

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