Ling 130 Guide to PS 4:
More Details on DPL

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Dynamic Predicate Logic (DPL)

1.0 $\exists x[P(x) \wedge Q(x)] \wedge R(x)$

Given an expression that is to be interpreted dynamically within DPL, you must decompose the expression so that the appropriate rule can be applied to each subcomponent of the expression. So, for an expression

(1) $\exists x[A \wedge B] \wedge C$

the first rule that applies is the dynamic-$\wedge$ rule, splitting the expression into the two subexpressions, $\exists x[A \wedge B]$ and C.

Next, on the first expression, you need to apply the dynamic-$\exists$ rule, since that allows you to open up the expression. Within this subexpression, you also need to apply the dynamic-$\wedge$ rule again!

Remember, that for each literal you encounter (e.g., A, B, etc.), you will need to apply the rule interpreting atomic formulas. This just ensures that formulas which are not to be computed dynamically do not change their interpretation.

The resulting interpretation should be intuitive (believe it or not!) and reflect what we want it to mean. As mentioned in class, assume that

(2) $\exists x[P(x) \wedge Q(x)] \wedge R(x)$

is a representational shorthand for the discourse in (3) below:

(3) a. A man entered. $\exists x[man(x) \wedge enter(x)]$
b. He sat down. $sit\_down(x)$

We know that we want a model that gives an interpretation equivalent to the expression in (4).

(4) $\exists x[man(x) \wedge enter(x) \wedge sit\_down(x)]$

This entails setting up our assignments for (2) to look something like the following, when all is computed:

(5) $\{\langle g, h\rangle | h[x]g \ \& \ h(x) \in F(P) \ldots\}$

2.0 $\neg\exists x P(x) \vee Q(x)$

As mentioned before, this will involve the same principles as given above for problem 1.0. Try to recall the equivalence that will make this similar (identical) to one of the examples you saw in class when Jess taught.