

Introduction

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1 SOME BACKGROUND

"It would not be an exaggeration to say that linguistic researchers are standing at the threshold of a new era". These are the words in which Atkins et al. (1994: 33) characterize the development in lexical research over the past two decades. Indeed, there are good reasons to believe that the strong shift of interest from grammar to lexicon that we are presently witnessing marks a step unparalleled in the history of linguistics. The idea that the lexicon is only an appendix to the grammar (listing all those irregularities which can not be captured by abstract grammatical rules) is normally associated with Bloomfield (1933: 274). However, it is much older and appears to have dominated linguistic thinking since its earliest days in antiquity.

Ironically, it was the preoccupation with vocabulary, e.g. bilingual or bidialectal glosses, that has provided us with some of the most ancient records of interest in language in Mesopotamia and Greece. Yet, these early attempts never evolved into a "science"; they remained confined to the practical domain in which they were developed. It was not until people in several parts of the world began codifying the grammatical rules of the vanishing literary languages of their classical periods that the investigation of language became accepted as a serious academic discipline, due to the close association between grammatical and philosophical theories.

That is to say, from the first moment that language came to be dealt with from a theoretical perspective with the objective of developing more general models for describing languages, it was grammar rather than lexicon that constituted the center of attention. This is particularly true of linguistics in Ancient India, overshadowed by grammar and its grand master Pāṇini (cf. Rocher 1992), and, strictly speaking, it also holds for other lines of ancient tradition which influenced Western linguistics, such as the Greek or Latin tradition. Admittedly, curiosity has been focussed on vocabulary time and again since classical antiquity, but this mainly the case not because vocabulary attracted theoretical interest per se comparable to that devoted to grammar (be it "school grammar" or "philosophical grammar") but for practical purposes such as compiling word lists and dictionaries. There is one notable exception: in the past century, etymological studies in historical linguistics ultimately led to the beginnings of lexical-semantic research (see Geraerts, this volume). All in all, however, the strong dominance of

grammar in relation to lexicon has never been seriously challenged. The view that the lexicon is basically uninteresting and that its role consists in supplying the core grammar (morphology and syntax) with unpredictable information, as postulated by Bloomfield and also assumed in the early stages of generative grammar, is thus the historically prevalent perspective on language.

In contrast to this, many contemporary lexicon-oriented theories claim that the lexicon lies at the heart of grammar, controlling and shaping it in a fundamental way. From this point of view lexical-semantic information crucially contributes to the morphological and syntactic structure of a sentence. Moreover, it is sometimes assumed that "[m]ost of what was stipulated in the grammars of earlier theories is taken to be a function of lexical semantics" (Wasow 1985: 202). Regardless of whether or not we consider this statement to be an exaggeration, the following points are clear: lexicon theories today tend to be not only partial theories about a certain inferior component of natural language fitting any grammatical model but, rather, they are often claimed to be theories of natural language in general considered from a lexical perspective. As such they manifest a perspective on the interaction of lexicon and grammar that turns the historically standard view into its exact opposite: Instead of conceiving of the lexicon as an appendix to the grammar, it sees the grammar as an appendix to the lexicon.

Linguists are accustomed to thinking of their discipline in terms of contrasts hard to reconcile, such as the ones

- between theoretical and application-oriented approaches (such as lexicology and lexicography);
- between different linguistic disciplines (such as theoretical linguistics, computational linguistics, psycholinguistics, etc.);
- between different schools (such as the generative, functionalist, cognitive paradigm etc.);
- between different theories or frameworks developed within a certain linguistic school (such as minimalist syntax/GB, LFG, HPSG, etc. in the generative school);
- between different approaches to a special linguistic issue such as the storage of lexical information in memory (e.g. relational vs. componential models) or the retrieval of lexical information from memory (e.g. multiple access vs. ordered access vs. context-dependent access).

On the other hand, the shift of interest to "lexical matters" has given rise to clearly observable convergences between neighboring disciplines or competing theories or approaches. This has been emphasized in a considerable number of recent publications. But how far-reaching are these convergences? Do we really find true agreement across the boundaries of different disciplines and schools which goes beyond the assumption that lexical representation must be fine-grained, highly structured, flexible, etc.?

2 OVERVIEW

The papers in this volume are intended to provide at least partial answers to the foregoing questions. They were originally presented at a workshop on "Lexicon Theories", held in 1995 during the annual meeting of the German Linguistic Society in Göttingen. We - the editors and organizers of the workshop - invited linguists, psycholinguists, and computational linguists to participate in a discussion about the current state of lexicon research since we strongly felt that we have arrived at a point where an evaluation of the convergences and differences observable in this field is a necessary prerequisite for future research.

