Introduction to Human Language Technologies

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Lecture 2: Corpora
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Overview

1. what are corpora
2. historical perspective
3. how they are annotated

What is a corpus?

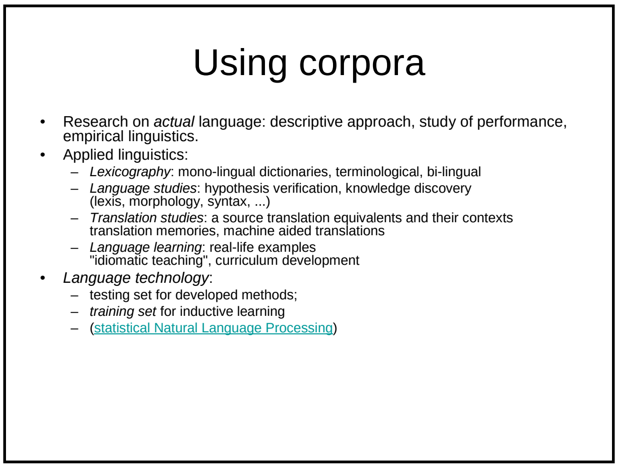
The Collins English Dictionary (1986):

1. a collection or body of writings, esp. by a single author or topic.

Guidelines of the Expert Advisory Group on Language Engineering Standards, EAGLES:

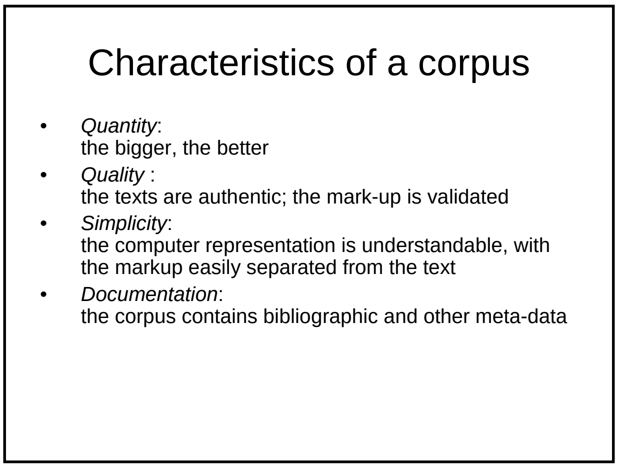
Corpus : A collection of pieces of language that are selected and ordered according to explicit linguistic criteria in order to be used as a sample of the language.

Computer corpus : a corpus which is encoded in a standardised and homogeneous way for open-ended retrieval tasks. Its constituent pieces of language are documented as to their origins and provenance.



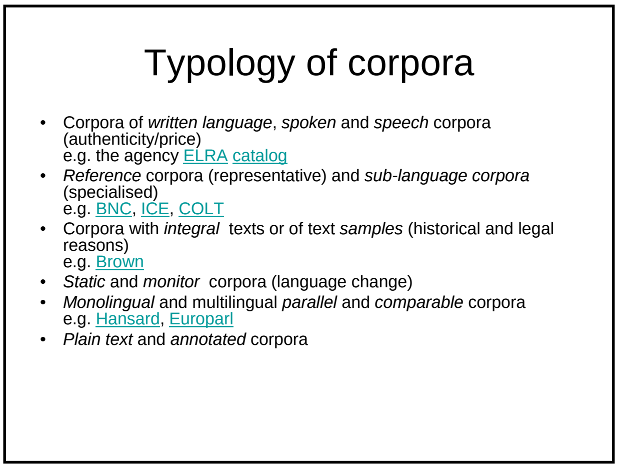
Using corpora

- Research on *actual* language: descriptive approach, study of performance, empirical linguistics.
- Applied linguistics:
  - *Lexicography*: mono-lingual dictionaries, terminological, bi-lingual
  - *Language studies*: hypothesis verification, knowledge discovery
    (lexis, morphology, syntax, ...)
  - *Translation studies*: a source translation equivalents and their contexts
    translation memories, machine aided translations
  - *Language learning*: real-life examples
    "idiomatic teaching", curriculum development
- *Language technology*:
  - testing set for developed methods;
  - *training set* for inductive learning
  - (statistical Natural Language Processing)



Characteristics of a corpus

- *Quantity*:
  the bigger, the better
- *Quality* :
  the texts are authentic; the mark-up is validated
- *Simplicity*:
  the computer representation is understandable, with the markup easily separated from the text
- *Documentation*:
  the corpus contains bibliographic and other meta-data



Typology of corpora

- Corpora of *written language*, *spoken* and *speech* corpora (authenticity/price)
  e.g. the agency ELRA catalog
- *Reference* corpora (representative) and *sub-language corpora* (specialised)
  e.g. BNC, ICE, COLT
- Corpora with *integral* texts or of text *samples* (historical and legal reasons)
  e.g. Brown
- *Static* and *monitor* corpora (language change)
- *Monolingual* and multilingual *parallel* and *comparable* corpora
  e.g. Hansard, Europarl
- *Plain text* and *annotated* corpora

The history of computer corpora:

- First milestone: Brown (1 million words) 1964; LOB (also 1M) 1974
- Cobuild Bank of English (monitor, 100..200..M) 1980
- The spread of reference corpora: BNC (100M) 1995; Czech CNC (100M) 1998; Slovene; FIDA (100M), Nova Beseda (100M...) 1998; Croatian HNK (100M) 1999,
- EU corpus oriented projects in the '90: NERC, MULTEXT-East,...
- Language resources brokers: LDC 1992, ELRA 1995
- **Web as Corpus (2002…)**: Sharoff's corpora, Sketch Engine

