New Lexicographic Approaches
to the Description of Sense Relations

Petra Storjohann
Institut für Deutsche Sprache
R5, 6-13
69161 Mannheim
Germany

Abstract
The presentation and description of paradigmatic sense relations in German dictionaries is often limited to types such as synonymy and antonymy. Their information is neither well presented nor helpful for users. Although corpora offer fundamental methodological advantages, various corpus-guided approaches have not played an important role in extracting and describing paradigmatic relations in German lexicography so far. ELEXIKO is a hypertext dictionary that explores a corpus to extract language data for the description of paradigmatic lexical relations. I will show how sense relations can be extracted systematically by employing both a corpus-driven and a complementary corpus-based approach. I will demonstrate how corpus data validates or challenges information in existing dictionaries and that in some cases lexicographic categories are not appropriate to capture specific linguistic phenomena with respect to sense-related items. Subsequently, an alternative method of extracting, describing, and presenting sense relations will be presented.

1 Introduction

German dictionaries of synonymy or antonymy, or onomasiological reference books are consulted by users particularly in situations of text production. Although corpora offer fundamental methodological advantages, various corpus-guided approaches have not played an important role in the extraction and description of paradigmatic relations in German lexicography. Dictionaries such as DUDEN 8, GWWB, WGDS and WSA restrict themselves to traditional methods of obtaining sense-related terms. Alternatively, the few reference works that use comprehensive corpus material (e.g. WORTSCHATZ-LEXIKON) retrieve their sense-related terms purely automatically and without subsequent lexicographic interpretation. In both cases, the results are debatable and their presentation of sense-related items in some aspects inadequate.

The following questions will be addressed. First, which advantages can corpus-guided approaches offer for the extraction and description of synonyms and words of contrast? Secondly, how can corpus data validate or supplement traditional dictionary information, and challenge conventional lexicographic categories? I will explore how a corpus can be successfully employed to extract relational structures by using different corpus-aided methods. I will argue that meticulous investigations of retrieved corpus material reveal insight into the para-

digmatics of a search item, which in a number of cases contradict given dictionary information. Finally, an alternative way of describing and presenting sense-related words, as followed in the German hypertext dictionary ELEXIKO, will be illustrated.

2 Dictionary Information vs. Corpus Data

In most synonymies and antonymies, semantically related items are usually provided for the lemma as uncommented lists. If sense-related terms are listed in meaningful arrangements, in many cases the applied principles of categorization remain opaque to the user (see Example 1). Up until now, for example, a strict sense assignment of synonyms can only be found in the latest edition of DUDEN 8 (2004).

> **frei:**
> uneingeschränkt, unkontrolliert, für s. allein, auf s. gestellt, unabhängig, selbständig, ungebunden, autonom, autark, unbeschränkt, sein eigener Herr, emanzipiert, unbehindert, selbstverantwortlich, ohne Zwang, souverän, unbelastet *verfügbar, disponibel, unbesetzt, leer, zu haben, vakant, offen, zur Verfügung *ledig, allein(stehend), unverheiratet, noch zu haben *entlassen, in Freiheit, befreit, erlöst *improvisiert, aus dem Stegreif, [...]

Example 1. *Lemma* frei *in WSA.*

Such synonymies can only be used by native speakers because they cause immense difficulties for foreign speakers, because they provide no guidance on how to use the equivalents. Apart from occasional labels of register, as in DUDEN 8 (see Example 2), there are generally no explanations as to questions of semantic or syntactic constraint and collocational behaviour. Compared to similar synonymy entries from English dictionaries, the German counterpart is "positively dangerous for the non-native speaker" (Partington 1998: 47).

