In practice **PROOF NETS**
implementation of categorial grammars
— more efficient for proof search
(machine learning step)

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actually

- extension of Lambek grammars:
  (word order ... → MMCG)
- semantic DRT
  FOL formulas + handling (references pronouns)

GRAIL categorial parser

syntactic (categorial style)

semantic (Montague style)

wide coverage

step 1

grammar acquisition

Semantic items?

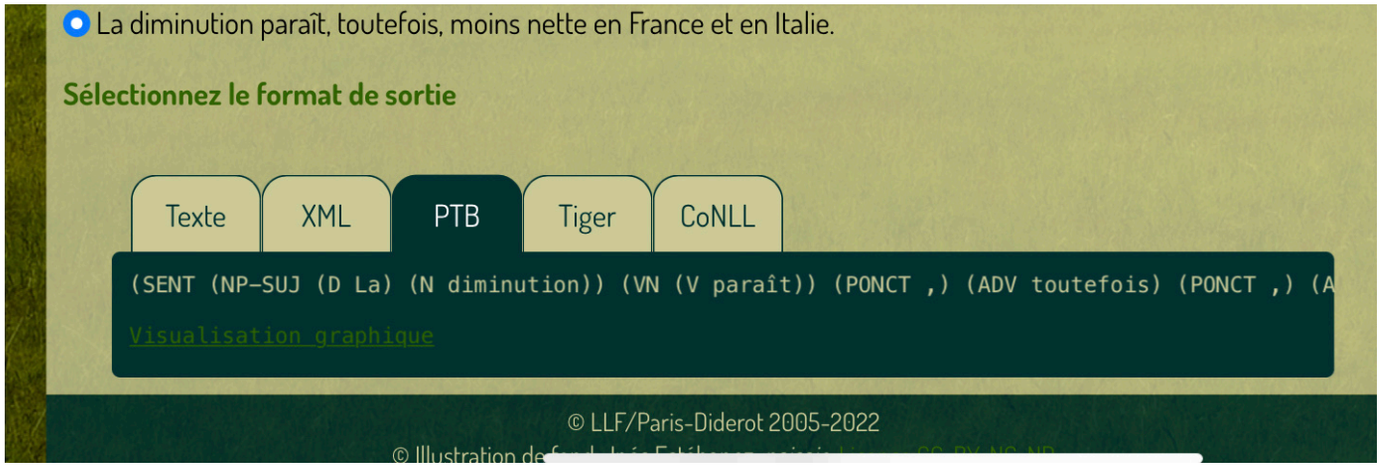
just for the logical structure
(grammatical words)

otherwise "chair" λx^e chair(x)

Un corpus de référence pour le français

Une ressource lexicale et syntaxique richement annotée (et validée manuellement) pour les linguistes, utilisable en TAL.

- Projet initié en 1997, avec le soutien de l'IUF, du CNRS et du CNRTL
- 21 550 phrases (environ 664 500 tokens) du journal *Le Monde* (1990-1993)
- métadonnées : auteur, date, domaine (par article)
- Annotations lexicales (catégories, sous-catégories, flexion, mots composés avec composants) et syntaxiques (constituants majeurs, fonctions grammaticales) validées
- Corpus annoté téléchargeable (version 1.0 2016) en plusieurs formats (xml, Tiger-xml, PTB, CoNLL)



step 2

input → supertagging

(deep learning step)

word → several grammatical categories

w_1 → 10

w_{10} → 10

10^{10}

step 3

analyses of the 7 most likely → why?

