

Machine Translation III: Hybrid Methods and Evaluation

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Language Technology I
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Hybrid Methods and Evaluation

Overview

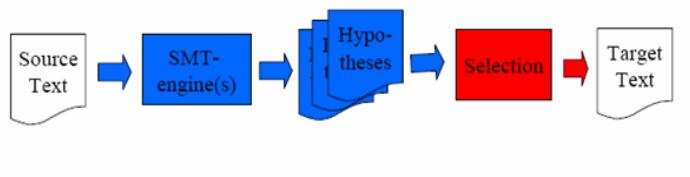
- Hybrid MT architectures in more detail

- Evaluation techniques

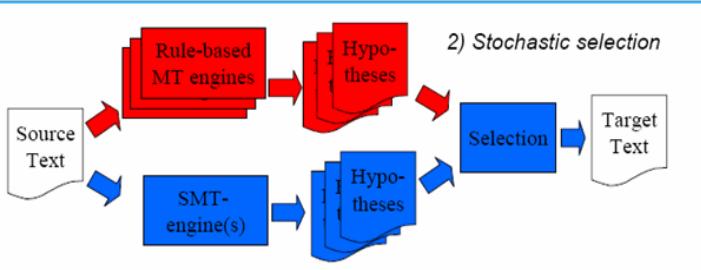
Some hybrid MT architectures

■ = SMT Module
 ■ = RBMT Module

1) Syntactic selection

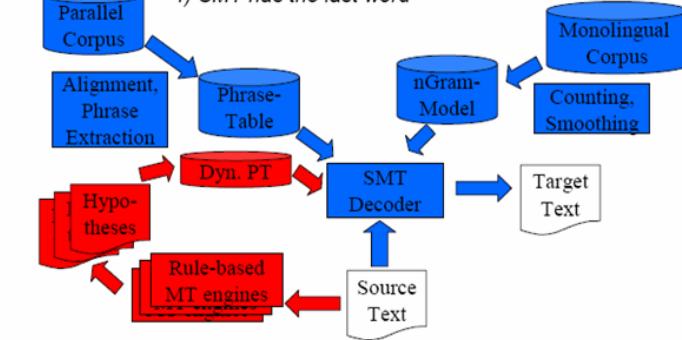


2) Stochastic selection

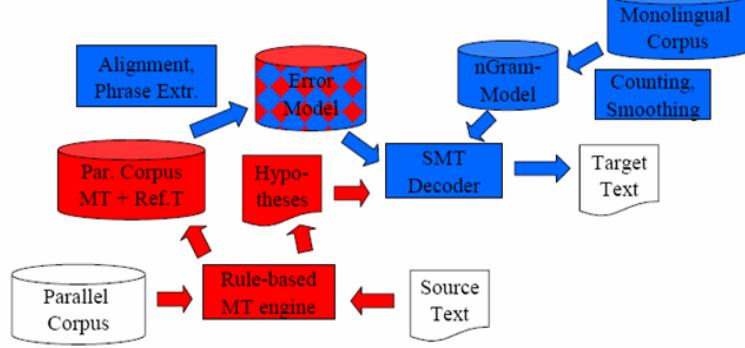


3) SMT feeds rule-based MT

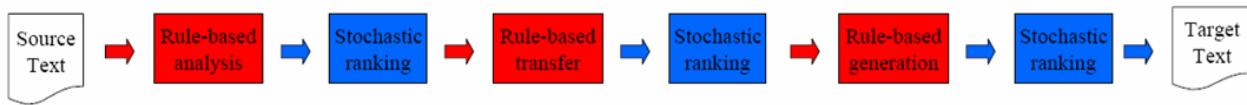