German (from DUDEN 8)	English (from MERRIAM-WEBSTER's Online Dictionary: http://www.m-w.com)
Fehler	*Error*
1. a) Inkorrektheit, Unrichtigkeit; *(ugs.):* dicker Hund, Hammer, Klops, Patzer, Schnitzer.	Synonyms: MISTAKE, BLUNDER, SLIP, LAPSE mean a departure from what is true, right, or proper. ERROR suggests the existence of a standard or guide and a straying from the right course through failure to make effective use of this <procedural *errors*>. MISTAKE implies misconception or inadvertence and usually expresses less criticism than *error* <dialed the wrong number by *mistake*>. BLUNDER regularly impules stupidly or ignorance as a cause and connotes some degree of blame <diplomatic *blunders*>. SLIP stresses inadvertence or accident and applies especially to trivial but embarrassing mistakes <a slip of the tongue>. LAPSE stresses forgetfulness, weakness, or inattention as a cause <a lapse in judgment>.
b) Fehlgriff, Irrtum, Missgeschick, Missgriff, Panne, Ungeschicklichkeit, Versehen; *(bildungsspr.):* Fauxpas, Lapsus; *(ugs.):* Ausrutscher, Schnitzer.	
2. a) Macke, Mangel, Manko; *(geh.):* Makel.	
b) Beschädigung, Defekt, Fabrikationsfehler, Lädierung, Macke, Schaden; *(geh.):* Makel; *(Med.):* Vitium.	

Example 2. *Comparison of dictionary entries* Fehler *and* Error.

More detailed and explanatory lexicographic information on semantic aspects is also of interest to native speakers. A good depiction of the paradigmatics of a word is itself part of the description of its meaning and use, as sense-related items contribute to semantic identity and determine a lexeme in semantic-pragmatic as well as thematic and discursive ways (cf. Cruse 1986). Notwithstanding the presentational problems and the absence of explanations on the appropriate use of synonyms/antonyms, some of the information given as such is misleading.

2.1 Corpus Data

As Hanks (1990: 40) points out "natural languages are full of unpredictable facts [...] which a corpus may help us to tease out". Until today, most German reference works which list synonyms and/or antonyms compile their data by traditional introspective methods or, alternatively, by working with file systems. If they consult an electronic corpus it is merely for the purpose of validating expectation or if in doubt. Corpora and corpus tools are, however, not used in order to analyse lexemes and to systematically recognize relational patterns. Hence, they cannot record a number of meaning patterns and sense relations that can be detected in a large and balanced corpus. Working with a corpus reveals the following: information on paradigmatic terms as found in existing German dictionaries is partly inadequate, and in a number of cases typical terms are entirely missing. In addition, the study of concordances discloses the semantic or syntactic embedding of search terms and exposes the use of corresponding sense-related terms. The following examples in 2.2 and 2.3 serve to show how corpus evidence can challenge statements in existing German dictionaries. In section 2.4, a critical account is given on a methodology where the corpus is used exclusively for the automatic extraction of sense-related terms without further lexicographic examination of the retrieved results.

2.2 When Synonyms are not Synonymous

Generally, dictionaries containing meaning equivalents have a broad understanding of the term *synonymy*. As Cruse (2004: 156) notes "no one is puzzled by the contents of a dictionary of synonymy, or by what lexicographers in standard dictionaries offer by way of synonyms". A closer look at corpus data, meaning the study of concordance and larger contexts, reveals that pairs such as *kaufen – bestechen (buy – corrupt)* and *schützen – decken (protect – cover)* which are listed as meaning equivalents in DUDEN 8 do not express synonymy, but have a conditional or causal relationship, because they denote two processes which follow one another, and do not refer to the same event (see corpus example 1 and 2).

1. Statt fleißig zu trainieren und beim Match hart um Tore auf dem grünen Rasen zu kämpfen, haben viele Vereine in den letzten Jahren lieber den Schiedsrichter **bestochen** und sich den Sieg **gekauft**. (die tageszeitung, 29.01.2002, S. 19.)

2. «Aus Liebe gelogen» Untersuchungsrichterin Eva Joly ist überzeugt, Dumas habe der «Hure der Republik», wie sich Christine Deviers-Joncour selbst bezeichnet, bei Elf eine Geldquelle erschlossen – aus der er sich auch selbst bediente. Diese Version bestätigt inzwischen die Kurtisane, nachdem sie Dumas in der Untersuchungshaft noch eisern **gedeckt** hatte. «Ich habe gelogen, um den Mann zu **schützen**, den ich liebte. (St. Galler Tagblatt, 23.01.2001.)

In context 1 the two verbs refer to different objects. While *bestechen* refers to an animate object *Schiedsrichter*, *kaufen* requires an inanimate object *Sieg*. In example 2, both verbs take an animate object. However, the syntagmatic structure to **do x in order to y** *[...] decken. [...] um zu schützen* signals that the act denoted by *decken* precedes the event designated by *schützen* and can hence not be synonymous in this context.

