Language

- Words
- Rules
- The anatomy of language

Alex the Parrot

- https://www.youtube.com/watch?v=ldYkFdu5FJk

Alex the Parrot

- https://www.youtube.com/watch?v=ldYkFdu

- Lived with researcher Irene Pepperberg for thirty years (!)

- Interesting book (I have not read it but have it on my bookshelf):

What is a word?

- A symbol that stands for something (referent)
- We say a symbol is <u>grounded</u> if it is attached to a <u>concept</u>

- Words are <u>arbitrary</u>, i.e., there's no reason that the word "cat" refers to a cat and the word "dog" refers to a dog.
- We could swap them.

- Is this true of all words?
- Onomatopoeia – words that sound like what they mean: buzz, meow

Famous experiment across cultures
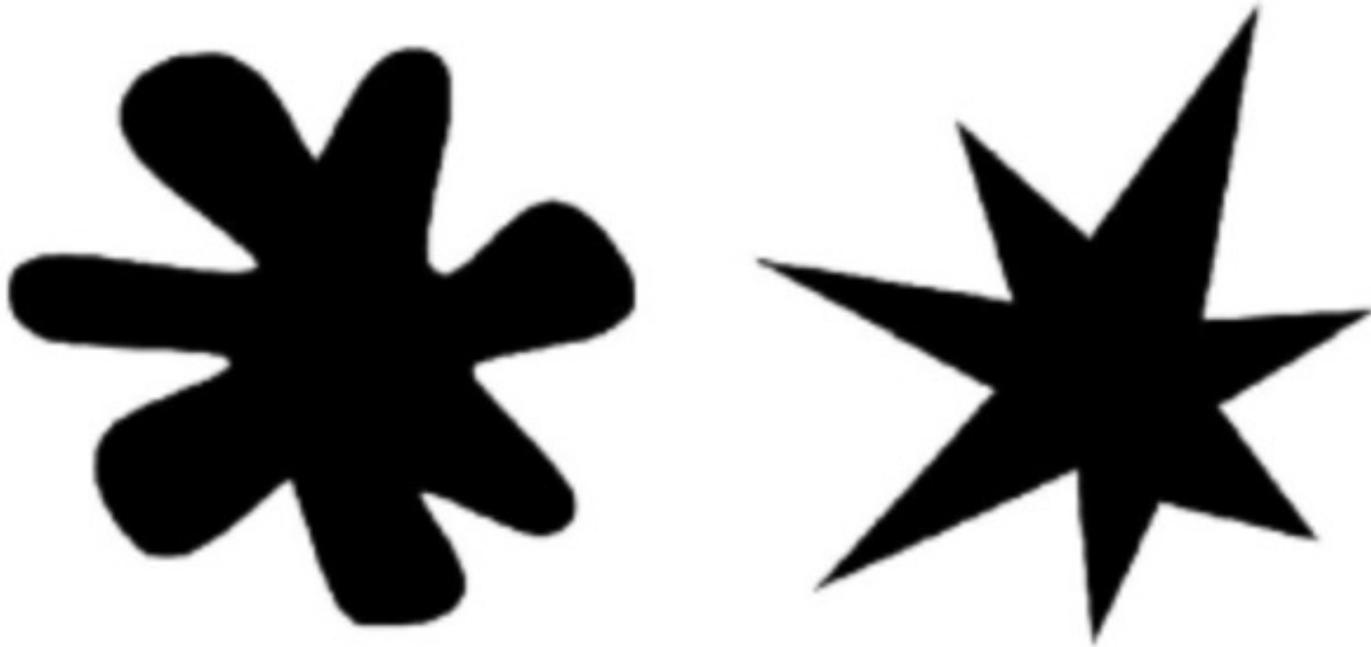
- One of these is a bouba, and one of them is a kiki. Which is which?
- One of these is a takete, and one of them is a maluma. Which is which?

- "We report an online experiment that tested the *bouba/kiki* effect across speakers of 25 languages representing nine language families and 10 writing systems."

