Corepresentational Grammar and Parsing English Comparatives

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SEC. 1 INTRODUCTION

Marcus [3] notes that the syntax of English comparative constructions is highly complex, and claims that both syntactic and semantic information must be available for them to be parsed. This paper argues that comparatives can be structurally analyzed on the basis of syntactic information alone via a strictly surface-based grammar. Such a grammar is given in Ryan [5], based on the corepresentational model of Kac [1]. While the grammar does not define a parsing algorithm per se, it nonetheless expresses regularities of surface organization and its relationship to semantic interpretation that an adequate parser would be expected to incorporate. This paper will discuss four problem areas in the description of comparatives and will outline the sections of the grammar of [5] that apply to them.

The central problem in parsing comparatives involves identifying the arguments of comparative predicates, and the relations borne by these arguments to such predicates. A corepresentational grammar is explicitly designed to assign predicate-argument structure to sentences on the basis of their surface syntactic organization.

SEC. 2 COMPARATIVE PREDICATES

An initial assumption underlying the proposed analysis of comparatives is that the comparative elements such as more, faster, more spacious, are syntactically akin to predicates, and thus that the principles applying to predicate-argument structure extend to them. Each comparative element will accordingly have arguments (Subject and Object) assigned to it, and comparative predications will also be analyzed as being in relations of subordination or superordination with other predications in the sentences in which they appear. For example, in (1) below, the comparative predicate richer will have both a simple NP Subject and a simple NP Object:

(1) John knows doctors richer than Tom
SUBJ ↑ OBJ

The referent of OBJ(richer), i.e. Tom, is to be interpreted as the standard of comparison against which the referent of doctors is judged. The entire predication forms a term expression ('T') acting as OBJ(know), so that the whole relational analysis is as shown in (2).

(2) John knows doctors richer than Tom
SUBJ ↑ SUBJ ↑ OBJ
Pr/richer(T)
OBJ

Because Pr/richer is included in an argument of another predicate (know), the former is in a relation subordinate to the latter.

This analysis assumes three types of comparative predicates: adverbial, adjectival, and quantifier. Illustrations are given below:

(3) Alice builds planes faster than robots fly them
(4) John met people taller than Bob
(5) Alice drank more beer than Helen

The adverbial predicates are subcategorized as taking predicational arguments in both relations, and only such arguments; the other types can take nonpredicational arguments, though in some cases their Objects may be predicational.

SEC. 3 COREPRESENTATIONAL GRAMMAR (CORG)

The grammar itself consists of two sets of principles. The first set consists of general constraints on sentence structure and applies as well to non-comparative constructions. These principles are discussed in detail in [1] and [2] and will be presented here without justification. In addition there are a number of principles applying only to comparative constructions but non ad hoc in the sense that each can be applied toward the solution of a number of distinct problems of analysis. These principles are as follows:

(6) Law of Correspondence Every NP or term in a sentence must be assigned a relational role. [1]
(7) Law of Uniqueness No two elements in a sentence may bear the same relation to a single predicate unless they are coordinate or coreferential. [1]
(8) Object Rule (OR) If P is an active transitive predicate, OBJ(P) must be identified in such a way as to guarantee that as many segments thereof as possible occur to the right of P. [1]
(9) Multi-Predicate Constraint Every predicate in a sentence which contains more than one predicate must be in an ordination relation with some other predicate in that sentence.[4]
(10) Term Identification Principles
   a. Any predication with the internal structure OBJ-SUB-PRED may be analyzed as T. Any NP is a T. Any T satisfying either of these conditions is a SIMPLE TERM.
   b. Any predication consisting solely of a comparative predicate with simple NP's as arguments is a T; such expressions will be called SIMPLE COMPARATIVE TERMS. All others will be COMPLEX COMPARATIVE TERMS.
   c. Any predication whose Subject occurs to the right of than, and whose predicate either occurs to the left of than or occurs as SUBJ(do) where do itself occurs to the right of than, is a T; such expressions will be called PREDICATE-CONTAINING TERMS or PCT's.
(11) Comparative Object Rule The object of a comparative predicate is any term or predication satisfying the subcategorization of the predicate and which includes some element occuring immediately to the right of than.
(12) Comparative Subject Rule The Subject of a comparative predicate must occur to the left of than.
(13) Comparative Object Restriction The Object of a nonadverbial comparative predicate must be a simple term unless the NP occuring immediately to the right of than is SUBJ of a PCT; in that case, the OBJ of the non-adverbial comparative predicate must be a PC-term.

