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Homework 3: PtMW Ch 3: Properties of Relations. Pp 51-53, all 5 problems, plus our optional problem 6 on kernels and quotients.

HW 3 Solution 1: All 5 PtMW problems well done and with reasons given.

This one is especially good on **Ex. 2** about minimal pairs, free variation, allophones, etc. The parts of that problem can be interpreted in various ways that lead to various different answers, so this is a case where being explicit about assumptions is particularly important. And this one gives good arguments for concluding that "is an allophone of the same phoneme as" is **not** an equivalence relation.

General note on issues illustrated by that exercise: you can see that in order to determine the formal properties of relations like "is in free variation with", etc., the relations themselves may have to be made more precise than we usually make them, and sharpening them may require answers to questions that we hadn't thought about before and that are not normally posed. [BHP recalls questions that came up in one of the first computational implementations of transformational grammar about where exactly things "attach" when they are adjoined to something else, and when our team consulted Chomsky to see what he thought about it, he came up with an answer which we then dubbed "Chomsky adjunction". Similar questions about the order of application of "subrules" within rules which contained optional parts in their structural descriptions arose first in the context of computer implementation [that's one good way to force yourself to be explicit!], and led to the notion of "disjunctive ordering".]

Moral: being forced to formalize may require you to think about questions you hadn't thought about before; that's both a benefit and a cost of formalizing. Occasionally you can't find any substantive reason for one answer over another, but also occasionally you will find that overall formal properties of the system will help to motivate an answer.

HW 3 Solution 2: Here are nice answers to **Ex. 4 and Ex. 5.** The solution to Ex. 4 is a novel one, not the one in the book. (That's the problem about 'why isn't every symmetric and transitive relation also reflexive?) This one also has a nice answer for #5, with diagrams.

HW 3 Solution 3: A nice answer for **Ex. 5**, with diagrams, and also a nice answer to our optional **Question 6**, with diagrams.