

# Intro to Linguistics – Animal Communication

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## Overview of topics

- Communication systems in general
- Bee communication
- Studies of primate communication

## 1 Communication Systems

Human language is just one kind of communication system; not every communication system is a language. Communication can be defined as the intentional transmission of information.

Communication: From Latin *communicare* ‘to share’, from *communis* ‘shared by all’, from *com* ‘together’ + *munia* ‘public duties’

Cf. common, community, communism, communion

All communication systems have the following elements or properties:

- **Signals** (or signs) – perceptible entities by which messages can be sent.
  - **Visual**: gestures, signs, writing
  - **Auditory**: speech, warning cries
  - **Tactile**: braille

This categorization of modalities is made from the point of view of perception, we can also categorize them in terms of production (speech, clapping, and warning sirens are all auditory, but they are produced in very different ways).

- **Semanticity** – signals have meanings. If signals are simply random, no communication is taking place.
- **Pragmatic Function** – messages serve some purpose (e.g., survival, transmission of culture, influencing others’ behavior)

Communication systems have some or all of the following additional properties:

1. **Interchangeability** – a single individual has the ability both to send and to receive messages.  
E.g., the female silkworm moth can only send messages, and the males can only receive messages.

2. **Arbitrariness** – symbols used are arbitrary (conventional).
3. **Cultural Transmission** – the system can and must be learned (it is not completely innate).  
Human language: Children learn the language of their surrounding environment.
4. **Discreteness** – a message is composed of smaller, distinct functional parts.  
No animal communication system has so far been shown to have this property.  
Human language: phonemes → morphemes → words → phrases → sentences
5. **Displacement** – ability to communicate about things or situations not present in space or time.  
Human language: We can talk about yesterday, the surface on Mars, the Lord of the Rings (Sauron), the future, etc.
6. **Productivity** – the system is open, i.e., it can be expanded if necessary.  
Human language: Productivity (a completely new sentence) is allowed by discreteness (through the manipulation of parts).

## 2 Bees

- Honeybees communicate the location of food sources to other bees.
  - Three distinct methods (not all species use all of them). All are based on “dances” performed by scouts returning to the hive after having located food sources.
1. **Round dance** – Used when food is less than 7 m (20 ft) from the hive. It communicates:
    - the **existence** of food – by the very performance of the dance;
    - the **quality** of food – by the excitement level of the bee;
    - the **type** of food – by the dust on the bee.
  2. **Sickle dance** – Used when food is 7-20 m (20-60 ft) from the hive. It communicates:
    - the **existence** of food – as round dance
    - the **quality** of food – as round dance

- the **type** of food – as round dance
  - the **direction** of the food wrt the hive and the sun – by angle of “perpendicular” wrt vertical
  - the **distance** of the food – the farther is the food the faster is the dance
3. **Tail-wagging dance** – Used when food is more than 20 m (60 ft) from the hive. It communicates:
- the **existence** of the food
  - the **quality** of the food
  - the **type** of the food
  - the **direction** of the food – by the angle of the “straight” part of the dance wrt vertical
  - the **distance** of the food – the farther is the food the slower is the dance  
Opposite strategy than in the sickle dance. Reason: The bees cannot dance so fast

### 3 Primate Studies

- The great apes (gorillas, chimpanzees, and orangutans) have very complex communication systems. They communicate with facial expressions, gestures, and calls to express anger, dominance, fear, danger, and the like.
- These communication systems nevertheless lack properties as displacement and productivity (they do not combine their gestures or calls in novel ways to create new meanings)
- The great apes are, however, very intelligent creatures and *Homo Sapiens*' nearest relatives.
- *Can language be taught to apes, even though it does not occur naturally?*

#### 3.1 Nim Chimpsky

The early experiments showed (by failure) that apes are not capable of producing human speech sounds.

- Taught ASL to prove that a chimp could acquire and display some use of grammar

- Acquired 125 signs at the age of four

#### *Conclusion*

- The apes' uses of signs are very different from human language.
- 40% of the signs were mere repetitions of what the trainer had just signed.
- The signing was always a request for food or social reward.
- There was no evidence that Nim knew any grammar.

Many researches believe the conclusions are not correct.

### **3.2 Koko the Gorilla**

- One of the longest project of its kind.
- In 1972, the one year old gorilla Koko started learning ASL.
- Now she uses around 1000 sings and can understand around 2000 signs.
- She also invents her own combinations of signs.
- In addition, she supposedly understands spoken English.

#### *Questions*

- Has Koko acquired human language?
- How long are her signed utterances?
- What are the main topics of her signing?
- Is there any evidence that she really knows the meaning of the signs she uses?
- Is she probably also only repeating and imitating her trainer's signs?

See: <http://www.pbs.org/wnet/nature/koko/> – Koko at PBS