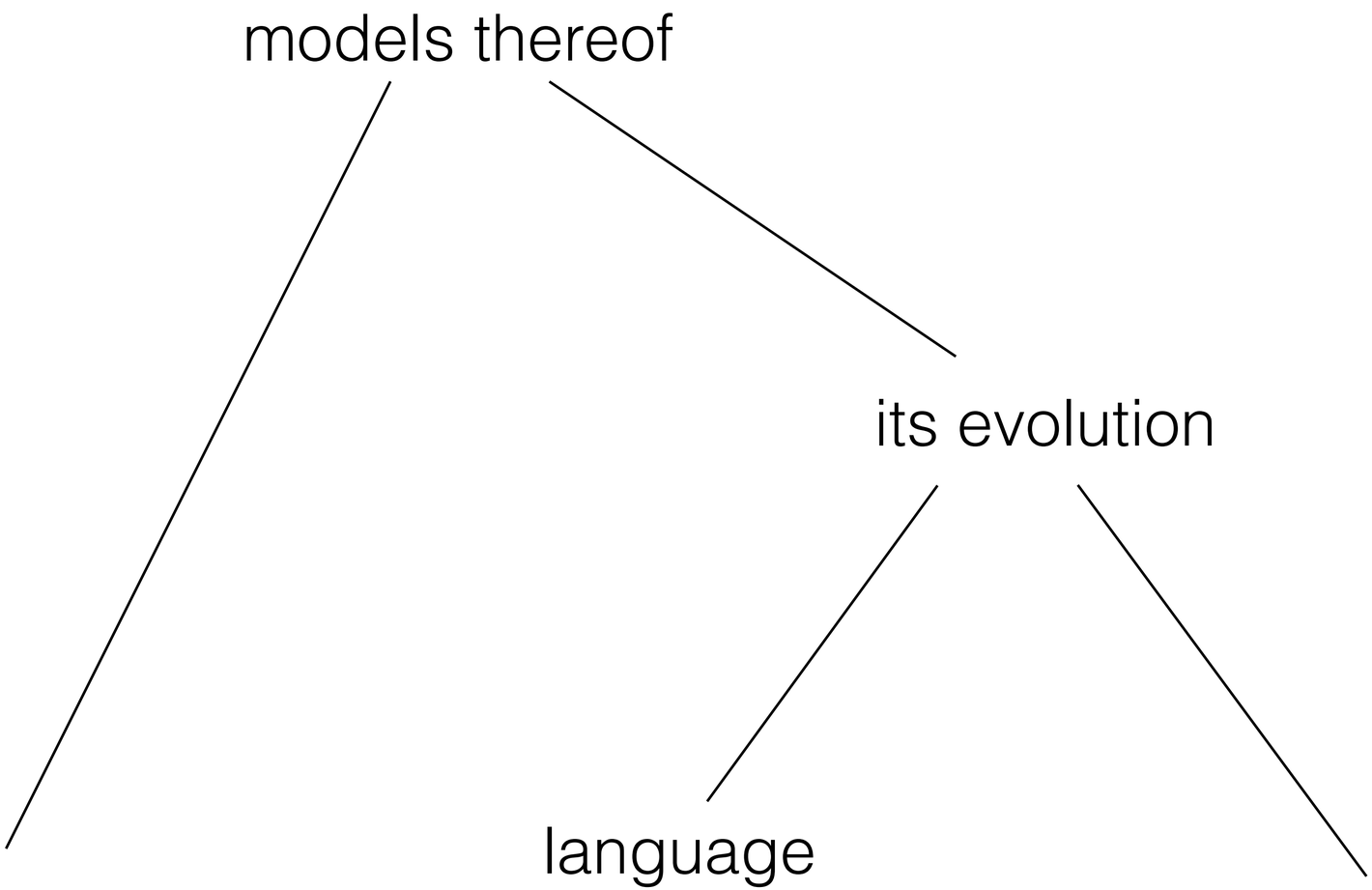
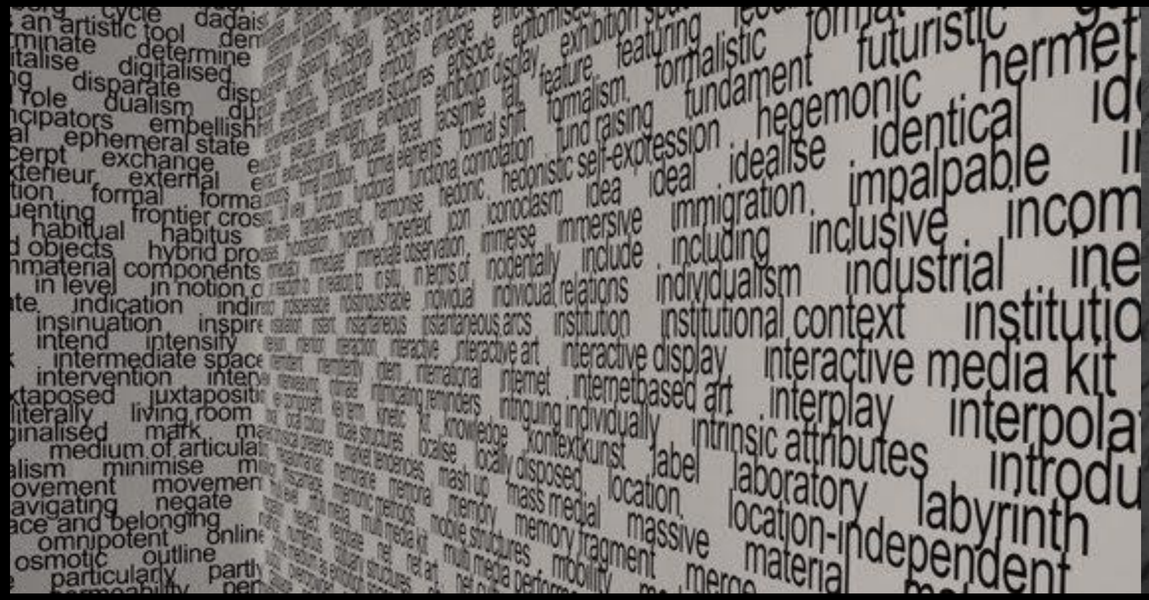
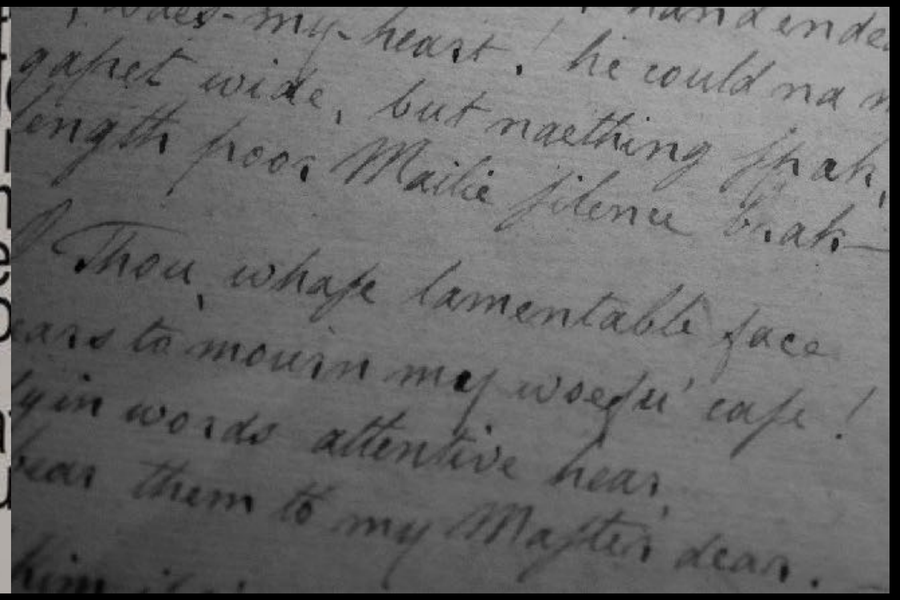
Models of Language Evolution