4) SMT has the last word



5) SMT corrects RBMT output

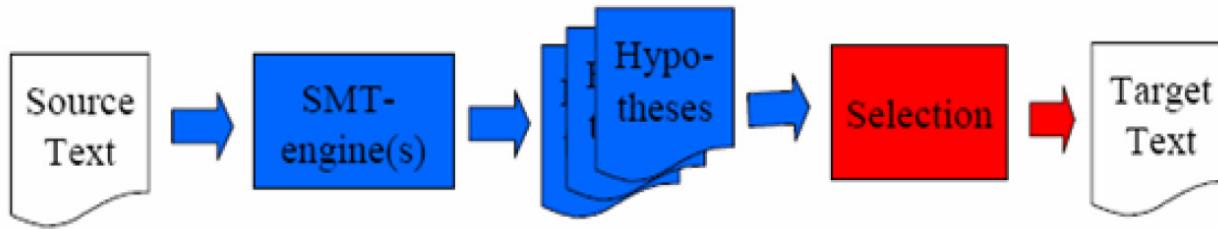


6) Rule-based transfer architecture interleaved with stochastic ranking



Syntactic Selection

1) Syntactic selection



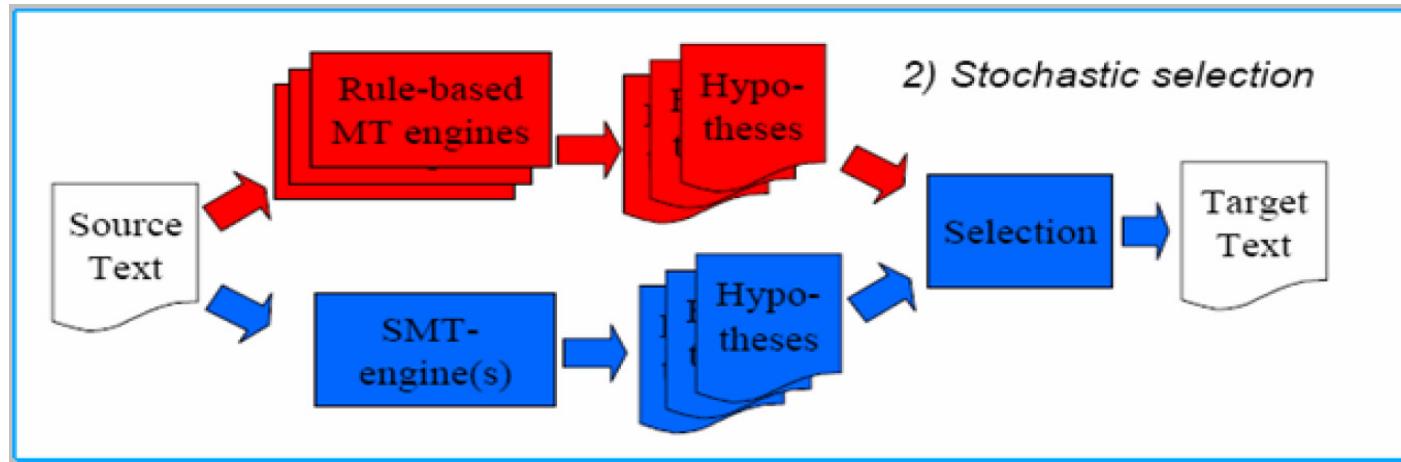
Motivation: SMT output often syntactically ill-formed

→ Selection mechanism in SMT „generate and test“ should be enriched with syntactic knowledge

BUT:

- syntactic parsers not (yet) robust enough
- High computational cost of processing many ill-formed candidates

Stochastic Selection



Motivation: Selection from an increased number of candidates can improve overall quality

