Still More Hints for Translating into Predicate Logic: Pt. III
(Phil. 210, Pelletier)

Indefinite Articles: In English the indefinite article is *a* (or *an*). Except for special uses such as "generics" (like *A snake is a reptile* –these "generic uses" most generally have stative verb phrases) the indefinite article should be translated as meaning "there is a...", and hence as an existential quantifier. It is for this reason that the prepositional phrases mentioned below will have existential quantifiers in them.

Genitives and Possessives: The most common genitives involve pronouns such as *his, hers, its, their, whose,* and nouns with an aphostrophe+*s*. It is used to indicate a relationship between one thing and another. When phrases in the genitive case are translated into logic, the translation almost always involves a two-place relation. often, the relationship is one of "ownership": *Clyde's dog* means *is a dog which Clyde owns (or possesses).* But the phrase *Clyde's brother* does <u>not</u> indicate the relationship of ownership…he is simply a brother of Clyde. And similarly for *Clyde's birthday* or *Clyde's hometown* or *Clyde's mortal enemy,* and the like. These examples just say that there is <u>some</u> relation between Clyde and the other, but not <u>what</u> that relation <u>is</u>. Thus: translate *Clyde's dog is vicious* as $(\exists x)(Dx\&Ocx\&Vx)$ –where O: x owns y (you could instead use a predicate which means "x belongs to y")– and translate *Clyde's brother is vicious* as $(\exists x)(Bxc\&Vx)$ –where B: x is a brother of y; translate *Clyde's brother's hometown is cold* as $(\exists x)(\exists y)(Bxc\&Hyx\&Cy)$ –where H: x is hometown of y. Translate *All of Sonja's husbands liked all her dogs* as $(\forall x)(Hxs \supset (\forall y)((Dy\&Osy)\supset Lxy))$, where H: x is a husband of y, O: x owns y, L: x liked y.

Prepositional Phrases: It is quite common in English to attach a preposition, such as *with* or *from,* to a noun phrase in order to express some relationship. Such expressions usually translate with an existential quantifier, especially when the object of the preposition is an indefinite noun phrase. *John saw the man with a hat* is translated as $(\exists x)(\exists y)(Mx\&Hy\&Wxy\&Sjx)$ – where W: x is wearing y, S: x saw y.

Pronouns: Pronouns are either "deictic"–and refer to something or someone in the environment–or else are "anaphoric" and refer to some thing or person previously introduced in the discourse. The former type of pronoun has to be treated as a proper name (and we won't worry about it any more); the latter type is handled by either names or variables in our symbolism. Sometimes it is quite clear to whom a pronoun in English refers to: *Mary kissed Sam and then he kissed her* clearly has the *he* refer to Sam and *her* refer to Mary. So it gets translated as: (Kms&Ksm). In cases like these where the pronouns are just being a shorthand for a previously mentioned name, we have what is called "pronouns of laziness", or "lazy anaphoric pronouns". But other times the pronouns refer back to quantified noun phrases, as in *Every man admires his father.* Although the *his* in this sentence somehow refers back to "every man", it is <u>not</u> a pronoun of laziness, because you can't simply substitute "every man" for *his.* If you did, you'd get *Every man admires every man's father,* which means something entirely different. The solution is that *every man* has introduced a quantifier and a variable, and the *his father* means "father of that man". Thus it would be translated as $(\forall x)(Mx\supset(\exists y)(Fyx\&Axy))$, where F: x is a father of y and A: x admires y. This is called "bound variable anaphora." To get these types of

translations right, just keep track of who or what it is that the pronouns refer back to, and use the variable that introduces that thing.

Reflexive Pronouns: These are pronouns such as *himself, herself, itself, themselves, yourself,* etc. Sometimes these are a kind of pronoun of laziness: *Albert shaved himself* is Saa. But other times they are bound variable anaphora: *Some person who kissed himself is unhappy* would be translated as $(\exists x)(Px \& Kxx \& Ux)$.