

## Extreme Long-Term Memory Capacity

Some people with developmental disorders have one (or more) areas of extreme expertise, for example, the ability to memorize huge amounts of information.

Many, but not all, of people with this so-called savant syndrome are diagnosed with autism.

For example,

- Stephen Wiltshire can memorize (and later draw) every building of a city after a helicopter ride above it.
- Kim Peek can read books at ten times the normal speed and memorize every single fact in them.

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## Extreme Long-Term Memory Capacity

Another example is David Tammet, who has synesthesia, i.e., he perceives digits and numbers as colored shapes.

This perceptual ability helps him to do complex computations in his head extremely quickly.

He can also memorize numbers unusually well, for example, 22500 decimal places of the number pi.

It took him five hours to recite all those digits.

Unlike Stephen Wiltshire and Kim Peek, he has no developmental disorder.

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## Extreme Long-Term Memory Capacity

YouTube videos:

Stephen Wiltshire:

[http://www.youtube.com/watch?v=dAfaM\\_CBvP8](http://www.youtube.com/watch?v=dAfaM_CBvP8)

Kim Peek:

<http://www.youtube.com/watch?v=k2T45r5G3kA>

<http://www.youtube.com/watch?v=NjIAbs-3kc8>

[http://www.youtube.com/watch?v=Auufbu\\_ZdDI](http://www.youtube.com/watch?v=Auufbu_ZdDI)

<http://www.youtube.com/watch?v=vRPxMDj33S4>

<http://www.youtube.com/watch?v=a1aA5osvYqY>

Daniel Tammet:

<http://www.youtube.com/watch?v=AbASOqcq1Ss>

<http://www.youtube.com/watch?v=WfoGsXYLxcs>

<http://www.youtube.com/watch?v=o7oEdE2XiXE>

<http://www.youtube.com/watch?v=UqLzoiVzEY8>

<http://www.youtube.com/watch?v=qMz3qil9x-M>

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# Psycholinguistics

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## Psycholinguistics

Psycholinguistics is the study of language in terms of psychological and neurophysiological factors.

- Deficits in language production or comprehension in patients with brain damage
- Development of language abilities during the lifespan
- Relationship between language and thought
- Can animals learn a language?

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## What is Language?

Clark & Clark (1977): Five essential characteristics:

1. **Communicative:** Language enables communication between individuals (production, transmission, comprehension of information).
2. **Arbitrary:** Language consists of arbitrary symbolic elements that refer to "things" in the world.
3. **Structured:** The ordering of symbols follows rules.
4. **Generative:** The symbols can be combined to create a very large number of meanings.
5. **Dynamic:** Languages are constantly changing ("e-mail").

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## Elements of Language

- **Phoneme:** Smallest unit of sound in a language (English: 45 different phonemes), for example:  
“a” in father: “ah” sound  
“a” in cane: “ay” sound
- **Morpheme:** Smallest unit of spoken language that has meaning, for example:  
“apple” is a morpheme, but also the sound “s”, because if we append it to “apple”, it changes the meaning to “apples” (plural).

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## Rules of Language

- **Phonology:** rules that govern the sound system of a language.
- **Morphology:** rules that govern word structure.
- **Syntax:** rules that govern the arrangement of words in sentences.
- **Semantics:** rules determining word meanings.
- **Grammar:** Collection of all of the above rules.

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## Language Use in Primates

- In the wild, monkeys use different cries for different types of threat.
- This is communication, but not language.
- Cries are not arbitrary, no use of grammar, and no new meanings are created.
- Do animals have the capacity for language, i.e., could we teach them a (simple) language?
- This has been studied in primates (chimpanzees and gorillas).

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## Language Use in Primates

- For example, the gorilla Koko was trained to use a subset of American Sign Language and to understand some spoken language.

### Criticisms:

- Koko was trained using rewards and may have associated ASL signs with concepts because of this training and not because she understood its meaning.
- Koko can combine symbols, but there is no evidence of syntax use.
- No clear evidence of creation of new meanings.

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## Language Use in Primates

YouTube videos about Koko:

<http://www.youtube.com/watch?v=Pmuu8UEi2ko>

<http://www.youtube.com/watch?v=3NDvs9bMsTE>

<http://www.youtube.com/watch?v=X67zBy0lQgw>

<http://www.youtube.com/watch?v=4i6Tr2aYO9q>

<http://www.youtube.com/watch?v=7t9it2l2lq0>

[http://www.youtube.com/watch?v=5KIL-e\\_9DVA](http://www.youtube.com/watch?v=5KIL-e_9DVA)

[http://www.youtube.com/watch?v=ZYE\\_tqw95eY](http://www.youtube.com/watch?v=ZYE_tqw95eY)

<http://www.youtube.com/watch?v=hbmOBsEBbqM>

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## Language Acquisition in Humans

Series of stages:

- **Cooing stage:** making sounds, exercising vocal cords
- **Babbling stage (6 months):** fewer sounds, more consonant-vowel pairs (“mama”), more phonemic than morphemic, also intonation learning.
- **One-word stage (1 year):** Morphemes and words, often inaccurate (“unky” instead of “uncle”)
- **Two-word stage:** rudimentary syntactical skills (“see kitty”, “want toy”).
- No clear subsequent stages, but rather continuous growth of vocabulary and syntax.

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