SOCIAL COGNITION

Language evolution

Byurakn Ishkhanyan
Email: byurakn@cc.au.dk

THE EVOLUTION OF HUMAN COGNITION

- Modern humans came to be approx. 200 000 years ago, which is too short in terms of evolution to explain the entire development of the human society
- Cognitively and genetically, humans are not that different from other apes
- Cultural transmission may be the key different between humans and apes
- Humans and apes have shared mechanisms of social learning but apes lack certain aspects of experiencing conspecifics as intentional causal agents
- The dual inheritance theory provides a probable explanation of how human cognition came to be

THIS WEEK: LANGUAGE EVOLUTION

1. What is language?
2. Written language evolution
3. Adaptive systems
4. Studying language evolution in a lab: iterated learning

1. WHAT IS LANGUAGE?

Go to menti.com and submit your answer

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LANGUAGE

Language is a system that consists of the development, acquisition, maintenance and use of **complex systems of communication**, particularly the **human ability** to do so; *a language* is any specific example of such a system.

Wikipedia

PROPERTIES OF LANGUAGE

- Unique to humans (?)
- **Productivity**: we can combine phonemes into words and combine words into sentences to form an infinite number of expressions
- **Creativity:** we create and understand sentences that have never existed before
- **Flexibility:** we can communicate about everything (almost)
- We can accumulate and share knowledge and experiences
- Teach and learn

PROPERTIES OF LANGUAGE (2)

- Consciously produced
- Intentional
- Symbolic – conventional
- Recipient design: we construct our messages for some intended recipient/audience
- Diversity

CREATIVITY

- Julia *summered* in Paris
- She slowly *beached* the boat
- I *wristed* the ball over the net
- I *googled* it
- I *youtubed* it

COMBINATORIAL RULES

The flib holtily maggled the grutter.

The grutter holtily maggled the flib.

Flibed the holtily maggled grutter the.

EXERCISE

1. Listen to the following sound files
2. Which one of them is language and which one is not? Why? Discuss in pairs

(a) 

(b) 

(c) 

(d) 

(e) 

WHAT THE SOUNDS ARE

(a) A pseudo-language that has the structure of Danish/Norwegian
(b) An excerpt from the song ”Bullet Proof” by This is the Kit
(c) Two people speaking Armenian
(d) Two people speaking Danish on a train (you can hear the train!)
(e) A cat meowing

We are wired to recognize language

UNIVERSAL GRAMMAR

- Innate rules
- Independent of sensory input
- Set of rules universal across languages
- Input determines which language is acquired

LANGUAGE UNIVERSAL EXAMPLES

All languages have

- major lexical categories
- anaphoric elements (e.g. pronouns)
- verbs for ”give” always have three arguments
- wh-movement

COMMON FOR ALL LANGUAGES

- Specialized neuroanatomy (e.g. language lateralization)
- Fast transmission
- Production-comprehension = 1:4
- Multilevel organization
- Ability to process linguistic diversity

”a biological system tuned to a specific linguistic system, itself a cultural historical product”

Evans & Levinson (2009)

Evolutionary question: gestures first or sounds first? How about written language?

ARE ALL LANGUAGES THE SAME?

- Think of at least two languages that you speak
- Think of similarities and differences at least at one level of organization
- Discuss with the person sitting next to you

2. THE EVOLUTION OF WRITING

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DEVELOPMENT OF WRITING

3500 BCE

2000 BCE

1000 BCE

MESOPOTAMIA

Pictographs

Cuneiform

EGYPT

Hieroglyphs

Hieroglyphs

CRETE

Hieroglyphs

Linear A

Linear B

SYRIA PALESTINE

Proto-Canaanite alphabet

Phoenician alphabet

ASIA MINOR

Hittite cuneiform

Hurrian cuneiform

Ugaritic alphabet

ELAM

Proto-Elamite Pictographs

Linear Elamite

Elamite cuneiform

INDIA

CHINA

Pictographs

WRITING – VISUALIZATION OF LANGUAGE

DRAWINGS (PRE-WRITING)

