7.1.s. Summary

7.1.1. Not all singular noun phrases are individual terms. Many are quantifier phrases formed using quantifier words. These phrases are used to say how many objects of a certain kind have a certain property. The study of them dates to Aristotle's theory of syllogisms and was active again in medieval theories of "supposition" but some central problems were solved only with Frege's work a century ago. The problems he solved concern the role of multiple quantifier phrases in the same sentence, something that can lead to multiple ambiguity. Frege's approach was to regard quantifier phrases as signs for operations that apply to predicates, with the interaction of phrases accounted for by the order in which these operations are applied. A particular order of application can usually be marked in English by subject-predicate expansions using the phrase *is such that*.

7.1.2. Complex predicates may be needed as input for quantifier phrases because a quantifier phrase may be used to state a relation between predicates that cannot be analyzed as a compound of separate claims about these predicates. For the same reason, pronouns with quantifier phrase antecedents often cannot be replaced by their antecedents.

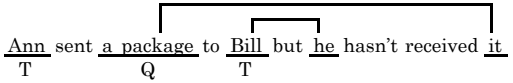
7.1.3. The core of a quantifier phrase consists of a quantifier word and a common noun, but the noun may be modified by adjectives, relative clauses, or prepositional phrases. You can test to see if you have isolated the whole of a quantifier phrase by seeing if it would be grammatical to replace it by the pronoun *it*. Prepositional phrases in the predicate can often be understood to modify either a noun or a verb (and can be missed by the pronoun test); they are part of the quantifier phrase if they can be restated as relative clauses.

7.1.4. A generalization claims that every object in a certain class, the generalization's domain, has a certain property, the generalization's attribute. In the simplest cases the domain is the class (the indicated class) that is picked out by the class indicator, the common noun plus modifiers of the quantifier phrase; and the attribute is expressed by the quantified predicate to which the quantifier phrase is applied. The content of a generalization can often be clarified by considering the sort of counterexample that would show it to be false. When the attribute of the generalization is expressed by the quantified predicate, the generalization is affirmative. The words *all* and *every* are used to express affirmative generalizations while *no* is used to express a negative generalization, one whose attribute is the denial of the quantified predicate. All these words express direct generalizations, whose domain is the indicated class; but, in other generalizations, complementary generalizations, the domain is outside the indicated class. In the simplest case, it is the full complement of this class, which is its complement relative to the class of all reference values—i.e., the result of subtracting it from this class.

7.1.5. Other, less straightforward, relations between the wording of the generalization and the claim it makes can be indicated by modifiers of the quantifier phrase that we will label bounds indicators or exception indicators. The complement of an indicated class over which a generalization is made is often not its full complement but its complement relative to some bounding class, which may cited explicitly by a bounds indicator (such as *among* Bs) or may be implicit in the context. There seems to be no word designed to express generalizations that are both affirmative and complementary. Nevertheless, direct generalizations may be restricted to objects outside a class of exceptions by use of such phrases as *except* Es. Bounds and exceptions limit the domain by intersecting it with another class (the bounding class or the complement of the class of exceptions); the order in which these operations are carried out makes no difference.

7.1.x. Exercise questions

1. In the sentences below underline all individual terms and quantifier phrases, and any pronouns that have such expressions as antecedents. Distinguish individual terms and quantifier phrases by marking them T or Q and indicate what antecedents any pronouns are bound to—as in the following example:



a. *Ann saw a movie and told Bill about it.*
b. *Tim watched a dance troop from India.*
c. *If anyone backs out, they will get a refund.*
d. *Dave called everyone he knew.*
e. *Every dog in the kennel was barking.*
f. *Bill heard something and Carol heard it, too.*
g. *Tim watched a dance troop from the balcony.*

2. Check the sentences below for any ambiguity that may be traced to the order in which quantifier phrases have been applied; when more than one interpretation is possible, bring out the differences by means of subject-predicate expansion and indicate which of the interpretations imply which others.
a. *Everyone works toward some goal.*
b. *Each member of the committee read each application.*
c. *Someone eats at a restaurant every day.*

3. For each of the following generalizations, take the following preliminary steps in its analysis: (i) separate the main quantifier phrase and quantified predicate through a restatement using *is such that* and mark the class indicator, (ii) describe the sort of thing that would count as a counterexample to the generalization, and (iii) determine whether the generalization is affirmative or negative and whether it is direct or complementary.
a. *Every book was checked out.*
b. *Kathy spoke to each guest.*
c. *No one in the lobby had seen the package before the explosion.*
d. *Tod carefully noted everything he saw in the room.*
e. *No one who was familiar with both France and Germany was surprised.*
f. *The committee accepted only entries submitted before the deadline.*

4. The generalizations below have quantifier phrases that make essential use of emphasis (marked here by underlining) to indicate the bounds on the generalization. Restate them so that these bounds are explicitly indicated. For example, *Only patient children will complete the puzzle* could be paraphrased by *Among children, only patient ones will complete the puzzle*.
a. *Only new commercial vehicles are covered by the regulation.*
b. *Only French composers of the early Baroque used that device.*
c. *All but emergency vehicles were banned from the park.*
d. *Only new commercial vehicles are covered by the regulation.*
e. *Sam eats all but orange jelly beans.*
f. *Only new commercial vehicles are covered by the regulation.*

5. In each case below, use the information given about a generalization to determine its domain and attribute. Also, state such a generalization in English.

a. type: direct and affirmative
class indicator: *road*
quantified predicate: λx (x *is finished*)

b. type: direct and negative
class indicator: *road*
quantified predicate: λx (x *is finished*)

c. type: complementary and negative
class indicator: *road*
quantified predicate: λx (x *is finished*)

d. type: direct and affirmative
class indicator: *road*
quantified predicate: λx (x *is finished*)
class of exceptions: *urban freeways*

e. type: direct and negative
class indicator: *road*
quantified predicate: λx (x *is well-maintained*)
class of exceptions: *urban freeways*

f. type: direct and affirmative
class indicator: *roads*
quantified predicate: λx (x *is finished*)
bounding class: *federal projects*
class of exceptions: *urban freeways*

g. type: direct and negative
class indicator: *dentists*
quantified predicate: λx (x *frowned*)
bounding class: *alumni*
class of exceptions: *orthodontists*

Homework assigned Mon 10/31 and due Wed 11/2

(i) Restate the following using a subject-predicate expansion, classify it as affirmative or negative and as direct or complementary, and identify its domain and attribute:

Al saw no one he knew at the party

(ii) Use derivations to check the following (you need not present a counterexample):

a = b, fc = fd, Rba, Rb(fa) → Rd(fc) ⇒ Ra(fb) → Rc(fd)