These principles do not define a parsing algorithm per se; rather, they express certain surface true restrictions which taken together and in concert with the general principles from Kac [1] and [2], define exactly the set of predicate argument structures assignable to a comparative construction. Since no particular analytic procedure is associated with CORG, the assignment of particular analyses may be thought of either as a comparison of complete potential relational analyses with the principles, whereby all potential analyses of the string not consistent with the grammar are discarded, or as a process of sequential assignments of partial analyses where each step is checked against the principles. The sequential method of analysis will be used here to present the operation of these principles; however, it is not a necessary adjunct to the grammar.

SEC. 4.0 STRUCTURE TYPES AND DESCRIPTIVE PROBLEMS

There are three types of comparative predicates, already noted in section 2: adjectival, quantifier and adverbial. The differing subcategorization of these predicates does affect the possible analyses for a given sentence. Several other factors which influence the interpretation of the sentence are the position of the comparative predicate in the sentence, the degree of ellipsis in the than-phrase, and the subcategorization of surrounding predicates. The effect of the type of predicate and the effect of the position of the predicate (in particular relative to than) will be considered separately in the following sections. The effects of the degree of ellipsis in the than phrase and the subcategorization of surrounding predicates will be considered together in section 4.3. It should be kept in mind however that all of these variables may act together in any combination to affect the type and number of interpretations a given sentence may have.

SEC. 4.1 SUBCATEGORIZATION AND PREDICATE TYPES

The effects of the type of comparative predicate on the interpretation can be noted in (3) and (4). The adverbial predicate faster in (3) takes predicational arguments only (ignoring for now the problem of lexical ambiguity) while the adjectival predicate taller takes non-predicational (NP or Term) arguments.

To see how these differences interact with the possible analyses which may be assigned, consider a complete analysis of (4). This analysis may begin with any element in the sentence. In most cases the assignment of the object of the comparative predicate, as the first step, will result in a more direct path to a complete analysis. Assume then, that Bob has been analyzed as OBJ(taller). This assignment satisfies the Comparative Object Rule and is also consistent with the OR.

(14) John met people taller than Bob.
OBJ

Since neither met nor taller is a reflexive predicate, the Law of Uniqueness guarantees that Bob cannot be analyzed as OBJ (P), where P is any predicate (other than taller) as long as it is analyzed as OBJ(taller). Since there are two non-reflexive predicates in this sentence (taller and met), there are four remaining relational assignments which must be made before the analysis is complete. These are SUBJ(met), OBJ(met), SUBJ (taller) and some ordination relation between the predicates met and taller.

Either John or people may be analyzed as SUBJ(taller) at this point since both satisfy the Comparative Subject Rule by occuring to the left of than. If John were assigned the relation SUBJ(taller) the analysis would violate some principles. Assume for purposes of demonstration, that John=SUBJ(taller). The relational analysis at this point would then be:

(15) John met people taller than Bob
SUBJ OBJ

The remaining relational assignments would be OBJ(met), SUBJ(met) and some ordination relation for the two predicates. The next apparently logical step would be to analyze people as OBJ(met). However, this will violate the OR, since it is possible to include more than just the NP people as part of the OBJ(met). The OR requires that as many segments as possible occuring to the right of a predicate be included in OBJ(P). The way to satisfy this condition would be to analyze people as part of PR/taller. Then the OR would be satisfied by the maximum number of elements (consistent with the grammar) which occur to the right of met. The only possible relation that people could bear to taller would be SUBJ (taller) since it occurs to the left of than (see Comparative Subject Rule). If it is analyzed as SUBJ(taller), then John can no longer be analyzed as SUBJ(taller). These steps would give the following partial relational representation:

(16) John met people taller than Bob
SUBJ OBJ
PR/taller(T)
OBJ

At this point in the analysis, the only relation which needs to be assigned still is SUBJ(met). The assignment of this relation to John is the only possible choice which violates no principle of the grammar and this assignment would give a complete analysis.

