Dependency Grammar

Thanks to Detmar Meurers, Markus Dickinson, Joakim Nivre and Sandra Kübler.
Dependency Grammar

- Not a single grammatical framework: wide range of different kinds of DG
  - just as there are wide ranges of “generative syntax”
- Increasing interest in DG in CL
- However, “the mind of most Western linguists goes completely blank when they are shown a dependency tree.”
The basic idea

Syntactic structure consists of lexical items, linked by binary asymmetric relations called dependencies.
A DG structure

A DG structure where "had" is the subject (sbj), "Economic news" is the object (obj), "effect" is the predicate (p), "little on financial markets" is the object modifier (nmod).
Comparison

- Dependency structures explicitly represent
  - head-dependent relations (directed arcs),
  - functional categories (arc labels),
  - possibly some structural categories (parts-of-speech).

- Phrase structures explicitly represent
  - phrases (nonterminal nodes),
  - structural categories (nonterminal labels),
  - possibly some functional categories (grammatical functions).

- Hybrid representations may combine all elements.
Economic news had little effect on financial markets.
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DG ⇔ PS
DG \iff PS

- PS $\rightarrow$ DG: ignore projections (merge N, $\tilde{N}$, NP, etc)  
  (Assumes that heads are marked.)
DG ⇔ PS

- PS → DG: ignore projections (merge N, \( \tilde{N} \), NP, etc) (Assumes that heads are marked.)
- DG → PS: introduce distinction between lexical (X) and phrasal (XP) categories (at least)
  Not unique: how many projections (how many levels between X and XP); is the arity of branching limited?
Some Frameworks

- Functional Generative Description (FGD) (Sgall et al 1986)
- Word Grammar (WG) (Hudson 1984, 1990)
- Meaning-Text Theory (MTT) (Mel’čuk 1988)
- Dependency Unification Grammar (DUG) (Hellwig 1986, 2003)
Economic news had little effect on financial markets.
Variants

Notational Variants

Economic news had little effect on financial markets.
Some Theoretical Issues

- Dependency structure sufficient as well as necessary?
- Mono-stratal or multi-stratal syntactic representations?
- What is the nature of lexical elements (nodes)?
  - Morphemes?
  - Word forms?
  - Multi-word units?
- What is the nature of dependency types (arc labels)?
  - Grammatical functions?
  - Semantic roles?
- What are the criteria for identifying heads and dependents?
  - Are Prepositions heads, dependents or attributes?
- What are the formal properties of dependency structures?
Some Tricky Cases (and one possible solution)

- Complex verb groups (auxiliary ↔ main verb)
- Subordinate clauses (complementizer ↔ verb)
- Coordination (coordinator ↔ conjuncts)
- Prepositional phrases (preposition ↔ nominal)
- Punctuation

I can see that they rely on this and that.
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![Dependency Grammar Diagram]

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Dependency Grammar 15(15)
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