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The symbol concept: History, semiotic foundation, neural and evolutionary significance.

The concept of "symbol" has taken on an extremely wide and conflicting set of meanings over the course of the past few hundred years. Definitions range from the most minimal, in which "symbol" refers to any arbitrarily token correlated with a referent, to highly nuanced, in which symbols are understood as cryptically conveying layers of complex interpretive possibility accessible only through rich cultural experience. Symbols are most usefully contrasted with icons and indices, whose referential properties depend on form similarity and contiguity/correlation between sign vehicle (understood generically) and referenced object/content, respectively. The most relevant distinction between them contrasts the form of representation epitomized by human language which is based on symbolic reference, compared to that of other forms of communication that are not, e.g. pointing, pantomime, simple depiction, symptom detection, and the innate calls of humans and other species, among others. This difference is shown not merely to involve arbitrariness (as is often assumed), but also underlying systematic convention (i.e. agreed upon habit of use with respect to other symbols). Under this definition, the merely arbitrary correlation relationships that are commonly learnable by the majority of mammals and birds (such as by a pigeon in a "Skinner box"), and innate call-object correlations (such as in food- and alarm-calls) are considered arbitrary indices, not symbols. This makes the symbolic transition a distinctive marker of human language and related culturally conventionalized systems. It also helps to explain the difficulty that prevents other species from making any significant foray across this threshold (though it is not an absolute boundary). Acquisition of symbolic interpretive capacity requires internalizing the relational structure of symbol-symbol use-conventions found within a given social group as well as discovering the mapping of this relational structure to phenomena in the world. This makes significant and atypical demands on attentional and mnemonic systems of the brain that appear to have been appropriately modified only in humans. This necessary underlying systematicity is also the source for some of the most ubiquitous grammatical regularities of language (which have been mistakenly attributed to innate biological biases as a consequence of assuming that simple arbitrariness is the only relevant feature).