The analysis of (3) procedes along somewhat different lines due to the subcategorization of the adverbial comparative predicate faster, which requires predicational arguments. The analysis can begin as before by attempting to assign arguments to the comparative predicate faster. However, the first NP after than cannot be assigned to faster as OBJ since it is not a predicational argument. The subcategorization of faster requires complete predications to be available before arguments for it may be identified. Thus consider the other predicates, build and fly. Both are transitive predicates taking only simple NP's as arguments. The NP them must be analyzed as OBJ(fly) because of the OR. The Comparative OBJ Rule and the OR together will require robots to be analyzed as part of the PR/fly. Since robots occurs immediately to the right of than, it must be included as part of the OBJ(faster) by the Comparative OBJ Rule. The OR requires the OBJ of any predicate to include as many elements to the right of that predicate as possible. Therefore, if possible, fly and them must also be included as elements of OBJ(faster). Since faster is an adverbial predicate, it will allow a complete predication (in fact requires) to be its object. Thus, all three of these aspects of the grammar work together to force the string robots..fly..them to be analyzed as a predication PR/fly as shown below, with PR/fly analyzed as OBJ(faster) (as allowed by the Comparative OBJ Rule).

(17) Alice builds planes faster than robots fly them
SUBJ OBJ
PR/fly OBJ

At this point the arguments of build still need to be assigned and build and faster must be assigned some ordination relation. Since faster requires a complete predication for its subject, the predication build must be built first. If any NP's other than Alice and planes are used as arguments for builds, the analysis could not be completed. For example, if robots were analyzed as OBJ(builds) (as well as SUBJ(fly)), then either Alice or planes could be analyzed as SUBJ(builds) completing PR/build.

(18) Alice builds planes faster than robots fly them
SUBJ OBJ SUBJ OBJ
PR/build PR/fly OBJ

PR/build could then be analyzed as SUBJ(faster) and all the necessary relations between arguments and predicates, and between predicates themselves (i.e. ordination relations) would be assigned. However, the analysis would be ill-formed since one element, in this case planes, would be left unanalyzed in violation of the Law of Correspondence. The only way this situation can be avoided, while at the same time not violating the OR or the Comparative Object Rule as discussed above for the OBJ(faster), would be to use only Alice and planes as arguments for builds. The OR would require that planes be analyzed as OBJ (builds) leaving Alice to be analyzed as SUBJ(builds). This resulting predication Pr/builds can then be analyzed as SUBJ(faster) completing the analysis with all rules in the grammar satisfied.

(19) Alice builds planes faster than robots fly them
SUBJ OBJ SUBJ OBJ
PR/builds SUBJ PR/fly OBJ

The most obvious differences between the analyses of (3) and (4) is in the types of arguments which the comparative predicates take and the ordination relations between the predicates and the order in which the different predications were "built up". For (3), the arguments for the non-comparative predicates must be assigned first, before the arguments for the comparative predicate. This is required by the subcategorization of the adverbial predicate, which takes predicational arguments only. In this sentence, the non-comparative predicates are analyzed as subordinate to the comparative predicate. This too is a conseqence of the subcategorization of faster. For (4), the most efficient procedure for assigning relations (i.e. the one requiring the least backtracking) requires the arguments of the comparative predicate taller to be assigned first. In addition since the subcategorization of this predicate allows only for non-predicational arguments, the comparative predicate is analyzed as subordinate to the non-comparative predicate in the sentence. Thus the type of comparative predicate and its subcategorization affects the type of analysis provided by the grammar, and also the "optimal" order of relational assignments, when procedural aspects of the analysis are considered.

