Translating English Sentences into Formal Logic

Philosophy 3

Take the following English sentence:

- If Ruth is restless, then she needs to pee or poop.

How would we go about translating this sentence into formal propositional logic? We can do this by isolating the logical connectives and atomic sentences in the sentence, translating those, and putting them together in sentence of propositional logic that mirrors the form of the original, English sentence.

Notice that there are two logical operators:

1. If..., then
2. or

Now we look for atomic sentences. In the easiest case, an atomic sentence has one of the following forms:

1. Subject-predicate, e.g. "He leapt", "Ruth swims"
2. Subject-predicate-object, e.g. "He went to the store", "Ruth ate her food"

We see one of the first sort as the antecedent of our sentence: "Ruth is restless". We can assign this sentence the letter R. What about the consequent? Is it "She [Ruth] needs to pee or poop"?

No. To see why, consider the truth conditions of "Ruth needs to pee or poop". The sentence is true just in case one or both of the following are true:

- Ruth needs to pee.
- Ruth needs to poop.

If we translate "Ruth needs to pee or poop" with a single letter, then we lose some of the logical structure of the sentence. Given a sentence that means "Ruth needs to pee" or "Ruth needs to poop", we would not be in a position to calculate the truth-value of the entire sentence, when we ought to be. The sentence ought to be translated as a disjunction. So we assign the two disjuncts distinct letters, P and O, respectively.

Given these assignments, the consequent of the conditional is the following:

- $P \vee O$

We are now in a position to present the full symbolic translation of our original sentence. We take our antecedent and consequent and put them on either side of a conditional symbol:

- $R \rightarrow (P \vee O)$