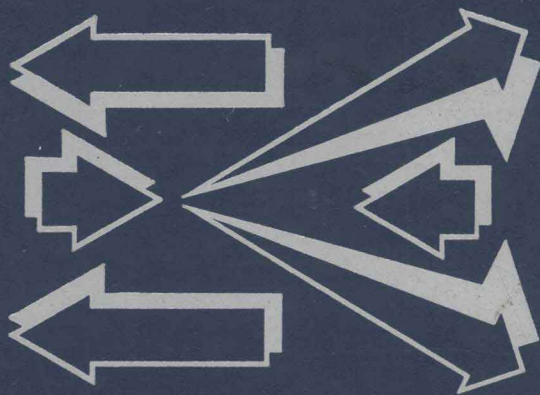


FRAMES, FIELDS, AND CONTRASTS

*New Essays in
Semantic and Lexical Organization*



Edited by
ADRIENNE LEHRER
EVA FEDER KITTAY



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Frames, Fields, and Contrasts

To Sir John Lyons

This collection grew out of a conference sponsored by the National Science Foundation held in Tucson, Arizona, July 8-10, 1989.

Much to our regret, Sir John Lyons, who originally planned to attend, had to withdraw. He was the teacher and mentor of several of the participants—Keith Allan, Eve Clark, Mava Jo Powell, and Adrienne Lehrer, and he was instrumental in bringing semantic field theory to the attention of English-speaking linguists. It is to him that we dedicate this volume.

Contents

Introduction	1
<i>Eva Feder Kittay and Adrienne Lehrer</i>	
PART I: PRINCIPLES OF ORGANIZATION	
1. Frames, Concepts, and Conceptual Fields	21
<i>Lawrence W. Barsalou</i>	
2. Toward a Frame-Based Lexicon: The Semantics of RISK and its Neighbors	75
<i>Charles J. Fillmore and Beryl T. Atkins</i>	
3. Semantic Fields, Prototypes, and the Lexicon	103
<i>Richard E. Grandy</i>	
4. Names and Naming: Why We Need Fields and Frames	123
<i>Adrienne Lehrer</i>	
5. Semantic Contagion	143
<i>James Ross</i>	
6. Conventionality and Contrast: Pragmatic Principles with Lexical Consequences	171
<i>Eve V. Clark</i>	

PART II: CONCEPTS AND RELATIONS

- ✓ 7. **What is a Concept?** 191
Ray Jackendoff
8. **Semantic Primitives and Semantic Fields** 209
Anna Wierzbicka
9. **Semantic Fields and the Individuation of Content** 229
Eva Feder Kittay
- ✓ 10. **The Concept of a Semantic Relation** 253
Roger Chaffin
11. **Antonymy Revisited: Some Thoughts on the Relationship
Between Words and Concepts** 289
D. A. Cruse

PART III: SPECIFIC ANALYSES

12. **At Least** 309
Paul Kay
13. **Folk Theories of Meaning and Principles of Conventionality:
Encoding Literal Attitude via Stance Adverb** 333
Mava Jo Powell
14. **“Something that Rhymes with Rich”** 355
Keith Allan

PART IV: COMPUTATIONAL PROCESSES IN THE LEXICON

15. **Lexical Retrieval Processes: Semantic Field Effects** 377
Merrill F. Garrett
16. **Synonymy from a Computational Point of View** 397
Yael Ravin
17. **Developing Computational Lexical Resources** 421
Donald E. Walker

- Author Index** 443
Subject Index 451

Introduction

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The chapters in this multidisciplinary volume reflect contemporary research into principles of lexical and semantic organization. Past years have seen much progress in the study of language in understanding the systems of phonology and syntax. The analysis of individual words has been undertaken by lexicography and philology, but the global organization of vocabularies of natural languages has not received comparable attention. Recently, there has been a surge of interest in the lexicon. The demand for a fuller and more adequate understanding of lexical meaning required by developments in computational linguistics, artificial intelligence, and cognitive science has stimulated a refocused interest in linguistics, psychology, and philosophy.

In linguistics, the earlier view was that the lexicon was an unordered list of words where information on the grammatical idiosyncracies of words was to be described. Recent syntactic theories ascribe a more significant role to the lexicon, some claiming that much of the syntax is projected from the lexicon (Bresnan, 1982; Chomsky, 1981). Work in these theories has revealed (or at least suggested) that many syntactic generalizations follow from the meaning of the words (Carter, 1988; Levin, 1985). If these generalizations hold up, then the semantic organization of the lexicon can predict and explain at least some syntactic regularities.