Models of Language Evolution

? What is language?





language | ˈlaNGgwij |

noun

1 the method of human communication, either spoken or written, consisting of the use of words in a structured and conventional way: *a study of the way children learn language* | *[as modifier]* : *language development*.

- any nonverbal method of expression or communication: *a language of gesture and facial expression*.

2 the system of communication used by a particular community or country: *the book was translated into twenty-five languages*.

- *Computing* a system of symbols and rules for writing programs or algorithms: *a new programming language*.

3 the manner or style of a piece of writing or speech: *he explained the procedure in simple, everyday language*.

- the phraseology and vocabulary of a certain profession, domain, or group of people: *legal language*.
- (usually as **bad/strong language**) coarse, crude, or offensive language: *strong language*.

PHRASES

speak the same language
understand one another as a result of shared opinions or values.

ORIGIN

Middle English: from Old French *langage*, based on Latin *lingua* **'tongue.'**

never start with a dictionary definition!!

"the language of"

- the language of **flowers**
- the language of **thorns**
- the language of **anatomy**
- the language of **science**
- the language of **medicine 11th edition**
- the language of **letting go**
- the language of **composition pdf**
- the language of **love**
- the language of **composition**
- the language of **god**

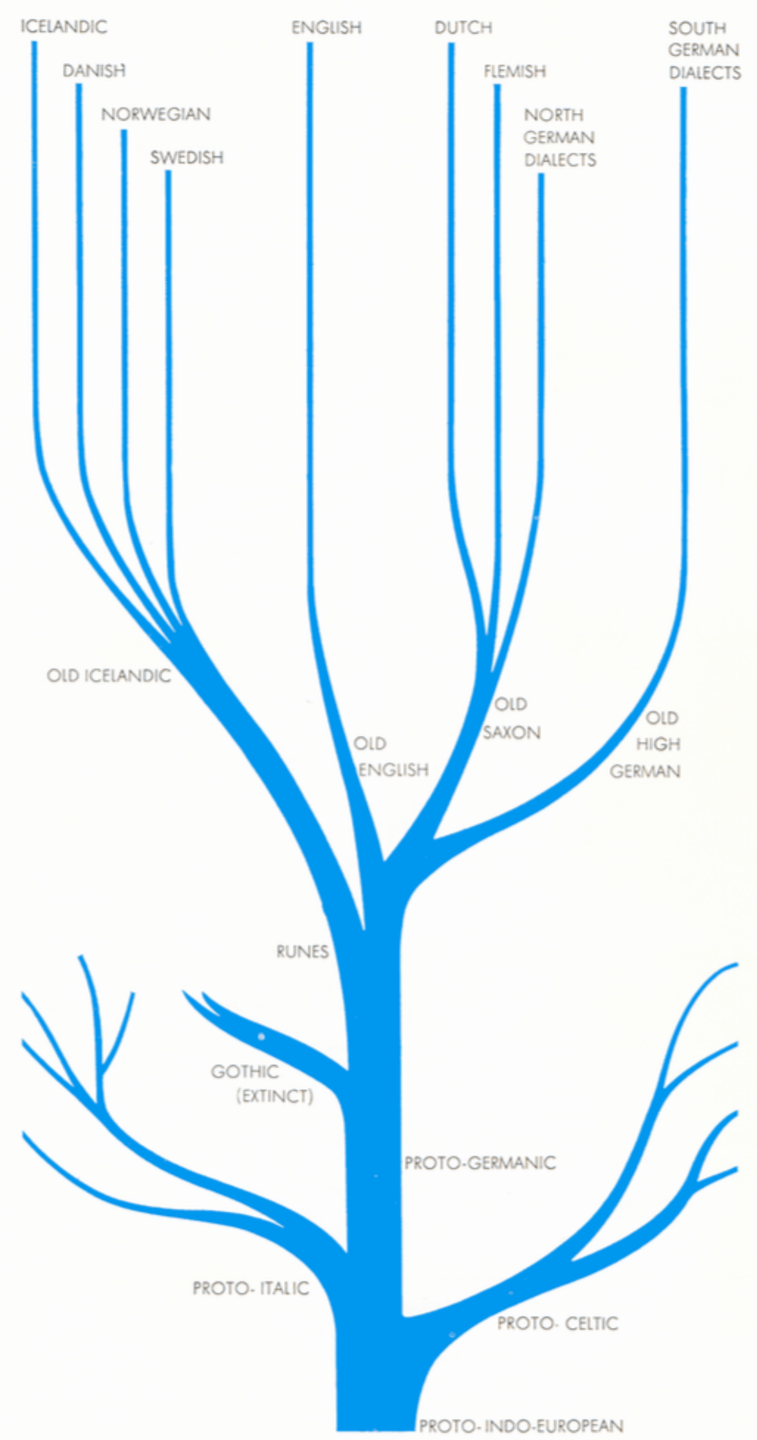
the language of

- **what is** the language of **minions**
- **spanish is** the language of
- **arabic is** the language of
- **french is** the language of
- **english is** the language of
- **what is** the language of **japanese**
- **what is** the language of **russian**
- **what is** the language of **programming**
- **what is** the language of **chinese**
- **what is** the language of **korean**

the language of Google search query completion

“A language is a dialect with an army and a navy.”