There are two common sources of convergences in lexicon research that we expected to be discussed at the workshop. The first simply involves similar insights about problems concurrently considered as central in different working fields. The consequence of detailed investigation of the lexicon is, of course, that a number of assumptions and theoretical constructs, which were commonly accepted formerly, when the lexicon played only a minor role, prove to be increasingly more problematic. Thus, they are likely to attract attention across the boundaries between the various subdisciplines and models. To mention just a few of them: the standard concept of lexical insertion, the metatheoretical criterion of redundancy, the principle of one-to-one relation the potential meanings associated with an item in the lexicon and the actual meanings that are activated in specific contexts or between lexical and syntactic categories, and, last but not least, the principle of compositionality in its rigid version. A related but different source concerns the integration of competing approaches to lexicon. Recently, there has been a growing number of publications which argue that some of those approaches formerly considered as alternative options for lexical organization are in fact not mutually exclusive. For this reason, it would be desirable to integrate these approaches when modeling lexicon as a rich, multilevel construct. Such integrating proposals have been made, for instance, with respect to lexical organization in terms of frames vs. semantic fields (cf. Barsalou 1992), or in terms of features vs. semantic fields (cf. Lyons 1977; Jackendoff 1992), or with respect to polysemy analyses on the basis of abstract core meanings as opposed to prototypically structured senses (Sweetser 86). Here, too, the fact that a wide range of lexical phenomena have in the meantime been investigated in detail crucially contributes to a relativization of theoretical positions. It turns out that most approaches are only appropriate in some restricted domains and seldom strong enough to cover all aspects of the lexicon.

We asked the participants of the workshop to present their point of view on current convergences or divergences in lexicon research, either by referring to some principled topics and taking into account developments that have taken place in their field or by generally indicating how their working domain is affected by overall tendencies in linguistics. Geeraerts provides a comprehensive overview of interdependencies between preferred methods and approaches in the history of lexical semantics. Three authors

proceed from a selected empirical problem in cognitive linguistics (Zelinsky-Wibbelt), clinical linguistics (Schecker), and computational linguistics (Oesterle) and try to demonstrate, on the basis of these problems, the methodological and theoretical difficulties met with in their respective fields. Finally, the other contributors (Roelofs, Gibbon, Pustejovsky) present their own computational models and show how these integrate current insights in linguistics. The papers cluster around three central issues which constitute a common thread running through the entire volume:

- Fine-grained lexica and the role of methodology
- Compositionality
- Lexicon and Syntax

3 FINE-GRAINED LEXICA AND THE ROLE OF METHODOLOGY

Nowadays, lexicographers and lexicologists generally agree that modeling lexical knowledge in a fine-grained fashion is highly desirable. Apart from the fact that the requirement of fine-grainedness seems more fitting to the research philosophy of "splitters" than to that of "lumpers", there is a certain variation as to what people mean when arguing in favor of a "fine-grained lexicon". In the context of lexical-knowledge acquisition, it often refers to a complementary use of a variety of lexical resources and methods for capturing all potentially relevant aspects of what is assumed to make up speakers' lexical knowledge. At the same time, "fine-grainedness" may be used as an attribute of representation, pointing to the fact that different kinds of lexical information - all of them assessed as being relevant in the mental lexicon - are organized in a rather complex way (e.g. on multiple levels and with a complex network of links).

It is important to distinguish between epistemological and ontological arguments favoring a fine-grained lexicon, i.e. between arguments focussing on heuristic merits in dealing with lexical data on the one hand and hypotheses about the psychologically valid kind of organization in the mental lexicon on the other. In reviewing the enormous amount of literature which critically compares competing approaches, it is striking that an overwhelming part of the arguments listed pro or contra the approaches in question are based on methodological considerations. The standard way of discussing componential and relational approaches, for instance, is to first point out the various methodological deficiencies in working with semantic primitives and to then point out those which arise by using linguistic constructs based on semantic relations (e.g. semantic fields or frames) (cf. Lyons 1977; Aitchison 1987). From the methodological difficulties we have with some linguistic constructs, however, it is not possible to draw direct conclusions about the mental reality of these constructs. For instance, methodological problems with defining semantic primitives do not prove their non-existence, as noted *inter alia* by Aitchison (1987: 67). Furthermore, some methodological problems are not necessary

concomitants of the linguistic entities criticized but result from the general methodology characteristic of those particular historical contexts in which the respective entities were typically applied. For instance, linguists used to criticize componential analysis by pointing out the deficiencies of the Katz/Fodor model. Not all of these problems are, however, necessary properties of componential analysis per se; some of them simply follow from the way componential analysis was applied and embedded in a syntax model at that time.

If we concentrate on the epistemological aspect and disregard basic ontological assumptions for a moment, what is noticed immediately is that competing models in lexical semantics very often have a strong bias toward a certain heuristic. Componential and relational approaches, for example, not only differ with respect to their basic assumptions (e.g. about the nature of internalized meaning as atomistic vs. holistic or - using Saussure's words - in terms of "denotational meaning" vs. "value") but very simply also in the preferred point of departure for analysis: componential analyses start from a semasiological point of view, while relational approaches start from an onomasiological one. Similarly, field and frame models (i.e. two types of "relational approaches" in a wider sense) obviously differ in their complementary bias toward paradigmatic and syntagmatic analyses respectively. One wonders whether there is a pure methodological justification for such preferred research strategies.¹ A different and likewise open question is whether such preferences for one or another perspective of analysis is anchored as a psychological reality in the mental lexicon.