A considerable number of most synonymies consist of semantically close items with meaning resemblance which share a large number of their semantic features, so-called plesionyms (cf. Cruse 1986). Such pairs often concern gradable adjectives and have one member (*kritisch, billig, kalt*) denoting a higher quality or intensification of the state or characteristic than the second element (*ernst, preiswert, kühl*) (consider corpus samples 3-5).

3. Das Leben der Vorsitzenden der Kommunistischen Partei Spaniens (PCE), Dolores Ibarruri, genannt "La Pasionaria", ist nach Auskunft ihres Arztes nicht in Gefahr. Die 93jährige, die als prominente Kämpferin des spanischen Bürgerkriegs bekannt ist, war am Dienstag abend wegen eines Rückfalls nach einer schweren Lungenentzündung ins Krankenhaus gekommen. Ihr Gesundheitszustand sei "**ernst**, aber nicht **kritisch**", erklärte ihr Arzt. (die tageszeitung, 10.11.1989, S. 6.)

4. Seine Schokoladen sind handgeschöpft, vom Feinsten, nicht **billig**, aber doch **preiswert** (Kleine Zeitung, 20.09.2000.)

5. "Klimatechnisch lässt sich leider wenig machen", bilanziert Stefany Goschmann, die deshalb alle Jahre wieder auf Messe-Idealwetter hofft: **kühl**, aber nicht **kalt** bei bedecktem Himmel. (Mannheimer Morgen, 12.05.2000.)

It is not unusual for such pairs to be used to express contrasts. Their common semantic features are backgrounded and it is the differences that contexts focus on rather than the similarities that they share. Through corpus material one can analyse common contexts of plesionyms and determine whether they are actually used synonymously. On the basis of quantitative investigations it can be decided whether the contrastive or the equivalent use of the two words is more central.

2.3 When Opposites Don't Express Contrast

What is generally termed *antonymy* in lexicography, is restricted to gradable adjectives in semantics (cf. Cruse 1986). Besides antonymy in its stricter sense, the most salient types of opposites are complementaries, reversives and incompatibles, all of which are comprised as antonyms in dictionaries containing terms of contrast. In a considerable number of cases, however, neither contradictory nor contrary words but terms which designate "cause and effect" events are listed as opposites irrespective of their absence of contrast. These are typical pairs that look at the same state of affairs or event from different perspectives, such as *nehmen – geben* (*give – take*), *fragen – antworten* (*ask – answer*), and undoubtedly there is a close relationship between these terms. Pairs like *geben – nehmen* are termed conversives and they are not in direct contrast with each other but in a reciprocal relationship. They consist of one member denoting an act which must happen first, and the event designated by the other term is an optional result. Frequently however, there are two possible options as a response to the first event. The actual opposition is established between the lexemes denoting the two response options, in this case *nehmen – ablehnen* (*take – reject*), or *antworten – schweigen* (*answer – to be silent*) as illustrated in Figure 1.

Figure 1. *Contrast between* nehmen – ablehnen *and* antworten – schweigen

Despite the existence of numerous corpus samples (see 6-7) where the contrastive use between *nehmen – ablehnen* and *antworten – schweigen* is attested, these pairs are not typically listed in antonymies.

6. Ein beliebiger Spieler beginnt und deckt die oberste Karte des restlichen Stapels auf. Nun muss er sich entscheiden, ob er die Karte **nehmen** oder **ablehnen** will. **Nimmt** der Spieler sie, zählt der aufgedruckte Zahlenwert am Ende des Spiels als Miese. **Lehnt** man sie **ab**, muss man einen Chip aus dem eigenen Vorrat auf die Karte legen. (Mannheimer Morgen, 13.11.2004.)

7. "Schutt und Asche", sagte einer und fragte dann in die Runde: "Was habt Ihr denn für Noten gegeben?" Die meisten haben betreten **geschwiegen**, nur einer hat **geantwortet**: Einmal Note zwei (für Möller), zwei Vierer, viele Fünfer und sogar eine Sechs (für Reinhardt). (Frankfurter Rundschau, 21.09.1998, S. 25.)