Literature on corpora

- *Corpus Linguistics* by Tony McEnery and Andrew Wilson. Edinburgh: Edinburgh University Press, 1996
- *An Introduction to Corpus Linguistics* by Graeme D. Kennedy. Studies in Language and Linguistics, London, 1998
- *Corpus Linguistics: Investigating Language Structure and Use* by Douglas Biber, Susan Conrad, Randi Reppen. Cambridge University Press, 1998
- Uvod v korpusno jezikoslovje, Vojko Gorjanc. Domžale: Izolit, 2005
- LREC conferences:
  Fifth international conference on Language Resources and Evaluation, LREC'06
- Slovenian Conferences on LANGUAGE TECHNOLOGIES 2006, 2004,2002, 2000, 1998

Steps in the preparation of a corpus

- Choosing the component texts:
  linguistic and non-linguistic criteria; availability; simplicity; size
- Copyright
  sensitivity of source (financial and privacy considerations); agreement with providers; usage, publication
- Acquiring digital originals
  Web transfer; visit; OCR
- Up-translation
  conversion to standard format; consistency; character set encodings
- Linguistic annotation
  language dependent methods; errors
- Documentation
  TEI header; Open Archives etc.
- Use / Download
  - (Web-based) concordancers for linguists
  - download needed for HLT use
  - licences for use

What annotation can be added to the text of the corpus?

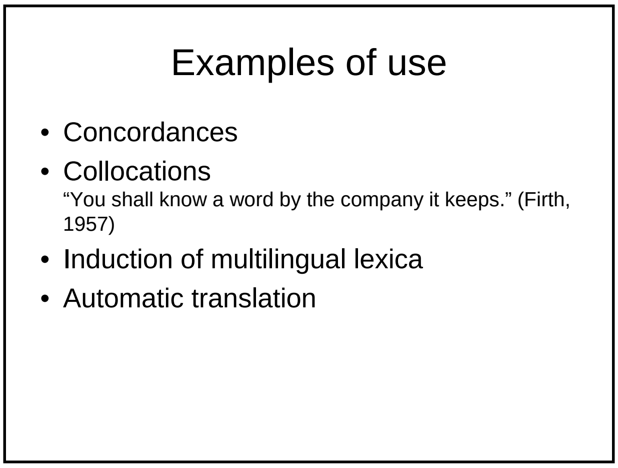
- Annotation = interpretation
- Documentation about the corpus
- Document structure
- Basic linguistic markup: sentences, words punctuation, abbreviations
- Lemmas and morphosyntactic descriptions
- Syntax
- Alignment
- Terms, semantics, anaphora, pragmatics, intonation,...

Markup Methods

- *hand annotation*: documentation, first steps
  generic editors or specialised editors
- *semi-automatic*: morphosyntactic and other linguistic annotation
  cyclic approach: machine, hand, validate, correct, machine, ...
- *machine, with hand-written rules*: tokenisation
  regular expression
- *machine, with inductivelly built models from annotated data*:
  "supervised learning"; HMMs, machine learning
- *machine, with inductivelly built models from un-annotated data*:
  "unsupervised leaning"; clustering technigues
- overview of the field

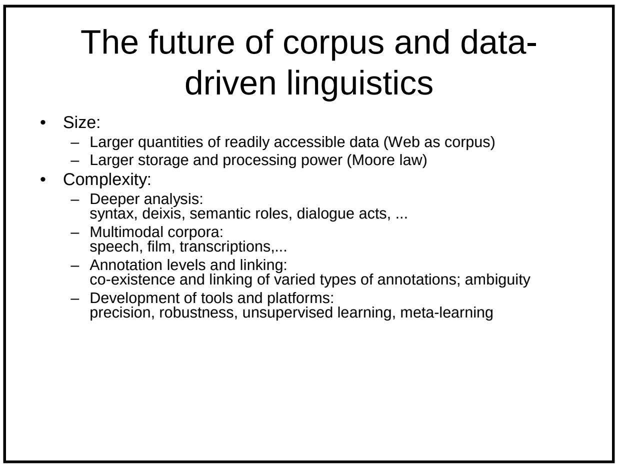
Computer coding of corpora

- Many corpora encoded in simple tabular format
- A good encoding must ensure durability, enable interchange between computer platforms and applications
- The basic standard used is *Extended Markup Language*, XML
- There are a number of companion standards and technologies: XML transformations (XSLT), data definition (DTD, XML Schema, ISO Relax NG), addressing and queries (XPath, XQuery), ...
- The vocabulary of annotations for corpora and other language resources are defined by the *Text Encoding Initiative*, TEI



Examples of use

- Concordances
- Collocations
  “You shall know a word by the company it keeps.” (Firth, 1957)
- Induction of multilingual lexica
- Automatic translation



The future of corpus and data-driven linguistics

- Size:
  - Larger quantities of readily accessible data (Web as corpus)
  - Larger storage and processing power (Moore law)
- Complexity:
  - Deeper analysis:
    syntax, deixis, semantic roles, dialogue acts, ...
  - Multimodal corpora:
    speech, film, transcriptions,...
  - Annotation levels and linking:
    co-existence and linking of varied types of annotations; ambiguity
  - Development of tools and platforms:
    precision, robustness, unsupervised learning, meta-learning