In psychology, there are at least two avenues of interest in the organization of the lexicon: One deals with studies in the relationship between the lexicalization of concepts—that is, how concepts are expressed—and broader knowledge structures; and the second involves studies of the mental lexicon, language processing, and lexical retrieval. Semantic relations and field or frame structures seem to be operative in the mental lexicon. Lexical substitution errors, for

example, show that speakers often substitute an intended word by one in the same semantic field (see Garrett, this volume).

In philosophy, lexical meaning has been confined to a small number of problems (e.g., synonymy and entailment), but, even where these concepts are recognized and valued, little work has been done on the details and implications. But principles of lexical organization bear on the very conception of meaning and mental content, and they challenge the adequacy of dominant theories of truth semantics and referentially based theories of word meaning.

Scholars in computer science, artificial intelligence, and computational linguistics are interested in the organization of the lexicon because lexical items are a convenient starting point for analyzing and parsing natural-language texts. How the lexicon is organized determines the nature of the access to those items. Moreover, if the relations among lexical items (whether semantic, syntactic, morphological, or phonological) are made explicit, text processing can be improved, since the connections among various parts of the text that might otherwise be overlooked can be processed in terms of those relations.¹ Finally, investigations into the requirements for lexical entry in a machine-readable language challenge the traditional dichotomy between dictionary and encyclopedic information.

Different disciplines have studied lexical structure from their own vantage points. Because scholars have only intermittently communicated across disciplines, there has been little recognition that there is a common subject matter. In the summer of 1989, we arranged a conference, sponsored by the National Science Foundation, to bring together interested thinkers across the disciplines of linguistics, philosophy, psychology, and computer science to exchange ideas, discuss a range of questions and approaches to the topic, consider alternative research strategies and methodologies, and formulate interdisciplinary hypotheses concerning lexical organization.

The problems which emerged and which are investigated in the chapters that follow are discussed briefly here. They include alternative and complementary conceptions of the structure of the lexicon; the nature of semantic relations; the relation between meaning, concepts, and lexical organization; the nature of polysemy; critiques of truth-semantics and referential theories of meaning; computational accounts of lexical information and structure; and the advantages of thinking of the lexicon as ordered. The conference and this volume are just the beginning of an investigation into the importance and consequences of taking seriously the idea of a structured lexicon—whether such structure be innate or a product of the configuration of knowledge reflected in a given language. As the editors of this volume, we wanted to reflect the conference participants' recognition of the exploratory nature of the work done so far, and so we end the

¹We are grateful to Terry Langendoen for this point.

introductory chapter with a cursory look at some questions that remain unanswered.

Concepts of Organization: Fields, Frames, and Contrasts

Semantic Fields. We begin with the concept of a semantic field, which has the longest history and widest acknowledgment. The concept was introduced by Humboldt (1936), Trier (1931), Porzig (1950), and Weisgerber (1950), and more recently developed by Lyons (1963, 1977), Lehrer (1974), Kittay (1987), and Grandy (1987). The proposal that the lexicon has a field structure has shown up in many disciplines. Common to all is the idea that words applicable to a common conceptual domain are organized within a semantic field by relations of affinity and contrast (e.g., synonymy, hyponymy, incompatibility, antonymy, etc.). The concept has far-ranging significance. It proposes a theory of semantic organization, of categorization, and of word meaning—positing that semantic relations are at least partly constitutive of the meaning of a word. It has been widely used as a basis of descriptive work on linguistics and anthropological linguistics, and the term *semantic field* is often used without comment by many linguists. Nonetheless, much work remains in clarifying the concept, and methodological problems in delineating semantic fields persist.

A semantic field, especially as understood in this volume, consists of a lexical field—that is, a set of lexemes or labels—which is applied to some content domain (a conceptual space, an experiential domain, or a practice). Although some field theorists (e.g., Lutzeier, 1981) restrict the field to lexemes belonging to the same syntactic class, others, for example, Lehrer (1974) and Kittay and Lehrer (1981), see an important part of the lexical study to look at semantically related words belonging to various parts of speech. The content domain supplies the concepts that are labeled by the lexical items, although the application of a lexical set to a given domain may in fact generate the set of concepts. Elements of the semantic field are generally “words” or “lexemes.”² However, some writers would permit elements to be phrases which could be but are not lexicalized in the language (e.g., “the parents of the spouse of my child,” a phrase which is lexicalized in some languages, as in Yiddish). A lexeme usually consists of a word-form and one or more related senses. Some sense may participate in other semantic fields.