[saying, popularized by Max Weinreich]



evolution of languages

[historical linguistics]

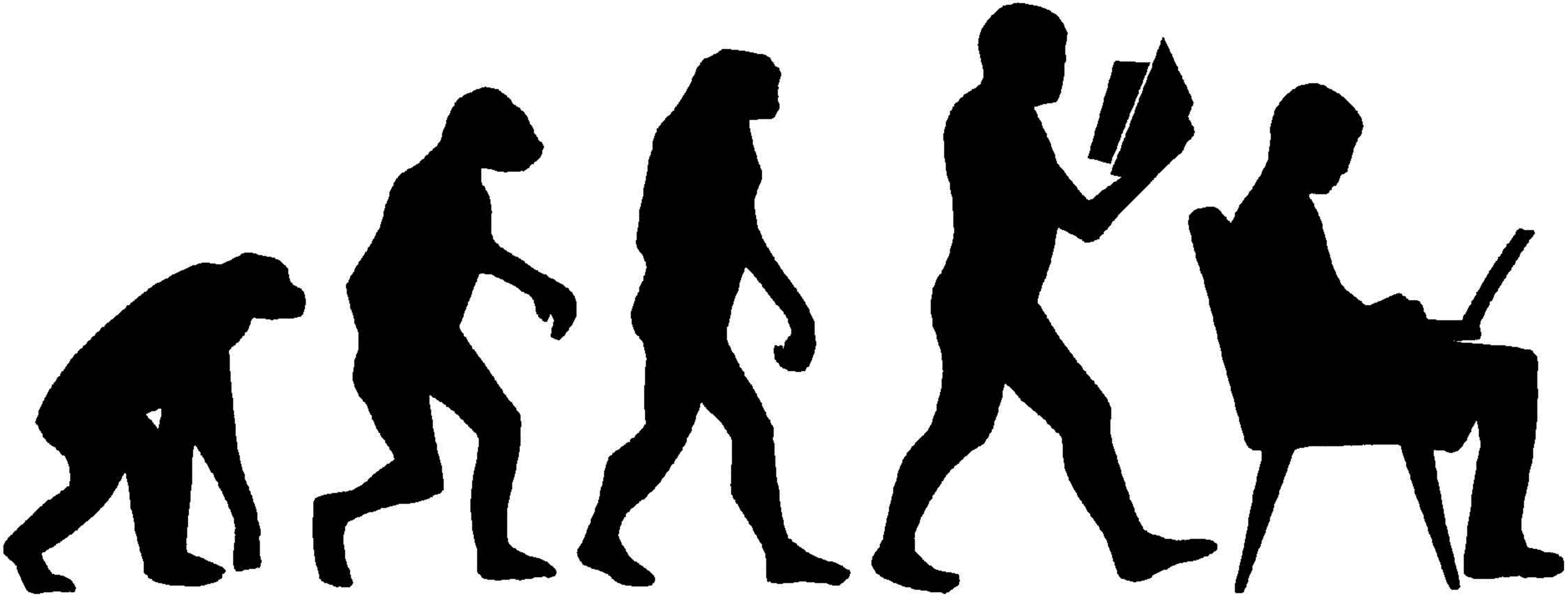
vs.

evolution of language

[evolutionary linguistics]

Watch a short video here!

language as a natural phenomenon




video

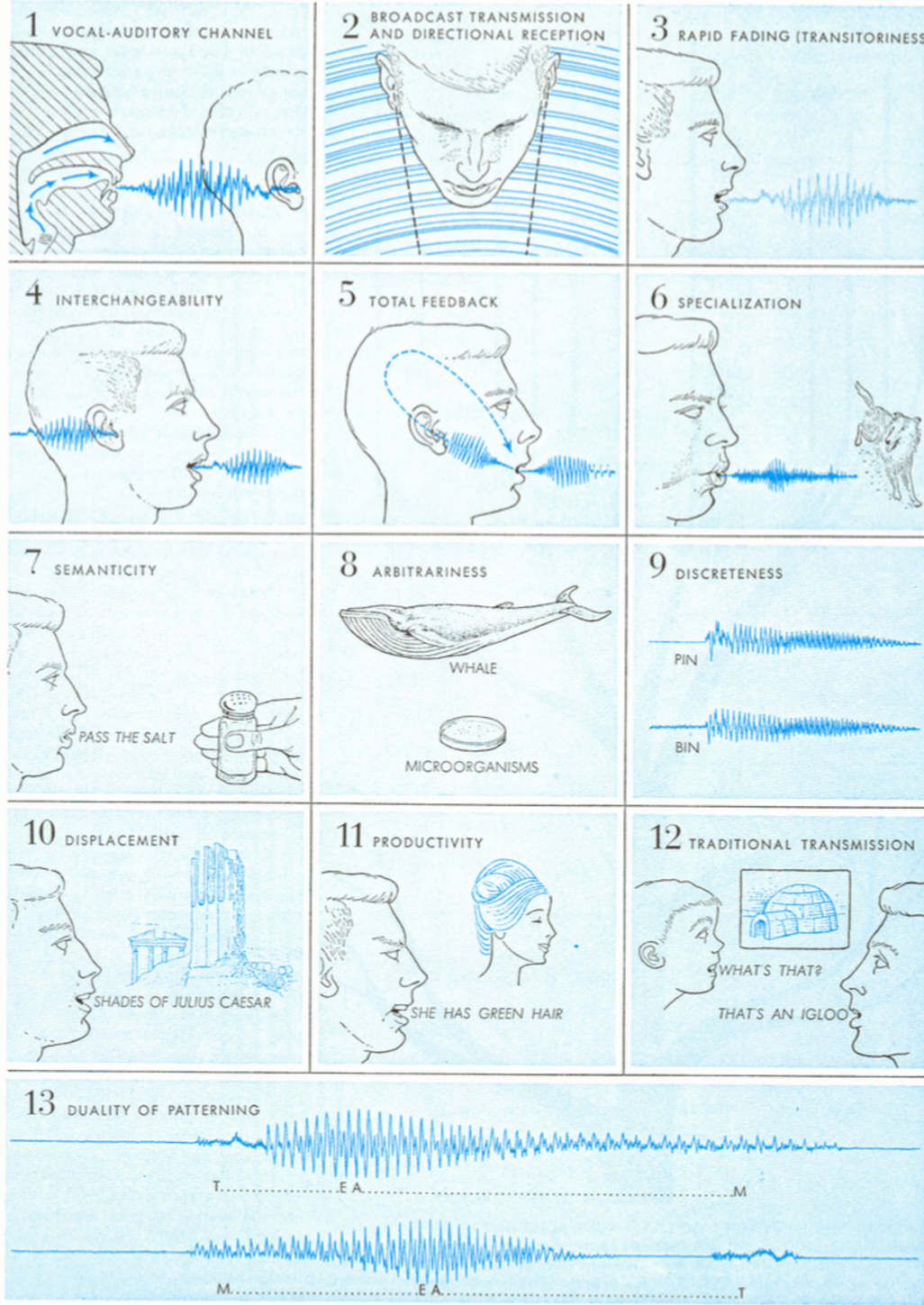

video


video

design features

1. vocal-auditory channel
2. broadcast transmission & directional reception
3. rapid fading (transitoriness)
4. interchangeability
5. total feedback
6. specialization
7. semanticity
8. arbitrariness
9. discreteness
10. displacement
11. productivity
12. traditional transmission
13. duality of patterning