SEC. 4.2 POSITION OF THE COMPARATIVE PREDICATE

There are two aspects to the problem of the position of the comparative predicate: one involves the position of the SUBJ(COMP P) relative to than; the other involves the position of the entire comparative predication relative to any other predicate in the string.

SEC. 4.2.1 COORDINATE AND NON-COORDINATE ADVERBIAL COMPARATIVE CONSTRUCTIONS

In some cases, the arguments of comparative predicates may be coordinate. This will always be the case for adverbial comparative predicates for which there is some ellipsis in the string as in

(20) John builds planes faster than robots

Here robots can be considered to be coordinate with either planes or John, that is it can be interpreted as either the SUBJ(builds) or as the OBJ(builds). In non-adverbial comparative constructions, it will not always be the case that a single NP after than will be interpreted as coordinate with some nother NP. Consider the differences in possible interpretations between (4) and (21)

(21) John met taller people than Bob
(4) John met people taller than Bob

For (4), there is only one possible interpretation, while there are two possible interpretations for (21). That is, in (21) Bob may simply be interpreted as OBJ(taller) corresponding to the meaning of the sentence

(22) John met people who are taller than Bob

However, (21) has another interpretation in which Bob is interpreted as SUBJ(met). This case corresponds to the interpretation of (23).

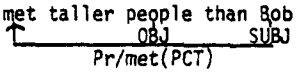
(23) John met taller people than Bob did

For this second interpretation, there are two subjects for met, i.e., John and Bob. This means that John and Bob must be formally defined as coordinate arguments. This formal definition is necessary since the Law of Uniqueness states that no two NP's may bear the same relation to a predicate (i.e. both be SUBJ(P_i) unless they are coordinate or coreferential. Such a definition for NP's such as John and Bob in (23) is not unreasonable since they both meet the basic requirements for coordinate elements. They are both interpretable as bearing the same relation to some Predicate P_i.

The Comparative Object Restriction and a definition of coordinate comparative elements are required to precisely define the conditions under which two elements may be construed as coordinate in a comparative construction. The essence of the Coordinate Comparative Definition (not included here due to space considerations) is that any two elements may be coordinated by than if no non-adverbial comparative predicate occurs immediately to the left of than. The ultimate consequence of this condition is that only one interpretation is allowed for constructions like (4) and this interpretation does not include any arguments coordinated by than. This means that in (4) for example there is no possible analysis in which Bob can be SUBJ(met).

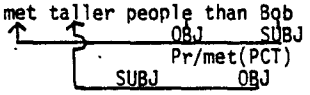
In the coordinate interpretation of (22), (i.e., where John is coordinate with Bob) the final analysis of the string will include the following predicational structure:

(24) John met taller people than Bob



It is this term, then, which is assigned to the relation OBJ(taller), people being SUBJ(taller) (note that people plays two distinct roles in this sentence).

(25) John met taller people than Bob



This particular assignment (of pr/met as OBJ(taller)) is allowed by the Comparative Object Restriction. That is, taller, being non-adverbial comparative predicate, is not subcategorized for predicational arguments. But in (25) OBJ(taller) contains a predicate as one of its arguments.

This particular predicational structure is defined as a Predicate Containing Term or PCT by the Term Definitions. The Comparative Object Restriction has the effect of allowing the OBJ(COMP P) to be a PCT. Since the particular substring of (22), met..people..Bob need not be analyzed as a PCT, an alternative analysis for (22) is also possible. The alternative analysis would be like that for (4), where only Bob=SUBJ(taller). That is, the Comparative Object Restriction does not necessarily require an analysis for (22) like (25); it merely allows it if certain conditions set out in the Term Definition are met. The Comparative Object Restriction is quite important, then, in distinguishing the possible analysis for non-adverbial comparative constructions. It is equally important in obtaining the correct analysis for the sentence types to be discussed in the next section.

