[94] DESIGN FEATURES OF HUMAN LANGUAGE

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About 20 years ago, Charles F. HOCKETT made the very interesting attempt to determine the design features of human language. This attempt resulted in a list of 13 items (HOCKETT 1960). Some years later, in cooperation with Stuart S. ALTMANN, he enlarged this list by three features, so that the final result was a list of 16 items (HOCKETT / ALTMANN 1968):

DF 1 Vocal-auditory channel
DF 2a Broadcast transmission
DF 2b Directional reception
DF 3 Rapid fading / Transitoriness
DF 4 Interchangeability
DF 5 Complete feedback
DF 6 Specialization
DF 7 Semanticity
DF 8 Arbitrariness
DF 9 Discreteness
DF 10 Displacement
DF 11 Productivity / Openness
DF 12 Traditional transmission
DF 13 Duality of patterning
DF 14 Prevarication
DF 15 Reflexiveness
DF 16 Learnability

I have reconsidered this list, trying to differentiate primary and secondary features, to keep primary features independent of one another and to take account of recent in- [95] sights into the nature of human language. The result is a list of ten main features which I shall enumerate and comment upon in this paper.

(1) *Human language is a complete semiotic system* (cf. DF 4).

This means that every unimpaired adult human individual is anatomically and physiologically able both to produce certain signals in order to manifest certain inner states and to perceive and to process obliquely such signals in order that inner states of the same kind are triggered in him. As already certain species of collective amoebe have developed a system of this type (serving as an aggregation system), the age of this feature is that of unicellular organisms. Alternatives to complete semiotic systems are partial semiotic systems enabling individuals of a species either to produce or to receive the corresponding signals (e.g. most sexual signaling systems) on the one hand and partial semiotic systems enabling individuals of a species to perceive signals coming from the environment on the other hand.

(2) *The signals of human language are of an acoustical kind.*

They are elastic vibrations of the air. This feature is as old as multicellular organisms endowed with organs that are specialized both for the production of sound by means of arbitrary movements and for the perception of sound. Characteristics of acoustical signals are independence of light conditions, flow over obstacles, little expenditure of energy for their production, little impairment of other acti-

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vities by their production (depending upon the corresponding organs), broadcast transmission (DF 2a), directional reception (DF 2b), rapid fading (DF 3). Alternatives to acoustical signals are chemical, tactile, optical or vibrational signals.

(3) *The signals of human language are produced* [96] *by means of organs of the respiratory and alimentary canal originally functioning exclusively as metabolic organs* (cf. DF 1).

(4) *The signals of human language are perceived by means of a general sound-sensitive organ the original function of which seems to have been the localization of sound sources* (cf. DF 1).

Features (3) and (4) originated with the class of mammals. A characteristic of feature (4) is the categorial perception of sounds (cf. DF 9), a characteristic of feature (3) and (4) the auditory feedback of sound production (cf. DF 5). Alternatives to (originally) unspecialized organs of sound production and perception are specialized organs like the syrinx in birds or the tympanal organ in certain insects.

(5) *The central control of the perception and the production of the signals of human language is functionally lateralized: The perisylvian system of the cortex of the dominant hemisphere of human brain is specialized for the control of both the processing of sound sequences with rapidly changing acoustical spectra and the production of sequences of oral, facial, brachial and manual movements characterized by rapid changes in the positions of the moving organs, thus also for the control of the perception and the production of rapid sequences of consonants and vowels* (cf. DF 6).

There is evidence for the assumption that lateralized control for the perception of sounds began in simians, whereas lateralized control for the production of sounds seems to have begun only with *Homo*. A characteristic of this kind of central control is the proprioceptive feedback of sound pro-
[97] duction (cf. DF 5).

(6) *The inner states manifested or triggered by means of human language are sections of knowledge stored in a memory* (cf. DF 7, DF 10).

This feature seems to have originated with the superfamily of the hominoids. The dances of the honey bee manifest similar inner states, but the two systems are evolutionarily unrelated, so that this is only a case of analogy. Characteristics of the manifestation of knowledge by signals are the possibility of prevarication (DF 14) and the possibility of manifesting beliefs concerning the semiotic system itself (cf. DF 15). Alternatives to the semiotic manifestation of knowledge are semiotic manifestations of emotional or motivational inner states.

(7) *The signals of human language have each an underlying syntactic structure*.

This is quite a recent feature (not older than *Homo erectus*). Its consequence is a duality of patterning underlying the signals of human language (cf. DF 13).

(8) *The abilities to process complex sequential auditory stimuli, to produce complex sequential oro-facial movements, to obtain, by an oblique processing of signals, knowledge storable in memory, to manifest, by means of signals, knowledge stored in memory and to structure signals syntactically resulted from different evolutionary processes*.

Thus, these different abilities are not due to coevolution, and there is not necessarily genetic coupling between them. The frame within which these evolutionary strands met was one of the multimodal, context-dependent, emotionally and motivationally based signal systems typical of subhuman primates. An alternative to this kind of separate evolution is [98] a coevolution of productive and receptive semiotic abilities.

(9) *Human language acquisition is a process controlled genetically, depending upon a (not necessarily monolingual) linguistic environment and consisting in a successive maturing of the abilities mentioned in (8)* (cf. DF 12).

The signals of human language evolve ontogenetically and have evolved phylogenetically prior to their getting a signaling function and, hence, independently of the knowledge they manifest. For this reason they are, in principle, arbitrary (DF 8). Language acquisition is a neotenous process in so

far as some of its elements are preserved during adulthood (cf. DF 11, DF 16).

(10) *In humans production and perception of signals relates to partners recognized as individuals.*

This feature could be called intentionality. Its age is difficult to determine. Alternatives are the production of signals as a mere effect of inner pressure and the reception of signals that merely are in the air.

The fact that human language functions as a cultural device is due to almost all of these ten features. Two of them, however, play a prominent role in this regard, namely the ability to manifest pieces of knowledge by means of linguistic signs (6) and the ability to process complex sequences (5). Knowledge is the genuine locus of culture, and complex sequenced sounds are so highly differentiatable that they are best suited for manifesting sections of highly structured knowledge.

REFERENCES

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