The *bouba/kiki* effect is robust across cultures and writing systems

Aleksandra Ćwiek[1,2], Susanne Fuchs[1], Christoph Draxler[3], Eva Liina Asu[4], Dan Dediu[5], Katri Hiovain[6], Shigeto Kawahara[7], Sofia Koutalidis[8], Manfred Krifka[1,2], Pärtel Lippus[4], Gary Lupyan[9], Grace E. Oh[10], Jing Paul[11], Caterina Petrone[12], Rachid Ridouane[13], Sabine Reiter[14], Nathalie Schümchen[15], Ádám Szalontai[16], Özlem Ünal-Logacev[17], Jochen Zeller[18], Marcus Perlman[19] and Bodo Winter[19]

[1]Leibniz-Zentrum Allgemeine Sprachwissenschaft, 10117 Berlin, Germany
[2]Institut für deutsche Sprache und Linguistik, Humboldt-Universität zu Berlin, 10099 Berlin, Germany
[3]Institute of Phonetics and Speech Processing, Ludwig Maximilian University, 80799 Munich, Germany
[4]Institute of Estonian and General Linguistics, University of Tartu, 50090 Tartu, Estonia
[5]Laboratoire Dynamique Du Langage UMR 5596, Université Lumière Lyon 2, 69363 Lyon, France
[6]Department of Digital Humanities, University of Helsinki, 00014 Helsinki, Finland
[7]The Institute of Cultural and Linguistic Studies, Keio University, Mita Minatoku, Tokyo 108-8345, Japan
[8]Faculty of Linguistics and Literary Studies, Bielefeld University, 33615 Bielefeld, Germany

What is a word?

- A symbol that stands for something (referent)
- We say a symbol is <u>grounded</u> if it is attached to a <u>concept</u>

- Words are <u>arbitrary</u>, i.e., there's no reason that the word "cat" refers to a cat and the word "dog" refers to a dog.
- We could swap them.

- Is this true of all words?
- Onomatopoeia – words that sound like what they mean: buzz, meow

- But these are the exception... for most words, the symbol is arbitrary

The mental lexicon

- Arbitrary sign: conventional pairing of meaning and sound.

- The mental lexicon is the set of all the words in the language.

- Often assumed to form a hierarchy or a network – mirroring how our concepts are organized

- Speakers of the same language have mutually intelligible lexicon entries.

Amazing facts about the human mental lexicon...

- Between birth and adulthood, children learn about 40,000 unique words and idioms (fit as a fiddle)

- During the second postnatal year, children's productive vocabulary accelerates dramatically: vocabulary explosion.

- People recognize and produce words extremely quickly:
  - meaning of spoken word is accessed by listener in 0.2 seconds.
  - The brain takes 0.25 seconds to name an object, and further 0.25 seconds to program mouth and tongue to pronounce it.

MacArthur-Bates Communicative Development Inventory (MCDI)

- How do children learn language? Have to start studying them BEFORE they have learned it!!!

- Amazing research tool developed starting back in 1975

https://mb-cdi.stanford.edu/

Merrill-Palmer Quarterly, 1975 Vol. 21, No. 3

THE ACQUISITION OF PERFORMATIVES PRIOR TO SPEECH[1]

Elizabeth Bates*
University of Colorado

Luigia Camaioni
Istituto di Psicologia
CNR - ROME

Virginia Volterra
Universita di Roma

Rules

- We do not just blurt out isolated words.

- Rather we combine them into phrases and sentences.

- The meaning of the combination can be inferred from the meanings of the words and the way they are arranged.

1. The boy saw the girl with the telescope
2. The girl saw the telescope with the boy
3. The boy with the telescope saw the girl

- Example of a rule: Noun phrase --> Verb --> Noun phrase

What are the rules?

- There must be a code, a set of rules that specifies how words may be arranged into meaningful combinations: **the grammar**

- Grammars are language / culture specific

- There are some shared properties, but some that can be distinct

- We'll talk about cultural differences more a bit later on

The expressive power of rules

- Expressive power of some representational system = how many different things can you represent?

- Rules are **productive**, defined over kinds of words rather than actual words (we assemble new sentences on the fly).
- Symbols contained in the rules are **abstract** (we can talk about anything we like!)

- Noun phrase --> Verb --> Noun phrase

The expressive power of rules II

- The rules are also **<u>combinatorial</u>**: a small inventory of elements can be assembled by rules into immense set of distinct objects.

- Noun phrase --> Verb --> Noun phrase

- What if you have 5 nouns and 2 verbs... how many sentences?

- 50 sentences

- 10,000 nouns, 4,000 verbs....

- 400,000,000,000 sentences (400 billion)

The expressive power of rules III

- The rules are also **<u>recursive</u>**: a small inventory of elements can be assembled by rules into immense set of distinct objects.
- the rules create an entity that can contain an example of itself

noun phrase

noun phrase
cat

modifier
who

verb phrase
sat on the mat

Recursion