Semantics and Pragmatics

[Chapter 19, Keith Allan]

Introduction

Semantics is the study and representation of the meaning of every kind of constituent and expression (from morph to discourse) in human languages, and also of the meaning relationships among them. Twentieth century semantics, especially in the period 1960-2000, has roots that stretch back to the Pre-Socratics of Greece in the sixth to fifth centuries BCE.

Pragmatics deals with the context dependent assignment of meaning to language expressions used in acts of speaking and writing. Though pragmatics is often said to have arisen from the work of Peirce (1931), Aristotle also wrote on certain aspects of pragmatics (Allan 2004) and illocutionary types (acts performed through speaking; see below and chapter 20) were identified by the Stoics (second century BCE), Apollonius Dyscolus, St. Augustine, Peter Abelard, and Thomas Reid before being rediscovered by speech act theorists such as Austin (1962) and Searle (1969; 1975) (for discussion see Allan 2010). Furthermore, at least since the time of Aristotle there have been commentaries on rhetoric and oratory. So, various aspects of pragmatics have a long history.

To chronicle the annual achievements in semantics and pragmatics from 1960 to 2000 would be almost unreadable and certainly unhelpful. Instead more or less chronological threads of development will be presented within thematic areas. These are divided into four major sections: Lexical Semantics; The Semantics~Syntax Interface; Logic and Linguistic Meaning; and Aspects of Pragmatics. Developments in any one topic area were often influenced by developments elsewhere, and the subdivisions within them are not discrete, as we shall see. The chapter concludes with a short essay on the importance of scripts (predictable personae and sequences of events) and conversational implicatures (probable inferences that arise from conventional expectations) which allow for the underspecification of meaning in language that renders natural languages much less explicit than most computer programming languages.

One problem that has been raised repeatedly over the course of the period in question and which underlies much of the discussion here is the scope of semantics (and thus the definition of meaning). For some scholars semantics studies entities such as words in isolation, and thus semantics concerns only the type of decontextualized, abstract information that would be

given in a dictionary. However, for others, semantics covers much more. This can be the type of information found in an encyclopedia – a structured data-base containing exhaustive information on many (perhaps all) branches of knowledge.[1] Or, it can be the relation of the word to other words in the co-text (the surrounding text), or the relation to the context of the speech event in which the word is used, experiences, beliefs and prejudices about the context in which it is used.

Lexical Semantics

Here I discuss componential analysis, semantic fields, semantic primes, prototype semantics, stereotype semantics and lexicography.

The rise of componential analysis

Until the mid-1960s twentieth century linguistic semanticists focused on lexical semantics, in particular the componential analysis of lexemes and semantic relations among them (see also chapter 21 for a discussion of lexicology). A lexeme is an item listed in the dictionary (or lexicon), "a language expression whose meaning is not determinable from the meanings (if any) of its constituent forms and which, therefore, a language user must memorize as a combination of form and meaning."[2] Examples of lexemes are simple words like *cat, walk, and, from*, complex words with derivational affixes like *education, reapply,* compounds like *loudspeaker, baby-sit, high school,* phrasal verbs like *look up, slow down,* idioms like *kick the bucket*, and proverbs like *a stitch in time saves nine.* What is more controversial is whether clichés like *bread and butter* (but not *butter and bread*)*, ham and cheese*, formulaic expressions (*many happy returns, it's nice to meet you),* expletives (*uh, huh; damn*), phonesthemes like the *fl-* onsets to *flee, flicker, flare*, etc. are lexemes. Serious proposals for incorporating these into dictionaries were discussed by several scholars (Weinreich 1969; Makkai 1972; Jackendoff 1995; Allan 2001; Stubbs 2001; and most interestingly in Wray 2002).

Componential analysis is typically based on the sense of a lexeme such as can be found in a dictionary, that is, decontextualized meaning, abstracted from innumerable occurrences (in texts) of the lexeme or combination of lexemes. In componential analysis, this sense is identified in terms of one or more semantic components. The principal means of accomplishing this has been through the structuralist method of contrastive distributional

1. The place of proper names and the problematic relationship between the dictionary and encyclopedia are examined by e.g. Allan (2001; 2006a); Hanks (1979).

2. The term 'lexeme' is used here because it is the word most used in the literature. Others have used 'listeme' for this meaning (Di Sciullo and Williams 1987; Allan 2001).

analysis. Lexemes that share semantic components are semantically related. There is no consistent one-to-one correlation between semantic components and either the morphs or the morphemes of any language. Being components of sense, semantic components reflect the characteristics of typical *denotata.* The *denotatum*, 'denotation', of a language expression is what it is normally used to refer to in some possible world. So, the *denotata* ('denotations') of *cat* are any animals that the English word *cat* (and *cats*) can be used to refer to. There is a hierarchy of semantic components which corresponds to perceived hierarchies among *denotata*. For instance, FELINE is a semantic component of *cat* and entails the semantic component ANIMAL which is also, therefore, a component of *cat*. This suggests a thesaurus-like structure for semantic components. It follows that the set of semantic components for a language can be discovered by identifying all the relationships that can be conceived of among the *denotata* of lexemes. In practice, this could be everything in all worlds, actual and non-actual, a procedure that has never been successfully achieved.

In American linguistics up to 1960 (see chapter 16), Leonard Bloomfield (see especially 1933) – the major figure of this period – was sympathetic to the cultural context of language, but he came to exclude semantics from the Bloomfieldian tradition in American linguistics on the grounds that semantics is not directly observable in the way that phonemes, morphemes, and sentences are manifest in phones. So, from the 1940s until the 1960s, semantics was regarded by many American linguists as metaphysical and unfit for the kind of scientific enquiry into observable language structures that they believed linguistics should undertake. The advance towards semantic analysis was therefore made within morphosyntax and by European linguists, using as a model Roman Jakobson's work on the general theory of case (1936). Jakobson identified the conceptual features of each case in Russian using the methodology of Prague School phonology (see chapter 14, Part two, and chapter 22). Thus, according to Jakobson (1936) each Russian case is distinguished from other cases in terms of the presence or absence of just the four features [±directedness], [±status], [±scope] (the scope of involvement in the context of the utterance), and [±shaping] (identifying a container or bounded area). The idea of characterizing cases in terms of distinguishing components can be applied to the traditional analysis of the nominal suffixes in Latin so as to identify features from the categories of case (NOMINATIVE ∨ GENITIVE ∨ DATIVE ∨ ACCUSATIVE ∨ ABLATIVE)[3], gender (MASCULINE ∨ FEMININE ∨ NEUTER), number, and declension type. For instance ACCUSATIVE ∧ FEMININE ∧ SINGULAR ∧ FIRST_DECLENSION generates the suffix *-am* as in *fēminam* "woman"; ABLATIVE ∧ MASCULINE ∧ SINGULAR ∧ SECOND_DECLENSION

3. ∨ is logical disjunction, "or"; ∧ is logical conjunction, "and".

generates the suffix *–ō* as in *puerō* “by the boy”. In ‘Componential analysis of a Hebrew paradigm’, Zellig Harris (1948) analyzed the verb paradigm using the categories of tense, person, and gender on a similar distributional basis to this; the result corresponds to Jakobson’s analysis in terms of conceptual features.