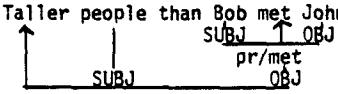
SEC. 4.2.2 SUBJECT COMPARATIVES

The position of the entire comparative predication, relative to other predicates in the string is also quite important in determining the possible types of analysis. Sentence (26) exhibits a subject comparative where the comparative predication occurs to the left of another predicate. It is useful to compare this sentence with the object comparative in (22) repeated here.

(26) Taller people than Bob met John
(22) John met taller people than Bob

As has already been discussed in 4.2.1, (22) has two possible interpretations. Sentence (26), however, has only one possible interpretation. Therefore there should be only one possible analysis. The analysis which needs to be avoided is

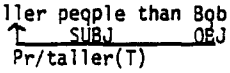
(27) Taller people than Bob met John



This case must be disallowed while at the same time allowing the structure in (24) to be analyzed as OBJ(taller). The Comparative Object Rule and the Term

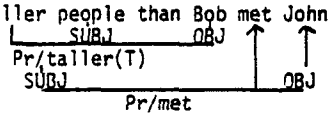
Definitions work together to achieve this. The structure Pr/met shown in (28) does not meet the requirements set out for a PC-Term and the subcategorization of taller (i.e. non-predicational arguments only) will not allow Pr/met to be analyzed as an argument of taller unless it is analyzable as a PC-Term. Thus, the subcategorization of taller and the Comparative Object Restriction will both prevent the assignment of Pr/met as OBJ(taller) in (27). Since an analysis which includes (27) is not possible, the only way the analysis can procede is as follows. The Comparative Subject Rule will require people=SUBJ(taller) since it is the only NP to the left of than. Since Bob is the element occuring immediately to the right of than, it is the only NP which can be analyzed as object of taller. The resulting predication Pr/taller is defined as a term by (10b).

(28) Taller people than Bob met John



The NP John must be analyzed as OBJ(met) to satisfy the OR, leaving Pr/taller to be analyzed as SUBJ(met). This will also satisfy the MultiPredicate Constraint since taller and met will be in some ordination relation as a result.

(29) Taller people than Bob met John



No other analysis is possible since no non-comparative predicate occurs to the left of than (which would allow for possible coordinate interpretations).

SEC. 4.2.3 CONCLUSIONS

The important points in this section are that for Subject Comparatives such as (26), only one interpretation is possible, while for Object Comparatives such as (22), two interpretations are possible. Position of the comparative predication relative to the rest of the string is thus an important factor in determining the number of possible interpretations. Position of individual NP's relative to than is also an important factor in determining the number of possible interpretations a sentence may have. Sentences like (4), where no NP occurs between than and the comparative predicate, have only one interpretation, while sentences like (22), where an NP does occur in the position, have two possible interpretations. The Comparative Object Restriction and the Term Definitions figure crucially in all these cases in the determination of the correct number and type of possible analyses.

SEC. 4.3 DEGREE OF ELLIPSIS AND SUBCATEGORIZATION OF SURROUNDING PREDICATES

The degree of ellipsis following than in comparative structures is quite important in determining the number of possible interpretations a structure may have. For example, in the first sentence of each pair below, where only a single predicate occurs before than, more than one interpretation is possible per string, while in the second sentence in each pair, where an NP followed by some predicate occurs, only one interpretation is possible.

(30) Alice builds planes faster than robots
(31) Alice builds planes faster than robots do

(32) John knows richer doctors than Alice
(33) John knows richer doctors than Alice does

The actual analysis of these sentences will not be presented here. Such sentences are discussed in detail in Ryan [5].

SEC. 4.3.1 DEGREE OF ELLIPSIS AND SUBCATEGORIZATION OF SURROUNDING PREDICATES.

The problem of degree of ellipsis interacts crucially with another factor, the subcategorization of surrounding predicates, in a very interesting way. Consider the following sets of sentences.