(Hockett 1960)



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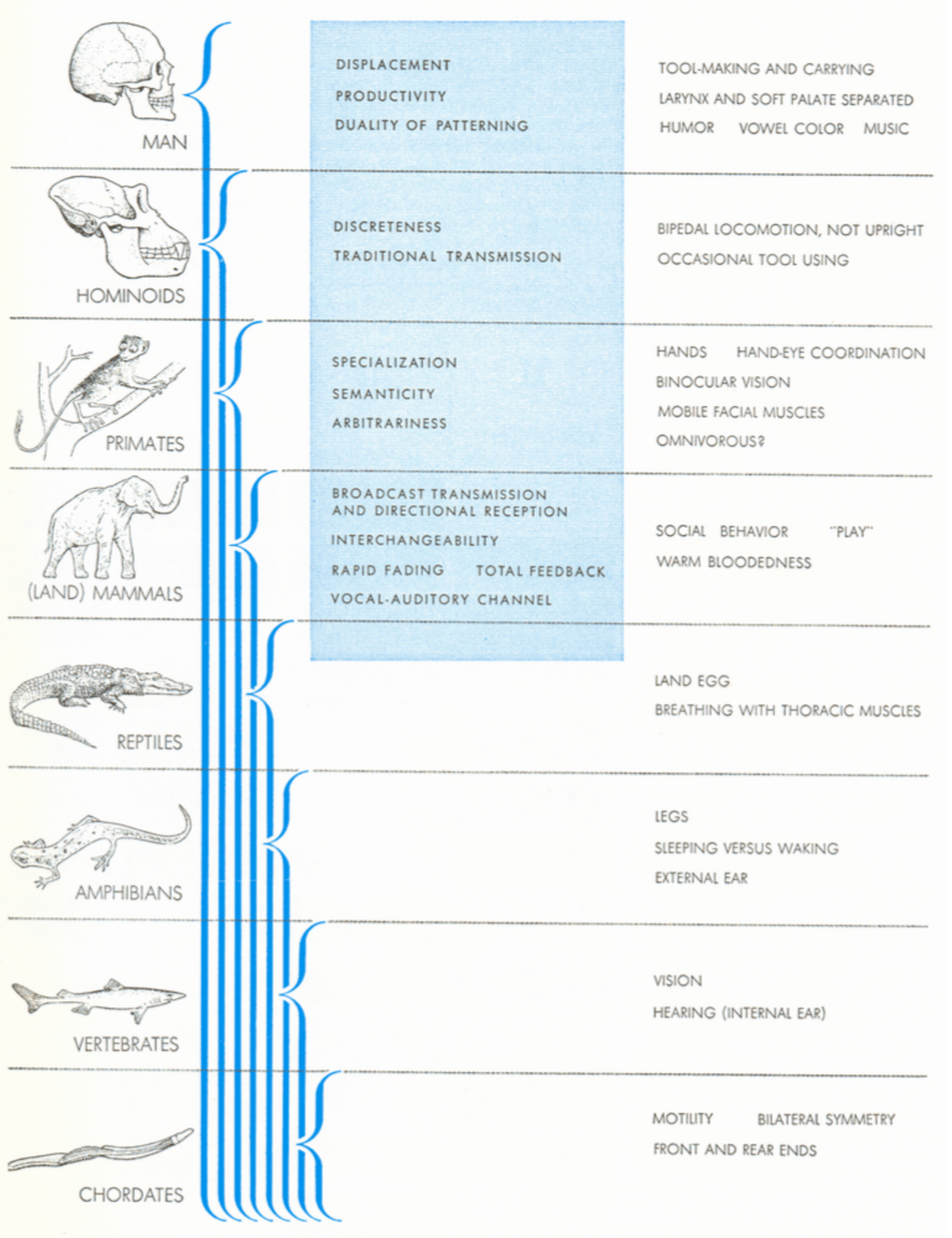

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(Hockett 1960)

this course's

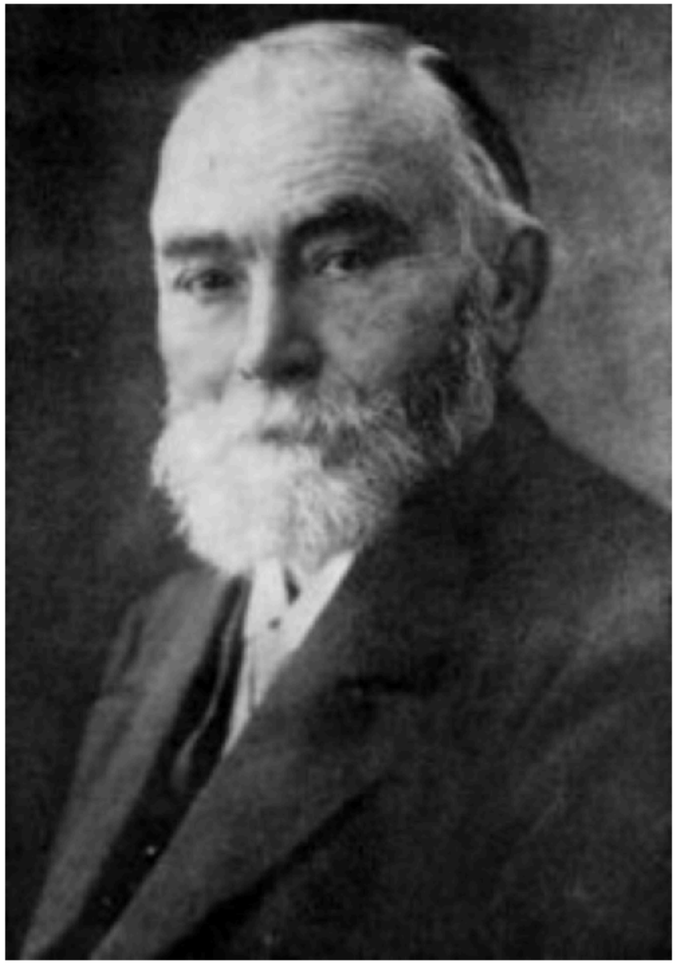
FOCUS

meaning

compositionality

conventionality

compositionality



It is astonishing what language can do. With a few syllables it can express an incalculable number of thoughts, so that even a thought grasped by a terrestrial being for the very first time can be put into a form of words which will be understood by someone to whom the thought is entirely new. This would be impossible, where we not able to distinguish parts in the thoughts corresponding to parts of a sentence, so that the structure of the sentence serves as the image of the structure of the thought.