Sequences of TAGs

7: in 90% of the cases the proper analysis is in the 7

to increase this 90% one needs many more sequences

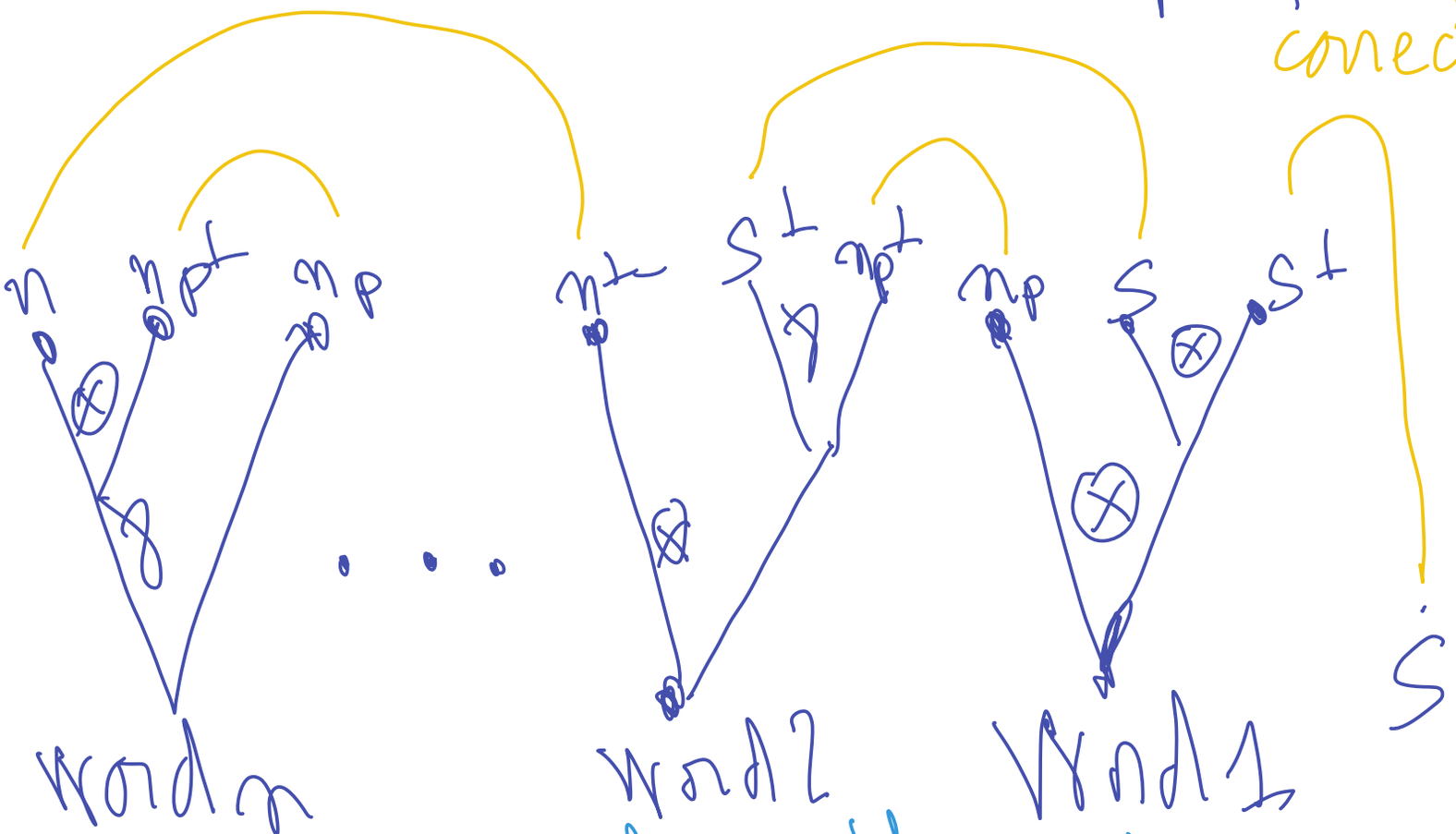
— machine learning (THRESOLD)

+ checking proof net correctness

— fails → exhaustive exploration

cut elimination → we only look for normal proofs

correct?



guessing where the axioms are

machine learning solution works in 70%

Step 4

inserting the semantic items

β reduction

formula(s) → supertagged sentence

↳ at least 7 formulas

a sentence may have several analysis → DRT

On going improvement

lexical semantics

I finished my textbook.

