Algorithm for Generating Truth Tables

Philosophy 130
Fall 2015

Given a complicated sentence with multiple connectives and the task of constructing a truth table for that sentence, you should begin by determining how the sentence is constructed out of its parts. You need to number the connectives as a way of clearly indicating how the sentence is put together, and then proceed to develop the truth table by following the order of the numbers. Here is a way to determine the numbers you should assign the connectives.

1. Using capital letters for the constituent propositions (i.e., sentences) and symbols for the connectives, convert the sentence into symbolic notation.

2. Once you have the sentence in symbolic form, begin at the left of the sentence and move to the right, passing over the sentence as many times as it takes to number all the connectives. On each pass, stop at the unnumbered connectives and ask the following question:

   Does this connective I'm looking at apply to (or connect) sentences that contain unnumbered connectives?

   - YES
     - Skip over it and move to the next connective.
   - NO
     - Assign to the connective the number that is one greater than the highest number assigned to the connectives in the connected sentences. (If the connected sentences contain no connectives, at all, the number is 1.)

2. The number 1 will be assigned to those connectives that apply only to reference column sentences. The number 2 will apply to sentences at least one of which contains a connective assigned the number 1. The number 3 will apply to sentences at least one of which contains a connective assigned the number 2. And so on.

3. The smaller numbers apply to the smaller chunks of the sentence and the larger numbers the larger chunks. Remember that these sentences are built up from smaller chunks to larger chunks, and this is the order you should follow in generating truth tables.

4. When filling the truth table out for a sentence, you will need to generate columns of "T"s
and "F"s under the "1"s first, and then move on to the "2"s, and then the "3"s, and so on. When generating columns under the number 1, the input truth values are taken from the reference columns only; when generating columns under the number 2, you will need to take input truth values from at least one column under a number 1; when generating columns under the number 3, you will need to take input truth values from at least one column under a number 2; and so on.

5. The Point of Truth Tables: By generating truth tables, you learn how the structure of sentences constrain and help determine their meanings. You must respect the structure of sentences if you are to understand what they mean; otherwise, confusion will be your curse.