MAGPIES SING?

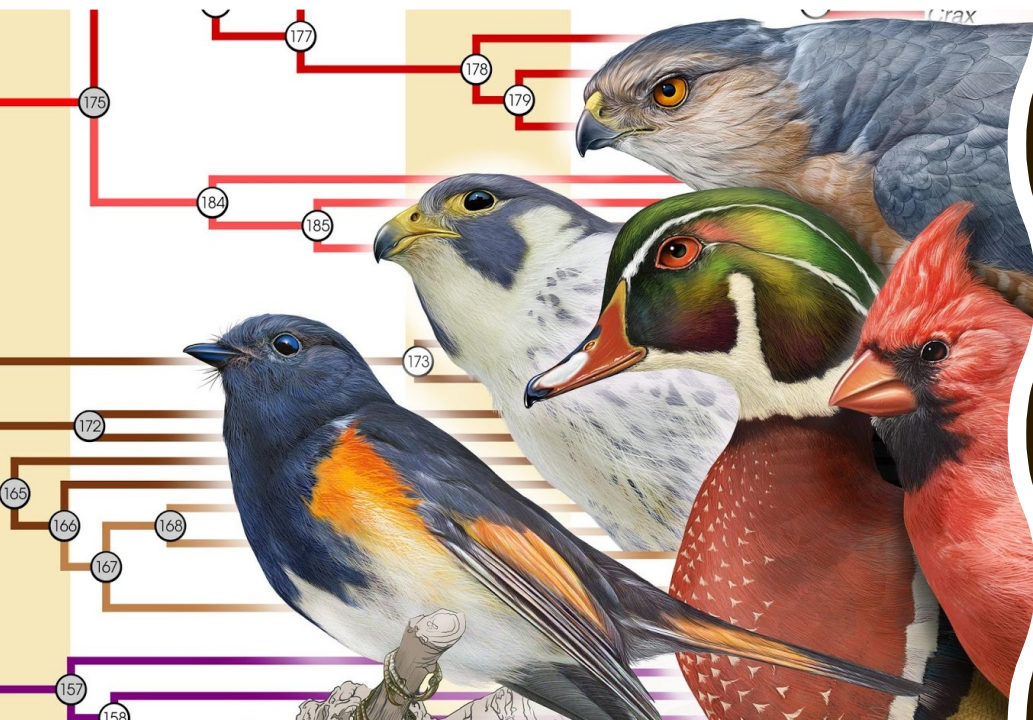
A3: Mark territory, raise alarm, indicate food, call attention, indicate food, beg, bond, for leisure...



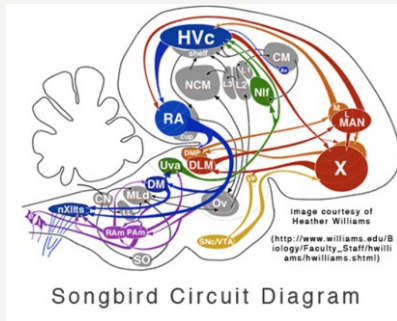


Q: WHY DO MAGPIES SING?

A4: Singing was selected for, i.e. singing birds in certain environments/niches had more viable offspring