↳ read, write, print...

Proof net as parse structure

- easy to construct
- easy to connect to terms

+ provides additional information

W_1 $W_n \not\vdash$

A_1 $A_n \vdash S$

$\vdash \neg A_n \dots \neg A_1 \; S$

M Johan 1998
G Morrill 2005?

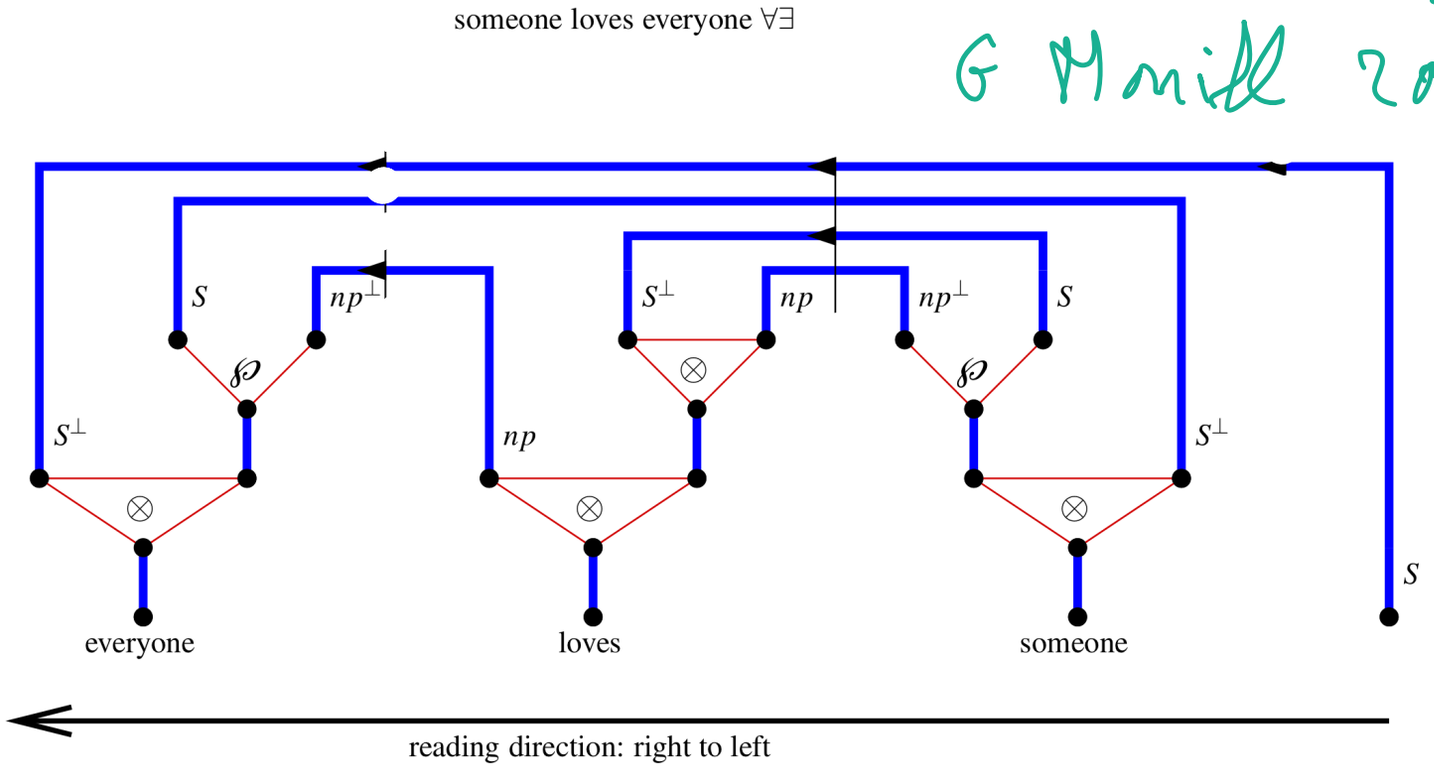


Fig. 6.6. "Someone loves everyone" with wide scope for everyone.