It is a small step from the componential analysis of closed morphosyntactic systems like case systems to the componential analysis of closed semantic fields like kinship systems. Anthropologists had for many years been comparing widely differing kinship systems in culturally distinct societies by interpreting them in terms of universal constituents (such as FEMALE_PARENT_OF, MALE_SIBLING_OF) that equate to semantic components. Two of the earliest articles in the componential analysis of meaning (Lounsbury 1956 and Goodenough 1956), appeared consecutively in the same issue of the journal *Language* and were both analyses of kin terms. Without stepping far outside the Bloomfieldian tradition, these early writers on componential analysis were responsible for changing contemporary linguistic opinion by showing that semantic analysis could be carried out using approved methods of structural analysis, similar to those used, for example, to filter out the phonetic components of the Sanskrit stop phonemes. For instance, Floyd Lounsbury’s paper begins with a comparison of Spanish and English kin terms: *ti-o, hij-o, abuel-o, herman-o* (‘uncle’, ‘son’, ‘grandfather’, ‘brother’) vs *ti-a, hij-a, abuel-a, herman-a* (‘aunt’, ‘daughter’, ‘grandmother’, ‘sister’). He notes that English has no gender morphs corresponding to the Spanish suffixes *-o* and *-a*, but gender is nonetheless a significant component in the meaning of the English kin terms. Their covert gender must be compatible with the sex of the person denoted; consequently, it is anomalous to call one’s uncle *aunt*, or one’s sister *brother*. There are grammatical consequences, which provide evidence for the covert gender: the personal pronoun anaphoric to *uncle* is *he/him*; the one for *aunt* is *she/her*; **My brother is pregnant* is anomalous. *Father, uncle*, and *aunt* have in common that they are FIRST_ASCENDING_GENERATION. *Father* and *uncle* additionally have in common that both are MALE, whereas *aunt* is FEMALE. *Aunt* and *uncle* are both COLLATERAL, whereas *father* is LINEAL. Thus are meaning relationships systematically identified.

Fields and differential values

Modern componential analysis grew out of Prague school distinctive feature analysis of phonology, conceptual feature analysis in inflectional morphology and anthropological interest in kinship systems -- and semantic field theory. Semantic fields are constructed from the semantic relations among names for concepts (see below). In effect this means that the semantic field of a lexeme is determined from the conceptual field in which its *denotata*

occur; the structure of a semantic field mirrors the structure of the conceptual field. The notion of semantic fields can be found in Alexander von Humboldt (1836) and it was developed among German scholars (in particular Trier 1931; Porzig 1950; Weisgerber 1950; and Geckeler 1971). John Lyons (1963) examined the meanings that can be ascribed to words such as *téchnē* ("skill"), *epistḗmē* ("knowledge"), *sophía* ("wisdom"), *aretḗ* ("virtue") (all of these translations are oversimplified) in the semantic fields of knowledge and skill in Plato's works. Lyons was motivated by Jost Trier's survey of the shifting field of High German *wîsheit*, *kunst* and *list.* Around 1200 these three words meant approximately: *knowledge,* which subsumed 'courtly skill' and 'technical skill'. By 1300 *wîsheit* had narrowed to 'mystical knowledge'; *kunst* shifted to 'artistic skill'; while *list* was effectively replaced by *wizzen* meaning 'technical skill'. But unlike Trier's subjective speculations, Lyons presents a rigorous analysis using techniques derived from the works by Zellig Harris (1951) and Noam Chomsky (1957).

Few scholars have undertaken extensive analysis of a semantic field, but Edward Bendix (1966) analyzed the field of *have* and its counterparts in Hindi and Japanese, Adrienne Lehrer (1974) studied the field of cooking and sounds, and Anthony Backhouse (1994) did an extensive study of taste terms in Japanese. A conceptual field such as color, kinship, or cooking terms is covered by a number of lexemes in a language, each denoting a part of the field. Different languages and, any one language at different times in its history, may divide the field differently among lexemes. Although the sensory data in the color spectrum are the same for all human beings, languages name parts of the field differently. The differential value (*"*valeur" in Saussure 1931 [1916]) of any lexeme is that part of the conceptual field that it denotes in contrast with the part denoted by other lexemes in the same semantic field. In the Papuan language Western Dani, *laambu* divides the color spectrum in half; the other half is *mili*. The differential value of *laambu* is very different from English *yellow*, even though it is a typical translation for English *yellow,* because *laambu* implies not-*mili* (not cool-dark), whereas *yellow* implies (not-white, not-red, not-green, not-blue, not-black, not-brown, not-pink, not-purple, not-orange, not-grey).[4]

Unlike the field of color terms, the field of cooking terms is not neatly circumscribed. Since the analysis by Lehrer (1974), microwave ovens have become ubiquitous; and because one can boil, roast, and poach in a microwave, the semantic field has been revised with the

4 This assumes that these color terms are 'basic' in the sense of Berlin and Kay (1969) – which is not uncontroversial; see MacLaury (1997). For further discussion of basic color terms, see chapter 27.

advent of this new form of cooking. To generalize: when new objects and new ways of doing things come into existence, there is a change in the conceptual field that usually leads to a change in the semantic field and the addition or semantic extension of lexemes. (This, of course, is what Trier was trying to show.) Seemingly closed fields such as case inflections or kin terms should permit exhaustive componential analysis in which every term within the field is characterized by a unique subset of the universal set of semantic components defining the field. However, these systems invariably leak into other fields when meaning extensions and figurative usage are considered. Furthermore an exhaustive componential analysis of the entire vocabulary of a language is probably unachievable, because it proves impossible to define the boundaries – and hence all the components – of every field.

Semantic primes and Wierzbicka's natural semantic metalanguage

Semantic primes are primitive symbols that with their interpretations constitute the vocabulary of the semantic metalanguage that a linguist may use to describe and analyze a particular language (object language). We may suppose that semantic components are, or are composed from, semantic primes, but what are they and how many primes are there? A number of seventeenth century seekers after a universal language, including Dalgarno (1661), Lodwick (1652) and Wilkins (1668), proposed primitive semantic components (see chapter 7). Their contemporary, Arnauld (Arnauld and Nicole 1996) recognized that the meanings of most words can be defined in terms of others but that, ultimately, there are some undefinable semantically primitive words.