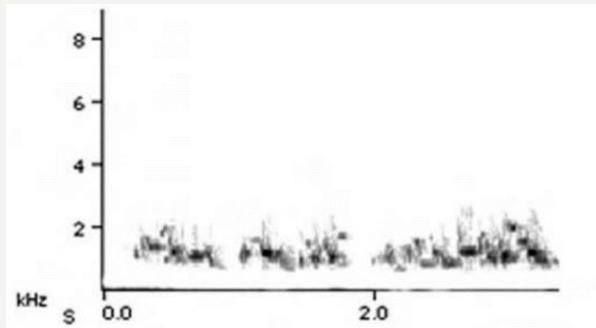
DIFFERENT KINDS OF EXPLANATION



Mechanism



Acquisition



Function



Phylogeny

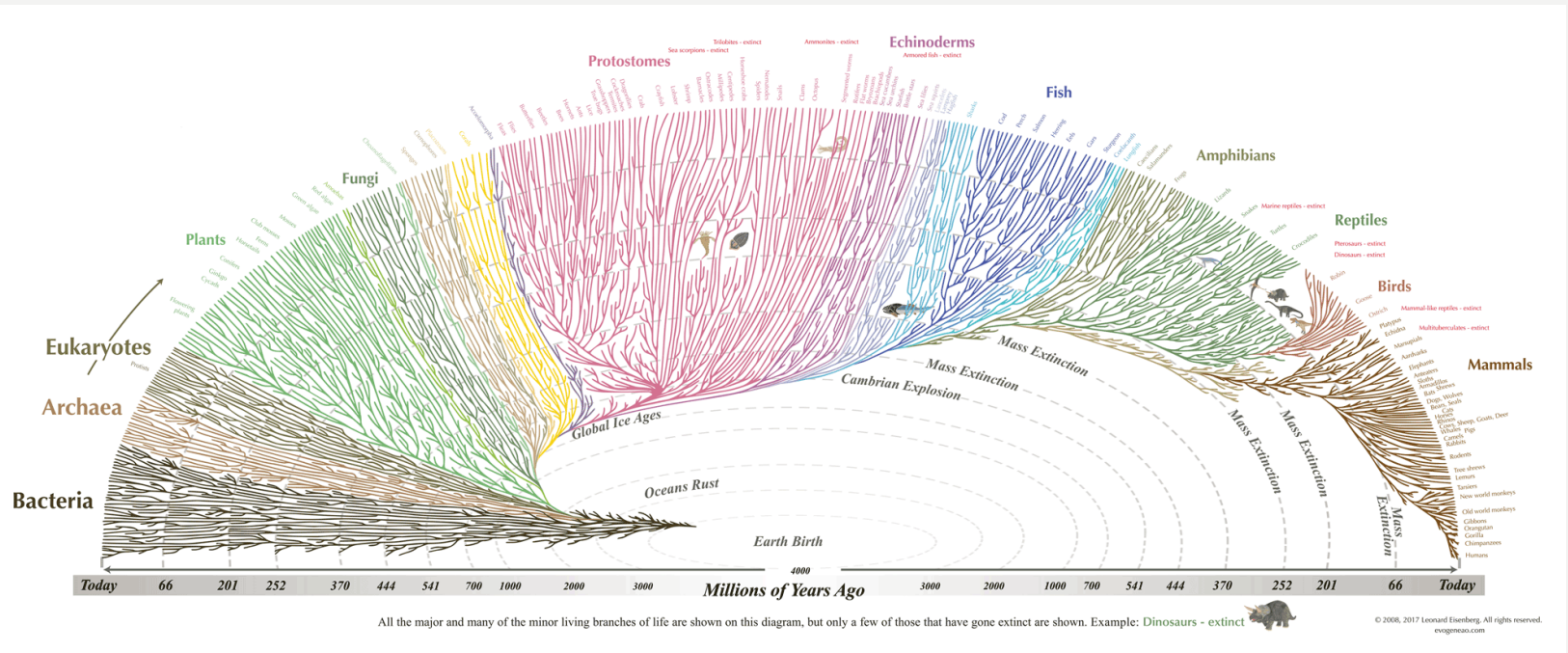
TINBERGEN'S FOUR QUESTIONS

Complementary
Explanations

Good evolutionary
thinking!

	snapshot	story
proximate	MECHANISM How does the behavior occur? What stimuli can trigger it? What processes respond to the stimulus to produce the behavior?	ONTOGENY How does an animal's expression of the behavior change over the animal's lifetime? Is it learned? Does it develop over time?
ultimate	ADAPTIVE VALUE How does the behavior benefit the animal and increase its fitness? Is there a cost/benefit tradeoff associated with the behavior?	PHYLOGENY How did the behavior evolve? Did it evolve once, or multiple times? Is it shared by closely related species?