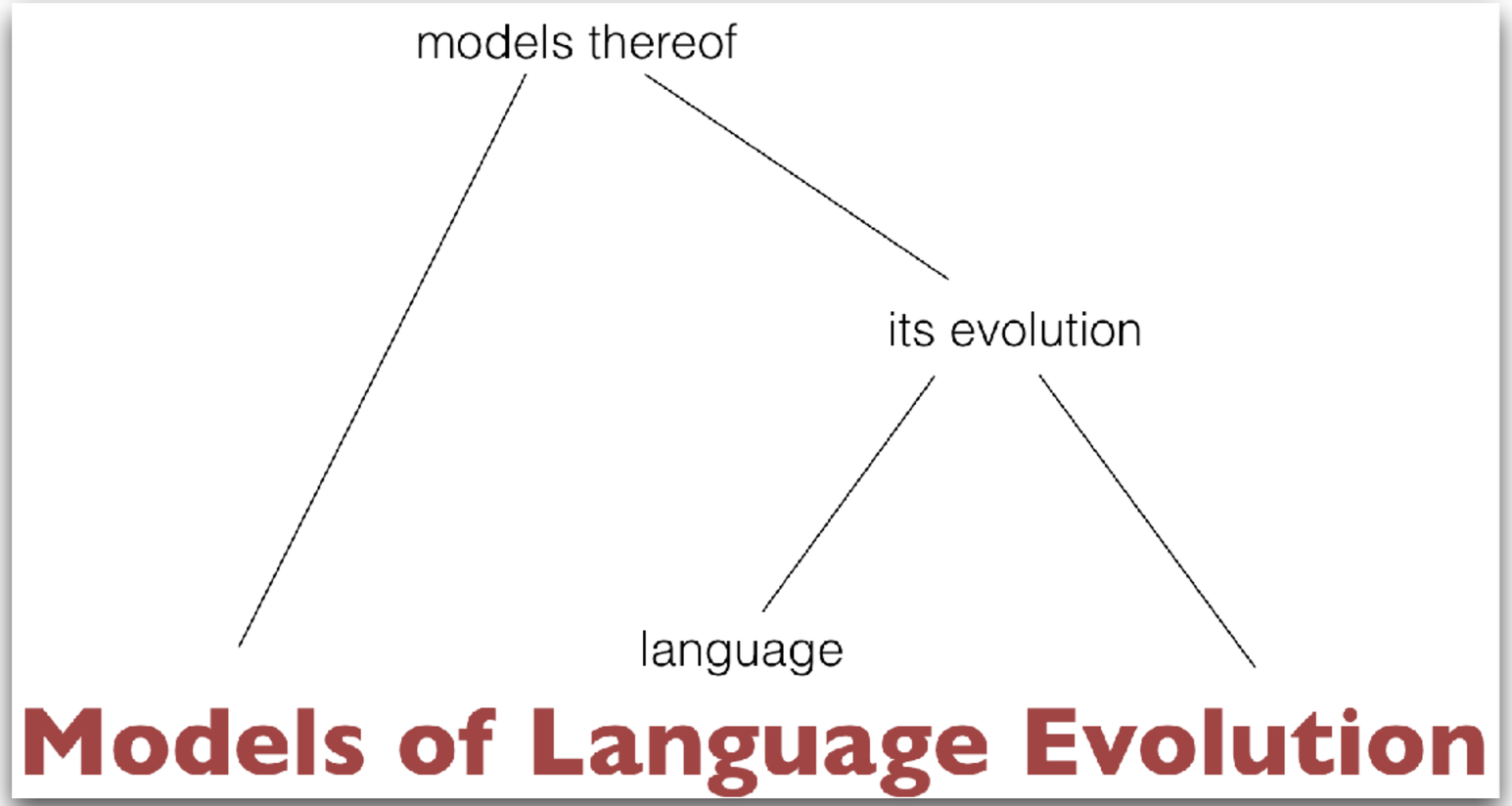
(Frege, 1923)