2.4 Puzzling Pairs of Opposition

As will be elicited in more detail in section 3, the advantages that corpus studies can offer to lexicographers lie in the possibility of an investigative approach to large material that is combined with a critical lexicographic interpretation of the data. Methodologically rather dubious is the approach taken by some information systems to retrieve their data exclusively from an electronic corpus without interpreting the extracted data further. The popular German online reference work WORTSCHATZ-LEXIKON which claims to be "Das Nachschlagewerk für Wörter und ihren Gebrauch" offer comprehensive lists of synonyms and antonyms. The following examples give an impression of computer-extracted lexical counterparts including the number of hits for the opposite item in the corpus:

Lemma	computer-extracted antonyms:
Leben	Nichtleben (7), Antileben (1)
Kritik	Antikritik (2)
Heimat	Antiheimat (0)
Vernunft	Widervernunft (9), Nichtvernunft (0)

Example 4. Computer-extracted antonyms in Wortschatz-Lexikon.

Here, software performs a query for negation prefixes *Nicht-*, *Anti-*, and *Wider-*.[1] Using this procedure, typical words of opposition such as *Ableben, Absterben, Ende, Sterben, Tod*

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[1] In German, the most typical form of negation of lexical items is constructed by the negation prefix *un-* which is not among any counterparts in WORTSCHATZ-LEXIKON.

and *Verscheiden* for the lexeme *Leben*, or *Anregung, Lob* and *Würdigung* as contrastive words for *Kritik*, are not ascertained. Neither typical and statistically relevant terms nor relevant and correct terms of contrast are detected, and this can be attributed to the lack of lexicographic analysis. Given such results, compilers undeniably fail to exploit the corpus profitably, beyond a quick quantitative compilation of the information.

3 Corpus-guided Approaches to Sense-Related Items

German synonymies and antonymies have not hitherto been written on the basis of an electronic corpus using corpus-guided approaches. Working with a corpus and enhanced query and data retrieval technology not only exposes discrepancies and answers questions of authenticity, but also indicates the typicality and significance of a paradigmatic pattern. Generally, lexicographers can gain a more differentiated and detailed insight into the use of a lexeme through a broad range of language material. By analysing contextual choices and selectional preferences as well as the semantic and discursive constraints and conditions of a search word in a corpus, the paradigmatics of a lexeme can be studied empirically and holistically. Corpus results should, however, be subject to linguistics interpretation. A detailed examination of sense-related items often involves the study of smaller and larger contexts, and by using two different but complementary approaches – the corpus-driven (henceforth CDA) and the corpus-based (henceforth CBA) method (cf. Tognini-Bonelli 2001) – a more complete picture of paradigmatic patterns is given. Whereas CDA implies that data is analysed without prior expectations, the complementary method CBA is applied where a corpus serves as a repository of data which contains evidence for intuitive expectations or as in most cases simply to find good citation samples that support assumptions.

3.1 Corpus Exploration

An investigative approach to comprehensive data and the application of corpus tools guarantees that rules and patterns are identified and enables lexicographers to systematically detect collocations and typical, central language patterns. By employing a corpus-driven methodology, lexicographers can approach the corpus without assumptions about a specific sense-related item in mind, and linguistic regularities are detected within lexical relations with the help of the computational analysis of collocations and the study of concordances. As Tognini-Bonelli (2001: 86) emphasises, it is the "unexpectedness of the findings" from corpus analyses which often does not fit the introspective conception and hence questions the reliability of intuition as a source of information about language. The corpus-driven methodology forces lexicographers to make conclusions exclusively on the basis of corpus examination. Statistically significant co-selections, provided as a list of collocates can be the lexicographer's direct access to lexical networks, among which paradigmatic sense relations are often present. The following example is a result from a collocation analysis of the corpora of the Institut für Deutsche Sprache (IDS) Mannheim conducted by the software *Statistische Kollokationsanalyse und Clustering.*[2]

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[2] This software is an integral part of the corpus processing tool COSMAS at the IDS (developed by Cyril Belica).

Flexibilität Total	Anzahl		Autofokus	LLR	Kookkurrenzen
		von bis			
1836	242		-3 3	3046	Mobilität
2837	60		-3 4	843	Kreativität
3392	47		-4 3	496	Schnelligkeit
3665	47		-5 3	459	Offenheit
3747	39		-3 5	442	Effizienz
3941	19		-2 5	347	Anpassungsfähigkeit
4261	35		-5 5	269	Dynamik
4287	26		-5 5	261	Produktivität
4312	19		-3 3	260	Innovation
5104	9		-5 5	211	Belastbarkeit
5300	21		-3 4	195	Transparenz
5362	22		1 4	192	Anpassung
5538	12		-3 4	162	Beweglichkeit
5964	8		-3 3	102	Vielseitigkeit
6852	6		-3 3	66	Festigkeit

Example 5. Semantically-related terms of Flexibilität from a computerized collocation analysis.