Geeraerts gives a comprehensive overview of how preferred research strategies - and, consequently, also primary empirical domains - have changed in the history of lexical semantics. He introduces three parameters (or "dimensions") which can be used to cross-classify the basic perspective and methodology of a lexical-semantic approach: the distinctions (a) between semasiology and onomasiology, (b) between qualitative and quantitative aspects of semantic structure, and (c) between structural and pragmatic orientation. After comparing the three major traditions in lexical semantics (pre-structuralist (diachronic), structuralist, and cognitive semantics), Geeraerts observes a clear shift of research interests: the primary orientation toward semasiological structures in historical semantics in the past century was more or less replaced by an onomasiological view during the structuralist period due to the general claim of the primacy of onomasiological structures vis-à-vis semasiological ones. It is only in cognitive semantics that these two opposite research perspectives play an equally important role for the first time, at least inasmuch as different branches of cognitive semantics concentrate on them complementarily, namely prototype theory on semasiological aspects and "basic level" research on onomasiological aspects. Cognitive semantics also shifts the

¹ Interestingly, it is precisely methodological arguments that Lyons (1977: 326) adduces in favor of considering componential analysis as an extension of field theory instead of regarding these two approaches as independent of each other.

attention toward quantitative and pragmatic (speaker-dependent) aspects in lexical semantics, overcoming the self-imposed restriction of structuralists to investigating lexical structure only from a qualitative and speaker-independent point of view.

Geeraerts takes the view that the historical extension of basic methods for approaching lexical semantics constitutes a gradual extension of its descriptive scope. Here, the simultaneous use of opposite methods such as the onomasiological and the semasiological strategies can be motivated both by theoretical and empirical considerations. Semantic relations within a single lexical item (and thus attracting semasiological interest) are partially identical to those holding between distinct lexical items (and thus attracting onomasiological interest) (e.g. antonymy, meronymy). Moreover, research fields characterized by opposite strategies are often linked to each other by an abstract conceptual relation which they share as their common object of research; for instance, the semasiologically-oriented metonymy research and the onomasiologically-oriented field research both deal with contiguity relations. In addition, convergent results achieved by complementary methods may strengthen scientific hypotheses as Geeraerts demonstrates with his own research. He shows that we find a positive correlation between the prototypicality of a referent in the semasiological structure (as measured by the relative frequency of senses) and the likelihood of using a word for naming the same referent (as measured by the relative frequency in comparison to alternative words in the semantic field in question).

Zelinsky-Wibbelt, like Geeraerts an adherent of cognitive linguistics in the tradition of Langacker, Lakoff, etc., deals with borderline cases between "vagueness" and polysemy. Advocating finer phenomenological distinctions in her domain of investigation, she too fits in very well with the general tendency toward a fine-grained lexicon. Thus, for instance, she stresses the importance of distinguishing between lexical structures of different conceptual types, arguing that only a differentiated treatment of concepts will be successful in the long term. For the broad area commonly referred to by cognitivists as "vagueness", she introduces a subclassification, distinguishing *inter alia* between "peripheral vagueness", "internal vagueness", and vagueness due to "overall continuity". Her particular interest in this paper is devoted to lexical items which can be systematically used to refer both to a whole reference object and to its parts, e.g. "figure-ground reversals" such as the nouns *door* and *window*. There has long been a controversy in the literature as to how to analyze such nouns. Should we assume that the whole-part-variation is a case of regular polysemy with systematic variation between lexically established senses? Or would it be more adequate to assume a single concept with a unitary semantic structure which is subject to conceptual or referential shifts depending on the context of utterance and due to general cognitive or pragmatic principles. This controversy is overshadowed by the terminological problem of whether "metonymy" is an appropriate term here. Although "metonymy" is, in principle, neutral with respect to the distinction between lexical and non-

lexical variation of readings and referents, some linguists avoid its use in the second case.

Zelinsky-Wibbelt also confines this term to lexically-governed alternation. However, she tries to show that, with the nouns in question, reference-point variation and metonymy are intrinsically connected to each other in that they correspond to different diachronic stages. The first stage (reference-point variation) does not constitute an ordinary variation between distinct referents for her. Rather, what she means by "reference-point variation" is the phenomenon that the zone which is active within a single conceptual structure during the referential act may be shifted (e.g. between the parts and the whole), though the referent remains the same. As long as nouns with an internal part-whole structure are used in unmarked discourse situations, parts do not have an autonomous status as referents but belong to the same referential system as the whole, together forming a functional unity determined by the canonical discourse domain of the lexical concept. In contrast, in marked discourse situations, parts may - exceptionally - become autonomous individuals. This gives rise to a development into qualitatively different concepts with distinct referential systems, i.e. to a metonymical variation between distinct senses and distinct referents. As noted above, one of Geeraerts' arguments for a unified onomasiological-semasiological approach is the partial identity of semantic relations such as meronymy or antonymy within and between lexical items. Zelinsky-Wibbelt appeals to this fact by describing the discourse conditions under which lexical items with meronymically and metonymically related senses arise.

Geeraerts' and Zelinsky-Wibbelt's approaches share a further property worth mentioning in this context. Both are interested not only in idealized linguistic knowledge ("competence") but also in actual language use ("performance"). Of course, this seems unusual only in the context of standard assumptions in theoretical linguistics, whereas in psycholinguistics, it appears to be established practice. Here, processing considerations have always played a major role in developing linguistic models.