compositionality

meaning of complex expressions derived systematically from

(i) meaning of parts &

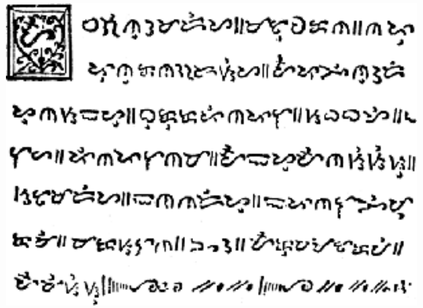
(ii) their way of combination

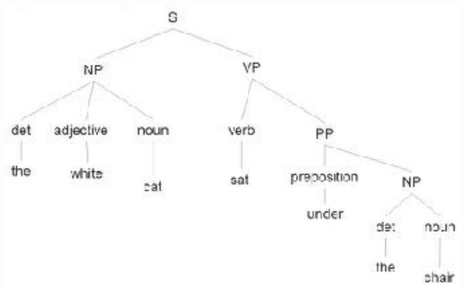


syntactic structure

language as …

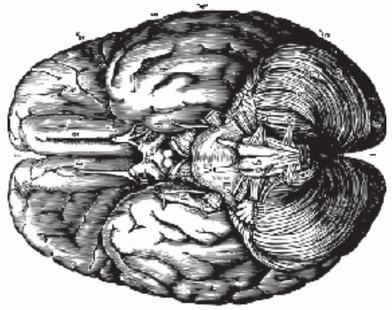
abstract system



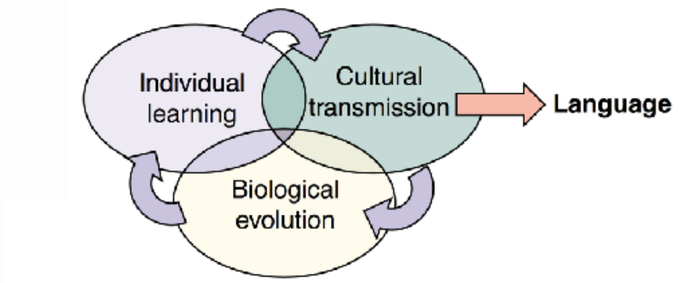


social behavior

biological adaptation



complex adaptive system



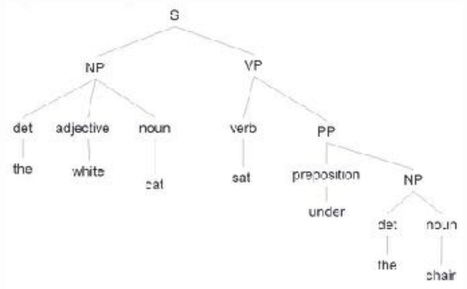
language evolution as …

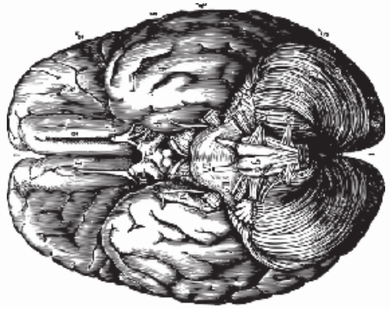
biological evolution

language faculty:

- innate / neurologically founded adaptation to the language learning problem
- enables language acquisition from sparse data

  poverty of the stimulus argument
- evolved by natural selection

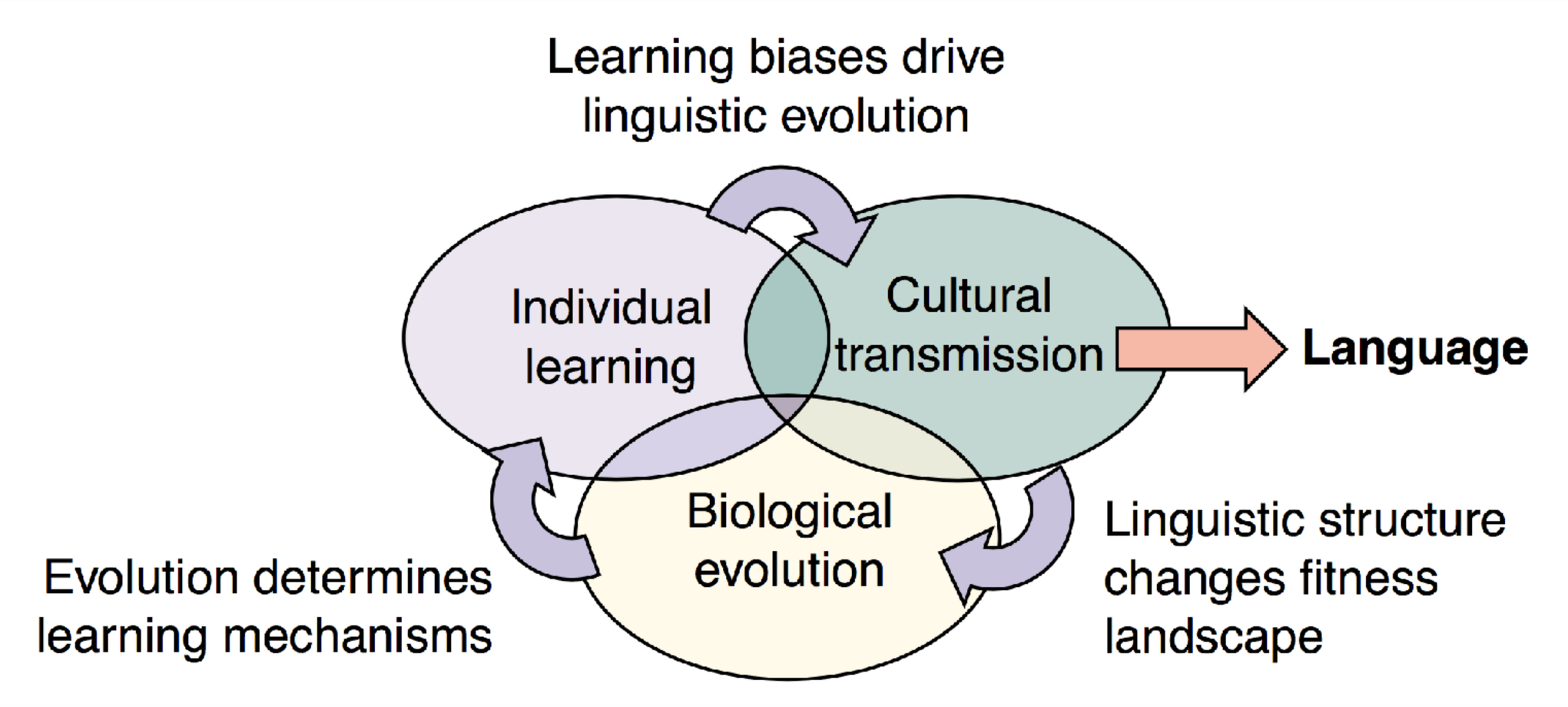




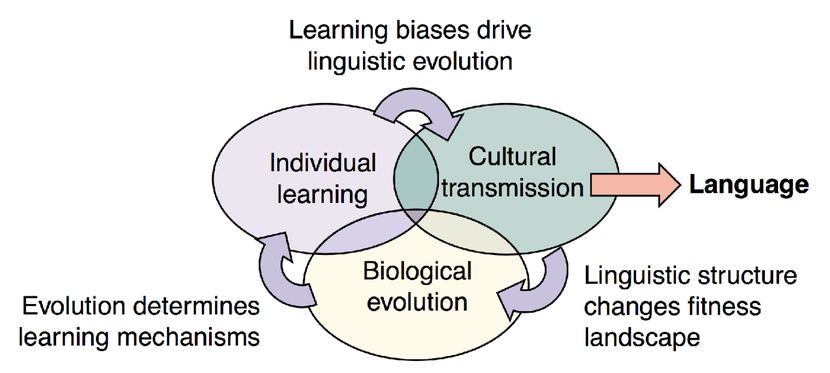
cultural evolution

- languages adapt to learners
- languages are selected for learnability and communicative efficiency
- languages shaped by repeated use, learning and language contact