Semantic field theory makes a meaning claim that the meanings of words must be understood, in part, in relation to other words that articulate a given content domain and that stand in the relation of affinity and contrast to the word(s) in

²A lexeme is a meaning-form unit which consists of at least one word, but which ignores allomorphy. Where a lexeme consists of more than one word, its meaning is noncompositional, as in idioms.

question. Thus to understand the meaning of the verb *to sauté* requires that we understand its contrastive relation to *deep fry*, *broil*, *boil*, and also to affirmative terms like *cook* and the syntagmatic relations to *pan*, *pot*, and the many food items one might sauté.

Frames. The largest organizational unit is the frame. Fillmore wrote the seminal article (1985) proposing a “frame semantics.” Within a frame semantics, a word’s meaning is understood “with reference to a structured background of experience, beliefs, or practices” (Fillmore & Atkins, this volume). Frames are interpretive devices by which we understand a term’s deployment in a given context. Frames can either be created by or reflected in the language. An example of a frame created by the language itself would be the case of grading terms for detergent packages. The framing device allows the consumer to properly interpret the label *large* on the package; knowing that the other sizes are *economy*, *family size*, and *jumbo*, the consumer is led to the correct conclusion that *large* signifies the smallest package (Fillmore, 1985, p. 227). Other frames reflect understandings encoded in the language. Interpretative frames can be invoked by the interpreter or evoked by the text itself; some frames are innate (e.g., knowledge of the features of the human face), while some are learned through daily experience or through explicit training. According to Fillmore (1985), the claim of frame semantics is that such knowledge structures are necessary “in describing the semantic contribution of individual lexical items and grammatical construction and in explaining the process of constructing the interpretation of a text out of the interpretation of its pieces” (p. 232).

The notion of a frame grew out of Fillmore’s early work in case grammar. There the grammatical positions often marked in languages by the use of case inflections were understood to structure the semantic items that could collocate with a verb. So, for example, the verb *to fish* would be represented as taking an AGENT as subject, a PATIENT as object. Since one fishes at a given place, the verb can take the prepositional phrase as LOCATIVE, and since one fishes with something, it can take another prepositional phrase as INSTRUMENT. From what is literally a frame for a verb, the concept grew to include more background knowledge. In this volume, Fillmore and Atkins describe a portion of a research project in construction grammar which has grown out of the concept of a frame. Within construction grammar, semantic and syntactic elements are combined in order to reflect the meaning dependence between word and frame. Fillmore and Atkins illustrate the possibilities of creating a “frame-based dictionary,” with an analysis of the term *risk*. Paul Kay (this volume), working within the same paradigm, provides another example of how semantic and syntactic considerations figure in construction grammar to give an adequate account of the lexical representation of *at least*. These contributions, as well as some others in the volume, (e.g., Clark, Ross, Lehrer) show how the direct encoding of various

pragmatic forces and interpretive instructions into the grammar of lexical items and constructions pose special kinds of challenges to standard truth-conditional semantics, even at the sentence level.

Barsalou provides a further development of the concept of a frame as consisting of attribute value sets, relations between attributes, and constraints. Barsalou attempts to integrate a theory of semantic fields and componential representation with a frame theory. He regards frames as dynamic, flexible configurations that are built recursively and that are highly sensitive to context.

Contrasts. Some writers, notably Grandy, base the concepts of fields and frames on the idea of contrast. Grandy has a relatively strong concept of contrast: If terms *A* and *B* contrast, then that which is denoted by *A* should not also be denoted by *B*. Clark also sees the notion of contrast as fundamental but works with a weaker sense: If terms *A* and *B* contrast, then there must be some appropriate applications of *A* that are not appropriate applications of *B*. But Clark's concept is primarily pragmatic; Grandy's is semantic. He proposes the *contrast set*, which contains two or more terms that contrast, a covering term and one or more relations specifying the contrast(s), as the building block for semantic fields and ultimately of semantic frames.