- 30 – 35 000 years ago
- Gradual standardization of patterns

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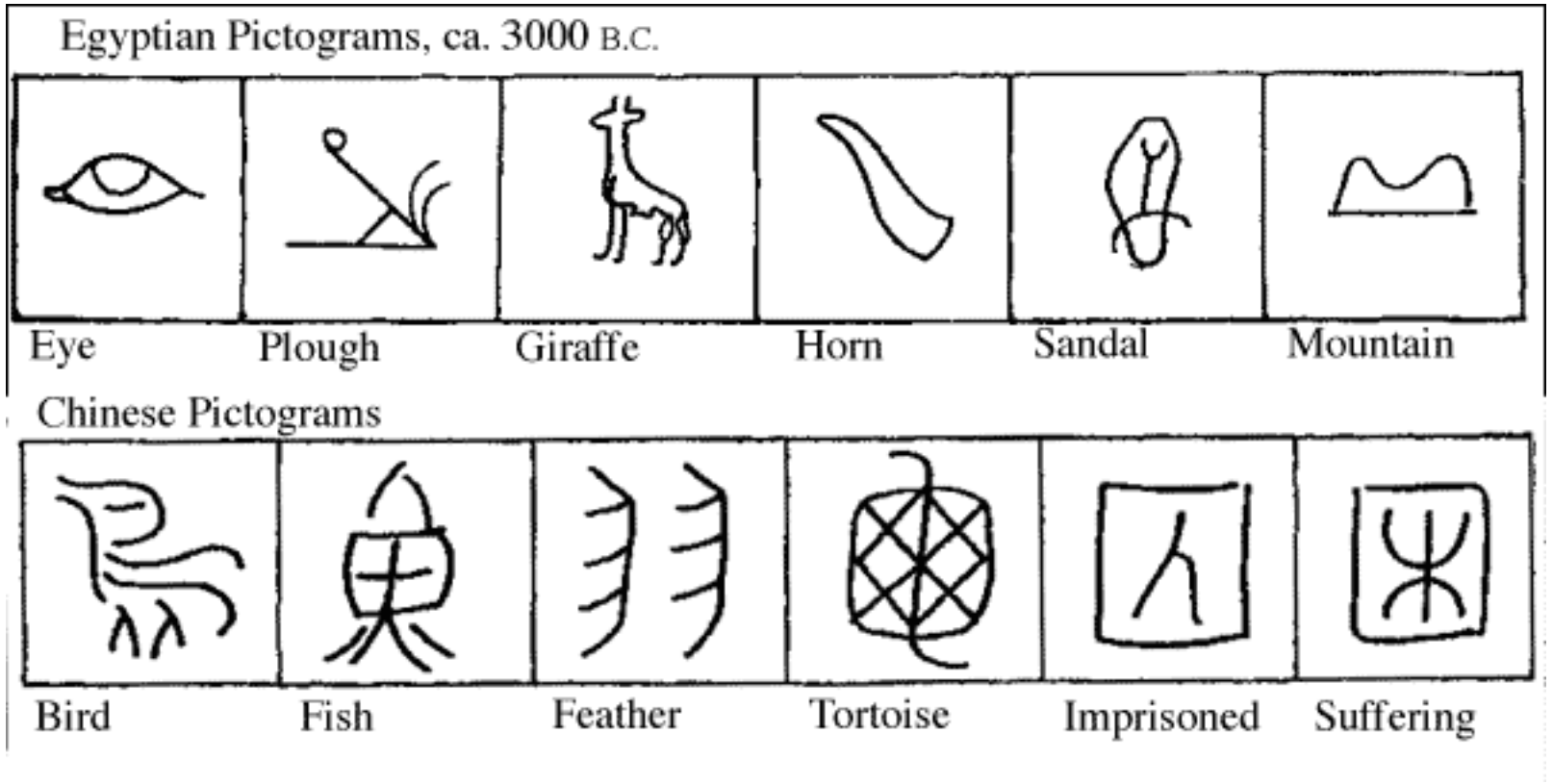
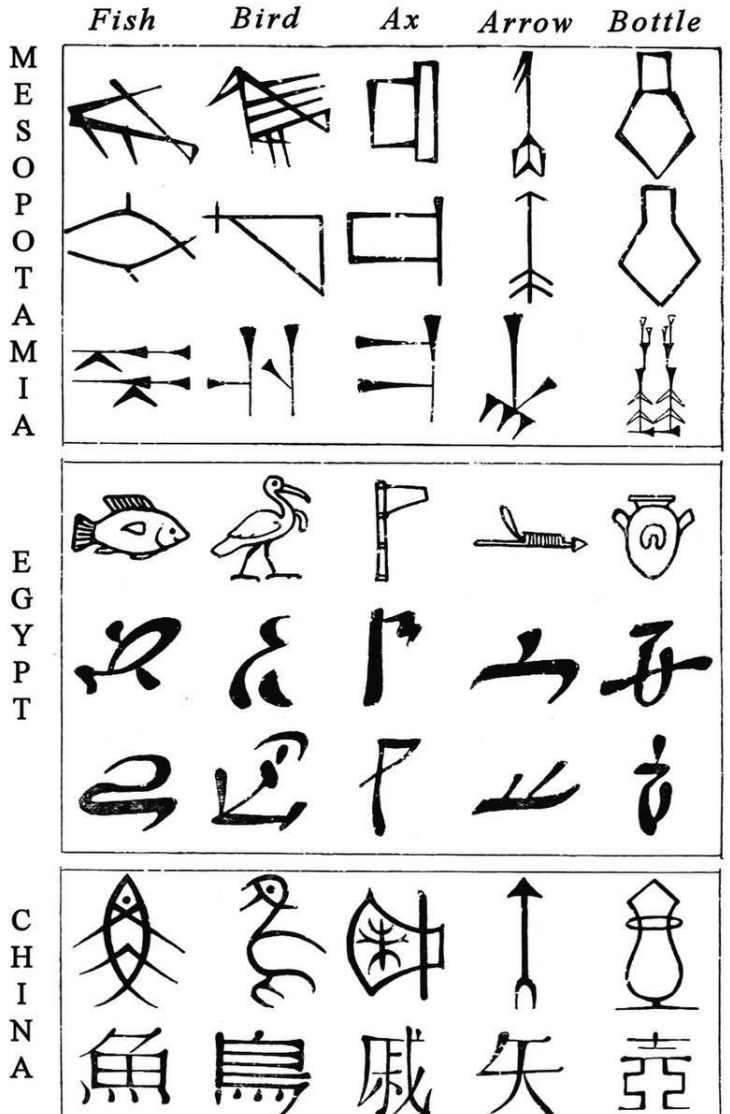
PICTOGRAMS



