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Problems in Subjunction

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Let us take a group of 9 people. (Figure 1.) Three of them are boys, three are girls, two are men, and one is a woman. Their individual names will be the numbers as shown in the diagram. To say, for example, that 3 is a boy, classifies 3. These classes are called sets, and are shown in Figure 2. A notation for these sets is also shown (Figure 3). The number of items in a set is called the scope of the sets. The scope of B is 3, the scope of G is also 3, M is 2 and W is 1.

Let us make a further classification of these 9 people. Let us say that 2, 3, 6, and 8 are sick. We will call this set S (figure 4). The people excluded from this set are not sick. We will call this exclusion set "bar S" $\overline{S}$, meaning "not sick". (Figure 5.)

We can put a similar bar over any of the other set labels and get the sets in Figure 6.

Another set (Figure 7) can be made by combining two of the other sets, such as making a set of children, set C, which is composed of the set of boys, together with the set of girls (Figure 8). This combination of sets is called a "union" and the symbol for it is a small U. Similarly, we can make a set A of adults (Figure 9), men and women.

Now let us take two sets, set B and set S, and represent them as streets. The members of the sets are people standing in the street (Figure 10). You see that 2 and 3 are in both streets--they are in the intersection (Figure 11). In set theory, members common to two sets make up a special third set, called the intersection. For intersection we use the U symbol upside down, $\cap$, and call it a "cap."

These three operations can be combined into interesting formulae which can be used to explain semantics.

In Figure 12 we have the phrase, "not sick boys, others." Others here means other boys, but not sick ones. The word others is in apposition to the phrase "not sick boys."

If on the other hand, boys is emphasized, we then take that as an indication that the not goes just with boys and (Figure 13) in the set theory we place the not bar over set B for boys, just as we place it over the S in the phrase before. Thus the bar placement in the set notation corresponds to the not; when clarification is needed to explain
exactly what we mean by not, that is, which part is actually negated, then the emphasis is helpful. If, on the other hand, as in the next phrase, (Figure 14) sick boys is emphasized as a whole, then the bar goes over the entire set theory phrase also. Note that sick boys is one emphatic phrase, not two, as I wrote in Figure 20 of Some Proposals for Junction Grammar. The emphasis is helpful, but not necessary if no one part of the noun phrase goes with the not bar. When the whole phrase is to be negated, no emphasis has the same effect as emphasis over the whole, as shown in Figure 15. Emphasis has other uses, and this illustrates just one.

Another typical set-theory notation for the bar is the prime mark. These are compared in Figure 16.

Note that the semantic result of the phrase sick boys is the same as the phrase boys who are sick, except for the reference to tense. Thus the phrase "who are sick" designates a set of all those "who are sick." In the phrase, the apple that the boy ate, the phrase "that the boy ate" likewise designates the set of all that the boy ate. We can intersect that set with the set of apples (we use only three, like we did for the set of boys). The boy ate cereal(1) toast(3) and apple(2). If apple(2) did not exist, then the intersection would be empty, and the sentence would be false. In this way, the set-theorists give us true/false denotations for our sentences (refer to the excellent material in Packard's book on logic, in the bibliography in Proposals.)

These modifiers can restrict the scope of the noun they modify. That is, the resultant intersection is sometimes smaller than the original noun was (Figure 18). This is then called a restrictive modifier. If, on the other hand, the result is not smaller, it is a non-restrictive modifier. All adjectives fall into this dichotomy. Some prepositional phrases and appositives do as well. There is no way to increase the scope however. Union operation correspond to the operation and. An and phrase is not a modifier, but a conjointed element. Junction Grammar agrees with this. In modifiers, however, JG claims that there is a third type. JG bases all of its three types on a criterion of the relative scope of the left and right operands. For example, JG says that for non-restrictive, the scope of the modifier is the same as that of the noun. An example sentence they use is "John Wayne, who is a famous movie star,..." (Non-restrictive Modifiers I by Eldon G. Lytle, page 1, no date).

Another example from the same page, is:

The governor, in China at the present time, left this note for you.
The scope of the governor is one, but if the scope of in China at the present time is also one, then the governor must be the only one in China at all. It is true that this is a non-restrictive modifier, but JG gives the wrong reason. The right operand does not enter into the criterion at all. It is non-restrictive, because the intersection (dominant node) is the same size as the left operand, regardless of how many millions make up the scope of the right operand. That is, the scope of the governor is just one, and the scope of the governor, in China at the present time, is also just one. The additional phrase does not change the scope.

In the sentence Boys who are poor need money, the scope of boys who are poor is smaller than boys. Otherwise, the sentence claims that boys are poor.

In Proposals we mentioned in a footnote (29) that the JG discussion on intersection included some additional contradictions which I removed for the sake of clarity in emphasizing another issue. We now present that contradiction and the resulting consequence.

Figure 20 shows us the JG restrictive modifier example, with emphasis on who are poor. If who is really a subset, that is, completely contained in set B, then all who are poor (W) are boys—clearly false. On the other hand, other JG literature (see reference B 22 in Proposals) indicates that the who node means the already intersected "boys who are poor." This tells us then that the right operand is equal to the dominant node. Since we said that the dominant node, not the right operand is important, and JG says the two are equal here anyway, the confusion begins.

Figure 21 shows the other sentence of this minimally contrasting pair. Here the emphasis is on boys, and JG gives the diagram shown. However, redrawing the diagram with our labels, shows that all boys are poor boys, since B is contained in W, and W has to mean "boys who are poor" in order for the last sentence (Figure 20) to make sense. In one sentence, W has larger scope than B, and in the other one, it has smaller scope. No single interpretation of W works for both sentences, and the two cannot be compared.