Roelofs presents a computational model (WEAVER++) of the skill of lexical access in speech production, which he has constructed within the theoretical framework developed by Levelt and his colleagues. He strongly emphasizes that this model is designed to explain facts about language performance taking into account factors such as the time needed for the retrieval of lexical information. Assuming that, in contrast to this, linguistic models have the objective to account for facts about language competence, he discusses the main differences between psycholinguistic and linguistic models resulting from these different goals. The perhaps most important difference concerns the attitude towards redundancy. Eliminating redundancy in representations according to the metatheoretical criterion of simplicity has traditionally been an imperative in theoretical linguistics, whereas it is not a particularly important issue in psycholinguistics. Linguists thus tend to think of memorizing ("listing") and computing

knowledge as two mutually exclusive options. Roelofs argues that, from a psycholinguistic point of view, this assumption is not indispensable. For this reason, psycholinguistic models sometimes establish several levels of representation for information that would be captured at a single level of representation in linguistic models. In this connection, the classical problem of componential analysis and lexical decomposition furnishes an illuminating example. Roelofs points out that it is normally taken for granted that the same set of arguments apply in favor of (or against) componential analysis and lexical decomposition. However, componential analysis (understood as abstract knowledge about the semantic components of words) does not at all imply lexical decomposition (understood as the process of decomposition into semantic components during lexical access). We can easily imagine a general memory system which implements componential analysis accounting for semasiological and onomasiological knowledge without actually performing lexical decomposition during speech processing. According to Roelofs, empirical findings about retrieval time provide evidence that lexical items ("lemmata" in the terminology of the framework) are retrieved in a non-decomposed way (as "chunks"). Consequently, this is reflected in the overall design of WEAVER++.

Schecker's article about association experiments with schizophrenics is devoted to methodological problems in interpreting experimental data. Here, we encounter a number of problems usually not tackled in linguistic discussions. First, associations, although they have always played a central role in psychology and psycholinguistics, are not very well investigated and understood as a linguistic phenomenon. The traditional psychological distinction between "standard" and "unusual" association, for instance, is not without problems from a linguistic point of view. Likewise, clarification is needed as to how to interpret the distinction between linguistic and non-linguistic associations as employed in empirical psycholinguistic and psychopathological practice in terms of the analogous distinction between knowledge types as drawn by linguists. As it is well-known, the adequacy of a clear-cut distinction between pure linguistic and encyclopedic knowledge is not uncontroversial at all. Second, in psycholinguistics, modalities of speech processing are controversial for healthy speakers too. This makes it difficult to interpret experimental data from schizophrenic patients in comparison to that received from healthy speakers as a control group. Schecker points to the different possibilities of interpreting data characterized as "contaminations" or "confusions". We may interpret these as manifestations of a deficiency in the process of selecting the correct forms or meanings. Alternatively, we may also assume that both healthy and non-healthy speakers exhibit multiple selection of lexical items, but that only the former have a kind of intact "context-selection filter" which forces a suppression of the contextually incorrect items after a very short processing time.

In his discussion of data with schizophrenics, Schecker proceeds among other things from the following observations: Schizophrenics seem to exhibit more "unusual" associations, i.e. more indirectly related associations

or more associations based on individual experience, than healthy speakers. Likewise in contrast to healthy speakers, they show positive priming effects in experiments with phonetically related primes, and, when tested with ambiguous primes in unambiguous contexts, positive priming effects with respect to both meanings of the ambiguous item as well. After careful examination of these and other results with respect to methodological fallacies along the lines of the problems mentioned above, Schecker arrives at the following conclusion: it is the inhibitory mechanism that is disturbed in schizophrenics, while they potentially exhibit the same kind of activations as healthy speakers. Linguistic and non-linguistic meanings are not stored separately but, rather, are linked to each other. However, in certain cases of language processing - namely reactions to linguistic stimuli - they may be kept separate in that, for healthy speakers, inhibitory thresholds will be created.

4 COMPOSITIONALITY

The increasing centrality of the lexicon in linguistics has also rendered an old problem more relevant than ever, namely that of compositionality. The principle of compositionality (in the form usually referred to in subsequent literature) goes back to Frege and is therefore also called "Frege's principle". It states that the meaning of a complex expression is a function of the meanings of its component parts and the way they are combined. As such it is a crucial assumption in formal semantics. The basic idea underlying this principle, viz. that the meaning of a sentence somehow depends on the meaning of its words and on its syntax, has always been presupposed by traditional grammarians (cf. Lyons 1991: 5). More recently it has found a rather rigid manifestation in the system architecture of Montague Grammar, where the semantic interpretation is conceived of as a homomorphic mapping from the syntactic algebra onto the semantic algebra.

The principle of compositionality has been criticized by semanticists and computational linguists for being either, in its weak version, trivial, or, in its strong version, wrong from a theoretical point of view and not very well tractable from a computational point of view (cf. Schiffer 1987; Wilks 1989). Disregarding purely syntactic problems with strict compositionality and focussing on lexical phenomena, the first thing linguists tend to think of is idioms. It is widely assumed that the essential feature of idiomatic expressions is their lack of compositionality, i.e. they are assumed to be definable as non-compositional complex expressions. However, the situation is slightly more complex: On the one hand, idioms or at least a considerable part of them, can be assigned a compositional interpretation alongside with their idiomatic one. And there are fixed phrases and collocations like *high wind* or *to land a job*, which have partially compositional meanings and which are unpredictable or arbitrary only from an onomasiological point of view. On the other hand, problems with

compositionality arise not only with those complex expressions that are usually characterized as idioms, as will be shown below.