In the American tradition of the 1940s-1960s, Morris Swadesh sought to establish a list of basic vocabulary created to plot diachronic relationships between unwritten languages in Africa, the Americas, and elsewhere (see also chapter 16). Words in the Swadesh-list are 'basic' in the sense that they name things likely to be common to the experience of all human communities (the sun, human body parts and functions, etc.). The purpose of the Swadesh-list was to take a pair of languages and compare 100–215 basic lexemes to discover how many are cognates (see Swadesh 1955); hence one name for the program is lexico-statistics (see Embleton 1986). The scale of vocabulary differentiation derives from studies of Indo-European languages for which there are historical records. For related languages, the time of divergence from a common mother language is estimated from the proportion of vocabulary common to both, a procedure sometimes called glottochronology.

In more recent times, Uriel Weinreich (1962: 36) identified a discovery procedure for a semantic metalanguage built upon natural language. This was to (a) stratify the language into a central core of semantic primes whose members are definable only circularly and by

ostensive definition such as "color of the sky" in the entry for *blue*. (b) The next stratum out uses items whose definitions contain only core items without (further) circularity. (c) Each more peripheral stratum uses items from the preceding strata without circularity. Since 1972 Anna Wierzbicka has been carrying out this program in a cross-language context, seeking a universal set of semantic 'primes' (originally named 'primitive*s*'), based on a "natural semantic metalanguage" (NSM). The proponents of NSM believe that semantic primes and their elementary syntax exist as a minimal subset of ordinary natural language (Goddard 1994: 10). It is claimed (e.g. in Goddard 1994: 12) that "any simple proposition" expressed in NSM using any one natural language (e.g. English) will be expressible in NSM using any other language (e.g. Japanese). This embodies a claim that, like predicate logic, NSM is linguistically and culturally unbiased and that there is a heuristic or algorithm for translation. The number of semantic primes has grown from 14 (in Wierzbicka 1972) to 63 (in Goddard 2009). However, there is a distinct NSM for every language, and primes are often not isomorphic across languages as the figures *1, 2, 3* are. NSM primes are compositionally and often semantically different across languages; their meanings show partial overlap rather than complete identity: English SOME corresponds in part to French IL Y A … QUI, and English THERE IS to French IL Y A. There is a professed need for allolexes (different variants of a single prime) which makes the "semantic primes" far more like meaning clusters than unit primes, for example: English I and ME; DO, DOES, DID; Italian TU (singular 'you') is a prime, but VOI, LEI (plural, polite 'you') are semantically complex and defined in terms of TU. At the end of the 20th century, the characteristics of NSM syntax were only beginning to be addressed (see Wierzbicka 1996: 19–22, Goddard 1998: 329–36). NSM is described as "elementary" although it is unclear what differentiates a well-formed semantic definition or description from an ill-formed one (Allan 2001).

The expressions used in a semantic representation in NSM are supposed to match those that children acquire early. They are deliberately anthropocentric and subjective, referring to the natural world of sensory experience rather than intellectualized abstractions. Thus, *red* is the color of blood or fire (Wierzbicka 1980; 1990; 1992), not an electromagnetic wave focally around 695 nanometers in length. There are important questions about the playoff between the effectiveness of a definition and its accuracy. What is the purpose of the semantic analysis? For whom or what is the resulting semantic specification designed? (These questions apply to any semantic theory, of course.) NSM semantic definitions are not designed to be used by machines that simulate language understanding; they are intended to be easily accessible to a non-native speaker of the language (see Allan 2001). Where a brief description would be sufficient for some objects (e.g., *dog*), terms for emotions, being culture-specific, are much

more difficult to define. This raises the question of just how specific a definition should be. Cruse (1990: 396) claims that "For dictionary purposes, the concept has only to be identified, not fully specified". This, of course, should apply to the whole lexicographical endeavor and not just to NSM (see also chapter 21).

Prototype and stereotype semantics

Prototype and stereotype semantics are alternatives to theories of meaning which postulate a "checklist" of properties to be satisfied for the correct use of the object language expression 'e' (Fillmore 1975: 123). For example, the default *denotatum* of *bird* is bipedal, has feathers, and is capable of flight. But there are several species of flightless birds (e.g. emus, penguins); a downy chick and a plucked chicken are featherless, but nonetheless birds; and a one-legged owl and a mutant three-legged hen are also birds. So, many have pointed out that the notion of a checklist of essential properties for the *denotatum* of *e* is problematic.

Ludwig Wittgenstein (1953: §§66–71) wrote of some categories being defined not by a checklist of properties but by "family resemblances" (Familienähnlichkeit); e.g. *games* may be expressions of amusement, play, competition, skill, luck, and so forth. Such subcategories exhibit chains of similarity. Take the example of the word *mother* and the category 'Mother'. The prototypical mother is the woman who produces the ovum, conceives, gestates, gives birth to and then nurtures a child (giving rise to the traditional definition of *mother*). Radiating from this are more peripheral attributes of a *mother*. The natural or biological mother produces the ovum, conceives, gestates, and gives birth to the child. The genetic or donor mother supplies the ovum to a surrogate mother in whose womb the genetic mother's ovum is implanted and in whose body the fetus develops through to birth. The nurturant mother may be the genetic mother, a surrogate mother, adoptive mother, or foster mother. In addition there is a *stepmother*, a *mother-in-law*, while polygamous societies and certain kinship systems (like many in Australia) offer additional complexities. Figurative extensions arise: the prototypical or natural mother is the source for *necessity is the mother of invention*. A mother's status is recognized in the convention of referring to *mother nodes* in a mathematical tree structure. The nurturant mother is the source for *house-mother* and also *mother superior* in a religious order. By contrast, descriptions like *single mother* or *working mother* can connote challenges to the individual's capacity as a nurturant mother. What we see here is a set of identifiable resemblances among these uses and meanings of the word *mother*, but no set of properties common to all of them. As Wittgenstein pointed out, the boundaries of a category can be extended and some of its members are more peripheral than others.

This last point corresponds to the prototype hypothesis that some *denotata* are better exemplars of the meaning of a lexeme than others, therefore members of the category denoted by the lexeme are graded with respect to one another. For example a bird that flies, such as a pigeon, is a better exemplar of the category Birds than a penguin, which doesn't. How are prototypes discovered? The psychologists Battig and Montague (1969) asked students to list as many Vegetables, or Fruits, or Diseases, or Toys, etc. as they could in 30 seconds based on the hypothesis that the most salient members in each category would be (a) frequently listed and (b) high on the list. Thus, for instance, a carrot is the prototype for Vegetable, i.e. the best exemplar of that category, because it was listed frequently and early. A tomato belongs to two categories: it is a Vegetable in folk belief and technically a Fruit. On the Battig and Montague (*ibid.*) scale, a tomato ranked 6th as a Vegetable and 15th as a Fruit. Using their figures for salience, the tomato's degree of membership of the category Vegetable is 68% and of the category Fruit is only 14%.