language as a complex adaptive system



language as a complex adaptive system



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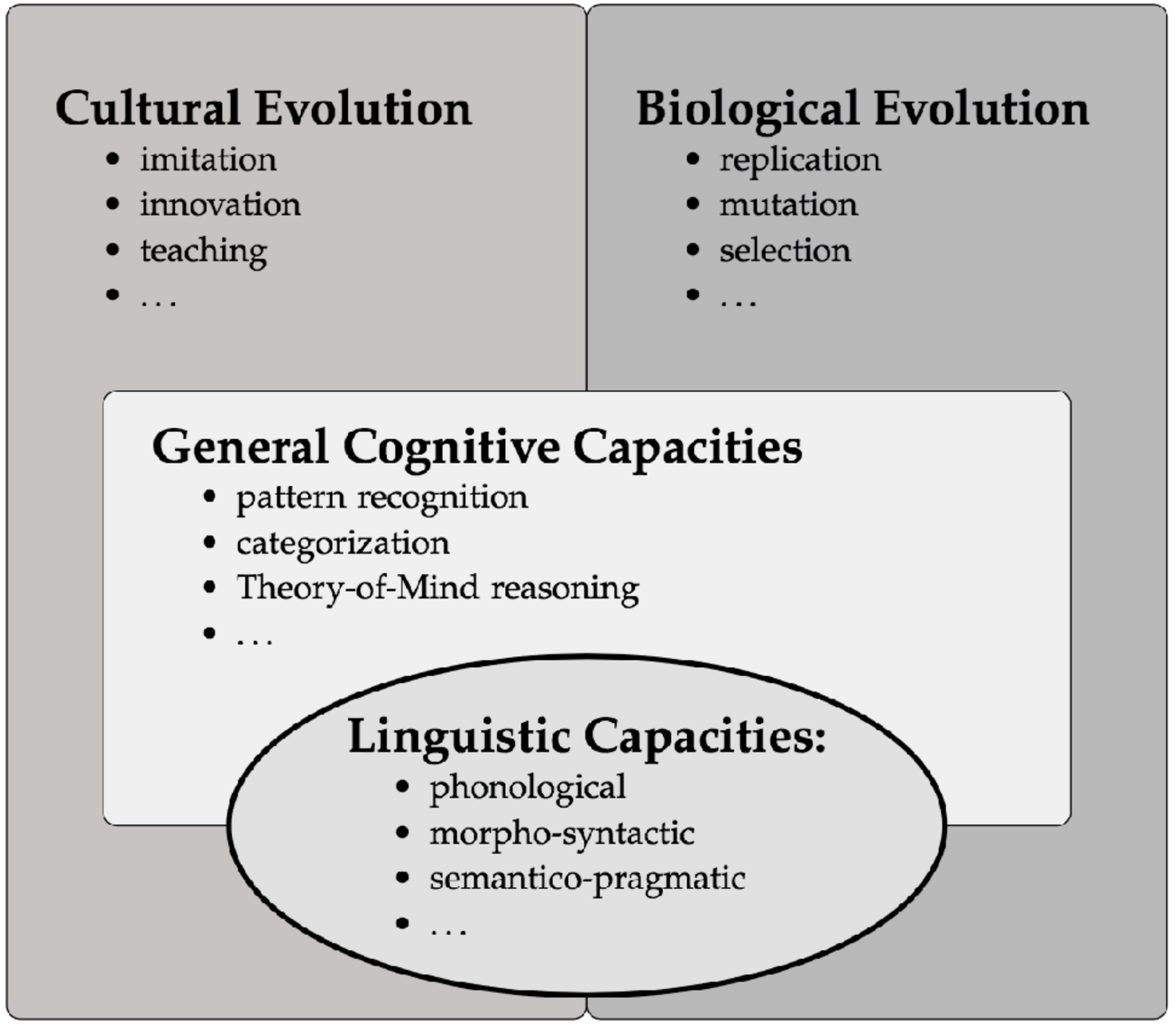
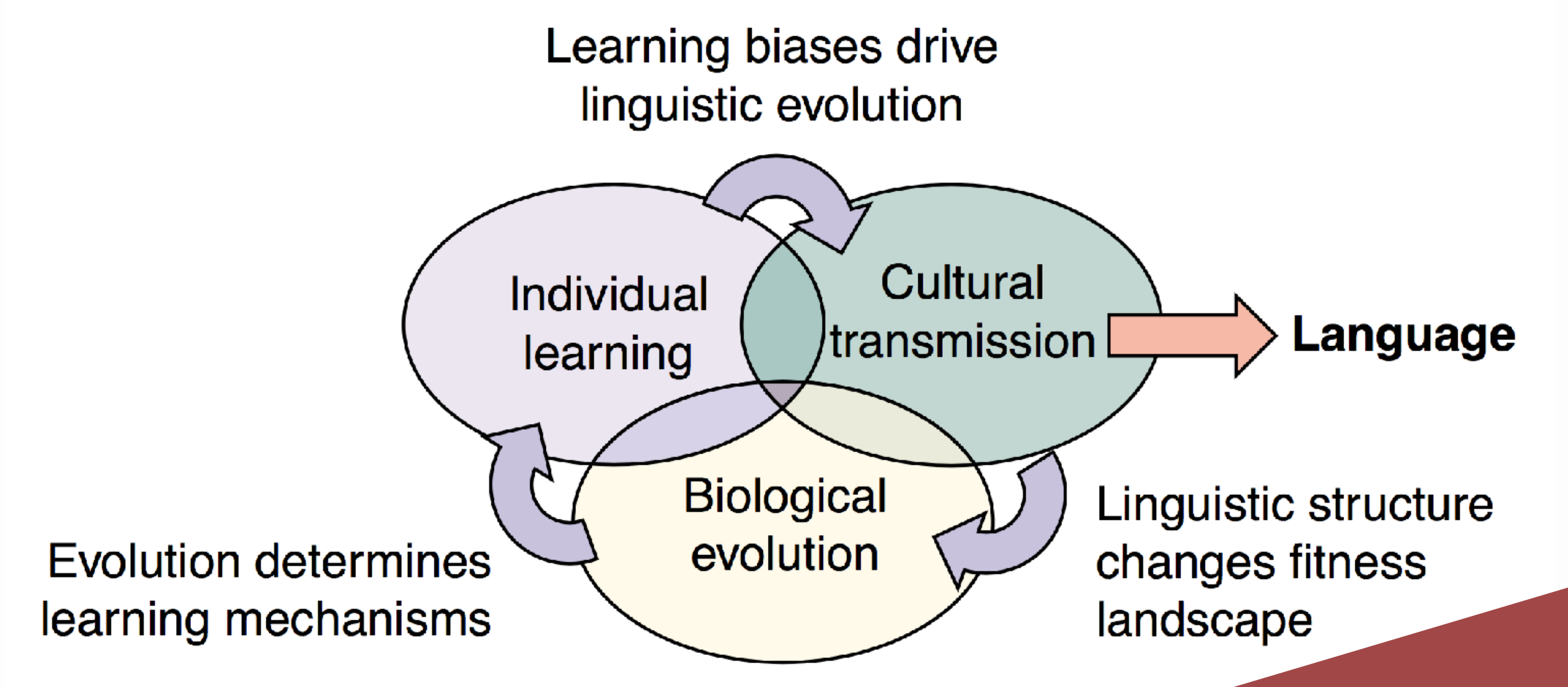
How much does general cognition explain?