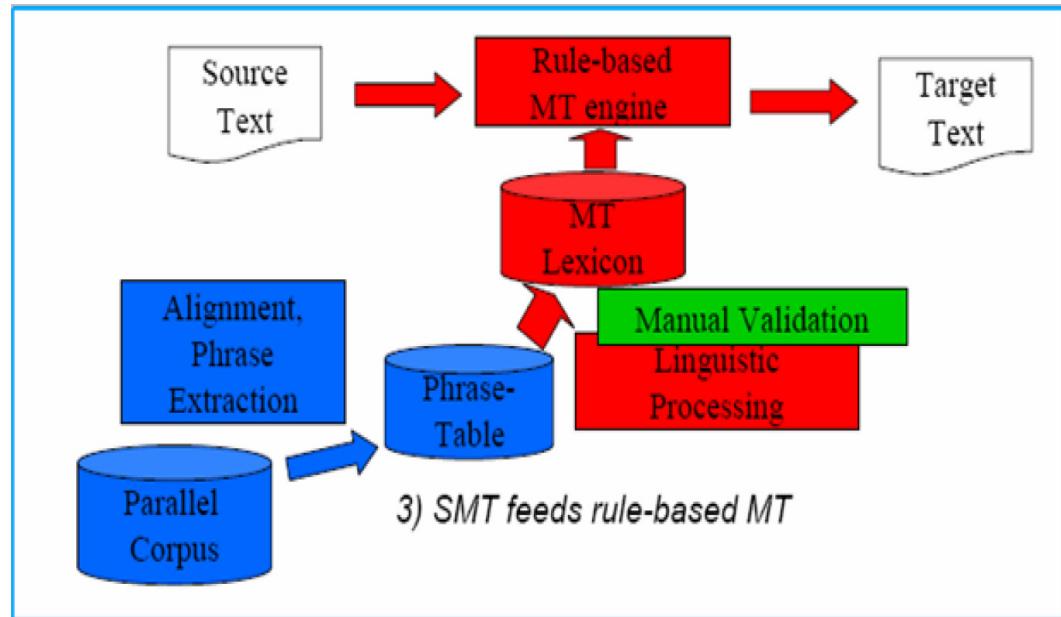
BUT:

- Works mainly for short utterances, where one of the candidates may be good enough (VerbMobil)
- Different candidates may have problems in different parts of the sentence, granularity of decisions too coarse

SMT feeds rule-based MT

Motivation:

- Adapting RBMT to new domains requires lots of new lexical entries that are difficult to write manually