George Lakoff (1972a) interprets such rankings in terms of fuzzy sets of objects with a continuum of grades of category membership between 0.0 and 1.0. The carrot is the best instance with a value 1.0 and a pickle only 0.006. A tomato has the value 0.68 and 0.14 membership in the fuzzy set Fruit. Any entity assigned a value greater than 0.0 is a member of the category, i.e. the pickle is a Vegetable no less than the carrot. What the fuzzy set membership value indicates is how good or bad an exemplar of the category a certain population of speakers perceives that entity to be. A tomato is vegetable-like because it is eaten, often with other vegetables, as part of an hors d'oeuvre or main course or in a salad. It is not eaten, alone or with other fruits, for dessert. A tomato is fruit-like because it grows as a fruit well above the ground and not on or below it. Also, it is often eaten raw and the extracted juice is drunk like fruit juices. And, whereas flowers are cultivated for ornamentation, tomatoes are cultivated for food. Conclusion: it is our practice of eating tomatoes as if they are vegetables rather than fruit that explains the relative ranking in each category.

The most influential work in this domain of prototype semantics is that of the psychologist Eleanor Rosch, who carried out a series of experiments summarized in Rosch (1978); see chapters 18 and 27 for further discussion). Rosch (1973) found that the common cold is a very poor exemplar of Disease – which conflicts with the Battig and Montague (1969) finding. The discrepancy between the two findings is explained by the fact that Rosch only gave her subjects six diseases to rank (cancer, measles, malaria, muscular dystrophy, rheumatism, cold) and a cold is the mildest of them. The salience would also be affected by the number of people suffering from colds at the time of the experiment. Obviously, then, establishing the

prototype depends upon the experiences and beliefs of the population investigated. Consequently, the claimed prototypicality ranking is valid for the community surveyed, but not for all speakers of the language, or even for the same subjects on a different occasion.

Insert Figure 1 here

William Labov (1978) reported on various kinds of labeling tasks such as applying the terms *cup, mug, bowl, glass, goblet* and *vase* to line drawings of containers of different shapes and configurations such as those in Figure 1, where those in the left column in Figure 1 are close to the prototypical cup. Some subjects were asked to label a picture without any particular context being mentioned, others where it was to be imagined that someone was drinking coffee from it, or it contained mashed potatoes, soup or flowers. Sometimes the vessel was said to be made of china, glass or aluminum. The results leave no doubt that the term chosen is based on the perceived characteristics of the referent. For a given container, naming depended on the shape and configuration; what it is made from; the purpose to which it is put; sometimes its location.

Lakoff (1987) adopted Wittgenstein's (1953) theory of "family resemblances" explicitly into prototype theory by identifying chains of similarities among members of a category such as the various senses of *over*, the Japanese nominals that take the classifier *hon*, the fact, as we saw above, that the prototypical *mother* links to the *biological mother, donor mother, mother superior*, etc. Some extended meanings are figurative, e.g. *mother superior* as an extension of *mother*, and a very important development in late twentieth century studies of meaning was the general acceptance, following Lakoff and Johnson (1980), that metaphor and metonymy are all pervasive in language and not clearly demarcated from 'literal' meaning (see Sweetser 1990; Coulson 2001; Kövecses 2002; Traugott & Dasher 2002). For example, "TIME IS VALUABLE": *time is money; wasting time; this gadget will save hours; don't spend time on it; I've invested a lot of time that I can't spare, it wasn't worthwhile; use your time profitably; he's living on borrowed time* (see Lakoff & Johnson 1980: 7–8). From 1980 to the present and into the 21st century, the number of scholars who have worked in this domain has increased steadily (see chapters 18 and 27 and others?).

Hilary Putnam (1975) proposed that the meaning of an object language expression *e* (typically a lexeme) is a minimum set of stereotypical facts about its typical *denotatum*, including 'connotations'. Connotations of *e* arise from encyclopedic knowledge about the denotation of *e* and also from experiences, beliefs and prejudices about the context in which *e* is typically used. For example, the connotations of *cat* could include 'cute', 'easy to take care of', 'causes allergies', 'good for catching mice', etc., although they may be different from one

person or speech community to another (for some, cats may be domestic animals that live with their owners, for others they are farm or even semi-wild animals that live in a barn.) Connotations are especially obvious with tabooed terms such as the difference between *nigger* and *African American* or between *shit* and *feces*: the denotations of these pairs are (almost) identical, but their connotations are very different (see below). Connotations vary between contexts and speech communities independently of sense and denotation: a male chauvinist and a radical feminist might have quite different stereotypes and connotations for *man* and *woman*, but under normal circumstances will have no difficulty picking the *denotatum* of one vs. the other. Putnam expressly allows for experts to have considerably more knowledge at their command than other members of their speech community – which raises the interesting question: Do the words *elm* and *beech* have the same stereotype and meaning for a botanist as they do for an inner city dweller who can't distinguish an elm from a beech? Presumably not. However, if the botanist were to point out and name an elm, the inner city dweller would know that referent is not a beech, even if s/he could still not recognize another elm thereafter.

How is 'a (stereo-)typical *denotatum* of *e*' distinguishable from 'as-good-an-exemplar-as-can-be-found among the class of things denoted by *e*'? Presumably, the stereotype properly includes the prototype (see Allan 2001, chapter 10). For instance, whatever the stereotype of a Vegetable may be, it properly includes the prototype carrot and the peripheral onion. The stereotypical Vehicle includes the prototypical car and/or bus together with the peripheral horse-drawn wagon. If this is correct, then we should favor the stereotype in giving the semantics of language expressions.

The Semantics–Syntax Interface

Here, Katz's semantic theory is presented as the first to try to comprehensively integrate linguistic semantics with syntax. Logicians had already taken steps in this direction since the Stoic period (see chapters 5 and 20); and Prague school linguists had studied aspects of functional sentence perspective (see chapters 14, Part two, and 18). However, in spite of its shortcomings, Katz's conception of the syntax~semantics interface was far more wide-ranging and influential. The problem posed by the need to establish constraints on the structured combination of items from the lexicon into phrases, sentences, and texts is discussed, and some alternatives to Katzian semantics are surveyed, namely, generative semantics, conceptual semantics, semantics and pragmatics in a functional grammar (see also chapter 18), and semantic frames and meaning in construction grammar (see also chapters 17 and 18).

Katz's semantic theory

Most semantic relations extend beyond lexemes to the syntactic structures into which the lexemes combine. The first step within linguistics was undertaken by a philosopher, Jerrold J. Katz, and a cognitive scientist, Jerry Fodor (in Katz & Fodor (1963) 'Structure of a semantic theory'). It was Katz who was largely responsible for establishing semantic theory as one component of a transformational grammar (see chapter 17). The principal kind of semantic component that Katz used was "semantic markers", which name a concept that any human being can conceive of; hence, the theory is applicable to all natural languages (Katz 1967; 1972).