To isolate the effect of the emphasis on the meaning of others, the two sentences must be the same in all other respects (the Latin term ceteris paribus, a favorite of Halle and Jakobsen, fits here). That is, as far as the scope diagrams to, one diagram is needed to work for both sentences.

In Figure 23 we present such a diagram, repeat from Proposals. W must be different from the resultant intersection. Note carefully that any emphasis, or presence of the pronoun others in the sentence does not alter the fact that
the intersection (dominant node only) has a smaller scope than does the original noun at the left operand. Such an example with $B \cap W$ is just as much a restrictive clause example as are the other examples. Emphasis and calculation of others is a separate matter from restriction. Also, emphasizing $B$ is no more distinctive than emphasizing $W$, and so the extra label of Frame II is unwarranted—we would have as many "frames" as combinations of clauses and others. As it stands, the JG formulae are unworkable. (Figure 24.)

The first two, $B$-$W$ and $W$-$B$ contradict each other, and imply that all boys are poor. JG literature is silent on the third type, which is no less common than the other two.

Restriction versus non-restriction is an exclusive binary category. All modifiers are one or the other, and the criterion is the relative scope of the resultant intersection and the original noun. There is no third choice. Frame II is not a third type as JG claims.
1. \[ \begin{array}{c c c c}
1 & 2 & 3 & 4 \\
\hline
Boys & Girls & Men & Women \\
\end{array} \]

2. \[ B \cup G \cup M \cup W \]

3. \[ B = \{1, 2, 3\} \]
   \[ G = \{4, 5, 6\} \]
   \[ M = \{7, 8\} \]
   \[ W = \{9\} \]
   \[ \text{Scope: } 3 \]

4. \[ S = \{2, 3, 6, 8\} \]

5. \[ \bar{S} = \{1, 4, 5, 7, 9\} \]

6. \[ \bar{B} = \{4, 5, 6, 7, 8, 9\} \text{ (not boys)} \]
   \[ \bar{G} = \{1, 2, 3, 7, 8, 9\} \text{ (not girls)} \]
7. \[ C = \{1, 2, 3, 4, 5, 6\} \]

8. \[ C = B \cup G \]

9. \[ A = \{7, 8, 9\} \]
\[ A = M \cup W \]

10. \[ B \text{ Street} \]

11. 2 and 3 are in the intersection of S Street and B Street.
\[ S \text{ intersect } B = 2, 3 \]
\[ S \cap B = \{2, 3\} \]

\[ \begin{align*}
\text{sick} & \quad \text{boys} \\
S \cap B & \\
\end{align*} \]
APPPOSITIVES

12. Not sick boys, others!
\[ S \cap B = \text{others} \]

13. Not sick boys, others!
\[ S \cap \overline{B} = \text{others} \]

14. Not sick boys, others!
\[ S \cap B = \text{others} \]

15. Not sick boys, others!
\[ \text{Not } ( \quad ) = \text{others} \]
\[ S \cap B \quad \text{same as } \#14 \]
16.

**EQUIVALENT NOTATION**

\[
\begin{align*}
\overline{S} & \cap B & S' & \cap B \\
S & \cap \overline{B} & S & \cap B' \\
\overline{S} & \cap B & (S \cap B)' \\
\end{align*}
\]

17.

The apple that the boy ate

The apple

\{ apple_1, apple_2 \}

that the boy ate

\{ cereal_2, toast_3, apple_3 \}
18. **RESTRICTIVE**

Result is smaller than original noun

\[ B \cap S \]

boys sick boys

18. **NON-RESTRICTIVE**

Result is NOT smaller than original noun

\[ B \cap (C \cup C) \]

Boys who are children (all boys)

\[ B \cap C \]

who are children

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John Wayne, who is a famous movie star,...

Example from

1. *Non-restrictive Modifiers I*, by E.G. Lytle

JG claims, however, that the left and right operands (John and who) are equal--
then he is the only "famous movie star" or
the operation has already taken place.
20. boys who are poor

This implies that all who are poor are boys. To correct this, \( W \) must mean "boys who are poor"

which is also the result of the conjunctions!
21. boys who are poor

If \( W = \) boys who are poor as required in \#20, then all boys are poor boys!
This is a contradiction.

22. \#20

\[ W \text{ has smaller scope than } B \]

\#21

\[ W \text{ has greater scope than } B \]

No single interpretation of \( W \) works for both sentences.
ONE DIAGRAM
FOR BOTH SENTENCES

$B \cap W$

$B = \{1, 2, 3\}$  all those who are boys
$W = \{1, 2, 8, 9\}$  all those who are poor
$\overline{W} = \{4, 5, 6, 7\}$  all who are NOT poor
$\overline{B} = \{4, 5, 6, 7, 8, 9\}$  all who are NOT boys
$B \cap W = \{8, 9\}$  all poor who are not boys (#21)
$B \cap \overline{W} = \{3\}$  all boys who are not poor (#20)

$\overline{B \cap W}$ is supposed to be "Frame II" but it is restrictive. "Others" is not a modifier, but a pronoun, and has no special rule from #21 or #20.
"OTHERS"

Intersection Formulae

1. \( B \cap \overline{W} \)
2. \( \overline{B} \cap W \)
3. \( B \cap W \)

JG Formulae

1. \( B - W \)
2. \( W - B \) \{ Contradictory all boys must be poor \}

25.

RESTRICTIVE

NON-RESTRICTIVE

"Frame II" is not a third type of modifier