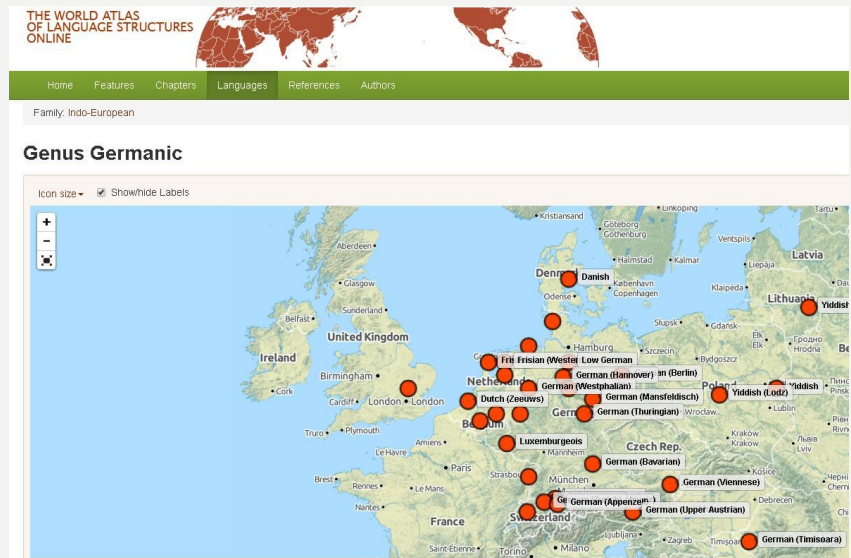
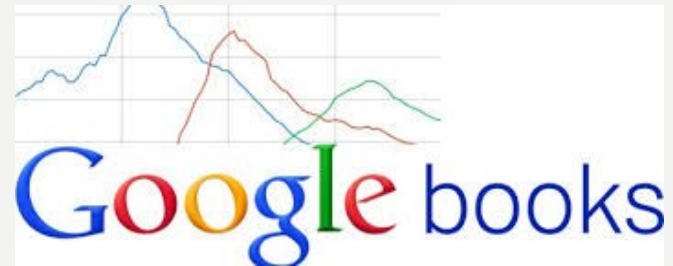
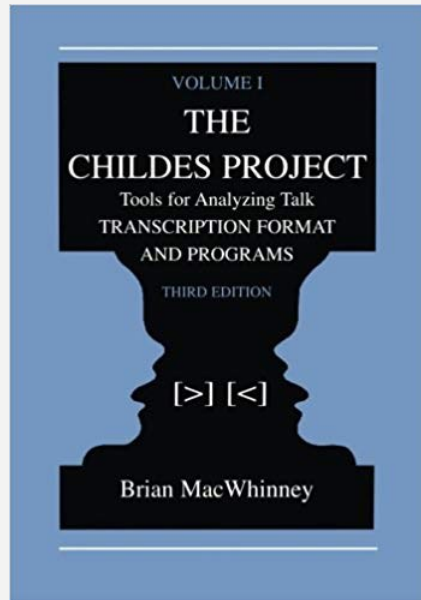
METHODOLOGIES: COMPARATIVE METHOD





METHODOLOGIES: DEVELOPMENTAL APPROACHES

METHODOLOGIES: NATURAL LANGUAGE DATA



METHODOLOGIES: EXPERIMENTS



Cumulative cultural evolution in the laboratory: An experimental approach to the origins of structure in human language