Writers on semantic fields generally accept that the relations of contrast and affinity which order a field are of two types: paradigmatic and syntagmatic. Paradigmatic relations, such as synonymy, hyponymy, meronymy, antonymy, etc., exist among terms that are substitutable for one another in a well-formed syntactic string, preserving well-formedness. Syntagmatic relations hold between words that collocate in a grammatical string and that have semantic affinities (e.g., one *kicks* with a *leg*, or *foot*, but not with an *arm*). Syntagmatic relations have been variously characterized. One account (Kittay, 1987; Kittay & Lehrer, 1981) builds on Fillmore's case grammar (Fillmore, 1968) and considers case relations such as AGENT, PATIENT, LOCATIVE, etc. as syntagmatic field relations. Most work in semantic field theory has used sets of paradigmatic contrasts such as color terms, kinship terms, and calendrical terms as exemplars, often underestimating the importance of syntagmatic relations. The syntagmatic relations seem to have pride of place in the construction of frames. In Barsalou's formulation, the paradigmatically related terms appear as variables in attribute sets.

Some writers have developed the notion of semantic relations or contrasts independently of fields or frames and essentially regard them as autonomous meaning structures. Cruse (1986) has provided perhaps the most comprehensive study of semantic relations. Ross' account (1981, and this volume) stresses the dynamic relations that are affirmitive or oppositional and that emerge as words exert different "forces" on one another in given contextual frameworks. In the contribution to this volume, Ross tries to set the notion of linguistic force into a

“general theory of linguistic relativity.” Using the metaphor of the theory of physical forces, Ross attempts to place notions of opposition and affinity at the center of his dynamical and relativistic account of meaning.

We leave a detailed discussion of semantic relations for the section that follows, but we note here that a central concern when focusing on contrasts is whether the contrasting items are concepts, senses, or lexemes. In speaking of lexical fields the relata in many theories are lexemes, or in some theories, are lexemes after we disambiguate them. Cruse (1986) understands relations to stand between senses, while Chaffin (this volume) holds that relations, which are themselves concepts, can hold between either relations or words. The theory proposed by Ross is clearly a theory of word meaning, and the relata are polysemous words whose meanings get specified and disambiguated in their dynamic interactions with other words.

Comparing the Three Structures. The three positions outlined may be seen as alternative or as complementary theories. Whereas Fillmore contrasts his view with that of field theorists, Barsalou, Grandy, and Lehrer (this volume) all argue that one needs both frames and fields to adequately discuss conceptual and lexical organization. Barsalou tries to show how fields emerge out of frames and how relations structure not only fields but frames as well. In short, he argues that all fields have frames implicit in them and that one could not have fields without frames. A question that remains is whether frames and fields are mutually derivable, or whether insisting on the one or the other would lead to different empirical predictions. In earlier work, Fillmore (1985) has argued that it would, but he used a conception of fields limited to paradigmatic notions. If one broadens the concept to include syntagmatic relations, can one eventually build enough into a field for it to incorporate everything accounted for by frames? A difference between frames and fields that may remain is noted by Barsalou, who suggests that frames allow for temporal, dynamic, script-like relations between the elements. Fields tend to be constructed like tableaux and not like scripts. Frames might better capture the temporal elements constitutive of many practices or domains. Other differences are evident. Whereas frame semantics has explicitly distanced itself from a truth semantics, that is, a semantics that asserts that the meaning of a sentence is given by the truth conditions of the sentence, semantic field theorists have not explicitly distanced themselves from such a position. And although frame semantics explicitly includes encyclopedic knowledge within a frame, taking some encyclopedic knowledge to be important as a precondition for understanding a term, field theorists have not determined what kind of information is to be included in a field. Instead, the criteria for what is included in a field has been the product of relationships of a specifiable kind among words. As *yellow* is a hyponym of *color* and a cohyponym of *red*, both *red* and *yellow* are part of the semantic field of color. Similarly with syntagmatic relations: We fish for fish and because *trout*, *carp*, *snapper* denote kinds of fish, they are all

included in the semantic field of *fishing*. *Shark* also denotes a species of fish, but we more often speak of *hunting sharks* or refer to a catch of big fish as the result of *deep sea fishing*. These kinds of distinctions are clearly not analytic but they are guided by the relations rather than by a pre-given synthetic-analytic distinction.

Although most conceptions of fields emphasize the importance of structure and therefore of relations, at least one author views the significance of fields more as a heuristic. Wierzbicka argues that the meaning of a word is “a configuration of semantic primitives” and as such does not “depend on the meaning of other words in the lexicon.” The value of semantic fields, she claims, lies in the grouping of words thought to be similar in meaning, for “to establish what the meaning of a word is one has to compare it with the meaning of other, intuitively related words” (this volume). Relations are for Wierzbicka just concepts, some of which are decomposable into primitives.