Katz sought to establish a theory of meaning that would do all of the following: define what meaning (i.e. sense) is; define the form of lexical entries; relate semantics to syntax and phonology by postulating semantic theory as an integral component of a theory of grammar; establish a metalanguage in which semantic representations, properties, and relations are expressed; ensure that the metalanguage is universal by correlating it with the human ability to conceptualize; identify the components of meaning and show how they combine to project meaning onto structurally complex expressions. Essentially, these are goals that should be met by any semantic theory – though what is meant by "component of meaning" and the integration of semantics with phonology and syntax may be radically different within different theories. Missing from Katz's conditions is the requirement that the meaning of language expressions needs to be related to the real and imaginary worlds people speak and write of. Furthermore, Katz's theory offered no account of utterance or speaker meaning.

Katz's semantic theory is interpretative. The earliest version (Katz and Fodor 1963), was geared to the Chomsky's (1957) syntactic model and was quickly abandoned when Dwight Bolinger (1965) and Uriel Weinreich (1966) objected that its recursively conjoining meaning components destroys input from syntactic structure. In later versions Katz's theory was designed to assign meanings to the output of autonomous syntactic rules of a transformational generative grammar of the kind described by Chomsky (1965, *Aspects of the Theory of Syntax*), but it was not updated to accommodate later developments in generative syntax (see chapter 17). Katz never properly justified the vocabulary and syntax of his theory, and we can only learn to interpret his metalanguage by abduction from his examples, among which there is little consistency, and so his semantic markers remain only partially comprehensible. The rules for constructing semantic markers were never specified, and there were at least five

differently structured semantic readings for *chase* given by Katz himself (Katz 1966; 1967; 1972; 1977b; Katz and Nagel 1974) and an additional two in Janet Fodor (1977; see also the detailed discussion, explication, and exemplification in Allan (1986; 2010). Briefly: there is no consistent set of relations in any semantic marker tree, which is not the case for those of syntactic phrase markers (trees).

Katz and Paul Postal (1964: 16) proposed a set of semantic redundancy rules to reduce the number of semantic markers in a dictionary entry. For instance, from the rule (Human) → (Physical Object) ∧ (Sentient) ∧ (Capable of Movement), for every occurrence of (Human) the redundancy rule adduces the entailed markers to give a full semantic specification. Most semantic theories propose some counterpart to this.

Katz claimed that his theory directly captures all the subtleties of natural language, which is a better instrument for semantic analysis than the metalanguages of standard logic because it is a formal language that maps knowledge of language without confusing it with use of language (Katz 1975a; b; 1977a; 1981). In fact we can only interpret Katz's semantic markers for *chase*, for instance, because it uses English words whose meanings we combine to match up with our existing knowledge of the meaning of *chase*. If we reword his various semantic markers for *chase* into more or less normal English, they will read something like *X is quickly following the moving object Y with the intention of catching it*. Katz has claimed (as have others, e.g., Lakoff 1972b and McCawley 1972) that the English used in the semantic metalanguage is not English, which is used only as a mnemonic device. However, the only way to make any sense of the metalanguage is to translate it into a natural language. That is why analyzing *bachelor* into {(Human), (Adult), (Male), (Single)}, as did Katz and Nagel (1974: 324), is a more enlightening semantic analysis than, say, {(48), (41), (4D), (53)}. Formalism, especially unconventional formalism, can only be justified if it increases explicitness of statement, rigor of analysis, and promotes clarity of expression.

Katz's semantic theory has been discussed at some length because it was the first comprehensive theory of linguistic semantics linked with generative grammar. For reasons that have been given, it was not successful, but it did identify the parameters that other theories needed to engage with. Another major limitation was no proper treatment of pragmatics and no obvious extension beyond sentences to texts. These faults are also to be found in many of its rivals, reviewed in this chapter.

Identifying selectional restrictions

Language combines the meaning encapsulated in lexemes into the complex meanings of phrases, sentences, and longer texts. Such combination is conditioned by the rules of syntax

and at least four kinds of selectional restrictions (see Chomsky 1965). There are category features (Noun, Verb, …), which determine different morphological and collocational possibilities, e.g. of *fly*$_{\text{Noun}}$ and *fly*$_{\text{Verb}}$ in *A fly flew into the room.* Strict subcategorization identifies other syntactic categories that collocate with the lexeme. Syntactically transitive verbs, for instance, are defined by some notational variant of the strict subcategorization feature "[+ ___NP]" "takes a 1st object": *open* (as in *Fred opened the box*) has this feature, whereas the intransitive verb in *The door opened easily* has the feature "[– ___NP]". Inherent features such as [+ human, + female, ...] for *woman* or [+ active, ...] for *go* have a semantic basis. The selectional features of one lexeme refer to the inherent features of collocated lexemes (e.g. for a verb "[+ [+ animate]___[+ abstract]]" "has an animate subject NP and an abstract 1st object NP"). Originally, syntactic selectional features were postulated to constrain what was assumed to be a purely syntactic process of lexical insertion into syntactic phrase markers. Later, it was appreciated that the procedure is semantically conditioned, as shown by meaningful sentences like Shakespeare's *Grace me no grace, nor uncle me no uncle* or Scott's *But me no buts*. What governs the co-occurrence of lexemes is that the collocation has some possible denotation (be it substance, object, state, event, process, quality, metalinguistic statement, or whatever). The most celebrated example of a supposedly impossible sentence, "*Colorless green ideas sleep furiously"* (Chomsky 1957: 15), was, in 1971, included in a coherent story by Yuen Ren Chao (1997 [1971]). Or one could take an example marked anomalous in McCawley (1968a: 265): "**That electron is green"*, which is judged to be anomalous because electrons are theoretical constructs that cannot absorb or reflect light, and therefore cannot be felicitously predicated as green. However, an explanatory model of an atom could be constructed in which an electron is represented by a green flash: there would be no anomaly stating *That electron is green* with respect to such a model (see Allan 1986; 2006b).

Empirical evaluations of sequences of lexemes for coherence and sensicalness depend upon what they denote; evaluations must be matched in the grammar by well-formedness conditions, in part expressed by selectional restrictions. To describe the full set of well-formedness conditions for the occurrence of every lexeme in a language entails trying every conceivable combination of lexemes in every conceivable context, and such a task is at best impracticable and at worst impossible. Perhaps the best hope is to describe the semantic frames (see below) for every lexeme.

Generative semantics

Noam Chomsky, the founder of generative grammar (see chapter 17), was educated in the Bloomfieldian school, which, as said above (see also chapter 16), eschewed semantic theory as speculative. For Chomsky semantics was at best an add-on for the syntactic base, a position affirmed by Katz and Fodor (1963) and in subsequent work by Katz as explained above, and a decade later by Jackendoff (see below). The *Aspects* theory developed in Chomsky (1965) had a level of deep structure at which the meaning of each sentence constituent was specified and the meaning "projected" upwards through nodes in the phrase marker to develop a reading for the sentence. Deep structure was separate from a level of surface structure at which the form of the sentence (as used in everyday utterance) was specified. This conception of grammar leads naturally to the view that pairs of formally distinct but semantically equivalent expressions arise from the same deep structure by different transformations, e.g. (a) *X caused Y to die* and *X killed Y* or (b) *X reminds me of Y* and *X strikes me as similar to Y* or (c) *my mother* and *the woman who bore me*. The next theoretical development, generative semantics, proposed that the initial structures in a grammar are semantic rather than solely syntactic (see also chapter 17). Despite its name, generative semantics was always primarily a theory of syntax which focused exclusively on the structuring of meaningful elements. It grew directly from reaction to the "standard theory" of Katz and Postal (1964) and Chomsky (1965) with its emphasis on syntactic justification.