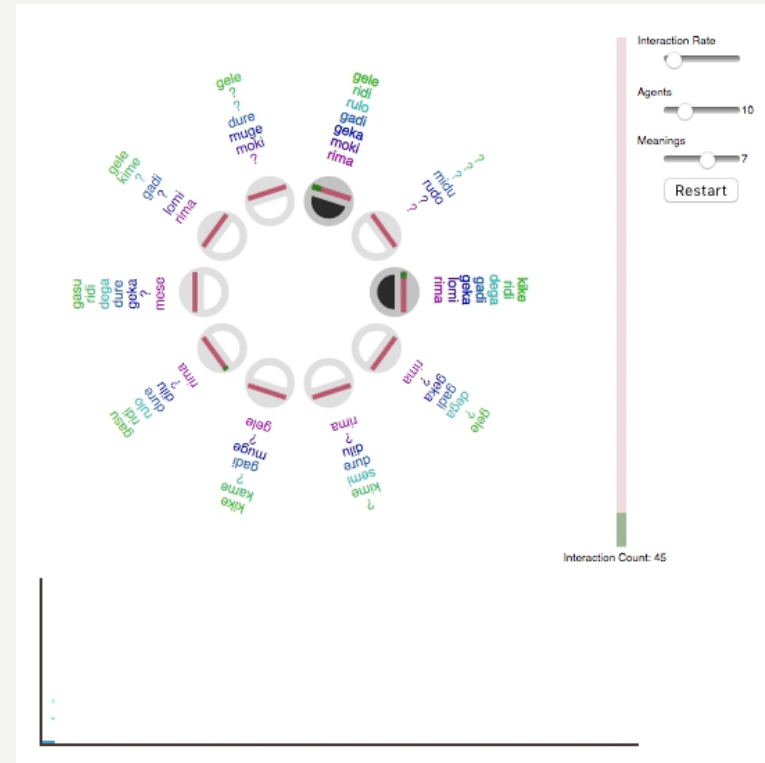
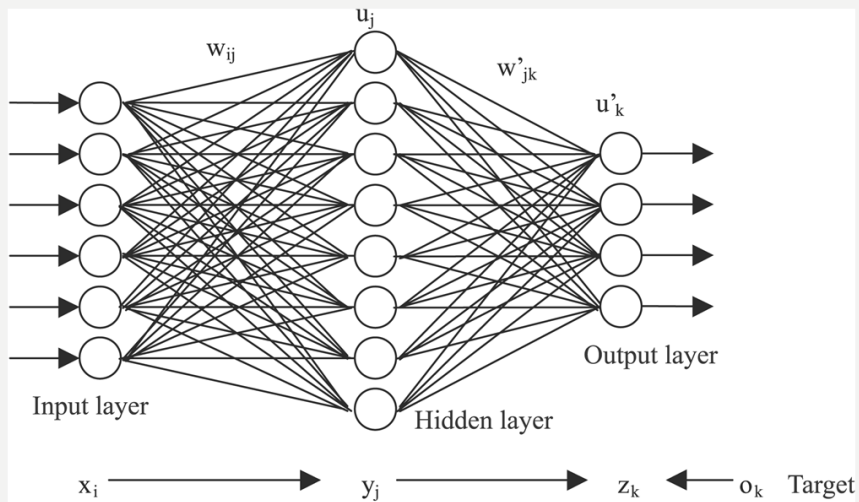
Simon Kirby^{*†}, Hannah Cornish^{*}, and Kenny Smith^{*}

^{*}School of Philosophy, Psychology, and Language Sciences, University of Edinburgh, Edinburgh EH8 9LL, United Kingdom; and [†]Division of Psychology, Northumbria University, Newcastle-upon-Tyne NE1 8ST, United Kingdom

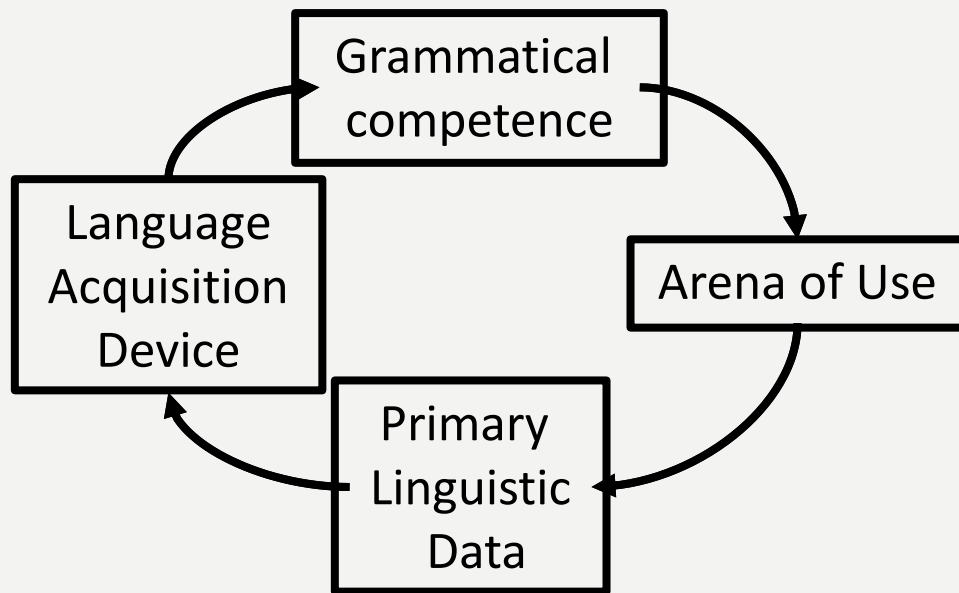
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METHODOLOGIES: MODELLING