In contrast to Example 4, CDA cannot be effectively applied for verbs, because they are characterised by syntactic valency and hence they often co-select nouns that indicate typical subject and object slots, rather than verbs which belong to the same paradigm. Particularly valuable for the detection of synonyms and antonyms of verbs is advanced computer technology which searches for lexemes with similar collocation profiles. Such programmes (consider Figure 2) can be used to derive potentially sense-related words with similar semantic neighbouring (see right button "similar profiles").

Figure 2. Software tool for automatic extraction of terms with similar collocation profile.

For the query word *akzeptieren*, the following words with similar collocational behaviour were drawn from the corpus and are potentially paradigmatic terms: *respektieren, zustimmen, anerkennen, hinnehmen, abfinden, ablehnen, beugen, abrücken, annehmen, ignorieren, widersetzen, tolerieren, zulassen, opponieren, aufzwingen, unterstützen, zurückweisen.*[3] In a next step, these potentially sense-related words and their relationships to the search item *akzeptieren* need to be studied in detail in a corpus in order to identify their status as synonyms or antonyms and to allocate them to a specific sense before they are documented lexicographically.

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[3] This result is based on a tool developed at the IDS within the project *Similar Collocation Profiles.*

3.2 Corpus Validation

In a number of cases the exclusive application of CDA is not sufficient to identify a complex paradigm. The list of collocates in Example 4, for example, does not contain antonymic words of the search term *Flexibilität*. In other cases, hardly any meaning equivalents are detected through computer collocation analysis. Paradigmatic terms do not always occur in the immediate contextual neighbourhood; therefore, sense-related items are not always captured by collocation analyses. Here, CBA can be used as a complementary procedure where the corpus serves as a validation tool for potential synonyms or antonyms. Corpus evidence "is brought in as an extra bonus" (Tognini-Bonelli 2001: 66) on the basis of which intuitive knowledge is supported and expectations about lexical relations are verified. Typical opposites of *Flexibilität*, such as *Beständigkeit, Sicherheit, Starrheit, Sturheit* and *Unbeweglichkeit*, which the lexicographer could have had in mind or collated with other dictionaries, can be attested through a corpus-based query of the underlying corpus. As lexicographers are able to quantify linguistic phenomena in a corpus and can determine the status of the above-listed terms of contrast through contextual examination, CBA provides essential supplementary information. Furthermore, as access to retrieved lists of collocates is restricted to significant patterns, infrequent antonymic variants are not ascertained. For example, opposites of *sozial* (*asozial* and *unsozial*) or *Missgeschick* versus *Ungeschick* as contrastive terms of *Geschick* cannot be obtained by CDA due to their statistical insignificance. However, learners of German would expect to find both terms in antonymies, preferably with explanations as to their semantic difference. For such cases, a targeted corpus query with a sense-related word in mind is essential to obtain less frequent items or terms that do not co-occur in immediate co-text. Altogether, one cannot but conclude that each approach has advantages but it is a combination of different strategies which has substantial benefits for the extraction of semantically-related items and the detection of contextual constrains on semantically related terms. Above all, introspection remains essential for the interpretation of data and contexts and for the identification of certain types of lexical relations.

4 Lexicographic Description of Sense Relations in ELEXIKO

ELEXIKO is a long-term project which bases the compilation of its hypertext dictionary on a comprehensive corpus[4] and aims at explaining and documenting present-day German. 300,000 single-word entries contain details on spelling, syllabication and grammar, and presently about 500 headwords have been fully lexicographically described. These entries contain detailed semantic, pragmatic, grammatical, and diachronic information as well as information on morphology and word formation. Information on sense-related terms labelled "Sinnverwandte Wörter" is part of the extensive lexical description in a separate sense-bound rubric[5] among which also a meaning definition, collocations, syntagmatic patterns, pragmatic behaviour and grammar are explained in detail. One of the major differences to other existing

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[4] Currently, the underlying ELEXIKO-corpus contains 1,300 million words.

[5] There is also a lemmatic level which refers to spelling, syllabication, word formation, etymology, etc.