Semantic Relations

Most authors represented in this collection consider relations an integral part of the structure of the lexicon. A number of chapters query the nature of relations. Lyons (1963, 1977), Lehrer (1974), and Cruse (1986) have treated relations like antonymy, synonymy, hyponymy, etc. as primitives, in the sense that they cannot be further decomposed. But are semantic relations, in fact, primitive in this sense or derived from more elemental concepts or relations? In this volume, Cruse (on antonymy) joins Chaffin (on meronymy and hyponymy) in arguing that relations are themselves composed of more primitive notions (see Lehrer & Lehrer, 1982).³ Cruse analyzes antonymy in terms of grading schemas and scale schemas, each of which depends on other concepts, such as directionality and intensification. Chaffin, with Wierzbicka (this volume), treats relations as concepts, but as complex ones. He decomposes meronymy into the features $+/-$ FUNCTION, where a part has a function (as in the relation between *handle* and *cup* but not between *tree* and *forest*); $+/-$ SEPARABLE (as in *cup* and *handle*, but not in *bicycle* and *aluminum*); $+/-$ HOMEONEROUS (in *pie* and *slice*, but not in *forest* and *tree*); and $+/-$ SPATIO-TEMPORAL EXTENT, which distinguishes processes and events from other relations. Another concern is whether relations can be dynamic and still capture the changing and contextually bound interactions between words. Although lexical semanticists all recognize that languages are continually evolving and that lexemes are always used in new ways (e.g., to fill lexical gaps where the language may lack an appropriate word, to make novel metaphors and metonyms), most scholars have treated semantic relations as fixed contrasts in the language. Ross, however, presents a dynamic model of the lexicon, in which word meaning is not static but

³Lehrer and Lehrer (1982) analyzed antonymy in terms of scales and directionality.

is always dependent on the textual and contextual environment, where changing relations among words are reflected in changing sense. Yet there are constraints as well, because word meanings adapt and adjust in principled ways.

Specific semantic relations receive an extended treatment in several chapters. Chaffin's discussion of hyponymy and meronymy helps elucidate puzzling features such as the apparent failure of transitivity in some but not all cases. He shows that we are dealing not with a uniform set of relations, but with complex configurations of concepts that exhibit a wide range of properties. Cruse's analysis of antonymy involves cross-linguistic comparisons, displaying intriguing cross-linguistic patterns of contrast involved in antonymous relations.

Synonymy is a traditional semantic relationship (and one of the few, along with antonymy, whose name is part of common English vocabulary). In the philosophy of language synonymy has been overemphasized—to the exclusion of more interesting other semantic relationships, such as antonymy. Goodman (1952) and Quine (1953), using a very strong characterization of synonymy as complete substitutability, have argued that there are no synonyms and therefore no principled basis for drawing a distinction between analytic and synthetic knowledge. Goodman has said that we must settle for a weaker notion—likeness of meaning.⁴

In the current volume, synonymy is discussed by Clark and Ravin. Clark, like Goodman and Quine, argues that there are no exact synonyms, but her conclusion is based on evidence from lexical innovations, historical change, and language acquisition. So-called synonyms have at least some differences in informational content—be they differences in dialect or register.⁵ Children and adults assume that if two words are different in form, then there must be some difference in meaning. If necessary, they will invent differences!

Ravin describes techniques for on-line manipulation of synonyms extracted from thesauri. But if there are no synonyms, how can this be accomplished? Is there a contradiction in the two chapters? Not necessarily. Part of the problem concerns the definition of *synonymy*. If synonyms are by definition exactly equivalent in meaning and interchangeable in all contexts, then there may not be any. However, there is certainly similarity of meaning or an overlap of word

⁴One problem with similarity is that it is too general and too weak a notion. Antonymous pairs are similar in meaning, even though they are oppositions. *Hot* is more similar in meaning to *cold* than it is to *telephone*. *Answer* and *ask* are also similar in meaning, because they both involve speaking, but they are not synonyms.

⁵Clark calls these differences “meaning” differences. Although what constitutes a meaning component is theory dependent, it seems safe to say that lexemes that differ in dialect or register are not equivalent simpliciter and often convey different information. Even if one could find a half dozen exact synonyms in a language (with say 50,000 words), Clark's point would still be valid.

meaning, and if we use a weaker notion and call that *synonymy*, which is what Ravin does, then one finds considerable synonymy in languages.

