EBERHARD KARLS UNIVERSITÄT TÜBINGEN

The Collection of Distributionally Idiosyncratic Items

Beata Trawiński

SFB 441

Universität Tübingen

trawinski@sfs.uni-tuebingen.de

Seminarium „Przetwarzanie języka naturalnego”
Instytut Podstaw Informatyki PAN

Warszawa, 20.12.2004

Overview

- The Project
- Purpose and Design of CoDII
- The Collection of Bound Words in German
- First Evaluation
- Outlook

The Project: General Information

- CoDII has been developed in the framework of Project A5 *Distributional Idiosyncrasies* of the Collaborative Research Center (Sonderforschungsbereich) 441 *Linguistic Data Structures: On the Relation between Data and Theory in Linguistics* at the University of Tübingen.
- The following people have contributed to the design and the compilation of CoDII: Monique de Jong, Manfred Sailer, Jan-Philipp Soehn and Beata Trawiński.
- The formulation of basic design principles of CoDII and the compilation of the first subcollection of CoDII, the collection of German bound words, have been realized within the first project phase from 2002 to the end of 2004.

The Project: Subject

- The project deals with linguistic expressions showing distributional idiosyncrasies, that is with expressions, whose distribution follows not only from their syntactic, semantic and pragmatic properties and general principles of grammar.

Two Types of Irregularities

Based on various empirical data, one can observe two types of irregularities in language:

- internal irregularities,
- (external) distributional irregularities.
- Richter and Sailer (2003) and Sailer (2003, 2004) argue for such distinction.

Internally Irregular Expressions

An internally irregular expression (construction) can be characterized as follows:

- there is no transparent way to account for the meaning of the whole expression on the basis of the meaning of its parts,
- no parts of the expression can be modified,
- the expression cannot undergo regular syntactic processes such as passivization (in the case of VPs).

Example:

kick the bucket ‘die’

Externally Irregular Expressions

An externally (distributionally) irregular expression (collocation) can be characterized as follows:

- it behaves regularly with respect to interpretation,
- it behaves regularly with respect to modification,
- it behaves regularly with respect to syntactic processes such as passivization (in the case of VPs),
- but it provides certain requirements on the linguistic environment this expression occurs in.

Examples:

*make / *do a decision*, *do / *make a favour*

Continuum of Irregularity

Thereby, based on various example types, a continuum can be observed of

- the internal irregularity,
- the external (distributional) irregularity.

Construction Continuum

The construction continuum relates to the question to what extent the structure of a given syntagma is formed according to general grammar principles and to what extent it can be interpreted compositionally.

Regular

general phrase structure rules:

ID-Schemata

S $\longrightarrow$ NP VP

special phrase structure rules:

relative clause constructions (Sag, 1997)

the *What's* X *doing* Y construction (Kay and Fillmore, 1999)

marked syntagmas:

let alone construction (Fillmore et al., 1988)

phraseological patterns:

Me worry? (Lambrecht, 1990)

fixed word combinations:

by and large

Irregular

Collocation Continuum

The collocation continuum relates to the question of how far lexical elements are limited with regard to their contextual appearances in addition to their syntactic, semantic and sectional characteristics.

Regular

“free words”:	*read*, *book*, . . .
“free phrases”:	*read a book*
empty elements:	traces
	ellipses
anaphora:	*himself*
polarity items:	*anybody*
	nothing
“ordinary” collocations:	*strong / *powerful coffee*
	*heavy / *weighty smoker*
bound words:	*make headway*
	by dint of

Irregular

Constructions in the Linguistics

For internally irregular expressions (constructions) there are analytic proposals in formal systems such as

- Construction Grammar (CG, (Fillmore et al., 1988)),
- Tree Adjoining Grammar (TAG, (Joshi, 1987)),
- (constructional) Head-driven Head Phrase Structure Grammar (HPSG, (Riehemann, 2001))

Distributional Irregularities in the Linguistics

In contrast to constructions, distributional irregularities have not systematically been treated in the theoretical linguistics. Merely, some groups of lexical items have been investigated such as

- anaphora and pronouns (Binding Theory),
- polarity elements,
- theoretical constructs such as traces (the HPSG Empty Category Principle).

A General Theory of Distribution

- The aim of the project is to elaborate a general theory of distribution within the formal paradigm of HPSG in the tradition of (Pollard and Sag, 1994).
- To provide an empirical basis for the distribution theory, a large number of distributionally idiosyncratic items should systematically be considered.
- CoDII (the Collection of Distributionally Idiosyncratic Items) should provide such an empirical basis.

CoDII: The Essential Idea

- The essential idea of CoDII is to provide a basis for linguistic investigations of lexical items showing distributionall idiosyncrasies.
- This includes
  - listing appropriate items,
  - providing existing linguistic documentation,
  - specifying possibilities of data ascertainment relating to these items.

