

## 7 COMPARING COMMUNICATION SYSTEMS: DESIGN FEATURES

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Throughout this chapter, we have emphasized the distinction between communication and language. In this final section, we will compare human linguistic communication with what we have learned about systems of animal communication.

Differences and similarities between human language and natural animal communication systems can be highlighted by comparing essential characteristics of the systems. These characteristics are called **design features** and are set up (perhaps unfairly) with reference to human language. Since this book emphasizes the essentially mental nature of linguistic ability, the design features that follow do not include the traditional reference to vocal-auditory transmission. What is emphasized is the nature of the semantic and organizational structuring of each system. These design features represent an adaptation of those of Charles Hockett and W. H. Thorpe, as noted at the end of this chapter.

1. *Interchangeability* All members of the species can both send and receive messages.  
This is obviously true of human language. It is not the case with bee dancing (performed only by foragers) or birdsong (performed only by males). Nonhuman primate vocalizations appear to be largely interchangeable.
2. *Feedback* Users of the system are aware of what they are transmitting.  
Humans monitor their linguistic output and correct it. It is debatable whether bees do so when they dance, or whether birds monitor their calls. It is not known if birds monitor their song; it is likely that they do.
3. *Specialization* The communication system serves no other function but to communicate.

Human language represents reality—both external (real world) and internal (states, beliefs)—symbolically in the mind. Manifested as speech, language serves uniquely as a communicative system. Bee dancing and birdsong also appear to be specialized communicative activities. Alarm calls of any species may be symptomatic but at the same time are specialized for different types of predators. Symptomatic tokens, on the other hand, are unspecialized. Crying is a symptomatic sign that may be interpreted by someone else and thus function communicatively, but its primary purpose is physiological (the clearing of foreign matter from the eye, the release of emotional tension). If animal communication is primarily symptomatic—a claim that is hotly disputed by specialists in animal communication—then it would not qualify as a specialized communicative system.

4. *Semanticity* The system conveys meaning through a set of fixed relationships among signifiers, referents, and meanings.

Human language conveys meaning through arbitrary symbols. Bee dancing conveys meaning, but within a very limited range, as do bird calls and song. The range of meaning is broader and more subtle in nonhuman primate vocalizations. Although we cannot claim to know the minds of such near relations as chimpanzees and gorillas, it appears that the range of meanings suggested by their behavior in the wild does not approach the vastness of human semanticity (see feature 8).

5. *Arbitrariness* There is no natural or inherent connection between a token and its referent.

This is true of human language, with the possible exception of a few onomatopoeic terms. Bee dancing shows arbitrariness in that there may be no connection between the form of the dance and the distance from the hive. Expressions of food-source quality and direction are not arbitrary, however. Many bird calls are highly suited for their purpose, such as danger calls that are difficult to locate, and in this sense are not arbitrary. Most nonhuman primate vocalization appears to be equally adaptive, though arbitrariness has been claimed for vervet monkey alarm calls.

6. *Discreteness* The communication system consists of isolable, repeatable units.

Human language shows distinctive features, phonemes, syllables, morphemes, words, and still larger combinations. There are two (three, in some dialects) discrete types of bee dances, but these dances are not combined in various ways to produce novel messages. There is some evidence for subunits in birdsong. They are also present in primate call systems.

7. *Displacement* Users of the system are able to refer to events remote in space and time.

Bee dancing shows displacement. No evidence for displacement is found in bird calls or songs. Baboons occasionally produce threat and fight vocalizations long after an aggressive encounter, but there is no evidence that this is reflecting displacement; it probably reflects a slow winding down of the animal's emotional state. Among apes, it is not yet clear whether some degree of displacement is a feature of either their communication in the wild or the systems they have learned

from humans. Nonhuman primates do not appear to communicate about imaginary pasts or futures, which humans are able to do with language.

8. *Productivity* New messages on any topic can be produced at any time.

This is obviously true of human language. Bees show limited productivity. Bird calls show none. Birdsong shows evidence of recombination (the songs of laughing gulls are well documented in this respect), but it is doubtful whether these recombinations transmit novel messages. This is also true of recombination in the calls of certain monkeys, such as macaques.

9. *Duality of patterning* Meaningless units (phonemes) are combined to form arbitrary signs. These signs in turn can be recombined to form new, meaningful larger units.

In human language, phonemes can be combined in various ways to create different symbolic tokens: *spot*, *tops*, *opts*, and *pots*. These tokens in turn can be combined in meaningful ways: *Spot the tops of the pots*. There is no evidence of this type of patterning in any known animal communication system.

10. *Tradition* At least certain aspects of the system must be transmitted from an experienced user to a learner.

This is obviously a factor in the acquisition of human language. It is possibly present in a very limited way in bee communication, and it is definitely present in the acquisition of birdsong for some species. As noted in Section 5.4, there is some recent evidence for a degree of tradition among chimpanzees.

11. *Prevarication* The system enables the users to talk nonsense or to lie.

Undoubtedly, this property is found in human language. There are specialized mimics among birds, fishes, and even insects. A few examples of animal deception have been noted among the arctic fox and among vervets, but it is not clear whether this is normal species-specific behavior or the acts of a few isolated individuals. The question of intentionality is crucial here. Current work with birds suggests that some species learn as many songs as possible and use this repertoire to maintain territorial advantage by "impersonating" other species. This may well be purely genetically determined behavior, but in any event, it is highly complex.

12. *Learnability* A user of the system can learn other variants.

Humans can learn a number of different languages. Bees are limited to their own genetically specified dialect. Bird calls are apparently limited in this same way. As noted previously, some birds learn the songs of other species, but this may well be simply mimicry. Nonhuman primates seem restricted to their own systems in the wild.

13. *Reflexiveness* The ability to use the communication system to discuss the system itself.

No evidence exists that any other species writes grammars or linguistics textbooks.