

C SC 620  
Advanced Topics in Natural  
Language Processing

Lecture 16

3/23

# Reading List

- *Readings in Machine Translation*, Eds. Nirenburg, S. *et al.* MIT Press 2003.
- Reading list:
  - **12. Correlational Analysis and Mechanical Translation. Ceccato, S.**
  - 13. Automatic Translation: Some Theoretical Aspects and the Design of a Translation System. Kulagina, O. and I. Mel'cuk
  - 16. Automatic Translation and the Concept of Sublanguage. Lehrberger, J.
  - 17. The Proper Place of Men and Machines in Language Translation. Kay, M.

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- The Three Approaches to Mechanical Translation
- Knowledge about the world
  - He eats and drinks vodka
    - *Eat*: intransitive
  - He buys, sells, and drinks vodka
    - *Vodka* may be the object of all three verbs
  - Ave Caesar, morituti te salutant
    - *Ave*: *hail* or *bird* + ablative case
    - Caesar, those who are about to die salute you with the bird

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- Linguistics for Machines
- Notional Sphere
  - I paid for the book with the old prints (ambiguous)
  - I paid for the book with the Swiss francs
  - I paid for the book with the pages missing

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

## Thesaurus/WordNet-style classification

Table 12.6

001	Living beings	051	Atmospheric phenomena	027	Carnivora	075	Textiles
002	Non-living beings	052	Weather conditions	028	Herbivora	076	Clothing and things that can be worn
003	Animate beings	053	Cardinal points	029	Dangerous animals	077	Clothing made of textiles
004	Inanimate beings	054	Geographic extensions	030	Peaceful animals	078	Personal effects
005	Human beings	055	Geographic extensions, land	031	Wild animals	079	Parts of 074
006	Animals	056	Geographic extensions, water	032	Domesticable animals	080	Parts of 076
007	Vegetables	057	Geographic extensions characterized by th	033	Domestic animals	081	Instruments
008	Minerals	058	Geographic extensions characterized by th	034	Domestic animals	082	Means of transport
009	Parts of 003	059	Geographic extensions characterized by d	035	Animals of prey	083	Means of aquatic transport
010	Parts of 005	060	Extensions of water	036	Animals for slaughter	084	Means of aerial transport
011	Parts of 006	061	Foods	037	Fruit trees	085	Means of terrestrial transport
012	Parts of 007	062	Solid foods	038	Opaque things	086	Domestic animals
013	Collectives of 002, 004	063	Liquid foods and beverages	039	Transparent things	087	Containers
014	Collectives of 005	064	Foods in powder form	040	Liquids	088	Musical instruments
015	Collectives of 006	065	Fruit	041	Aeriform	089	Mobile musical instruments
016	Collectives of 007	066	Vegetable foods	042	Solids	090	Fixed musical instruments
017	005 — and by the profession	067	Normal objects	043	Fluids	091	Toys
018	005 — geographic appearance	068	Artifacts	044	Powders	092	Activities and professions
019	005 — cultural appearance	069	Settlements, inhabited places	045	Fluids and powders	093	Languages
020	005 — family relationship	070	Buildings and constructions	046	Translucent aeriform things	094	Measuring instruments
021	005 — social relationship	071	Parts of 069	047	Non-transparent aeriform things	095	Measures
022	Political communities	072	Interior parts of 069	048	Transparent solids	096	Linear measures
023	Aquatic animals	073	Exterior parts of 069	049	Celestial bodies	097	Square measures
024	Flying animals	074	Objects of interior decoration	050	Atmospheric agents	098	Cubic measures
025	Terrestrial animals	075	Furniture				
026	Creeping animals						

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- 122 Things can be hung up

Table 12.6  
(continued)

099	Weights	121	Complementary things for opening or closing something
100	Measures of time	122	Things that can be hung up
101	Names of weekdays	123	Instruments for hanging up
102	Names of months	124	Products of art
103	Indications of time based on astronomic facts	125	Solid things
104	Objects bought with view to something else	126	Hollow things
105	Economic objects	127	Things that can be held in the hand
106	Semantic objects	128	Five things that can be held in the hand
107	Events	129	Mobile things that can be held in the hand
108	Public places	130	Things that can be transported
109	Places open to the public	131	Things that can be transported by lifting
110	Places of economic activities	132	Things that can be transported by pushing or pulling
111	Public services	133	Painted things
112	Activities + their localization	134	Curving things
113	Things that are covered	135	Things used for indicating
114	Things that can be covered	136	Numbers
115	Covers	137	Things presenting themselves in pairs
116	Things open or closed by adding or subtracting something	138	Things presenting themselves in rows
117	Things open or closed owing to their position with respect to something else	139	Things which owing to their inside play a part in certain activities
118	Things open or closed owing to the position of a part of them	140	Things which owing to their outside play a part in certain activities
119	Sliding or rotating things that open or close something	141	Things which owing to their direction play a part in certain activities
120	Detachable things that open or close something		

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- The Fourth Approach to MT
- An Illustration of the Third Approach: Correlation Approach
  - *Engineer Small has a little train*
  - *Macchinista Small ha un piccolo treno*
  - 1. ENGINEER
    - 1.1 noun                   ingegnere fuochista machinista
      - gender, number, common, person, profession
    - 1.2 verb costruire organizzare sovrintendere ...
      - 1.2.1 mood, tense, person (2nd), number
      - 1.2.2 mood, tense
        - » 1.2.2.1 person (1, 2) number: sg
        - » 1.2.2.2 person (1,2,3) number: pl

