HEDGES: A STUDY IN MEANING CRITERIA AND THE LOGIC OF FUZZY CONCEPTS*

1. Degrees of truth

Logicians have, by and large, engaged in the convenient fiction that sentences of natural languages (at least declarative sentences) are either true or false or, at worst, lack a truth value, or have a third value often interpreted as 'nonsense'. And most contemporary linguists who have thought seriously about semantics, especially formal semantics, have largely shared this fiction, primarily for lack of a sensible alternative. Yet students of language, especially psychologists and linguistic philosophers, have long been attuned to the fact that natural language concepts have vague boundaries and fuzzy edges and that, consequently, natural language sentences will very often be neither true, nor false, nor nonsensical, but rather true to a certain extent and false to a certain extent, true in certain respects and false in other respects.

It is common for logicians to give truth conditions for predicates in terms of classical set theory. 'John is tall' (or 'TALL (j)') is defined to be true just in case the individual denoted by 'John' (or 'j') is in the set of tall men. Putting aside the problem that tallness is really a relative concept (tallness for a pygmy and tallness for a basketball player are obviously different)¹, suppose we fix a population relative to which we want to define tallness. In contemporary America, how tall do you have to be to be tall? 5'8''? 5'9''? 5'10''? 5'11''? 6'? 6'2''? Obviously there is no single fixed answer. How old do you have to be to be middle-aged? 35? 37? 39? 40? 42? 45? 50? Again the concept is fuzzy. Clearly any attempt to limit truth conditions for natural language sentences to true, false and 'nonsense' will distort the natural language concepts by portraying them as having sharply defined rather than fuzzily defined boundaries.

Work dealing with such questions has been done in psychology. To take a recent example, Eleanor Rosch Heider (1971) took up the question of whether people perceive category membership as a clearcut issue or a matter of degree. For example, do people think of members of a given
species as being simply birds or nonbirds, or do people consider them birds to a certain degree? Heider’s results consistently showed the latter. She asked subjects to rank birds as to the degree of their birdiness, that is, the degree to which they matched the ideal of a bird. If category membership were simply a yes-or-no matter, one would have expected the subjects either to balk at the task or to produce random results. Instead, a fairly well-defined hierarchy of ‘birdiness’ emerged.

(1) Birdiness hierarchy

- robins
- eagles
- chickens, ducks, geese
- penguins, pelicans
- bats

Robins are typical of birds. Eagles, being predators, are less typical. Chickens, ducks, and geese somewhat less so. Penguins and pelicans less still. Bats hardly at all. And cows not at all.

A study of vegetableness yielded a similar hierarchical result:

(2) Vegetableness hierarchy

- carrots, asparagus
- celery
- onion
- parsley
- pickle

Further experiments by Heider showed a distinction between central members of a category and peripheral members. She surmised that if subjects had to respond ‘true’ or ‘false’ to sentences of the form ‘A (member) is a (category)’ – for example, ‘A chicken is bird’ – the response time would be faster if the member was a central member (a good example of the category) than if it was a peripheral member (a not very good example of the category). On the assumption that central members are learned earlier than peripheral members, she surmised that children would make more errors on the peripheral members than would adults. (3) lists some of the examples of central and peripheral category members that emerged from