'the teacher attempted to prove the theorem'

While syntactically distinct from the well-known West Germanic verb raising construction, the third construction is similar to it in that it exhibits cross-serial dependencies and is hence not context-free. Recently, Joshi 1990 has proposed an analysis of the parsing of verb sequences using extended push down automata (EPDA) which presents a formal model of the differential psycholinguistic processing complexity of cross-serial vs. nested dependencies, as reported by Bach, Brown and Marslen-Wilson 1989. Interestingly, den Besten and Rutten 1989 have proposed an analysis of the third construction (in Dutch) according to which it reflects two independently motivated syntactic processes: long distance scrambling (leftward movement) and extraposition. Joshi's EPDA for cross-serial dependencies corresponds directly to den Besten and Rutten's grammer of the third construction - a result that is striking since the motivation for Joshi's EPDA lies in the explanation of processing complexity, while the motivation for den Besten and Rutten's analysis lies in distributional generalizations of the conventional linguistic type. We presented two TAG analysis of the third construction. The first analysis requires only one-part trees; however, it has certain linguistic drawbacks - in particular, it requires relaxing the important constraint that traces be c-commanded by their antecedents, and it is unable to derive instances of pure long-distance scrambling, which German (like many verb-final languages) allows. As a result, we present an analysis of the third construction using multicomponent adjunction which does not have the above-mentioned drawbacks. Even this analysis, however, is unable to derive certain instances of long-distance scrambling (in particular, one in which a long-distance scrambled constituent interrupts two matrix arguments). We propose a multicomponent adjunction analysis which relies crucially on introducing arguments of the verb on a par with adjuncts. We conclude by presenting linguistic evidence based on facts concerning weak crossover and parasitic gaps, which support the last multicomponent adjunction analysis presented.

French and english determiners:
Interaction of morphology, syntax and semantics
in Lexicalized Tree Adjoining Grammars
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Tree adjoining grammars have proved quite relevant for handling numerous linguistic phenomena, for example unbounded dependencies (A. Kroch and A. Joshi 1985, A. Kroch 1987), light-verb constructions (A. Abeillé 1988) and idioms (A. Abeillé and Y. Schabes 1989, 1990). Two sizable grammars have been written for French and English (A. Abeillé 1988, A. Abeillé, K. Bishop, S. Cote, Y. Schabes

1990). They result from common work at University of Pennsylvania and Université de Paris 7-Jussieu. We present recent work which has been done focusing on the interactions between morphology, syntax and semantics. A case study of French and English determiners, involving such interactions, is also presented.

Interaction of Morphology and Syntax A lexicalized TAG grammar is organized into two lexicons: a "morphological" one which lists for all the lemmas the corresponding inflected forms (with the associated morphological features) and a "syntactic" one which lists for all autonomous lexical items the corresponding elementary tree structures they head (these elementary trees are usually gathered into Tree Families, which express the possible syntactic variation of a given predicate argument structure).A given lemma has in the syntactic lexicon as many entries as it has different subcategorization frames, associated to different meanings. As first shown by M. Gross 1975, it is thus possible to perform a lot of semantic disambiguation on syntactic grounds. For example, 'voler' means either 'to fly' or 'to steal': the first one is intransitive, the second one transitive. They thus have different entries in the syntactic lexicon. Adjectives and nouns are disambiguated in the same way. Such disambiguations are usefull in the perspective of machine translation (Abeillé, Schabes, Joshi 1990). Notice that the subcategorization frame (i.e. the syntactic category of the predicate) may interfere with some of its morphological properties. In French, as noticed by M. Gross 1989. when a verb can be both transitive and intransitive (with different meanings) it will lack inflected past participle forms in its intransitive use, since the past participle usually agrees with the preposed object in French. Thus the set of inflected forms corresponding to the intransitive VOLER (fly) is smaller than that of the transitive VOLER (steal). This is done here by allowing morphological features in the entries of the syntactic lexicon.

Syntactic Flexibility and Semantic Non-Compositionality Lexicalized Tags, which associate sets of elementary trees to lexical items, define linguistic units of extended domain of locality that have both syntactic and semantic relevance. Such a formalism offers very natural representations for constituents that follow regular syntactic composition rules, and may exhibit internal discontinuities, but lack semantic compositionality (Abeillé and Schabes 1990). Examples, for French and English, are idioms, light verb constructions, and verb particle combinations. We require that all entries be syntactically and semantically autonomous in the syntactic lexicon. We thus allow entries in the syntactic lexicon to be comprised of several lexical items (or lemmas). This is made possible by the extended domain of locality offered by TAGs. When some word is not autonomous semantically (as most idiom chunks, English particles or case marking prepositions) then it cannot be an autonomous entry by itself and is considered part of the entry of the expression it belongs to. Our 'syntactic' lexicons are in fact semantico-syntactic ones.

