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# LST Prep Course: Linguistics – Computational Linguistics – Language Technology

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In the Conversational Implicature Part, the slides use material from  
Ivana Kruijff-Korbyova's course

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Language Technology Systems



Algorithms, Tools, Resources



Linguistic Knowledge, Linguistic Theories

## Grammars in LST

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- Grammar formalisms
  - CFG, TFS, Unification grammar
- Grammar Theories
  - LFG, HPSG, ...
- Grammar Engineering Platforms
  - XLE, LINGO, ...
- Large Grammars for specific languages

## Deep and shallow techniques in Language Technology

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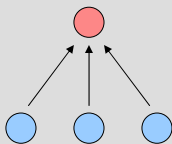
- The central question in traditional NLP: What kind of knowledge do we need to achieve general, full, and reliable understanding of language?
- A practically more helpful question: What can we achieve with certain kinds and amounts of knowledge?

# Criteria to Evaluate the Usefulness of Grammars /Grammar Systems

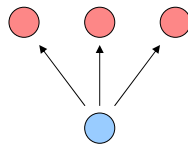
- Correctness, Reliability
- Coverage
- Efficiency
- Costs + Accessibility

## Three basic tasks

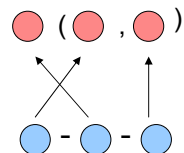
Abstraction



Disambiguation



Composition

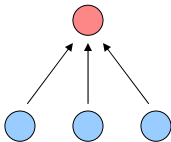


## Abstraction from Linguistic Surface

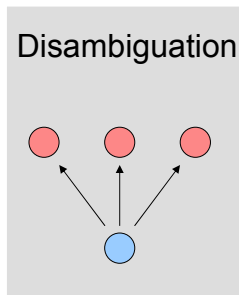
- Word forms → Stems/Lemmas (Lemmatiser)
  - *sell, sells, sold*
  - *verkaufen, verkauft, verkaufe, verkaufte, verkauften*
- Parts-of-speech → Roots (Morphology)
  - *sell, sale, selling*
  - *verkaufen, Verkauf*
- Synonyms → Concepts (WordNet)
  - *aircraft, airplane, plane*
  - *Flugzeug, Flieger, Maschine*

## Interpretation: Three basic tasks

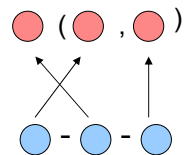
Abstraction



Disambiguation



Composition



## Ambiguity of "plane" [1]

plane:     noun?  
           verb ?  
           adjective?

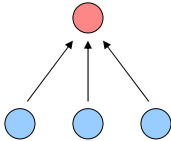
POS-Tagger (>98% accurate)

## Ambiguity of "plane"[2]:

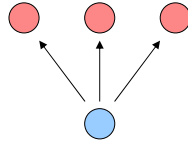
1. airplane, aeroplane, **plane** -- (an aircraft that has a fixed wing and is powered by propellers or jets)
2. **plane**, sheet -- ((mathematics) an unbounded two-dimensional shape)
3. **plane** -- (a level of existence or development; "he lived on a worldly plane")
4. **plane**, carpenter's plane, woodworking plane -- (a carpenter's hand tool with an adjustable blade for smoothing or shaping wood)

# Interpretation: Three basic tasks

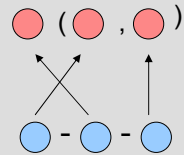
Abstraction



Disambiguation



Composition



# Composition

■ sell(Airbus, five A380 superjumbo planes, China Southern)



■ Airbus sells five A380 superjumbo planes to China Southern

## Composition

- **Airbus** sells **five A380 superjumbo planes** to **China Southern**
- **China Southern** buys **five A380 superjumbo planes** from **Airbus**
- **Airbus** arranged with **China Southern** for the sale of **five A380 superjumbo planes**

## Semantic roles

- **Commercial\_Transaction**
  - Seller: **Airbus**
  - Goods: **five A380 superjumbo planes**
  - Buyer: **China Southern**

## Links to Tools and Resources



- Course on linguistic resources, course description: <http://www.coli.uni-saarland.de/courses/korbay/Complingres/>
- Tools available at the department: [http://wiki.coli.uni-saarland.de/wiki/User\\_Doc/CorpTools](http://wiki.coli.uni-saarland.de/wiki/User_Doc/CorpTools)

## Tools for Logical Reasoning



- Description Logic
  - RACER (OWL-reasoning) <http://www.sts.tu-harburg.de/~r.f.moeller/racer/>
  - FaCT (DL) <http://www.cs.man.ac.uk/~horrocks/FaCT/>
- FOL
  - Otter/ Mace (model generation): <http://www.cs.unm.edu/~mccune/sobb2/>
  - SPASS: <http://spass.mpi-sb.mpg.de/webspass/index.html>
  - bliksem: <http://www.mpi-sb.mpg.de/~nivelle/software/bliksem/index.html>



- Questions?
- Comments?
- General comments on the Prep Course?

- Tank you for your attention!
- Have an interesting, successful time in Saarbrücken!

- Thank you for your attention!
- Have an interesting, successful,  
**and pleasant 😊** time in  
Saarbrücken!