Two strategies used to deal with these problems are worth mentioning in this context. The first one is the "listing strategy". The assumption that conventionalized expressions are listed in the lexicon with a single unitary meaning, as advocated by the "lexicalist view" in morphology and syntax (cf. Di Sciullo/Williams 1987), opens up the possibility of interpreting the principle of compositionality as treating such lexically listed items like morphemes. Unfortunately, many semantically conventionalized expressions do not behave like simple syntactic objects in that they fail to show "lexical integrity". Furthermore, "listemes" – be it phrasal compounds or classical idioms – are not entirely immune to those semantically-governed operations on their parts which are symptomatic for referential use (e.g. anaphor). Without doubt, idioms, especially those involving figuration such as *pull strings*, give the impression of semantic non-compositionality, but this impression also arises only under certain conditions, namely when speakers not familiar with an idiom are asked to recover its meaning in an uninformative context. Under these conditions the idiomatic meaning is non-predictable. Once the meaning of an idiom, however, is known or can be recovered from the context, speakers are normally able to recognize its internal structure as consisting of chunks whose figurative meanings are related to the whole meaning of the idiom in a compositional manner (cf. Burger 1973; Gibbs 1990).

Based on similar considerations, Nunberg et al. (1994) argue that the standard literature on idioms is based on the misconception that no such semantic compositionality exists. They claim that the essential feature of idioms is conventionality (or "semantic idiosyncrasy"), which, in their view, does not entail non-compositionality. Consequently, they also criticize the common practice of using the terms "conventionality" and "non-compositionality" interchangeably in the literature. A crucial point in the argumentation of Nunberg et al. (1994) is, of course, that our understanding of compositionality depends on how we draw the distinction between literal and figurative meaning. This is precisely the starting-point of the second strategy to get rid of compositionality problems caused by idioms. Instead of listing idioms as unanalyzable units, we could also assume that the parts are polysemous. This was discussed by Weinreich as early as 1969. In other words, we could extend the concept of "contextually restricted word sense" to include "senses" which are restricted to occurring in certain idiomatic expressions. Obviously, this strategy too has serious drawbacks; it provides counterintuitive results with respect to what makes "word senses" and easily leads to "polysemy inflation".

In spite of (or as a result of) the problems mentioned, both the listing and the polysemy strategy shed light upon a fundamental disadvantage of the principle of compositionality as understood by Frege and his successors. It is basically a static concept, proceeding from the result of composition as a static meaning (rather than from the process of composition) and relating this to static word meanings. Here, it is – presumably incorrectly –

presupposed that all word meanings are determined from a finite stock of meanings. However, as it is now generally accepted, natural languages are in a constant process of change, in the course of which new conventionalized meanings constantly arise. Above all, speakers are continuously adjusting and negotiating meaning in context while composing and decomposing utterances; they are able to creatively build and understand word senses never used or heard before. As noted by Zelinsky-Wibbelt, from a dynamic point of view we have to recognize that speakers continuously strive for coherence between conventionalized knowledge and newly encountered information.

In view of what we have said so far, it comes as no surprise that the question of "compositionality" is currently approached from markedly different angles as evidenced also in this volume. We encounter descriptively oriented approaches where "compositionality" is used as a technical term indicating the degree of relative generality (or idiosyncrasy) of system information inherited from the parts to the whole. On this understanding, it is not longer necessarily restricted to semantic information but may be applied to any kind (e.g. phonological, morphological) of inheritable information. In contrast, other linguists try to model composition in the sense of an interaction of sublexical factors (factors concerning the internal structure of lexical items) and contextual factors that influence this mental process. Here, the problem of creative word senses is assumed to directly address the issue of compositionality and vice versa (cf. Pustejovsky 1995).

The relation of creative polysemy and compositionality is a central issue in Zelinsky-Wibbelt's and Pustejovsky's papers. **Zelinsky-Wibbelt** states that we can accept the principle of compositionality only in its weak form, not in its strong version. She argues that the meaning of a complex utterance – even though it is certainly determined by the meaning of its components – is, in principle, more than the mere sum of these component meanings given that particular utterances are always assigned unique interpretations on the basis of our socio-culturally influenced knowledge system. The meanings of the components of an utterance themselves are evaluated on the basis of already existing knowledge systems and on the basis of the specific discourse situation actually holding in each particular case. When words are used creatively, novel interpretations compatible with the discourse situation soon become integrated into the system of old knowledge. The latter is thus continuously modified and amplified by contextually rendered novel information and provides as such a continuously changing feed-back for the interpretation of word meanings. Zelinsky-Wibbelt takes the view that, for this reason, composition is a bottom-up process that is complemented by some kind of decomposition, a continuous top-down inheritance from the whole to the parts.

Pustejovsky investigates lexical items exhibiting "logical", i.e. systematic polysemy (e.g. *book* as physical object and as information, *lunch* as event and as food), taking the view that they are most appropriately represented as lexically underspecified items rather than, for instance, in the

form of enumerated and fully specified senses. He strongly emphasizes that in dynamic models of the lexicon such as his "Generative Lexicon" model, underspecified representations are taken as a crucial part of the compositional process: it is in the process of sentence composition that underspecified items acquire a determinate and unique meaning, i.e. they become fully specified due to contextual interaction.