German dictionaries is ELEXIKO's comprehensive context-dependent presentation of paradigmatic relations including a system of cross-referencing which exhibits lexical structures and the interrelatedness of words within the lexicon. A detailed account of the paradigmatics of a lexeme is given for specific senses, comprising all types of horizontal and vertical structures respectively. Following Cruse (1986), ELEXIKO is particularly concerned with a detailed distinction of terms of exclusion and opposition (consider Example 5).

flexibel 'anpassungsfähig'		
Antonym(e):	stur	
komplementäre(r) Partner:	fest	
	kompromisslos	
	unbeweglich	
	unflexibel	
	starr	
inkompatible(r) Partner:	effizient	
	kostengünstig	
	schnell	
inkompatible(r) Partner:	anpassungsfähig	
	beweglich	
	kreativ	
	mobil	
	dynamisch	

Example 6. Overview of relations of contrast of flexibel
in its sense „anpassungsfähig" as presented in ELEXIKO.

The description of sense relations is not restricted to the listing and hyperlinking of corresponding relational items, but also incorporates authentic corpus examples (see button labelled "Belege" which is realized as a pop-up box). These illustrate the common contextual ground and the semantic and syntactic embedding of the relevant relational term. Specific problems between different types of contrasts as elicited in the case of *fragen – antworten* and *schweigen* in 2.3 are solved by provided corresponding categories and explanatory notes.

antworten 'erwidern'		
komplementäre(r) Partner:	schweigen	
Konversonym(e):	fragen	
	sprechen	
Kommentar: Während Konversonymie vor allem dadurch charakterisiert ist, dass sich die beteiligten Relationspartner gegenseitig bedingen, liegt in diesem Fall eine Einschränkung vor. Das Verhältnis der Konversonymie funktioniert hier nur in einer Richtung: Ohne vorheriges fragen oder sprechen ist antworten nicht möglich, allerdings ist fragen oder sprechen ohne anschließendes antworten denkbar.		

Example 7. Relationship between fragen – antworten – schweigen as presented in ELEXIKO.

4.1 Corpus Data vs. Lexicographic Categories

A specific type of meaningful pattern escapes lexicographers who do not conduct a collocation analysis of corpus data. This concerns the relation of incompatibility which holds be-

tween hyponyms of a common superordinate. Typically, such words are listed in onomasiological dictionaries (e.g. DORNSEIFF), but without explicit labelling, sense allocation or explanations. Apart from studies within the field of critical discourse analysis, this paradigmatic structure has not played a major part, either in semantics or in lexicography. Through the analysis of collocations and concordances it can be observed that incompatibles can play a major part in determining a lexeme's discursive-referential notion and pragmatic use. Therefore, it is a meaningful sense relation to be included in dictionaries which aim at describing the meaning and the use of words. Example 7 shows how sets of incompatible terms refer to a specific notional area. There is also a strong correspondence between the incompatible paradigm and information provided in another sections, particularly to statements under the heading "Besonderheiten des Gebrauchs".

Flexibilität 'Anpassungsfähigkeit'	
Inkompatible Partner:	*Mobilität, Innovation, Kreativität, Vielseitigkeit, Vielfalt*
Inkompatible Partner:	*Ausdauer, Risikobereitschaft, Belastbarkeit, Kommunikationsfähigkeit, Eigeninitiative, Risikobereitschaft, Einfühlungsvermögen, Einsatzbereitschaft, Engagement, Teamfähigkeit, Selbstständigkeit, Teamgeist, Zuverlässigkeit*
Inkompatible Partner:	*Dynamik, Effizienz, Qualität, Kundennähe, Leistungsfähigkeit, Produktivität, Schnelligkeit, Spontaneität, Transparenz, Wettbewerbsfähigkeit, Wirtschaftlichkeit*
Inkompatible Partner:	*Offenheit, Toleranz*
Besonderheiten des Gebrauchs Diskurs:	Flexibilität wird in den Texten des elexiko-Korpus als etwas positiv Bewertetes gefordert, verlangt, ist gefragt, muss aufgebracht und gezeigt werden, ist nötig, notwendig bzw. erwünscht, wie nur einige der typischen lexikalischen Mitspieler zeigen. Zugleich erwächst aus der häufig überzogenen Forderung nach Flexibilität, die im Korpus oft als hoch, groß, maximal, enorm charakterisiert wird, ihre negative Bewertung. Auf der einen Seite wird das Vorhandensein von Flexibilität bei Menschen, in Firmen und Einrichtungen oder in Systemen ganz allgemein also positiv bewertet. Mangelnde Flexibilität wird dann beklagt, wie der Beleg zeigt. Auf der anderen Seite bewirkt die überzogene Forderung nach Flexibilität eine kritische Einschätzung, wie der Beleg verdeutlicht. Flexibilität wird außerdem in den Texten des elexiko-Korpus gemeinsam mit anderen politischen und wirtschaftlichen Schlagwörtern thematisiert und damit zugleich einer negative Bewertung unterzogen. In den Texten des elexiko-Korpus wird Flexibilität häufig in wirtschaftlichen Zusammenhängen, insbesondere im Hinblick auf den Arbeitsmarkt und die dort herrschenden Bedingungen, thematisiert. Flexibilität zählt im modernen Berufsleben zu den Schlüsselqualifikationen bzw. zu den Fähigkeiten, die insbesondere von Arbeitnehmern gefordert werden.