- Standardized and generalized drawings
- Gradually becoming more abstract and moving towards phonology

LOGOGRAMS



- Visual representation of a word/phrase/a morpheme

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SYLLABIC GRAPHEMES

hoy	läwe	ḥäwt	may	śäwt	rə's	sat	š	qaf	qaf
ሀ hä	ለ lä	ሐ ḥä	መ mä	ሠ śä	ረ rä	ሰ sä	ሸ šä	ቀ qä	ቈ quä
ሁ hu	ሉ lu	ሑ ḥu	መ mu	ሡ śu	ሩ ru	ሱ su	ሹ šu	ቁ qu	
ሂ hi	ሊ li	ሒ ḥi	ሚ mi	ሢ śi	ሪ ri	ሲ si	ሺ ši	ቂ qi	ቊ qui
ሃ ha	ላ la	ሓ ḥa	ማ ma	ሣ śa	ራ ra	ሳ sa	ሻ ša	ቃ qa	ቋ qua
ሄ he	ሌ le	ሔ ḥe	ሜ me	ሤ śe	ሬ re	ሴ se	ሼ še	ቄ qe	ቌ que
ህ hə/ø	ል lə/ø	ሕ ḥə/ø	ም mə/ø	ሥ śə/ø	ር rə/ø	ስ sə/ø	ሽ šə/ø	ቅ qə/ø	ቍ quə
ሆ ho	ሎ lo	ሖ ḥo	ሞ mo	ሦ śo	ሮ ro	ሶ so	ሾ šo	ቆ qo	

bet	täwe	č	ẖärm	nähas	ñ	'älf	kaf
በ bä	ተ tä	ቸ čä	ኀ ẖä	ኈ ẖuä	ነ nä	ኘ ñä	አ 'ä	ከ kä	ኰ kuä
ቡ bu	ቱ tu	ቹ ču	ኁ ẖu		ኑ nu	ኙ ñu	ኡ 'u	ኩ ku	
ቢ bi	ቲ ti	ቺ či	ኂ ẖi	ኊ ẖui	ኒ ni	ኚ ñi	ኢ 'i	ኪ ki	ኲ kui
ባ ba	ታ ta	ቻ ča	ኃ ẖa	ኋ ẖua	ና na	ኛ ña	ኣ 'a	ካ ka	ኳ kua
ቤ be	ቴ te	ቼ če	ኄ ẖe	ኌ ẖue	ኔ ne	ኜ ñe	ኤ 'e	ኬ ke	ኴ kue
ብ bə/ø	ት tə/ø	ች čə/ø	ኅ ẖə/ø	ኍ ẖuə	ን nə/ø	ኝ ñə/ø	እ 'ə/ø	ክ kə/ø	ኵ kuə
ቦ bo	ቶ to	ቾ čo	ኆ ẖo		ኖ no	ኞ ño	ኦ 'o	ኮ ko	

- Each sign corresponds to a syllable
- Amharic is an example (alphasyllabic)