CoDII: Conceptual Design and Data Structure

The conceptual design and the data structure of CoDII have been conceived in such a way that

- subcollections of various types of distributionally idiosycratic items can be modeled (anaphora, negative and positive polarity items, bound words, etc.),
- collections of distributionally idiosyncratic items from various languages can be compiled.

CoDII-BW.de

The Collection of German Bound Words (CoDII-BW.de) is the first completed subcollection of CoDII. The motivation for the compilation of CoDII-BW.de at first was following:

- In the project we first wanted to focus on the end of the collocation continuum, where the distributional restrictions are the strongest. Bound words are clearly lexical elements with extremely limited distribution.
- German bound words are relatively good documented in the German phraseological literature.
- Extraction of bound words from corpora is very trivial.

CoDII-BW.de: The Starting Basis

The starting basis for CoDII-BW.de are collections and classifications of bound words in

- (Dobrovol'skij, 1988),
- (Dobrovol'skij, 1989),
- (Dobrovol'skij and Piirainen, 1994b),
- (Dobrovol'skij and Piirainen, 1994a)
- and our own observations.

Currently, CoDII-BW.de involves about 450 items.

CoDII-BW.de: Modeling CoDII-BW.de entries

Each item in CoDII-BW.de is characterized by four information blocks:

- general information,
- classification,
- syntactic information,
- queries.

CoDII-BW.de: General Information

The General Information block identifies bound words by providing

- a particular bound word,
- the English translation of the bound word,
- the expression in which the bound word occurs,
- the set of possible paraphrases of this expression.

CoDII-BW.de: Classification

The field Classification specifies classes associated with a given bound word according to the following classifications:

- classification in (Dobrovol'skij, 1988),
- classification in (Dobrovol'skij, 1989),
- classification in (Dobrovol'skij and Piirainen, 1994b),
- Nunberg et al. (1994) oriented classification,
- classifications used in the project.

CoDII-BW.de: Syntactic Information

The field Syntactic Information provides information on

- the syntactic category of a bound word,
- the syntactic structure in which the bound word occurs,
- possible syntactic variations such as passivization, pronominalization, modification, occurrence in raising constructions, etc.

For syntactic description of bound words and expressions in which they occur, the Stuttgart-Tübingen Tagset (STTS) has been used (`http://www.sfs.uni-tuebingen.de/Elwis/stts/stts.html`).

For each context, examples from various corpora, from Internet and the linguistic literature are provided.

CoDII-BW.de: Queries

Finally, hints on further data search are given by providing optimized queries for various publicly available corpora of German such as

- corpora of the Institut of German Language in Mannheim (`http://www.ids-mannheim.de/cosmas2/`),
- the corpus of das Digitale Wörterbuch der Deutschen Sprache – DWDS (`http://www.dwds.de/`),
- the Tübinger Sammlung nutzbarer empirischer linguistischer Datenstrukturen – TUSNELDA (`http://www.sfb441.uni-tuebingen.de/tusnelda.html`),
- TIGERSearch, a search engine for retrieving information from a database of graph structures (`http://www.ims.uni-stuttgart.de/projekte/TIGER/TIGERSearch/`),
- Internet via Google.

CoDII-BW.de: Technical Realization

CoDII-BW.de has internally been encoded in XML. The DTD has been specified in such a way that:

- The element `codii` is the document root and its instance is identified by attributes `type` (for specifying collection type) and `xml:lang` (for specifying language the data come from).
- The content model of the element `codii` consists of two elements: `dii-list`, whose content is a list of distributionally idiosyncratic items, and `dii-examples`, whose content is a list of examples.
- The content model of the element `dii-list` consists of a list of `dii-entry` elements, whose content model consists of a set of elements which
  - identify distributionally idiosyncratic items (`dii`),
  - provide expressions in which they appear (`dii-expression`),
  - describe documentation on each item (`dii-classification`),
  - present syntactic properties of items and the expressions (`dii-syntax`),
  - give query hints (`dii-queries`).