One of the earliest works in generative semantics was Lakoff (1965), published slightly revised as Lakoff (1970), originally conceived as an extension of standard theory. Lakoff postulated phrase markers that terminate in feature bundles like those in Chomsky (1965); he differed from Chomsky in proposing that lexemes be inserted into only some of these terminal nodes, the rest functioning as well-formedness conditions on lexical insertion and semantic interpretation. Lakoff (1965) assumed, as did Chomsky, that lexical insertion preceded all other transformations. Gruber (1965) contained lexical structures that have most of the syntactic characteristics of standard theory trees, but some terminal nodes are semantic components. Gruber argued that some transformations must operate on "prelexical syntax" (prior to lexical insertion). For instance, from the prelexical structure VP[V[MOTIONAL, POSITIONAL] PrepP[Prep[ACROSS] …]] lexical insertion will put either the verb *go* under the V node and the lexeme *across* under the Prep node, or alternatively map the single verb *cross* into a combination of both the V and Prep nodes. The latter was a radical innovation: because semantic interpretation was made before transformations such as passive applied, semantics and syntax were interdependent. A similar conclusion was reached by others (Postal 1966; 1970; 1972; Lakoff and Ross 1976, circulated from 1967).

Weinreich (1966) showed that lexical insertion is semantically governed and that syntactic structure is just the skeletal structure for semantics. James McCawley (1968b) assumed that all natural language syntax can be represented by the symbols S (sentence), V (verb functioning as predicate) and one or more NPs (noun phrases functioning as logical arguments). In initial structure, V consists of a semantic component or "atom" and NP, which is either a recursive S node (if it's an embedded sentence, such as in *John said that he was coming*), or a variable (an index) designating the referent (*John* or *the cat*). Thus, in generative semantics, meaning is determined directly from the initial semantic structure: initial symbols represent semantic components set into structures that are a hybrid of predicate logic and natural language syntax – both well-established conventional systems. These structures can be rearranged in various ways by transformations before lexical forms are mapped onto them. Then transformations may rearrange or delete nodes until the final derived phrase marker gives a surface form for the sentence together with its structural description.

The problem for generative semanticists was to give consistent semantic descriptions for morphemes, lexemes, phrases, etc., as they occur in different sentence environments in such a way that the meaning of any sentence constituent could be determined from the initial sentence structure. The semantic metalanguage was based on a natural language, and both Lakoff (1972b) and McCawley (1972) claimed that a semantic component such as CAUSE is distinct from the English verb *cause* but they didn't explain how this can be so. No rules governing the insertion of semantic predicates under V were ever specified. Either selectional restrictions must apply to constrain insertion or there will be unrestricted insertion subject to output conditions (see Weinreich 1966). In practice no such constraints have ever been systematically identified. There was also the problem identified by Fodor (1970): it was proposed that a simple sentence like *X killed Y* derives from the complex *X caused Y to die.* However, *kill* and *cause to die* cannot always be used in the same contexts. In a sentence like (1) the adverbial *on Sunday* seems to block the insertion of *kill;* however the adverb in (2) has no such effect.

(1) X caused Y to die on Sunday by stabbing him on Saturday.
(2) X almost killed Y.

Die is supposedly based on BECOME NOT ALIVE or *cease to be alive*. The fact that the sentences in (3) are acceptable but those in (4) are not suggests that DIE is a semantic component (atom, prime).

(3) X died in agony.

X died emaciated.

(4) *X ceased to be alive in agony.
*X ceased to be alive emaciated

Allan (1986) argued against semantic decomposition of most lexemes in favor of recognizing entailment relations such as those in (5).

(5) X dies → X ceases to be alive

X ceases to be alive → X dies
Y kills X → X dies

This certainly seems to be justified from a psycholinguistic point of view (see Fodor, Garrett, Walker et al. 1980).

Conceptual semantics

For Ray S. Jackendoff, semantics is a part of "conceptual structure" in which linguistic, sensory, and motor information are compatible (see Jackendoff 1983; 1990; 1992; 1995). This breadth of vision has a consequence that is unusual in semantic theories: Jackendoff, although not subscribing to prototype or stereotype semantics, believed that word meaning is a large, heterogeneous collection of typicality conditions (i.e. what's most likely the case, such as that a bird typically flies) with no sharp distinction between lexicon and encyclopedia. Conceptual structure includes a partial three-dimensional model structure based on visual perception such that the actions denoted by *run, jog*, and *lope* look different but have a common semantic base represented by the primitive verb GO. A partial model for such verbs represents the manner and stages of motion, but is unspecified so as to enable an individual to recognize different instances of running, jogging, etc. as the same kind of activity. Jackendoff (*ibid.*) referred to the different manners of motion visible in each of *run, jog*, and *lope* on the one hand, and *throw, toss*, and *lob* on the other, as differences in model structures. Along with visual differences are other sensory differences that would be perceived by the unsighted as well as the sighted person. No semanticist has discussed these, but if visual data are to be accounted for, so should other sensory data. All this information is encyclopedic rather than lexical.

According to Jackendoff (1983, 1990), every content-bearing major phrasal constituent of a sentence corresponds to a conceptual constituent. S expresses STATE or EVENT. NP can express almost any conceptual category. PP expresses PLACE, PATH, and PROPERTY. Jackendoff was principally interested in the semantic structure of verbs, with a secondary interest in "function-argument structures" in the spatial domain (see Jackendoff 1983,

chapters 9 and 10; 1990, chapter 2). He made no attempt to decompose nouns semantically, treating them as semantic primitives. In his view, only kin terms and geometric figures admitted of satisfactory semantic decomposition. By contrast, he found that verbs decompose into comparatively few classes (as also in Role and Reference Grammar, see below).

Jackendoff's vocabulary of semantic primitives (1983, 1990) is very much larger than the set used by NSM researchers (see discussion above). The syntax of his "lexical conceptual structure" (LCS) is a configuration of functions ranging over arguments. For instance,

(6) *Bill went to Boston* $[_{\text{Event}}\text{GO}([_{\text{Thing}}\text{BILL}], [_{\text{Path}}\text{TO}([_{\text{Thing}}\text{BOSTON}])]$

(7) *Bill drank the beer* $[_{\text{Event}}\text{CAUSE}([_{\text{Thing}}\text{BILL}], [_{\text{Event}}\text{GO}([_{\text{Thing}}\text{BEER}],$
$[_{\text{Path}}\text{TO}([_{\text{Place}}\text{IN}([_{\text{Thing}}\text{MOUTH OF}([_{\text{Thing}}\text{BILL}])])])])])]$

A preferred alternative to the double appearance of BILL in (7) is argument binding, symbolized 'α' in (8), in which other arguments are also spelled out.

