Language and the human brain

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Animal language?

Protective coloration
Vervet alarm calls

Kanzi
Is this language?

4 quick examples

1.
Where are the words, anyway?
Baby statisticians?

Saffran, Aslin, Newport, 1996

2.
What a big vocabulary you have!

Do you want to eat a VIOLET CRUMBLE?

cookie
run
milk
bed
bird
candy
mommy
daddy
candy
man
dog
candy
man
mommy
daddy

kitty
go
chair
drink
doggie
horse
Jane
see
3. Syntax, syntax, syntax

that the
The mouse sees the dog. The dog barked.

4. Saying one thing, meaning another

The dog the mouse the cat chases sees barked.

The dog

that the mouse sees

that the cat chases

Sentence

Noun Phrase

The dog

NP

VP

barked

Verb Phrase

sees

chases
This car is a lemon.
If you do that, you’ll be sorry.
If I were you, I’d hate myself.

The Voringian Binx glorphed the Knappaboar.

Human language really is different
A language organ in the brain?
Brain regions that are active in expert chess players during the end game of chess

Nichelli et al. (1994).

Brain areas that process environmental sounds


Brain areas that process language


Our brains are opportunistic
Our brains are integrative

Hearing (speech) alone
Seeing (lips) alone
Hearing (speech) & Seeing (lips) together

A gene for language?
A gene for language?

The KE family

3 generations
30 family members
15 afflicted members
Human FOXp2

Mouse FOXp2

nearly identical
Chimpanzees cannot voluntarily control vocalizations
Language depends on rapid and complex vocal movements
A very small change in FOXP2 makes this possible

Small changes can lead to big differences

A new machine built out of old parts
The connections really matter
Coronal section of brain (looking forward)

Superior longitudinal fasciculus

Superior longitudinal fasciculus of Leborgne

Right Hemisphere
Other things matter, too
Putting it all together. . .

Thank you