Pustejovsky discusses two possible strategies within a typed inheritance framework which could make use of the concept of underspecified representation: one operating with unified types and the other with complex types. Both of them have in common that they presuppose a lexicon with multiple levels of representation which allows reference to distinct and orthogonal facets of knowledge. Since the "qualia structure", developed in Pustejovsky's earlier work, is such a representational device, it serves him as a basis for illustrating the difference between unified and complex types. Among other things, the qualia structure separates knowledge about the characteristic form of an object (represented in the FORMAL quale) from knowledge about its characteristic function (represented in the TELIC quale). In the case of unified types, seemingly contradictory properties associated with a lexical form are conjoined as predicates (or "unified as types"), each coming from a different quale (e.g. in the case of *lunch*, the value "substance" from the FORMAL quale and the value "eat" from the TELIC quale). Pustejovsky emphasizes that this kind of conjunctive typing unifying orthogonal values from distinct qualia would not be a case of unconstrained multiple inheritance; rather, it is structured by the qualia structure and constrained by the well-formedness condition to the effect that, within a particular quale, only inheritance from a single parent is permitted. Moreover, he claims that there is no multiple inheritance per se in natural language semantics, but only structured orthogonal inheritance (as just described) and inheritance by complex types. Pustejovsky argues that conjunctive typing, while being a powerful strategy for creating increasingly specific senses, is not adequate in all cases. In particular, it misses the generalization that there is a deeper structural relation between the senses of logically polysemous lexical forms.

In his opinion, members of such classes must be represented as complex types. Complex types are directly represented as objects including two or more component types in the qualia structure (e.g. as "dot objects", defined by Pustejovsky as the Cartesian product of the component types). As such, they allow the observation to be captured that some contexts disjunctively select one of the relevant types while other contexts simultaneously evoke all of them. A crucial point in Pustejovsky's model is the correspondence between nominal complex types (e.g. *book*) and verbs selecting complex types (e.g. *read*). In this way, the composition of a particular sentence, depending on the lexical structure of the nouns and verbs it contains, may give rise to the following kinds of semantic specification: (a) in the case of the combination of a nominal complex object with a verb requiring one-type complements (*book* and *burn*), one of the nominal types will be restrictively selected; (b) in the case of the combination of a nominal one-type object

with a verb requiring complex-object complements (*subway wall* and *read*), the verb coerces its complement into both components of the complex type in question; (c) in the case of the combination of complex objects with a verb requiring a complex-object (*book* and *read*), all related aspects both of the nominal object and the verbal event, as expressed by the dot object, will be activated.

Gibbon deals with compositionality in the "Inheritance Lexicon", a sign-based theory of the lexicon which was initially developed to capture generalizations in word-formation.² He outlines the basic features of this theoretical approach (especially those of the ILEX version) and shows how it works when implemented in DATR. DATR is a declarative network-based knowledge-representation language which may be characterized by two principal mechanisms: orthogonal multiple inheritance and default inheritance. Default inheritance is a device for optimally organizing generalizations in relation to exceptions: it means that a value of a given attribute (of a sign) may be specified more than once in the same inheritance path, in which case the values at lower (more specific) nodes in the hierarchy override values at higher (more general) nodes. In the approach presented by Gibbon, the concept of "compositionality" is immediately connected to this mechanism. All signs – consequently all lexical signs from morphemes through derived and compound forms to idiomatic phrases and proverbs – are said to be, in principle, compositional down to their smallest constituents, unless they are idiosyncratically specified by default overrides somewhere in the inheritance path. Compositionality is understood as a matter of degree, ranging from the ideal type "totally compositional" to "totally non-compositional", where the degree of compositionality is measured by the depth of the exception (default override) in the inheritance hierarchy. That is, a lexical sign inherits all its properties from its parts is totally compositional, one which inherits none of its properties is totally non-compositional, and the others are partially compositional to varying degrees.

As mentioned above, it is rather natural to extend this conception of compositionality beyond the issue of semantic interpretation since we practically encounter the same kind of gradualness of generality and irregularity with respect to the formal side of lexical elements (morphophonology, morphotactics, etc.) as with respect to the semantic interpretation of phrasal or word-size idioms. Actually, one of Gibbon's major goals is to integrate seemingly disparate problems such as idioms, lexical prosody, and word-formation in a theoretically well-founded and computationally tractable fashion by introducing a general notion of compositionality and compositional co-interpretation for surface and semantic interpretation. The semantic and the surface (phonetic and orthographic) aspect of a sign are thus treated, in principle, identically. Both of them are considered as "interpretative properties" of signs, in contrast to

² In the meantime, the approach has been extended to deal with systematic polysemy as well (cf. Kilgariff 1995).

"compositional properties", which indicate their category and parts. It is the former which are claimed to be decisive for gradual compositionality as defined by idiosyncratic specification. Following from this, Frege's principle is also applied to "surface form interpretation" in this approach, as emphasized by Gibbon. In the second part of his paper, Gibbon provides an illustration of the ILEX/DATR approach showing the treatment of English compounds. He points out that the same sign may exhibit diverging degrees of compositionality with respect to meaning, phonetic form, and orthography (e.g. *dustman*: totally compositional in orthography, partially compositional in meaning and phonetic form).

5 LEXICON AND SYNTAX

The issue of compositionality is immediately connected with two further questions, both of them extraordinarily important for an understanding of the way lexicon and syntax interact. The first question is: Are lexical items, in principle, monomorphic, i.e. monocategorical, monovalent, and monosemous, and therefore – by virtue of their inherent properties – sufficiently restrictive to unequivocally determine their admissible syntactic contexts (category of the phrases they head, complement and modifier types) and their semantic interpretation in these contexts? Or are they essentially polymorphic, i.e. polycategorical, polyvalent, and/or polysemous, freely occurring in a great variety of syntactic contexts and exhibiting meaning shifts constrained only by pragmatic principles? The second option overstates perhaps the role of pragmatic factors. However, it becomes increasingly clear that the formerly predominant hypothesis of the monomorphic nature of lexical items, tacitly assumed in the original conception of "lexical insertion", has to be abandoned for empirical reasons. At least, the ubiquity of polymorphy in natural languages seems to strongly militate against the assumption of a one-to-one correspondence between inherent categories of lexical items (characterizing their syntactic and semantic potential) and sentence-level categories. Note that this is also independent of the type of representation, i.e. whether the many-to-many relation is expressed by multiple listings (of categories, subcategorizations, and senses) or by lexical underspecification.