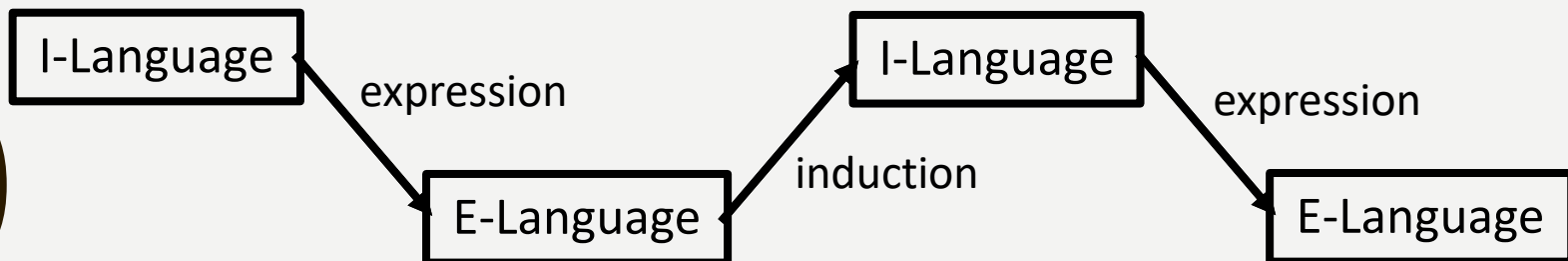


LEARNING AND USE

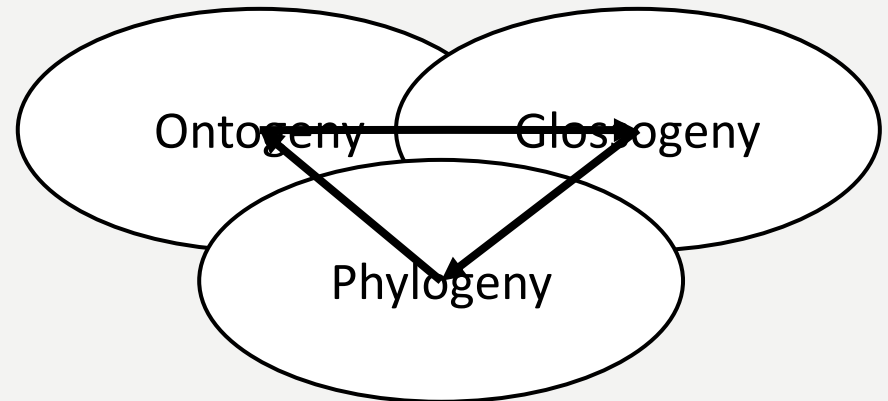
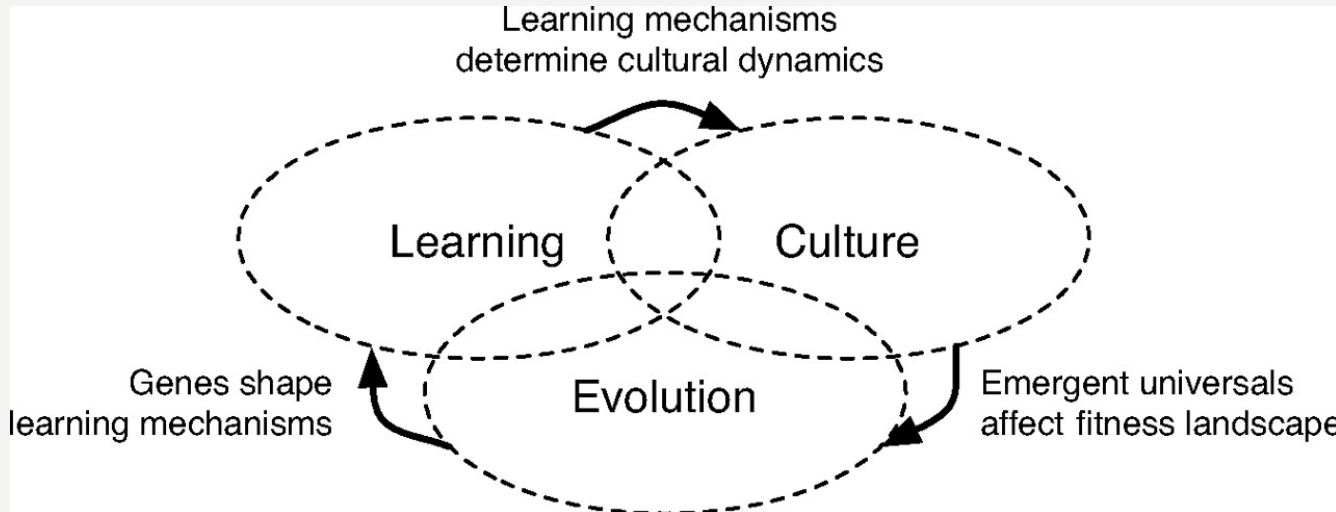


Language is transmitted via repeated **learning** and **use**

Language is shaped as a consequence of these processes



LEARNING, CULTURE, AND BIOLOGY



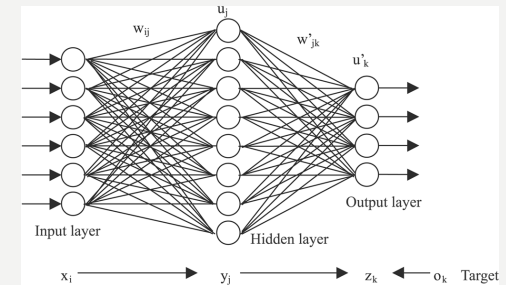
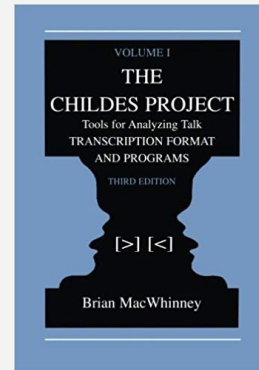
Upper: from Kirby, S., Dowman, M., & Griffiths, T. (2007). Innateness and culture in the evolution of language. *PNAS*, 104, 5241-5245.

Lower: adapted from Fitch, W.T. (2010). *The Evolution of Language*. Cambridge: Cambridge University Press

METHODOLOGIES: MANY

Not mutually exclusive, e.g.,

- Developmental models using natural data
- Comparative developmental approaches
- Behavioural experiments that replicate modelling work



e.g., Li, Farkas, MacWhinney (2003). Early Lexical Development in a self-organising neural network. *Neural Networks*, 17(8).

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²Department of Human

Differences in the Early Cognitive Development of Children and Great Apes

ABSTRACT: There is very little research comparing great ape and human cognition developmentally. In the current studies we compared a cross-sectional sample of 2- to 4-year-old human children ($n = 48$) with a large sample of

FIN

- Prepare to use evidence-based approaches to evaluate theories of language evolution
- Prepare to evaluate a variety of types of data as evidence: natural language, animal behaviour and cognition, experimental results, modelling results
- Next time:
 - Natural selection and adaptation
 - Read Fitch (2010) ch 1-2
 - Do reading quiz on TopHat (when available)