(8) $[_{\text{Event}}\text{CAUSE}([_{\text{Thing}}\text{BILL}]^{\alpha}{}_{\text{A-actor}}, [_{\text{Event}}\text{GO}([_{\text{Thing-liquid}}\text{BEER}]_{\text{A-theme}},$
$[_{\text{Path}}\text{TO}([_{\text{Place}}\text{IN}([_{\text{Thing}}\text{MOUTH OF}([_{\text{Thing}}\alpha])])])])])]$

Conceptual semantics shows that a semantic decomposition of verbs making extensive use of just a few primitives is a feasible project. The syntax of LCS is a function-argument structure similar to that of predicate calculus (see below and chapter 20), so that someone acquainted with predicate calculus can construct a lexical conceptual structure despite the fact that Jackendoff (1983, 1990) did not employ standard logical formulae. Although LCS made no use of logical connectives, some of the more complex formulae imply conjunction between the function-argument structures in a lexical conceptual structure. There is a score of primitive verbs so far identified, so although the set of functions is restricted, the vocabulary of primitive arguments is unbounded. Conceptual semantics was designed to integrate with a dominant syntactic theory in late twentieth century linguistics: A-marking links the semantic interpretation to a node in the syntactic phrase marker (see chapter 17). Jackendoff (*ibid.*) suggested that "argument binding" in LCS (using Greek superscripts) does away with the need for the level of "logical form" (LF) in syntax (the level of representation which fully determines the semantics of a sentence – see chapter 17). LF has not yet been abandoned in favor of conceptual structure; but Jackendoff's conceptual semantics has been a real force within the development of grammatical theory.

The issue of thematic roles

The original motivation for identifying thematic roles was to indicate in the syntactic frame of a predicate which surface cases, prepositional, or postpositional phrases it governs – all of which typically identify the roles of participants (people, objects, places, events) within the states of affairs (see, e.g., Fillmore 1968; Anderson 1971; Cruse 1973; Starosta 1988; Dowty 1991; Goldberg 1995; Van Valin and LaPolla 1997). Nonetheless, thematic roles are essentially semantic (at least in origin) – as their names reveal. Thematic roles are also referred to as 'valencies', '(deep) cases', and 'θ-/theta roles'. Each such term is theory-dependent and the definition of a particular role in one theory is likely to be different in at least some respects from its definition in another theory, despite the same label (e.g. agent, patient, experiencer, beneficiary) being used. Even trying to define each role in terms of a common set of entailments or nonmonotonic inferences leaves many problems unresolved.[5] There is probably a boundless number of thematic roles; for instance, roles such as 'effector' and 'locative' have a number of subcategories, and it is possible that ever finer distinctions can be drawn among them; so it is hardly surprising that no one has satisfactorily identified a full set of roles for any language (see Allan 2001: 374; Allan 2010: 274).

According to Van Valin (1993) and Van Valin and LaPolla (1997), the definition of thematic roles in grammar is so unsatisfactory that we should admit just two macroroles, 'actor' and 'undergoer', in the grammar. The macroroles of Van Valin's Role and Reference Grammar are similar to the proto-roles in Dowty (1991); they are defined on the logical structures of verbs. The maximum number is 2, the minimum is 0 (in sentences like Latin *pluit* '[it's] raining' and English *It's raining*). 'Actor' and 'undergoer' roughly correspond to 'logical subject' and 'logical object' respectively. They are called macroroles because they subsume a number of thematic roles. They are properly dependent on hierarchies such as the actor hierarchy, DO(x,... < do′(x,... < PRED(x,… ;[6] the undergoer hierarchy without an actor, PRED(x,... <PRED(...,y) < PRED(x) (where A < B means "A outranks B in the hierarchy"). In contrast to the uncertainty of assigning thematic roles, assigning macroroles to a clause predicate is well-defined.

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5 Entailment is a relation such that if A entails B then whenever A is true, B is necessarily true. A nonmonotonic inference is one that is not necessarily true, though it might be: *if most nurses are women and Pat is a nurse* it does not follow that Pat is necessarily a woman; by contrast, being a natural mother entails being a woman, thus *if Pat is a (natural) mother, Pat is a woman.*

6. DO only appears in the few logical structures that necessarily take an agent e.g. for *murder* as against *kill*.

Semantics and pragmatics in a functional grammar

Functionalists seek to show that the motivation for language structures is their communicative potential; so the analysis is meaning-based and compatible with what is known about psychological mechanisms used in language processing (see also chapter 18). Along with propositional content, participant functions (roles) are captured, and also all semantic and pragmatic information (such as speech act characteristics and information structure) is directly represented along with the syntactic structure. Thus, the whole monostratal analysis is as close to psychologically real as any linguistic analysis can be.

Role and Reference Grammar, RRG (Foley & Van Valin Jr 1984; Van Valin & LaPolla 1997; Van Valin 1993, 2001, 2005; Van Valin n.d.), is a functionalist theory that does not posit underlying and surface representations as different strata but integrates morphology, syntax, semantics, pragmatics, and information structure in a readily accessible monostratal representation (see chapter 17 for a discussion of multistratal representations, e.g., the difference between deep structure and surface structure). RRG has been specifically developed to apply to every natural language and seeks to show how language expressions are used to communicate effectively. The basic clause structure consists of a predicate, which together with arguments (if any), forms the Core. Other constituents are peripheral; they may be located in different places in different languages, and can be omitted. The structures are more like nets than like trees.

Semantic frames and meaning in construction grammar

"Frames" (Goffman 1974; Fillmore 1982; 2006; Fillmore and Atkins 1992) identify the characteristic features, attributes, and functions of a *denotatum*, and its characteristic interactions with things necessarily or typically associated with it (see also chapter 27 for a discussion of 'frames'). For instance, a restaurant is a public eating-place; its attributes are: (1) business premises where, in exchange for payment, food is served to be eaten on the premises; consequently, (2) a restaurant has a kitchen for food preparation, and tables and chairs to accommodate customers during their meal. Barsalou (1992: 28) described "attributes" as slots in the frame that are to be filled with the appropriate values. The frame for *people* registers the fact that, being living creatures, people have the attributes of age and sex. The attribute sex has the values male and female. It can be represented formally by a function BE SEXED applied to the domain D={x: x is a person} to yield a value from the set {male, female}. The function BE AGED applies to the same domain to yield a value from a much larger set.