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- 2. SMALL
  - 2.1 adjective
    - 2.1.1 size
      - 2.1.1.1 literal piccolo sottile esigu
      - 2.1.1.2 metaphorical debole legger misero
    - 2.1.2 intensity leggero
  - 2.2 adverb
    - 2.2.1 size poco
    - 2.2.2 intensity basso
  - 2.3 noun piccola cosa
  - 2.4 noun proper (from capitalization)



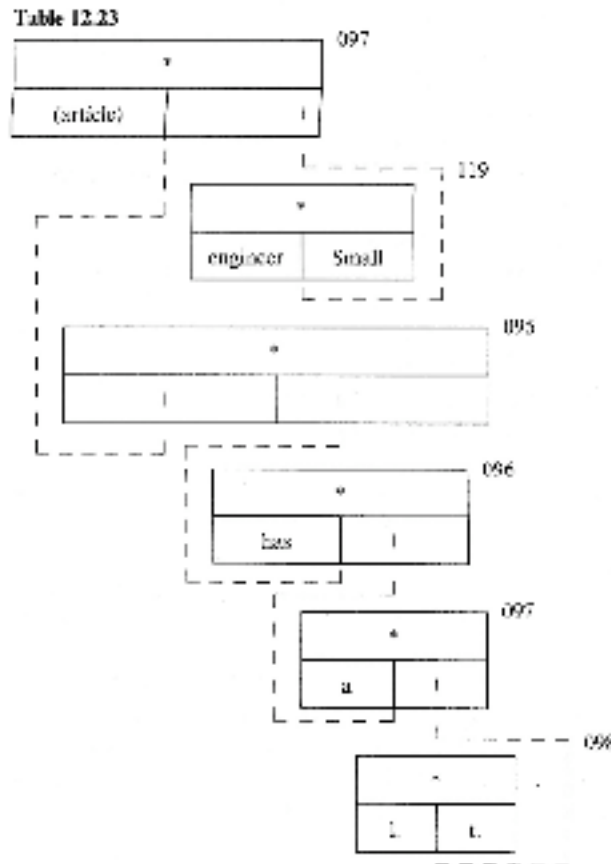
# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- 3. HAS
  - verb
    - 3.1 aux of tense      essere or avere
    - 3.2 aux of mood      dovere avere da
    - 3.3 principal          avere ricevere fare
- 4. A
  - article          un
- 5. LITTLE
  - 5.1 adjective
    - 5.1.1 size
      - literal              piccolo
      - metaphorical      meschino
    - 5.1.2 quantity      poco
  - 5.2 adverb
  - 5.3 noun

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- 6. TRAIN
  - 6.1 noun
    - 6.1.1 observatum means of transportation treno slitta
    - 6.1.2 mental category indicating an ordered succession coda fila
  - 6.2 verb allevare
    - 6.2.1 imperative, 2nd person
    - 6.2.2 indicative
      - 6.2.2.1 1st, 2nd sg
      - 6.2.2.2 1,2,3 pl

# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.



# Paper 12: Correlational Analysis and Mechanical Translation. Ceccato, S.

- Diagram referenced in paper?

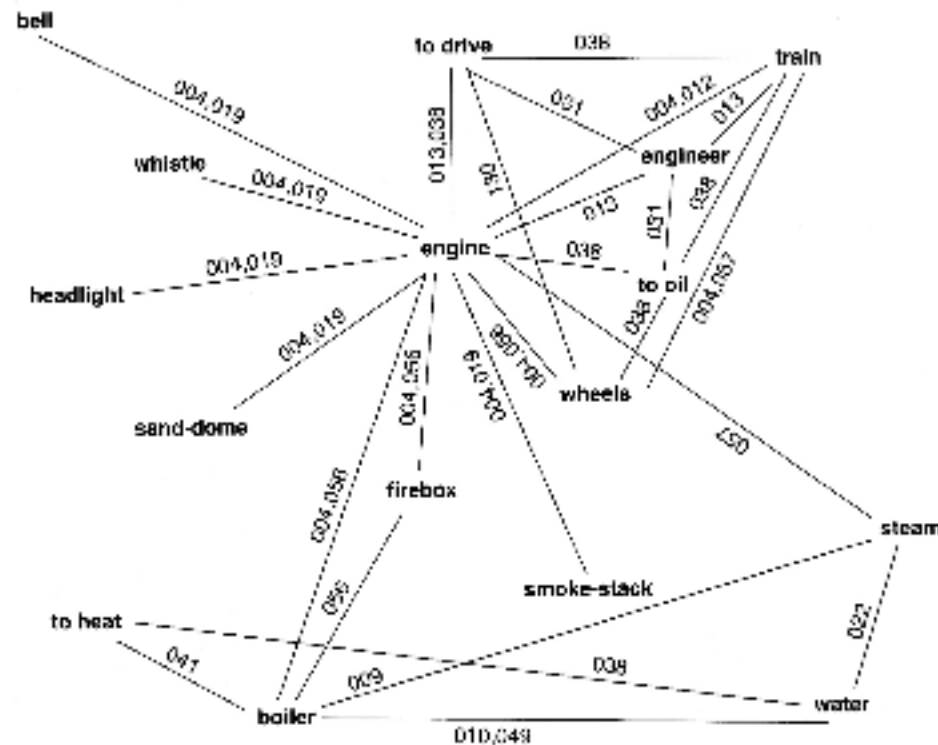


Figure 12.1  
From the first ten sentences of *The Little Train*, by L. Lenski.