5.2.s. Summary

5.2.1. The simple *if*-conditional is not the only conditional in English. The phrase *only if* is used to mark a compound which limits the possibilities for the truth of its main clause. It does this by asserting a denial of the main clause that is conditional on the failure of the subordinate clause, so it can be thought of as a hedged denial. As this suggests, the only-if-conditional can be paraphrased using the *if*-conditional and negation, with ψ *only if* φ expressed symbolically as ¬ ψ ← ¬ φ.

5.2.2. Like the *if*-conditional the *only-if*-conditional has implicatures. It suggests that the truth of its subordinate clause is a necessary condition for the truth of its main clause (while the *if*-conditional suggests that the truth of the subordinate clause is a sufficient condition). There is a secondary implicature of each conditional in which it suggests the truth of the other conditional, and this can make each seem to say that same thing as a conjunction of the two, a compound known as a biconditional . However, these secondary implicatures are easily canceled. The biconditional ψ *if and only if* φ can be expressed symbolically as (ψ ← φ) ∧ (¬ ψ ← ¬ φ), or (φ → ψ) ∧ (¬ φ → ¬ ψ) when arrows are reversed.

5.2.3. A third sort of conditional is marked by the English word *unless*. It hedges the main clause by asserting a limitation on the possibility of its failure, saying this can happen only when the subordinate clause is true. The effect is to assert the main clause conditional on the denial of the subordinate clause, and the unless-conditional can be stated using the *if*-conditional and negation, with ψ *unless* φ expressed as ψ ← ¬ φ. Like the other two conditionals, the *unless*-conditional carries implicatures, both core implicatures and easily canceled secondary ones.

5.2.4. The symbolic analyses of the conditionals can be captured by the rough formulas: *only if* = *not unless* (i.e., ψ *only if* φ = *not* ψ *unless* φ) and *unless* = *if not*. In these terms, *only if* = *not if not*.

5.2.x. Exercise questions

1. Analyze each of the following sentences in as much detail as possible.
   a. *Tom was late unless he left early.*
   b. *You'll get a good picture only if you take the cap off the lens.*
   c. *Neither Ann nor Bill knew of it unless they both did.*
   d. *The bill will pass if the chairman supports it—unless public opinion runs heavily against it.*
   e. *Unless Ed is late, we'll get started on time and finish early if*
   there isn't a lot of business.
   f. *If Bob was under no obligation to help, he worked only if he was in a good mood and had nothing to do.*

2. Synthesize idiomatic English sentences that express the propositions associated with the logical forms below by the intensional interpretations that follow them. These repeat **3 a**, **c**, and **d** of 5.1.x . This time, you should look for ways of stating sentences using *only if* and *unless*.
   a. ¬ S → ¬ B
      S: *I'll see it*; B: *I'll believe it*
   b. ¬ W ← ¬ (P ∧ ¬ B)
      W: *the set works*; P: *the set is plugged in*; B: *the set is broken*
   c. ¬ (A ∨ B) → (G ← ¬ (C ∨ D))
      A: *Adams will back out*; B: *Brown will back out*; G: *the deal will go through*; C: *Collins will have trouble with financing*; D: *Davis will have trouble with financing*

Homework assigned Mon 10/10 and due Wed 10/12

Analyze (and, after putting it into symbolic form, restate with all arrows running rightwards and put the result in English notation):

Unless it was an emergency, Fred worked if Ed did only if he was taking the next day off

["He" is ambiguous in its reference; either interpretation is acceptable.]