- SMT techniques can help to partially automate this process



BUT:

- Not all required information can be learned from data
- Errors in examples/SMT alignment may creep in, but RBMT has no mechanism to discard implausible outcomes
- Some manual effort is required

European Patent Office (EPO):

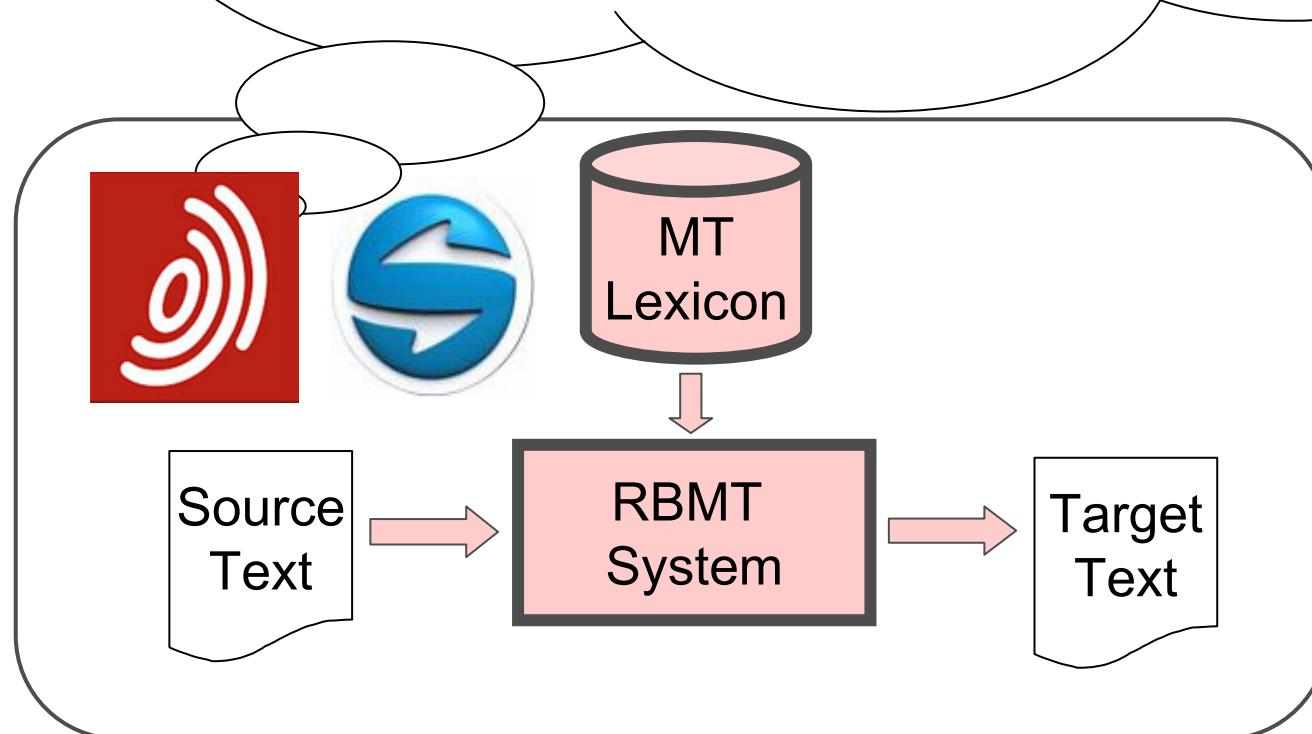
6000 employees from > 30 countries in Munich, The Hague, Berlin, Vienna, Brussels

