Enriching a French treebank

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Abstract

This paper presents the current status of the French treebank developed at Paris 7 (Abeillé et al., 2003a). The corpus comprises 1 million words from the newspaper le Monde, fully annotated and disambiguated for parts of speech, inflectional morphology, compounds and lemmas, and syntactic constituents. It is representative of contemporary normalized written French, and covers a variety of authors and subjects (economy, literature, politics, etc.), with extracts from newspapers ranging from 1989 to 1993. It has been used by computational linguists to train and evaluate taggers, parsers and lemmatizers, as well as by psycholinguists to extract lexical and syntactic preferences (Pynte et al., 2001). It is now being enriched with functional information, and used for parsing evaluation.

1. The French treebank

Similarly to the Penn TreeBank, we have annotated both parts of speech and constituents. Differently from the Penn Treebank, we have also annotated compounds, lemmas and inflectional morphology. Our annotation choices are meant to be linguistically motivated and compatible with various linguistic theories. We have chosen surface-based annotations, with no empty categories (Abeillé and Clément, 2002; Abeillé et al., 2003b; Abeillé, 2003).

With compounds amalgamated and not counting punctuation marks, the treebank comprises 870 000 tokens, using 37 000 different lemmas, making up about 32 000 independent sentences. The average number of words per sentence is 27 and the average number of phrases is 20 (some phrases are unary).

It has been automatically tagged and hand-corrected by human annotators in a first phase, and automatically chunked and hand-corrected in a second phase (Clément; 2001; Toussenel, 2001; Abeillé et al., 2003a). In the first phase, the task of the annotators was to validate the sentence boundaries, as well as the compounds (for missing compounds or possible compounds irrelevant in a given context), and to validate the morpho-syntactic tags, especially for notoriously difficult cases (for example de as a preposition or as a determiner). In the second phase, the annotators’ task was to validate the constituent labels and boundaries, adding embedding where appropriate, as well as to signal remaining errors which could have been overlooked in the first phase. They used a specific Emacs-based annotation tool. The annotated and validated corpus is formatted in XML, using the XCES recommendations, and is available for research purposes.

We distinguish 14 lexical categories, used for simple words as well as for compounds: A (adjective), Adv (Adverb), CC (coordinating conjunction), CL (weak clitic pronoun), CS (subordinating conjunction), D (determiner) ET (foreign word), I (interjection), NC (common noun), NP (proper name), P (preposition), PRO (strong pronoun), V (verb), PONCT (punctuation mark). We distinguish 12 phrasal categories: AP (adjectival phrase), ADP (adverbial phrase), COORD (coordinated phrase), NP (noun phrase), PP (preposition phrase), VN (verbal nucleus), VPart (participial clause), SENT (independent clause), Sint (parenthetical), Srel (relative clause), Ssub (other subordinated clause) We chose to only annotate major phrases, with little internal structure (we have determiners and modifying adjectives at the same level in the noun phrase for example). For the sake of simplicity, we make a parsimonious use of unary phrases. For rigid sequences of categories, such as dates or titles, it is difficult to determine the head, and we have one global NP with no internal constituents. For coordinations, we have a COORD phrase, for the conjunction and the non initial conjuncts) usually included inside a major phrase (headed by the initial conjunct). We do not have discontinuous constituents, since these can usually be recovered at the functional level: in Combien voulez-vous de pommes (lit. how many do you want of apples ?) both combien and de pommes have the same Object function.

Most of the difficult cases were with PP attachment, or scope of coordination, and human annotators had to spend the necessary time to fully understand the sentences. We got rid of spurious ambiguities (with the same interpretation) by a Attach high heuristics, for example in support verb constructions such as écrire un livre sur les indiens (write a book about Indians) where the PP complement passes the linguistic tests both as a complement of the Verb and as a complement of the preceding Noun, with no semantic difference.

2. Enrichment of the treebank

2.1. Enriching the treebank with grammatical functions

Similarly to what has been done for the German Neegra or Tiger Treebanks (Brants et al., 2003), we have added some functional information to the French treebank. We chose to annotate surface grammatical functions only, and mark them as labels on the phrasal categories. For clitics, we mark the corresponding functions on the verbal nucleus. Functional information such as complement (or modifier) of Noun or complement of Adjective is already implicit in the constituent hierarchy (or in the constituent label for relative clauses). So we have concentrated on the
functional tagging of verbal dependents, for which this information was not available. We distinguish 8 grammatical functions: A-object (A-OBJ), Subject predicate (ATS), Object predicate (ATO), De-object (DE-OBJ), Direct object (OBJ), Modifier (MOD), Prepositional object (P-OBJ), Subject (SUJ).