Example 8. Incompatible set of Flexibilität in its sense,
Anpassungsfähigkeit' and its discourse interpretation.

4.2 Discrepancies to Other Dictionaries

Working with a large corpus has shown that for instance some central synonyms which were elicited from the corpus are not recorded in any dictionary. Alternatively, synonyms recorded in a dictionary sometimes cannot be confirmed by corpus data because they do not occur in common contexts or because they have different references. If such discrepancies become apparent, specific prose-style user notes are provided. In other cases, alleged synonyms occur in common contexts but are not interchangeable due to semantic or discursive constraints which are not elucidated in a dictionary. Here, the examination of concordances enables lexicographers to discover differences in use. Semantic and syntactic restrictions as well as variation in register of sense-related items are incorporated in a dictionary entry. They refer to different kinds of constraints or are additional general lexicographic explanations and substantiations and are specifically designed to meet special needs of learners of German.

ergänzen ‚hinzufügen'			
Synonym(e):	anfügen		Kommentar: Diese Synonyme beziehen sich alle auf eine Handlung, bei der zum Ausdruck gebracht wird, dass sich etwas durch das Hinzufügen einer Person oder eines Gegenstandes vermehrt oder dass etwas dadurch größer wird.
	auffüllen		
	ausweiten		
	bereichern		
	erweitern		
	hinzufügen		
Synonym(e):	komplettieren		Kommentar: Diese Synonyme betonen den Aspekt der Vervollständigung. Sie bezeichnen eine Handlung, bei deren Abschluss etwas durch das Hinzufügen einer Person oder eines Gegenstandes in kompletter Form vorliegt.
	vervollständigen		

Example 9. Sets of synonyms and usage notes as presented in ELEXIKO.

Similarly, if terms of exclusion are grouped into different semantic sets, usage notes elucidating the difference are indispensable for the correct use, e.g. of the nullification (*Nichtakzeptanz*) and the negation (*Ablehnung*) of *Akzeptanz* (see lemma *Akzeptanz* in http://www.elexiko.de.)

4.3 Contextual Variation

Corpus data helps to capture systematic variation of sense relations caused by minor contextual changes of focus. Since most dictionaries limit themselves to the description of one or the other type of sense-relation (either synonymy or words of opposition), the phenomenon of alternating relationships is not represented. As briefly discussed in 2.2, besides the synonymous behaviour which is established between two lexemes and their senses, there are also a number of contexts where they manifest a different sense relation, sometimes even a relation of contrast. Some synonyms are, for example, more frequently used contrastively than in substitutable contexts, or there is also a causal relationship between supposedly synonymous items. Systematic alterations are documented in ELEXIKO (e.g. relationship between *billig – preiswert* as described for the lemma *billig*).

5 Prospects

In this paper I have attempted to show that corpus investigations of relational patterns open up a number of new issues with respect to paradigmatic relations in actual texts and discourse. A number of sense relations have not been studied in detail within a theoretical framework, let alone from a lexicographic perspective. Through the corpus investigations of semantically related terms one also recognizes the difficulties of allocating each relation to a specific sense or sub-sense. In some cases, some items cannot be identified unequivocally. Finally, the possibilities of effective visual lexicographic presentation and interactive displays to explore lexical networks is another issue that needs to be addressed. Besides simply filling the dictionary, these are some of the tasks which ELEXIKO is attempting to accomplish and for which, in the short term, we are seeking to identify solutions.

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