loves: $(np \backslash S) / np$ ↔ negation $np \otimes S^{\perp} \otimes np$

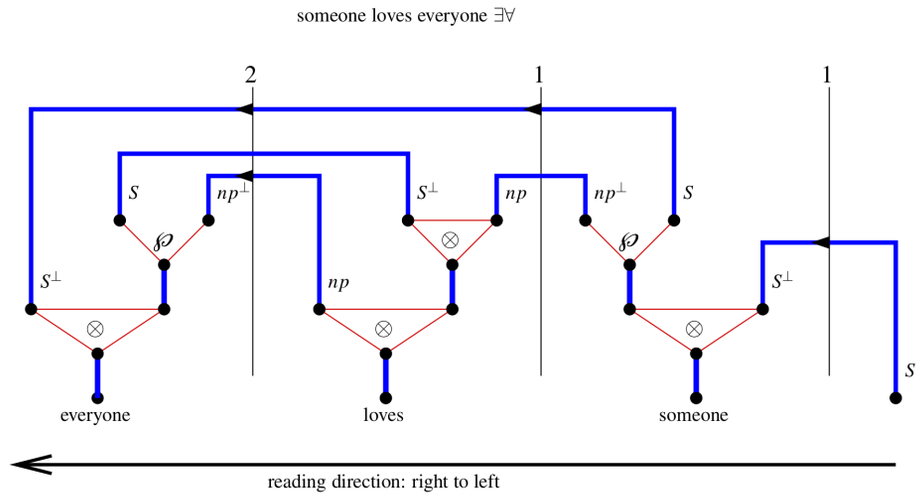


Fig. 6.5. "Someone loves everyone" with wide scope for someone. The complexity profile — read from right to left — is $1-1-2$.

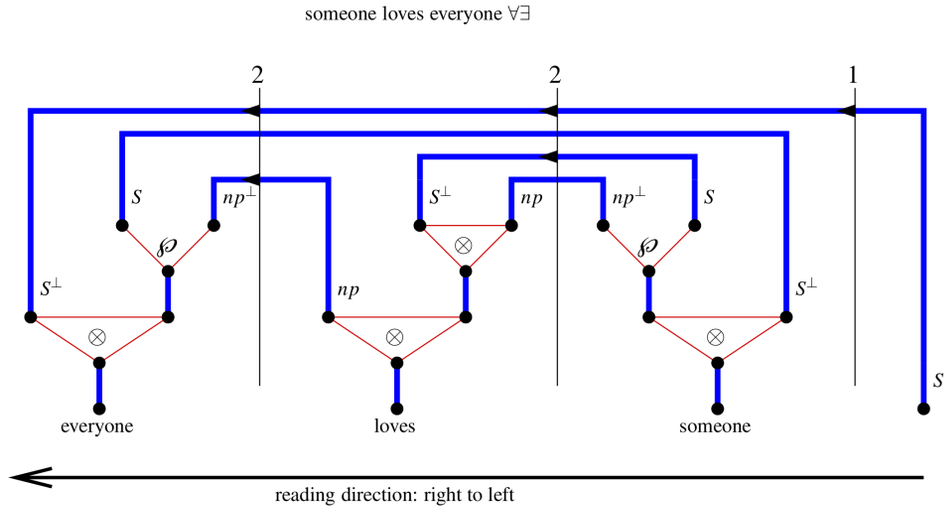


Fig. 6.6. "Someone loves everyone" with wide scope for everyone. The complexity profile — read from right to left — is $1-2-2$.

axiom links (especially $X \leftarrow X^{\perp}$ missing categories)

measure

local complexity of human understanding

Proof theoretical view of natural language analysis

- parse structure: proof in Lofs
  intuitionistic
  non commutative
  multiplicative linear logic
- Semantic interpretation
  proof in NJ of t