Case study: French and English determiners As an application of the principles relating morphology, syntax and semantics described above, we suggest a new treatment of determiners in TAGs which is based on the study of a few hundred French and English determiners which lead to the following observations:

- determiners are a more open class than is usually thought

- complex and frozen determiners ("a bunch of", "three liters of"..) have to be taken into account

- an NP may include more than one determiner.

Sofar, determiners have been considered substituted into NP initial trees headed by nouns (or compounds). We propose instead to have the determiners adjoined onto the root node N of the noun and its domain of locality thus extended. The difference now between NP and N is simply a feature <Det>=+ (corresponding roughly to NP) and <Det>=- (corresponding roughly to N). In the English morphological lexicon, plural forms ('flowers') are not marked for <Det>, since determiners are optional for them, whereas singular ones ('flower') are usually marked <Det>=- (at their bottom). In both lexicons names are marked <Det> =+. This is an example of a syntactic feature present in the morphological lexicons. If all N-initial trees are marked in advance <Det>=+ at their top, an obligatory adjunction constraint will result for forms such as 'flower'. The main advantages of this representation are as follows:

1. Complex determiners (such as 'a bunch of' or 'the majority of') can be handled in the same way as simple ones ('the', 'a') while being assigned an internal structure which is that of regular NPs ('a whole bunch of...). It is required that the noun be dominated by a PP node with determiners such as "all of N" or "a bunch of N" (as shown by the accusative a bunch of them all of them). Adjunction is the only way to achieve this result since the N node can also be an interior node (as in idioms with frozen object but free determiners).

2. Determiners can be made optional without assigning two different elementary trees to the head noun: I like butter/this butter; flowers/these flowers. In English, singular and plural forms of nouns will thus have the same structure (although different features).

3. Combinations of determiners (such as 'la plupart de ce type de gens') are easier to represent, especially the fact that some features (number, definiteness) of the whole NP may change depending on which determiner is finally adjoined.

4. Numerals and some other modifiers can be represented with only one structure yielding a phrase which can behave both as N or NP, for example 'three men' / 'the three men' or 'Je n'ai jamais lu semblable aventure'/ 'une semblable aventure'.

All nouns have only one maximal projection (elementary tree) whether they occur in an N or an NP context. In French, the top <det>=+ feature on the noun is dependent on the context: 'voir *sorcifflre' / 'une sorcifflre' vs. 'changer quelqu'un en sorcifflre' / '*une sorcifflre' (see: 'a witch' / 'change someone into a witch').

Syntactic properties of the wole NP can more easily be made dependent on the lexical value of the determiner. We thus present a feature system for distinguishing determiners on the basis of the syntactic properties of the NP they introduce (extractable or not, topicalizable or not). These features also serve to rule out some combinations of determiners.

**Japanese Tree Adjoining Grammar
and its Application to
On-Line Help System NeoAssist**
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ne of the greatest obstacles faced when attempting to develop a text generation anism for a language like Japanese is the unpredictability caused by the rela- ' free word order and by the case assignment. It is, thus, necessary to develop rammatical formalism which gives an account of some linguistic phenomena iar to Japanese. This paper proposes the Japanese Tree Adjoining Grammar G for short) which has more powerful mechanism for treating the word order ion than that of the original Tree Adjoining Grammar (TAG for short).

rst of all, by using a set of linear precedence statements, we can define word variation in Japanese, there still remains a linguistic phenomenon which can e explained in the framework of TAG. For example, embedded sentences in ese do not normally carry any sign (i.e. *which, where* in English) to mark beginning. As a result, the beginning of a deeply embedded sentence can look y like the beginning of a simple top-level sentence. Furthermore, no other cannot be inserted between the embedded sentence and the antecedent. In to explain this linguistic phenomenon in JTAG, we will introduce the new precedence relationship '$\leq$'. The new relationship $x \leq y$ (x strongly precedes ntroduced so as to prohibit some words or phrases from moving into a phrase ise.

ond, Japanese postnominal suffixes, by themselves, do not always provide necessary information for case assignment. In other words, the postnominal of the same deep case interpretation changes depending on the aspectual es (stative, transitive, process, completive, momentary), voice, or volition. In to solve the problem of case assignment, we will extend the notion of an

20