Definitions, Semantic Primitives, and Concepts

Central to the conception of an organized lexicon is the understanding of the lexical, semantic, and conceptual unit. Interconnections within the lexicon have often been derived from the grouping of words with reference to shared primitive components. But we need to ask if words can be decomposed and defined in terms of primitives of some kind. Semantic decomposition has a long history in semantic description, with roots in European structuralism (e.g., Hjelmslev, 1953) and American linguistic anthropology (Lounsbury, 1956). One motivation was economy—to show how a small number of semantic components could be used to define a large number of words and allow for semantic comparisons across languages. Although decomposition has been widely used as a descriptive device, it has been attacked by Lyons (1977), Allan (1986), and Cruse (1986). At one extreme is the position advocated by Fodor (1987), who claims that no decomposition is possible and all words are learned and treated as wholes. At the other extreme is the research by Wierzbicka (this volume), who has tried to work out a radical decomposition of all the words in any vocabulary into a couple dozen primitives. In between is the position of Jackendoff, who advocates some decomposition but argues that some conceptual information must be represented in other modalities. Our representation of the difference between a duck and a goose is stored in terms of the different way they look, not in terms of any differentiating linguistic features.

Wierzbicka and Jackendoff both select (with differing metalanguages) several of the same components, for example, (SOME)THING, PLACE, (BE)CAUSE, HAPPEN, BECOME, UNDER. Their two chapters form an interesting dialectic even though the two scholars have analyzed different lexemes, making it difficult to compare them directly. They differ in several fundamental ways. Most important is the fact that Wierzbicka assumes and uses English syntax, whereas Jackendoff develops explicit formal rules for mapping semantic structure onto syntactic structures which are consistent with the program of generative grammar. Wierzbicka analyzes grammatical meaning with the same methods and concepts as lexical meaning. In addition, she has focussed on cross-linguistic universals and the possibility of composing concepts and lexemes from a common store of universal primitives.

Related to the problem of definition are those of polysemy and disambiguation. Should we aim for a single general and abstract meaning for each lexical item or should we provide a more specific definition for each sense? Polysemy interacts with syntactic, semantic, and pragmatic principles enabling the hearer to select the most appropriate sense. The chapters that contain extensive analyses

of a given word or phrase, Kay's (on *at least*), Powell's (on *literal*), and Allan's (on "something that rhymes with rich"), as well as Fillmore and Atkins' (on *risk*), and Chaffin's (on *part of* and related terms), each use implicit or explicit criteria for distinguishing related word meanings. (Note that all this work presupposes the Principle of Contrast developed in Clark's chapter.)

Powell looks at the polysemy of *literal* by taking into account historical developments whose accretions are evident in the different ways we use the term. Allan points to the importance of nonliteral aspects of meaning to access the appropriate sense in certain contexts. In reconstructing the correct sense of the term that "rhymes with rich," Allan shows that phonological, syntactic, and encyclopedic knowledge are required and thereby throws into question the adequacy of an analysis in terms of a finite set of semantic primitives. Kay often resorts to subtle syntactic considerations in delineating differences in meaning. He argues that the various senses of *at least* have historical connections and semantic relationships that some speakers may be aware of, but that there are no principles that allow speakers to predict senses. Hence the speaker must learn each sense individually. In Ross's approach, where meaning is dynamic, polysemy plays a major role as contexts force the generation of new senses of words. The fragmentation of meaning evident in the argument for pervasive polysemy and the desire (as in Cruse, 1986) to make the unit of analysis a specific sense rather than a word with multiple senses still demands that we explain why multiple senses are lexicalized by the same phonological form.

Meaning, Truth, and Reference

We have suggested that principles of lexical organization have implications for word meaning. To see how this is the case, many of the chapters in this volume investigate textual units larger than the word or sentence. Dominant theories in semantic theory have been atomistic (with the focus on the word), molecular (with the focus on the sentence), or holistic (with the focus on the language as a whole). Some of the chapters advocate a "local holism" in which the focus of meaning must be sought in linguistic structures that simultaneously function to organize the individual words, structures such as frames, fields, or contrasts. This is to say that some elements of meaning are intralinguistic and that an entirely extralinguistic account is not adequate. Still other writers in the volume are interested in the relation of language and thought and see meaning not perhaps as dependent on linguistic structures as much as on mental structures. Writers who insist on the importance of intralinguistic and mentalistic analyses of meaning share a dissatisfaction with those dominant positions in semantic theory in which truth and reference are prominent.

Truth theories of meaning—the view that the meaning of a sentence is either explained or given by the conditions that make the sentence true or false—and referential theories of word meaning—the view that the meaning of a word is