By what mechanisms could trait X evolve if agents are cognitively only capable of Y?



language as a complex adaptive system



Modeling

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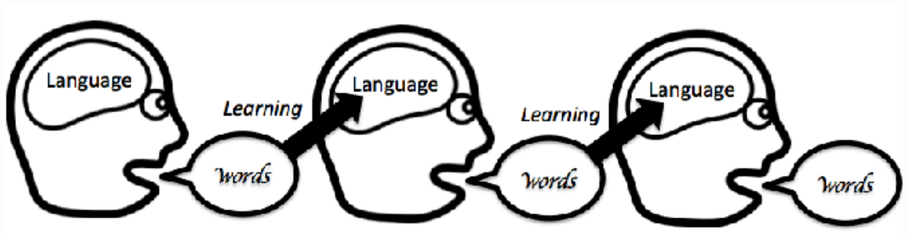
ager cognitively

only capable of Y?

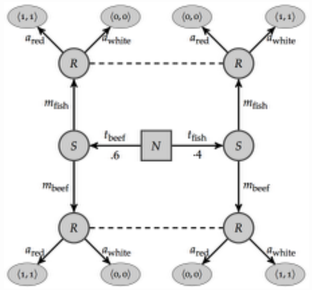
language evolution synthesized

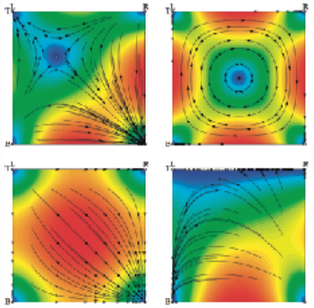
agent-based simulations

iterated learning

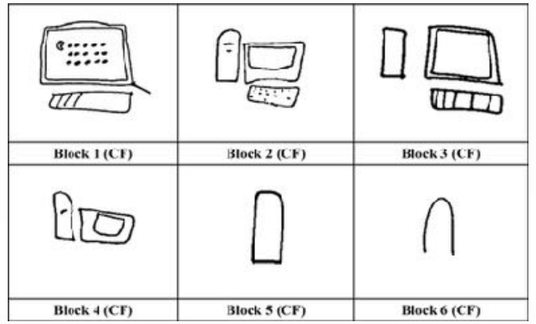


evolutionary game theory



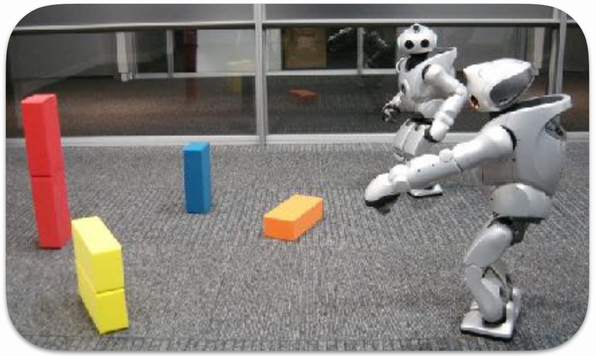


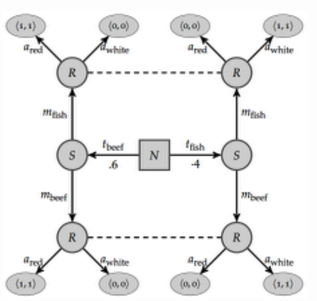
experimental semiotics

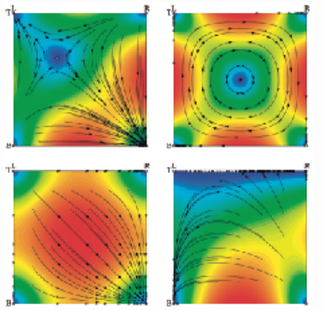


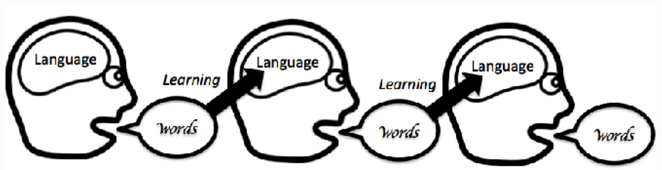
why modeling?

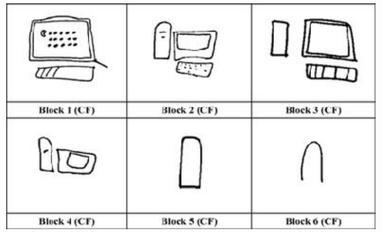
- protolanguage left little fossil evidence
- models are fully spelled-out thought experiments
  - allow us to study implied consequences of complex mechanism
  - force us to be clear about many assumptions otherwise left implicit
- speculative, yes; but also precise and falsifiable
- insight from breakdown: we learn about reality by observing where a model does **not** fit (and why)











Schedule

Session	Date	Topic	Reading
1	25.10.2018	Introduction and Overview	Smith (2014)
-	01.11.2018	**no class**	
2	08.11.2018	Agent-based models (naming game, category game)	tba
3	15.11.2018	Evolutionary game theory & signaling	Franke & Wagner (2013)
4	22.11.2018	Replication, mutation & universal grammar	Nowak et al. (2001)
5	29.11.2018	Iterated learning & compositionality	Kirby (2001)
6	06.12.2018	Bayesian iterated learning	Griffiths & Kalish (2007)
7	13.12.2018	Language evolution in the lab	Scott-Phillips & Kirby (2010)
8	20.12.2018	Midterm exam	--
		Christmas break	
9	10.01.2019	student presentations	tba
10	17.01.2018	student presentations	tba
11	24.01.2019	student presentations	tba
12	31.01.2019	student presentations	tba
13	07.02.2019	final discussion	tba

course requirements

- everybody must read the assigned papers for each class and participate actively in class

- everybody needs to pass midterm exam

- everybody needs to do either

  - present a paper (30 minutes presentation, 10 minutes discussion) & hand in a written summary of the paper/presentation

  - hand in a report based on a concise course project (can be in small groups), e.g., comparing 2-3 papers on a given topic

- everybody needs to pass three (out of four) short quizzes on the papers presented by students (quizzes take place *before* the actual presentations)

the **final grade** will be the mean of the midterm grade and the grade for the presentation/project