Collection of > 60 Mio. patent documents

130000 patent applications/year (2006)

Prepares translation service for patent documents

Call for tenders & ***selection test***, fall 2005



Language pairs

DE ↔ EN

ES ↔ EN

FR ↔ EN

IT ↔ EN

planned:

EL ↔ EN

PT ↔ EN

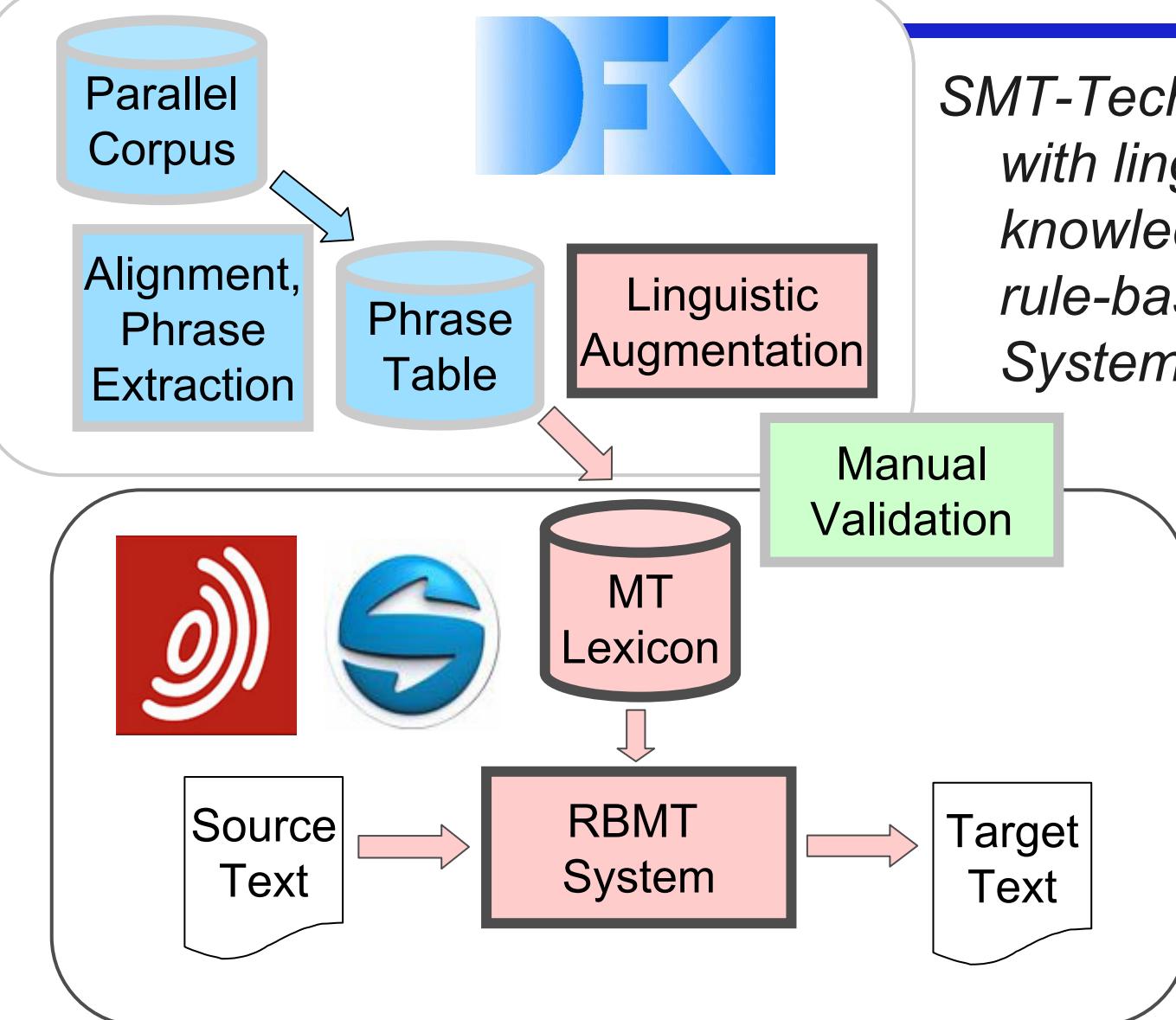
NL ↔ EN

RO ↔ EN

FR ↔ DE

FR ↔ ES