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PHONEMIC GRAPHEMES

1	Աա	a	10	Ժժ	ž	19	Ճճ	tš	28	Ռռ	r
2	Բբ	b	11	Իի	i	20	Մմ	m	29	Uu	s
3	Գգ	g	12	Լլ	l	21	Յյ	j	30	Վվ	v
4	Դդ	d	13	Խխ	x	22	Նն	n	31	Sտ	t
5	Եե	je/e	14	Ծծ	ts	23	Շշ	š	32	Րր	r;
6	Զզ	z	15	Կկ	k	24	Ոո	vo/o	33	Ցց	ts’
7	Էէ	e	16	Հհ	h	25	Չչ	tš’	34	Իւ	w
8	Ըը	ë	17	Ձձ	dz	26	Պպ	p	35	Փփ	p’
9	Թթ	t’	18	Ղղ	ṙ	27	Ջջ	dž	36	Քք	k’
									37	և *	yew/ew
									38	Oo *	o
									39	Ֆֆ *	f

- Each sign represents one phoneme

ARE WE GOING BACK TO BASICS?

Why (not)?

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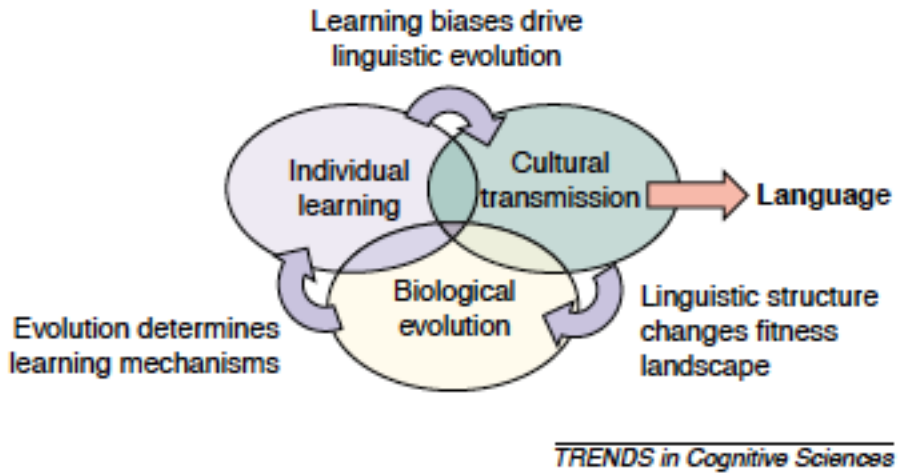
3. ADAPTIVE SYSTEMS



PRE-ADAPTATION

- Ability to use symbols
- Ability to relate the symbols to each other
- Joint attention
- Imitative learning
- Hierarchical learning of sequentially presented information

Quantitative, not qualitative difference

Christiansen & Kirby (2003)

GRAMMAR

- Innate system?
- Developed as a result of social ”grooming” (opposed to physical “grooming”)?
- Biological adaptation?
- Cultural transmission (grammaticalization)?
- Language after social structure?

Which one do you agree with?

3. STUDYING LANGUAGE EVOLUTION IN A LAB: ITERATED LEARNING

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Danish phonology is “exotic”

- Various phonetic processes make the sound structure of Danish particularly opaque (Basbøll, 2005; Grønnum, 2003):

  1. Weakening of contoids, e.g.:

     — [pʰ tˢ kʰ] → [b̥ d̥ g̊] (e.g., demokra**t**i > demokra**t**)

     — /b v/ → [u̯], /g/ → [u̯ ɪ̯] (e.g., koge, løbe, kniv)

     — [d̥] → [ð̞] (e.g., moderne vs. mode)

     — /r/ → [ɐ̯] (e.g., naturalist vs. natur)

  2. Schwa assimilation (e.g., [ð̞ə] → [ð̩]) (e.g., bade)

  3. Consonant drop (e.g., til [tˢel] → [tˢe], kan [kʰanʔ] → [kʰa])

ITERATED LEARNING: THE PUZZLE OF DANISH

Chinese whispers game (e.g. Kalish et al., 2007)

Language "neutral" Jabberwocky style stimuli

En **sutid** har kusfatet min brel.

Jabberwocky by Lewis Caroll

'Twas brillig, and the slithy toves

Did gyre and gimble in the wabe:

All mimsy were the borogoves,

And the mome raths outgrabe.

PREDICTIONS

Phonological underrepresentation
- Danes will develop a new ”language” distant from the original input, whereas Norwegians will stay relatively closer to the original input

Phonological overrepresentation
- Danes will stay closer to the original input, compared to Norwegians

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THE STUDY

- One common input for both languages
- 8 generations, 10 chains for each language

What do we learn?

DK

NO

LESSONS FROM ITERATED LEARNING STUDIES

- The stimuli become stabilize (become more ”learnable”) over generations
- The stimuli become more language-like

Are we “wired” to create language?

EXERCISE

- Open your homework and discuss it with the person sitting next to you
- What have you learned from reading the article?