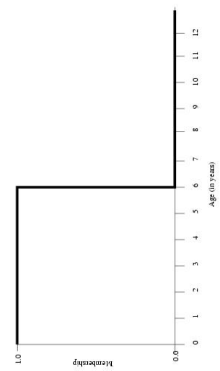

Figure 11.1: The set of children less than 6 years old.

Figure 11.2: The fuzzy sets of *Young*, *Middle-age*, and *Old*.

member of the set *young* (expressed as μ(young) as well as a member of the set *middle-aged* μ(middle-aged). A person who is 30 years old may be considered to be 0.45 in the set *young* and 0.55 in the set *middle-aged* (Figure) . It is not only possible to have a value be in more than one fuzzy set simultaneously, it is quite reasonable that this is so. Wildlife numbers might well be considered to be somewhat in the set *moderate* and somewhat in the set *abundant* depending on where the bounds are placed. This is why in fuzzy sets we speak of possibilities and not probabilities.

To drive home this difference, consider tomorrow's weather. We can ask the probability of whether or not it will rain tomorrow. When the day arrives, we can determine whether or not it rains. But, we cannot ask the probability that it will rain heavily tomorrow. If there is no rain then there is no heavy rain. If it does rain, some people will consider it heavy while other people will consider it moderate. There is a possibility that the rain is heavy, but this is not the excluded middle case of probability (is or is not, no in-between).

Many mathematical operations can be performed on fuzzy sets in a logical way. The two most common are concentration/dilution (hedging) and aggregation.

Concentrators are terms such as *very*. *highly*, *extremely* that mathematically are exponents of the fuzzy membership value. If you have a value in the set