Corpus-based Lexicon Extension for RBMT



*SMT-Technology
with linguistic
knowledge helps
rule-based MT-
System*

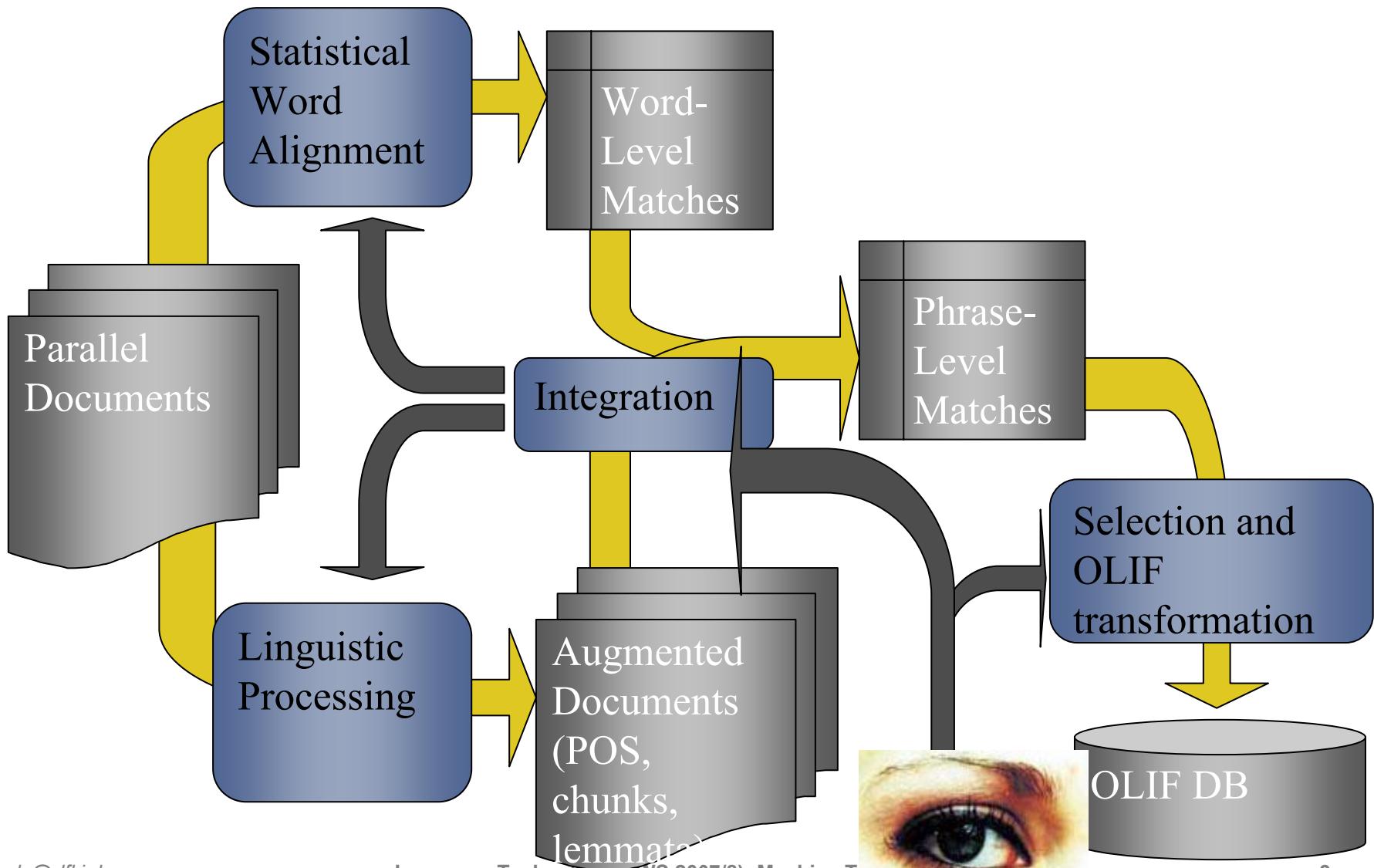
Language pairs

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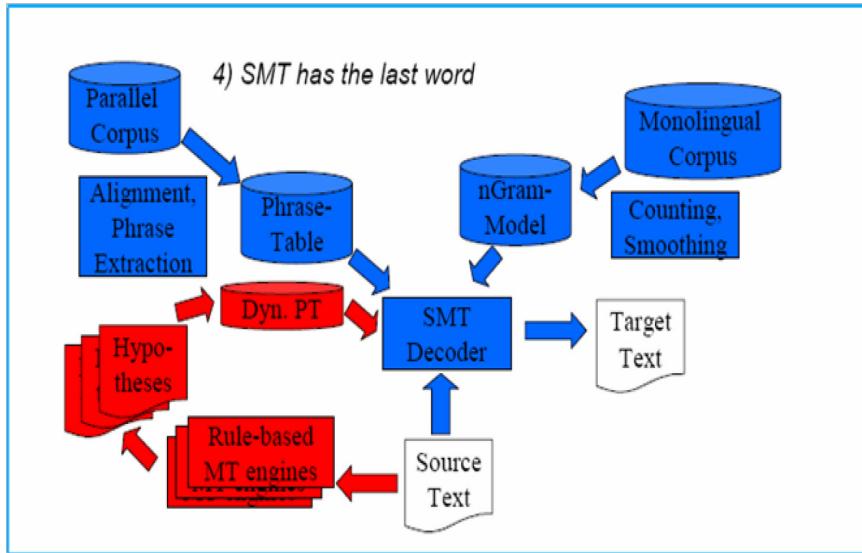
planned:

*EL ↔ EN
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NL ↔ EN
RO ↔ EN
FR ↔ DE
FR ↔ ES*