We only annotate surface functions: the subject of passive verbs for example bears a Subject function, not an Object one. Phrases have at most one function: in case of infinitival constructions, we only note the surface function of the NP complement (with respect to the main V) and not its “deep” subject function (with respect to the infinitival V). In *Je vois Paul partir* (*I see Paul leaving*), the NP *Paul* is annotated as the direct Object of the V *vois*, not as the Subject of the Vinf *partir*. On the other hand, two constituents can have the same function in the same sentence. It is the case with inverted clitics which are compatible with an NP subject in French. In *Paul parti ?* (lit. *Paul does he leave ?*) both the NP *Paul* and the following VN are tagged with a Subject function. Discontinuous dependents are another case of independent constituents tagged with the same function (such as the Object pronouns “en” and “quelques uns” in *On en a pris quelques uns* (lit. *We them have taken some*)). For verbal nuclei (VN), we annotate functions of the clitic pronouns included in the VN, such as Subject for “il”, Direct object for “la”, etc.

The grammatical functions are automatically added to the constituents (which are VN or sisters of VN) by a functional tagger developed by Jacques Steinlin and Nicolas Barrier, and then hand-corrected. It is rule-based, written in JAVA, using the XERCES API and 115 rules which are unification-based and fully ordered. The rules define underspecified patterns against which the corpus trees are corrected sentences (picked randomly from the corpus). It is annotated as the direct Object of the V “vois”, not as the Subject of the Vinf *partir*. On the other hand, two constituents can have the same function in the same sentence. It is the case with inverted clitics which are compatible with an NP subject in French. In *Paul parti ?* (lit. *Paul does he leave ?*) both the NP *Paul* and the following VN are tagged with a Subject function. Discontinuous dependents are another case of independent constituents tagged with the same function (such as the Object pronouns “en” and “quelques uns” in *On en a pris quelques uns* (lit. *We them have taken some*)). For verbal nuclei (VN), we annotate functions of the clitic pronouns included in the VN, such as Subject for “il”, Direct object for “la”, etc.

We have evaluated it against a sample of 1000 hand-corrected sentences (picked randomly from the corpus). It performs with an average precision of 89,69% (best precision for subjects: 99,47%) and an average recall of 89,27% (best recall for modifiers: 95,48%) (cf. Table 1).

Annotations are currently validating the functional tagging tool\(^1\). Human validation is significantly easier than in the previous annotations phases: only a subset of the constituents has to be considered, and it mostly involves understanding the sentence. Difficult choices imply distinguishing predicative complements from objects, and modifiers from prepositional objects. For the former, we use a list of verbs taking predicative complements, for the latter we ask the annotators to conform to linguistically available tests (modifiers are more mobile than complements, only complements can be obligatory, etc.). A distribution of the different functions among the different constituents has been computed on the same 1000 sample sentences and is presented in Table 2.

Notice that certain functions are not defined for certain constituents: no NP can be an a-object, no PP can be a sub-

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\(^1\)So far, about 20% of the corpus has been validated for functional tagging.
### Precision

| Subject | D. Object | a-object | de-object | Prep-object | S. Predicate | O. Predicate | Modifier |
|---------|-----------|----------|-----------|-------------|-------------|-------------|----------|
| 99,47%  | 92,29%    | 91,45%   | 87,93%    | 91,52%      | 95,61%      | 92,30%      | 79,04%   |

### Recall

| Subject | D. Object | a-object | de-object | Prep-object | S. Predicate | O. Predicate | Modifier |
|---------|-----------|----------|-----------|-------------|-------------|-------------|----------|
| 92,61%  | 89,03%    | 53,76%   | 76,11%    | 56,25%      | 84,21%      | 63,15%      | 95,48%   |

Table 1: Precision and recall of the functional tagger

| Subject          | Direct object          |
|------------------|------------------------|
| COORD NP Ssub VN VPinf | AP COORD NP Ssub VN VPinf |
| 0,13% 80,39% 0,07% 19,31% 0,07% | 0,07% 0,29% 66,59% 5,88% 6,03% 21,11% |

| a-object | de-object | prep-object |
|---------|----------|-------------|
| 3,71% (0,20) | 3,74% (0,21) | 1,79% (0,09) |
| PP Ssub VN VPinf | PP Ssub VN VPinf | NN PP VN VPinf |
| 63,81% 0,50% 17,08% 18,59% | 81,08% 1,49% 4,97% 12,43% | 1,04% 88,54% 3,12% 7,29% |

| Subject predicate | Object predicate |
|-------------------|-----------------|
| AdP AP NP PP Ssub VN VPinf VPpart | AP PP VPinf |
| 1,05% 55,75% 33,68% 11,92% 4,21% 0,70% 4,91% 1,75% | 57,89% 21,05% 21,05% |

| Modifier          |
|-------------------|
| 2,12% 0,83% 0,83% 9,79% 59,27% 7,34% 0,51% 6,57% 6,76% 5,92% |

Table 2: Functions’ distribution

in practice. Our experiment in enriching our constituency-based treebank for French with functional tags shows that a hybrid treebank is a possible and useful solution to the debate.

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Au début, on ramassait de quoi remplir quinze sacs poubelle.

Indique Roger.

Appendix 1: Sample with functional annotation (annotators’ format)

Appendix 2: Same sample in EASY format