The second question concerns the homomorphism between semantics and syntax throughout all levels of linguistic descriptions. Is there really such a strong parallelism between semantic and syntactic structures as, for instance, traditionally claimed in formal semantics? Here, too, clear empirical evidence such as constructional synonymy, discrepancies between semantic and syntactic heads, agreement mismatches (synesis), etc. speak against the hypothesis of a simple one-to-one relation between syntactic and semantic structures.

Pustejovsky's conception of a generative lexicon (cf. 1995) is essentially founded on the insight that the ensemble of the three postulates mentioned above – the principle of compositionality, the postulate of the monomorphic

nature of lexical items, and the postulate of a strict syntax-semantics parallelism – constitutes an inadequate basis for natural language semantics. In particular, he commits himself to a theory of "weak polymorphism", i.e. a theory in which sentence meanings are only partly determined by the lexicon rather than being totally constrained by a single literal meaning and a single subcategorization frame or being left entirely to pragmatic factors. Lexical underspecification is intended to provide a general solution for coping with problems of polysemy, polycategoriality, and polyvalency, since all these problems are phenomenologically and formally related. This point is particularly emphasized by Pustejovsky in the present volume.

Oesterle is chiefly interested in the question of how to deal, in a rather large computational linguistic system, with constructions in which the expected parallelism between syntax and semantics is absent. He concentrates on a family of constructions characterized by a high degree of constructional synonymy involving complex variation in lexical elements and syntactic categories: the family of measure constructions that are based on a dimensional expression (noun, verb, or adjective) and a quantifying expression. Oesterle notes that measure constructions are usually considered as having a number of exceptional features, in comparison to other "well-behaved" constructions constituting the model case for linguistic theories. He suggests that many of those problematic properties of measure constructions supposed to be exceptional are in fact quite commonly found with other types of constructions as well. In particular, measure constructions pose the following difficulties (at least in German, which he investigates in detail): for dimensional verbs, it is hard to identify the syntactic status of their phrasal environment (i.e. the quantifying phrase) as a complement or a modifier. This is complicated by the fact that (a) the syntactic category (part of speech) of the head of the phrases in question is not always clear due to lexical polycategoriality, (b) the semantic interpretation of the verbs depends in a complex, partly idiosyncratic manner on the question of whether or not these phrases are syntactically realized, (c) the verbs range between full verbs and auxiliary-like support verbs or light verbs. Similarly, complex nominal phrases containing either a measure noun plus a dimensional noun or a measure noun plus the quantified noun pose serious difficulties in identifying the head and the modifier component in the phrase, at least if we want to take into account the whole range of syntactic variations and the semantic similarities between these constructional variants.

In contrast to some other authors (e.g. Geeraerts) in this volume, who compare competing approaches with respect to their basic features, Oesterle proceeds from the set of standard analyses employed in the literature in the case of certain problems (e.g. problems in distinguishing between complements and modifiers, in determining parts of speech, etc.). He then evaluates these partly alternative analyses describing the consequences the choice of an analysis of one problem may have for the analyses of other problems. In so doing he takes into account some general assumptions in modern linguistic theories as well as assumptions which characterize

particular linguistic models. He also discusses the question of how the analyses of local problems may affect the overall design of a computational system. In this connection, Oesterle points to a difference between theoretical linguistic and computational linguistic approaches. He observes that theoretical linguistic approaches often deal with the problem of measure constructions only from a semantic or only from a syntactic point of view. In this way, semantically-oriented approaches sometimes arrive at the most elegant and economical representation by introducing only new syntactic features, while syntactic approaches do so by introducing new semantic features. Oesterle emphasizes that this method of measuring representational economy under restricted conditions is bound to fail in computational linguistics since the introduction of otherwise unmotivated features inevitably leads to an undesired increase of complexity in the overall system. In his conclusion, he suggests that the information exchange between the lexicon and the syntax should be improved and increased beyond the currently usual amount. In order to overcome the problem with complex distinctions allowing conflicting analyses (e.g. modifiers vs. complements), he advocates fine-grained representations in which the constitutive criteria are kept separate as independent properties.

6 CONCLUSION

Now, how strong are the different currents in lexicon research? Do the convergences between the various disciplines, theories and approaches outweigh the divergences, does the opposite hold, or is there simply a trade-off? The answer depends, of course, on the weight the different developments are assigned. One area where basic differences between the disciplines seem to remain quite stable is the issue of redundancy-free representation, where theoretical linguists, psycholinguists, and computational linguists continue to have rather divergent views. On the other hand, there is without any doubt a strong tendency towards a more integrated conception of lexical studies, both in empirical and in methodological respect, and this is confirmed and emphasized by all authors of the present volume.

One consequence of this is that some older controversies which were based on a rather simple conception of the lexicon and on a restricted use of linguistic methods became obsolete and have been replaced by new debates across theoretical boundaries. However, as Geeraerts rightly warns, such empirical and methodological convergences do not necessarily imply the disappearance of divergences from linguistics that concern the philosophical commitment to how language works (e.g. those between cognitive and non-cognitive or between formal and functional views on language). As far as particular linguistic problems (e.g. systematic polysemy) are concerned, we may even observe an increasing diversification of competing approaches where the differences are, in general, rather specific and much more

complex than before. This too is, of course, consistent with the observed widening of the field.