(34) John knows more doctors than lawyers debate
(35) John knows more doctors than lawyers debate psychiatrists
(36) John knows more doctors than lawyers run
(37) John knows more doctors than lawyers spoke to

(38) John hired more doctors than lawyers debate
(39) *John hired more doctors than lawyers debate psychiatrists
(40) *John hired more doctors than lawyers run
(41) John hired more doctors than lawyers spoke to

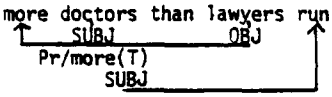
(42) John thinks more doctors than lawyers debate
(43) John thinks more doctors than lawyers debate psychiatrists
(44) John thinks more doctors than lawyers run
(45) *John thinks more doctors than lawyers spoke to

These sentences contain different combinations of comparative predicates with either transitive or intransitive verbs following them and preceding verbs which take: either complement or NP objects (34)-(37); NP objects only (38-41); and complement objects only (42-45). The type and number of interpretations depends on the subcategorization of these verbs and the verbs following the comparative predicate. The first sentence in each group contains a transitive verb, debate, with no overt object. The second sentence in each group contains debate with an overt object. This results in (39) in an ungrammatical sentence, as compared with (38), and in (35) in a sentence with only one possible interpretation as compared with (34), which has two possible interpretations. The third sentence in each group contains an intransitive verb, run. This also results in an ungrammatical sentence for (40) in the second group and in a sentence with only one interpretation, (36) in the first group. The last sentence in each group contains another transitive verb, spoke to, without an overt object. The difference between this verb and debate is that debate is a so-called 'object deletable' verb while spoke to is not. Note that in (45) this results in an ungrammatical sentence (compare to 42) while in (37) the sentence is grammatical. However, in (37) the structure of the phrase more doctors than lawyers differs from its structure in (35) and (36), in which more doctors than lawyers is the subject of the third verb. That is not the case in (37), where only lawyers is the subject of the third verb. It can be seen from this that the subcategorization of the preceding the following predicates is very important to the structure of the comparative predication. In addition, as the first two sentences in each group show, the degree of ellipsis also affects the structure.

In all cases, the structure of the phrase more doctors than lawyers shifts in structure. The most important aspect of this data is the type of arguments which the comparative predicates must take. In these particular cases it is a change in the object of the comparative predicate which corresponds to a shift in the structure of the sentence. This is accounted for most directly by the rules in (10), (11) and (13).

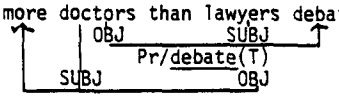
For example, in (36) the OBJ(more) is lawyers and the complete predication Pr/more is the Subject of run. This partial analysis is shown in (46).

(46) John knows more doctors than lawyers run



In (38), the object of more is the sequence doctors.. lawyers..debate, a term according to (10a). This is shown in the partial analysis in (47).

(47) John hired more doctors than lawyers debate



Sentence (36) could not be analyzed as in (47) because run, the third verb in (36), is intransitive while debate, the third verb in (38), is transitive. Thus run cannot be included in any structure satisfying the Term Identification Principles (10), while debate can be so analyzed. This means that run cannot be included as part of the OBJ(more). This is guaranteed by the Comparative Object Restriction (13).

Both of the analyses shown in (46) and (47) are possible for sentence (34) since knows may take predicational objects (in this case, more doctors than lawyers run) or it may take nonpredicational objects such as the complex comparative term in (47).

Sentences (39) and (40) do not have possible analyses since hired cannot take predicational objects (such as that shown in (46)), and the presence of either an intransitive verb (run) or a transitive verb with an overt object (debate psychiatrists) after the comparative predicate, forces such a structure because of rules (10) and (13). Sentence (41) would have a structure similar to (47).

Sentences (42) - (44) would all have structures similar to the partial analysis in (46). This is forced by the subcategorization of thinks, which takes only predicational objects. There is no possible analysis for (45) since the subcategorization of spoke to, unlike debate, requires the presence of an overt object. But if an object is assigned to spoke to, the result will ultimately be a structure like that shown in (47). But the structure shown in (47) is a term and therefore nonpredicational. This means it could not be analyzed as OBJ(thinks), while requires a predicational (complement) structure.