A Fragment of the CoDII-XML-Encoding of the Bound Word *Zampano*

```
<dii-entry id="zampano">
    <dii>
      <ol>Zampano</ol>
      <en>golden boy</en>
    </dii>
    <dii-expression>
      <ol>der gro&#223;e Zampano</ol>
      <en>the big doer</en>
    </dii-expression>
    <dii-classification>
      <dii-class class="dekompo" type="A5">
         <bibliography bib-item="A5"/>
      </dii-class>
    </dii-classification>
    <dii-syntax hits="zampano-Bsp zampano-apposition" cat="NE">
       <dii-expression-syntax cat="NP">
           der/ART gro&#223;e/ADJA Zampano/NE
       </dii-expression-syntax>
       <variation kind="OPEN" hits="zampano-ecclestone">
          <comment status="external">
             Spitzname von Formel-1-Manager Bernie Ecclestone
          </comment>
       </variation>
    </dii-syntax>
    <dii-queries>
      <query type="cosmasII">
          <query-text><![CDATA[Zampano]]>
          </query-text>
       </query>
    </dii-queries>
</dii-entry>
```

CoDII-BW.de: Encoding of Examples

- The content model of elements `dii-examples` consists of a list of `example` elements.
- `example` elements are linked to appropriate distributionally idiosyncratic items by dint of attributes `dii` and `id`.
- A CoDII-XML-description of a corpus example for *Zampano*:

```
<example dii="zampano" id="zampano-Bsp">
  <source corpus="cosmasII">
    R97/APR.32703 Frankfurter Rundschau, 29.04.1997, S. 15,
    Ressort: WIRTSCHAFT; F&#252;r eine lohnende &#220;bernahme
    sind einige H&#252;rden zu nehmen
  </source>
  <ol>
    "Ich glaube nicht, da&#224; da Manna vom Himmel f&#228;llt
     und der gro&#224;e Zampano f&#252;r diverse neue Stellen
     sorgt", meint der Betriebsratschef der Vegesacker Werft,
     Wolfgang Dettmer.
  </ol>
</example>
```

CoDII-BW.de: Visualization

- CoDII-BW.de is available via the Internet in the form of a set of XHTML files generated by an XSLT script.

- The URL of CoDII-BW.de is

http://www.sfb441.uni-tuebingen.de/a5/codii

The General Characteristic of CoDII

- CoDII is a research platform for linguistic investigations.
- CoDII does not provide its own corpus but refers to existing corpora and gives sample queries.
- The target audience of CoDII are primarily linguists.
- Information gathered in CoDII allow for a systematic study of distributionally idiosyncratic items.
- On the basis of empirical and theoretical data contained in CoDII-BW.de, a first evaluation is already possible.

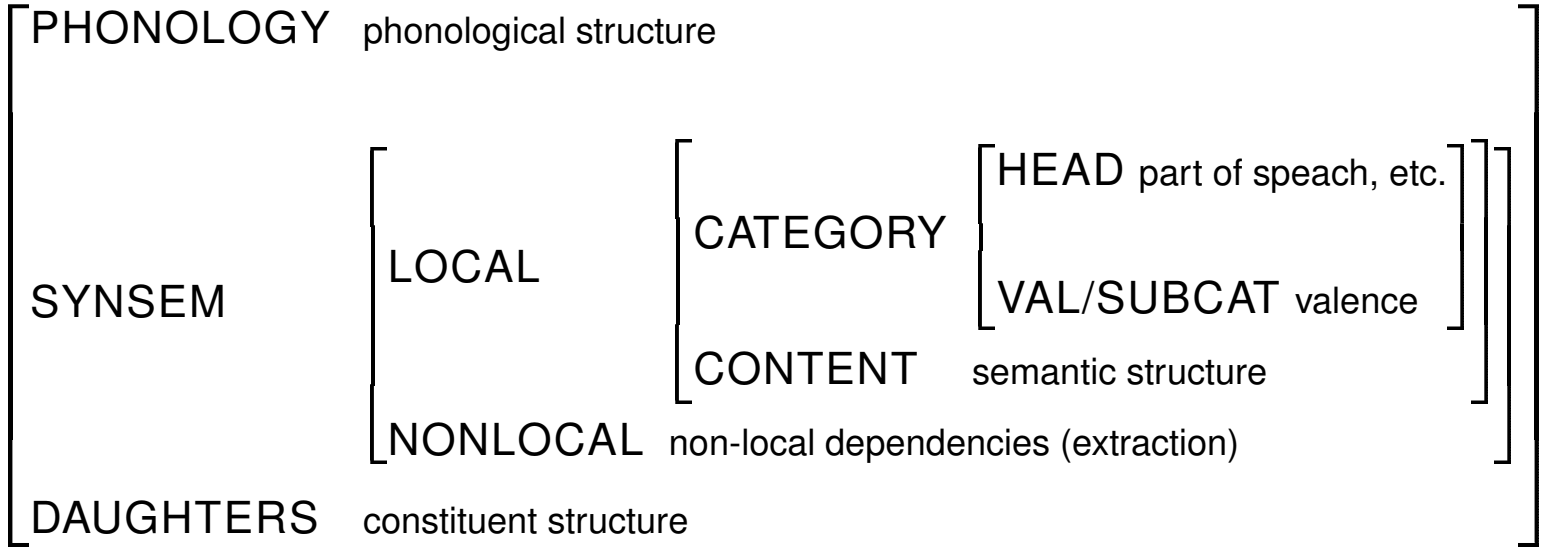
First Evaluation

A bound word (BW) requires the presence of a particular Lexeme (**LEX**), where:

- BW selects **LEX**:
  Angst *einjagen* 'to scare someone'
- **LEX** selects BW:
  Tacheles ***reden*** 'to talk straight'
- $\mathbf{LEX}_1$ selects $\mathbf{LEX}_2$ and $\mathbf{LEX}_2$ selects BW:
  *[****zu***$_2$ *Potte]* ***kommen***$_1$ 'to manage a task'
- but not $\mathbf{LEX}_1$ selects $\mathbf{LEX}_2$ and $\mathbf{LEX}_2$ selects $\mathbf{LEX}_3$ and $\mathbf{LEX}_3$ selects BW:
  [**zu***$_3$ *BW]* ***kommen***$_2$ ***lassen***$_1$

Grammar Theoretical Question

- How can these generalizations be integrated in a formal grammar architecture?



Architecture of linguistic signs according to Pollard and Sag (1994)

- It is the aim of the project to elaborate a general theory of distribution based on data collected in CoDII.

Outlook

- So far, only information on particular lemmata can be found. In order to make the access to the data dynamic and the search more detailed, CoDII will be converted into a data base.
- Existing CoDII entries will be completed.
- Further linguistic information such as dependency structure and logical form will be added to the structure of CoDII entries.
- A collection of bound words in English will be compiled.
- In the next project phase, a collection of German polarity items will be developed.
- The data structure of CoDII is designed in such a way that further collections of distributionally idiosyncratic items in any language can be modeled.

References

Dobrovol'skij, D. (1988). *Phraseologie als Objekt der Universallinguistik.* Verlag Enzyklopädie, Leipzig.

Dobrovol'skij, D. (1989). Formal gebundene phraseologische Konstituenten: Klassifikationsgrundlagen und theoretische Analyse. In W. Fleischer, R. Große, and G. Lerchner (Eds.), *Beiträge zur Erforschung der deutschen Sprache*, Volume 9, pp. 57–78. Leipzig, Bibliographisches Institut.

Dobrovol'skij, D. and E. Piirainen (1994a). PGF: Auf dem Präsentierteller oder auf dem Abstellgleis? *Zeitschrift für Germanistik* (NF 4), 65–77.

Dobrovol'skij, D. and E. Piirainen (1994b). Sprachliche Unikalia im Deutschen: Zum Phänomen phraseologisch gebundener Formative. *Folia Linguistica 27*(3–4), 449–473.

Fillmore, C., P. Kay, and M. O'Connor (1988). Regularity and Idiomaticity in Grammatical Constructions: The Case of *Let Alone*. *Language 64*, 501–538.

Joshi, A. K. (1987). An Introduction to Tree Adjoining Grammars. In A. Manaster-Ramer (Ed.), *Mathematics of Language*, pp. 87–114. John Benjamins, Amsterdam.

Kay, P. and C. J. Fillmore (1999). Grammatical constructions and linguistic generalizations: the *what's x doing y?* construction. *Language 75*(1), 1–33.

Lambrecht, K. (1990). "What, me worry?t't' — 'Mad Magazine sentencest' revisited. In *Proceedings of the 16th Annual Meeting of the Berkeley Linguistics Society*, pp. 215–228. BLS, Berkeley, USA.

Nunberg, G., I. A. Sag, and T. Wasow (1994). Idioms. *Language 70*, 491–538.

Pollard, C. and I. A. Sag (1994). *Head-Driven Phrase Structure Grammar.* Chicago and London: University of Chicago Press.

Richter, F. and M. Sailer (2003). Cranberry Words in Formal Grammar. In C. Beyssade, O. Bonami, P. C. Hofherr, and F. Corblin (Eds.), *Empirical Issues in Formal Syntax and Semantics*, Volume 4, pp. 155–171. Paris: Presses Universitaires de Paris-Sorbonne.

Riehemann, S. Z. (2001). *A Constructional Approach to Idioms and Word Formation.* Ph. D. thesis, Stanford University.

Sag, I. A. (1997). English Relative Clause Constructions. *Journal of Linguistics 33*, 431–483.

Sailer, M. (2003). Combinatorial Semantics and Idiomatic Expressions in Head-Driven Phrase Structure Grammar. Phil. Dissertation (2000). Arbeitspapiere des SFB 340. 161, Universität Tübingen.

Sailer, M. (2004). Distributionsidiosynkrasien: Korpuslinguistische Erfassung und grammatiktheoretische Deutung. In K. Steyer (Ed.), *Wortverbindungen — mehr oder weniger fest*, Institut für Deutsche Sprache, Jahrbuch 2003, Berlin, New York, pp. 194–221. de Gruyter.