Terminology Extraction for MT: Architecture



RBMT feeds SMT

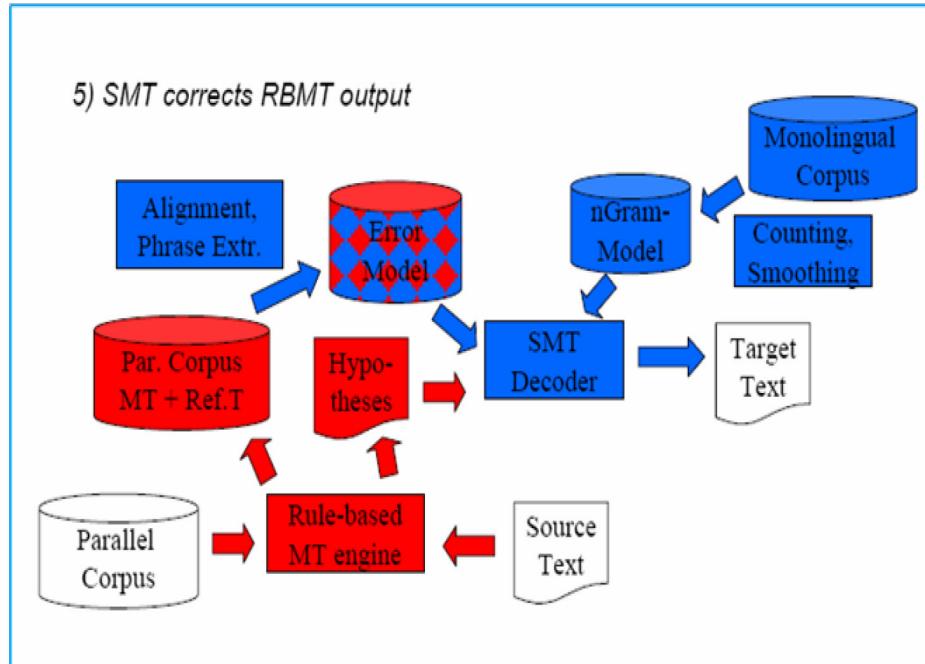


Motivation: SMT can only know what is in the training data,
 RBMT systems often contain extensive lexical knowledge

BUT:

Architecture can fix lexical gaps, but will not overcome
 problems with syntactically ill-formed candidates

Statistical post-correction

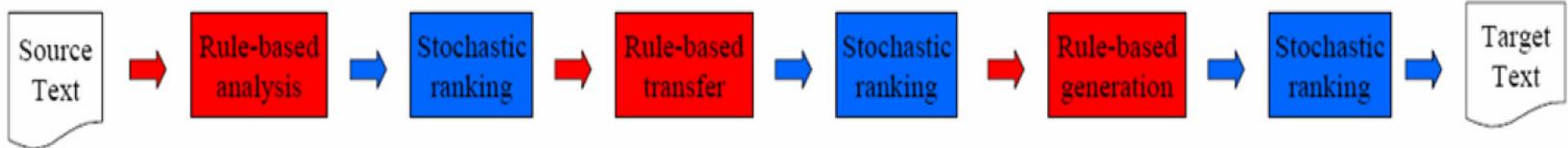


Motivation: Errors in RBMT can be systematic/regular, may be fixed automatically. Target language model helps to find most natural wording in context

BUT: Sometimes RBMT messes a sentence completely up, no hope to repair these cases via SMT

Transfer architecture with stochastic ranking

6) Rule-based transfer architecture interleaved with stochastic ranking



Motivation: Fine-grained combination of statistical and linguistic evidence on all levels requires a closely coupled implementation

BUT:

- Chain can only be as good as the weakest link
- Difficult to avoid mismatches between representations when hand-crafting grammars
- Many existing processing components are designed for deterministic processing; building up forests of alternative solutions may require redesign of algorithms

Evaluation of MT systems

Two types of MT evaluation

- Human („subjective“)
- Automatic („objective“)

The evaluation dilemma:

- Manual evaluation is meaningful, but expensive, tedious, and error-prone, not useful for regression testing
- Automatic evaluation is repeatable, objective, but not necessarily relevant; better systems may have worse scores

We need to

- lower the effort for manual evaluation,
- increase the quality of automatic evaluation,
- or do both

Highlights from Exercises

 Google Translate - Mozilla Firefox

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

Help

Google™ Translate BETA Text and Web Translated Search Dictionary Tools

Translate Text

Original text:

Substantiv ist ein grammatischer Begriff und bezeichnet eine Wortart. Es wird im Deutschen immer groß geschrieben. Ein Substantiv (auch Hauptwort, Namenwort, Dingwort oder Nomen), bezeichnet zum Beispiel ein Objekt (ein Ding, eine Sache), ein Lebewesen (Person, Tier, Pflanze), einen Sachverhalt (Situation etc.), einen Vorgang ("Explosion"), eine

Automatically translated text:

Pronunciation is a grammatical term and refers to a speech. It is the Germans always capitalized. A nouns (also noun, naming word, Ding word or noun), for example, refers to an object (a thing, a thing), a living creature (person, animal, plant), a fact (situation), a transaction ("explosion"), a property ("Beauty") or word (or an abstract thing comprehensive much as freedom, pride or organization, state).

German to English ▾ Translate

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Fertig