However, a negative side-effect of this increase in complexity and specialization is that convergences with respect to phenomenology remain hidden, because they are not accompanied by terminological standardization. Rather, the number of synonymous or polysemous terms even seems to be growing. For a volume such as this, it was therefore crucially important to retain the original terminology rather than to ask the authors to change their terms or to introduce radical discrepancies between index entries and original references. So the reader should keep in mind that many terms that appear in this volume have a number of fairly distinct uses, even seemingly "harmless" ones such as "lexical selection": this term is used to indicate (a) the speaker activity of choosing between different synonymous lexical forms for a given concept, as well as (b) the hearer activity of choosing between different senses of an ambiguous lexical item, and it is furthermore used to express (c) the fact that lexical items impose inherent restrictions on their contexts.

Looking at some current trends in lexicology with the intention of taking stock of the rather exciting developments that have taken place recently in this discipline, the former step-child and recent darling of linguistics, one can see that on the one hand some old trenches are being filled up, while on the other hand some differences between competing approaches persist, albeit not in a random manner. Setting the terminological complications aside, it seems fair to resume as follows: If one assumes, as seems reasonable, that the replacement of superficial controversies by deeper ones and of naive assumptions by more sophisticated ones is the hallmark of progress in a discipline, then the recent rearrangements in the field of lexicon research show all signs of progress. At the beginning of a new century of research on the lexicon and its role in language, the prospects are rather promising for deeper insights to become available rather soon.

7 REFERENCES

- Aitchison, Jean. 1987. *Words in the Mind. An Introduction to the Mental Lexicon*. New York: Basil Blackwell.
- Atkins, Beryl T. Sue, Beth Levin, and Antonio Zampolli. 1994. Computational Approaches to the Lexicon: An Overview. In Beryl T. Sue Atkins, and Antonio Zampolli, eds., *Computational Approaches to the Lexicon*, 17-45. New York: Oxford University Press.
- Barsalou, Lawrence W. 1992. Frames, Concepts, and Conceptual Fields. In Eva Feder Kittay, and Adrienne Lehrer, eds., *Frames, Fields, and Contrasts*, 21-74. Hillsdale, NJ: Lawrence Erlbaum.
- Bloomfield, Leonard. 1933. *Language*. London: George Allen & Unwin LTD.
- Burger, Harald (unter Mitarbeit von H. Jaksche). 1973. *Idiomatik des Deutschen*. Tübingen.

- Di Sciullo, Anna-Maria, and Edwin Williams. 1987. *On the Definition of Word*. Cambridge, MA: The MIT Press.
- Gibbs, Raymond W. Jr. 1990. Psycholinguistic Studies on the Conceptual basis of Idiomaticity. In *Cognitive Linguistics 1(4)*, 417-451.
- Jackendoff, Ray. 1992. What is a Concept? In Eva Feder Kittay, and Adrienne Lehrer, eds., *Frames, Fields, and Contrasts*, 191-208. Hillsdale, NJ: Lawrence Erlbaum.
- Kilgariff, Adam. 1995. Inheriting Polysemy. In Patrick Saint-Dizier, and Evelyne Viegas, eds., *Computational Lexical Semantics*, 319-335. Cambridge: Cambridge University Press.
- Lyons, John. 1977. *Semantics*. Cambridge et al.: Cambridge University Press.
- Lyons, John. 1991. Bedeutungstheorien. In Arnim v. Stechow, and Dieter Wunderlich, eds., *Semantik. Ein internationales Handbuch der zeitgenössischen Forschung*, 1-24. Berlin / New York: Walter de Gruyter.
- Nunberg, Geoffrey, Ivan A. Sag, and Thomas Wasow. 1994. *Idioms*. In *Language 70(3)*, 491-538.
- Pustejovsky, James. 1995. *The Generative Lexicon*. Cambridge, MA / London, England: The MIT Press.
- Rocher, Rosane. 1992. History of Linguistics: Ancient India. In William Bright, ed., *International Encyclopedia of Linguistics*. Vol. 2., 141-144. New York / Oxford: Oxford University Press.
- Schiffer, Stephen R. 1987. *Remnants of Meaning*. Cambridge, MA: The MIT Press.
- Sweetser, Eve E. 1986. Polysemy vs. Abstraction: Mutually Exclusive or Complementary? In Vassiliki Nikiforidou et al. eds., *Proceedings of the Twelfth Annual Meeting of the Berkeley Linguistics Society February 15-17, 1986*, 528-538. Berkeley, CA: Berkeley Linguistic Society.
- Wasow, Thomas. 1985. Postscript. In Peter Sells, ed., *Lectures on Contemporary Syntactic Theories*, 193-205. Stanford, CA: CSLI, Stanford University.
- Weinreich, Uriel. 1969. Problems in the Analysis of Idioms. In Jaan Puhvel, ed., *Substance and Structure of Language*, 23-81. Berkeley / Los Angeles: University of California Press.
- Wilks, Yorick. 1989. On Keeping Logic in its Place. In Wilks, Yorick, ed., *Theoretical Issues in Natural Language Processing*, 130-135. Hillsdale, N.J.: Lawrence Erlbaum.