Finally, it is precisely because a sentence with spoke to as the third verb must have a structure like (47) (i.e. nonpredicational) that sentence (41) has a possible analysis in contrast to (45). That is, the structure of the string more doctors than lawyers spoke to in (49) has a nonpredicational (comparative term) structure. Since it is a term and not a predication, any verb taking it as an argument must be subcategorized for nonpredicational arguments. Think in (45) takes only predicational arguments in the object relation, while hired in (41) takes only nonpredicational arguments in the object relation. Thus, only the sentence with hired may take the comparative term as an argument. But spoke to does not allow the string more doctors than lawyers to simply be analyzed as its subject, since no possible object would then be available for spoke to. However, if the string more doctors than lawyers is not analyzed as SUBJ(spoke to), it will not be possible to analyze the string as a predication Pr/spoke to, thus blocking the analysis of the string as OBJ(think).

SEC. 4.3.2 CONCLUSION

The degree of ellipsis and the subcategorization of the surrounding predicates interact to affect the possible number and type of interpretations for each of the sentences in this section. That interaction can be most clearly seen in a comparison of (34) and (35) and (36). The verb know is subcategorized for either predicational or nonpredicational arguments. This allows the string more doctors than lawyers debate to have two possible structures corresponding to the structures shown in (46) and (47). The structure in (46) is a predicational structure while the structure in (47) is a nonpredicational structure. The subcategorization of knows allows either of those as possible interpretations of the OBJ (knows). Verbs subcategorized for only one type of argument, say predicational, will allow only one of those possible structures of more doctors than lawyers debate, in this case the predicational one shown in (46), to be analyzed as the object of that verb. This is one way in which the subcategorization of surrounding predicates affects the type and number of possible interpretations a sentence may have.

The effect of the subcategorization of the following predicate parallels the effect of no ellipsis after than. Thus sentences (35) and (36) each have only one possible interpretation and the relation of the string more doctors than lawyers is the same in each case; that is, it is the same as the predicational structure shown in (46), being the subject of the following predicate. Thus, the presence of an intransitive verb or the presence of a transitive verb plus an overt object to its right as in (35) and (36) forces a predicational structure of the type shown in (46). Since knows takes predicational objects, these sentences are still grammatical. If hired is substituted for knows as in (39) and (40), the sentences are no longer grammatical, since the subcategorization of hired does not allow predication arguments.

The last type of effect of the predicate following than is in some cases to force a nonpredicational structure like that shown in (47). The verb spoke to is not an object deletable verb, while the verb debate does allow unspecified objects. For this reason, the verb spoke to cannot be part of a structure like that shown in (46), since it would require the object of spoke to to be analyzed as "unspecified". Thus, the presence of a verb like spoke to after than forces the nonpredicational structure of the type shown in (47), since in this structure the object of spoke to would be overt. Since the presence of spoke to forces a nonpredicational structure for the string more doctors than lawyers spoke to, it can only occur as part of an object of a verb which allows nonpredicational objects, like know or hired. It follows from this that if the string more doctors than lawyers spoke to occured after a verb which took predicational arguments only, such as thinks, the result would be an ungrammatical sentence. This is in fact the case, as can be seen from sentence (45).

SEC. 5 CONCLUSIONS

The rules presented here provide an axiom system which allows only one possible analysis for each interpretation of a sentence, and no possible analysis for sentences which are ungrammatical. The rules specifically proposed for comparatives have been shown to apply to a wide variety of construction types; for example, the Comparative Object Restriction and the Term Definitions figure crucially in the analysis of sentences in all the subsections of section 4. In addition, these rules are based on observations about characteristics of the sentences which are either directly observable in the string (e.g. left to right relative order) or which are a necessary part of any grammatical description (e.g. subclassification and subcategorization of verbs). Such a grammar can provide useful and accessible information for the problem of parsing as well as grammatical description.

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