Frames interconnect in complicated ways. For instance, the social status and the appearance of a person are usually partly dependent upon their age and sex, but not necessarily so. Knowledge of frames is called upon in the proper use of language. Part of the frame for *bird* is that birds are FEATHERED, BEAKED and BIPEDAL. Most birds CAN FLY; applied to an owl this is true, applied to a penguin it is false. Birds are sexed, and a (normal adult) female bird has the attribute CAN LAY EGGS with the value true. Attributes for events include participants, location, and time of occurrence, e.g. the verb *buy* has slots for the attributes buyer, seller, merchandise, payment: these give rise to the "thematic structure" (see above) of the verb. An act of buying occurs in a certain place at a certain time (a world~time pair with values relevant to evaluation of truth, see below). To sum up, frames provide a structured background derived from experience, beliefs, or practices, constituting a conceptual prerequisite for understanding meaning. The meaning of a language expression relies on the frames, and it is these that relate lexemes one to another.

"Lexical semantic structures" (Pustejovsky 1995) systematically describe semantic frames for every lexeme, and may offer a solution to the problem of selectional features, discussed earlier. Pustejovsky's "generative lexicon" entries potentially have four components. "Argument structure" specifies the number and type of logical arguments and how they are realized syntactically. "Event structure" defines the event type as state, process, or transition. For instance, the event structure of the verb *open* involves a process wherein X carries out the act of opening Y, creating a state where Y is open. "Qualia structure" identifies the characteristics of the *denotatum*. There are four types: "constitutive" (material constitution, weight, parts and components); "formal" (orientation, magnitude, shape, dimension, color, position); "telic" (purpose, function, goal); "agentive" (creator, artifact, natural kind, causal chain). "Lexical inheritance structure" identifies relations within what Pustejovsky calledthe lexicon, but which is arguably encyclopedic information. For example, *book* and *newspaper* have in common that they are print matter, and *newspaper* can refer to both the readable product and the organization that produces it. A book is a physical object that holds information and a book is written by someone for reading by someone (see Pustejovsky (1995: 95, 101).

"Construction grammar" (Fillmore and Kay 1987; Goldberg 1995; 2006) is a development based on frame semantics. Unlike the semantic theories of Katz and Jackendoff, it does not project meaning onto syntactic structures from lexemes. A projection would require the verbs italicized in (9)–(12) to be distinct from default meanings: *pant* is not normally a motion verb; *bark* and *sneeze* are not normally causative; *knit* is not normally ditransitive (i.e. a three place

verb like *give*, which has a giver, the person given to and the thing given, as in *Ed gave Eli the book*).

(9) All in a sweat, Marlow *panted* up to the door and rapped on it loudly.
(10) The prison warder *barked* them back to work.
(11) Adele *sneezed* the bill off the table.
(12) Elaine *knitted* George a sweater for his birthday.

The additional verb meanings result from the construction in which the verb occurs. Construction grammar proposes various integration types. For instance in (9) and (11) the construction indicates the motion, the verbs *pant* and *sneeze* the manner of motion; in (10) and (11) the constructions are causative, indicating a theme and result; in (12) the valence of *knit* is augmented to make it a verb of transfer by mentioning the recipient/beneficiary (compare *buy*). The construction coerces an appropriate interpretation by imposing the appropriate meaning. This is exactly what happens with apparent violations of selectional restrictions discussed earlier; also in interpreting variable countability constructions such as (13)–(15) (see Allan 1980).

(13) Have another/some more potato.
(14) She bought sugar. / He put three sugars in his tea.
(15) The herd is/are getting restless and it is/they are beginning to move away.

The principal motivation for countability is to identify the individual from the mass; typically, uncountable referents are perceived as an undifferentiated unity, whereas countables are perceived as discrete but similar entities. Thus (14) offers as alternatives an individual potato or a quantity of, say, mashed potatoes; (15) compares an unspecified quantity (mass) of sugar with three individual spoonfuls or lumps of sugar. (16) compares the herd as a single collection of animals against the herd as a set of individual animals (not all dialects of English allow for this).

Linguistic theories of meaning that go beyond lexis to account for the meaning of syntactic constructions necessarily incorporate aspects of lexical semantics. For many centuries certain philosophers have discussed aspects of lexical and propositional meaning. From the term logic of Aristotle and the propositional logic of the Stoics developed the strands of inquiry dealt with in the next part of this chapter.

Logic and Linguistic Meaning

Truth conditions are crucially important to every aspect of semantics and pragmatics. I briefly review some approaches to formal semantics. The semantics and pragmatics of anaphora provide a bridge to Aspects of Pragmatics.

The importance of truth conditions

Davidson (1967b: 310) said that "to give truth conditions is a way of giving the meaning of a sentence." But truth is dependent on worlds and times: *Marilyn Monroe would have been 74 on June 1, 2000* is true: although MM died in 1962 we can imagine a possible world of June 1, 2000 at which she was still alive, and given that she was born June 1, 1926, she would indeed be 74. McCawley (1968b; c) was one of the first linguists to adopt and adapt truth conditions and predicate logic (a common way of studying truth conditions, see chapter 20) into grammar, most popularly in his book *Everything that Linguists Have Always Wanted to Know about Logic* (McCawley 1993 [1981]). The importance of truth conditions had often been overlooked by linguists, most especially those focusing on lexical semantics. Hjelmslev (1943); Lyons (1968) and Lehrer (1974) suggest that the nine lexemes *bull, calf, cow, ewe, foal, lamb, mare, ram, stallion* – which constitute a fragment of a semantic field (see above) – can be contrasted with one another in such a way as to reveal the semantic components in Table 1.

Insert Table 1 here

How can we determine that the analysis is correct? The basis for claiming that BOVINE or MALE is a semantic component of *bull* cannot be a matter of language pure and simple. It is a relation speakers believe exists between the *denotata* of the terms *bull* and *male* and *bovine* (i.e. things in a world that they may be felicitously used to refer to). Doing semantic analysis of lexemes, it is not enough to claim that (16) is linguistic evidence for the claim that MALE is a semantic component of *bull*, because (17) is equally good until a basis for the semantic (and therefore grammatical) anomaly has been established that is independent of what we are seeking to establish – namely the justification for the semantic components identified in Table 1.

(16) A bull is male.
(17) A bull is female.

The only language-independent device available is an appeal to truth conditions, and this takes us to the *denotata* of *bull* and *male*. In fact what we need to say is something like (18).

(18) In every admissible possible world and time an entity which is a bull is male and in no such world is an entity which is a bull a female.

Note that the semantic component MALE of Table 1 must be equivalent to the relevant sense of the English word *male*. Thus, the assumption is that semantic components reflect characteristics of typical *denotata* as revealed through their intensions across worlds and times. Intensions are what 'senses' describe. Some people think of them as concepts, others as the content of concepts (see below). In any case, they provide the justification for postulating the semantic components in Table 1 as a set of inferences such as those in (19).

(19) For any entity x that is properly called a *bull*, it is the case that x is adult ∧ x is male ∧ x is bovine.

In fact it is not part of a general semantic characterization of *bull* that it typically denotes adults; one can, without contradiction, refer to a *bull calf*. Rather, it is part of the general naming practice for complementary sets of male and female animals. Nor is *bull* restricted to bovines, it is also used of male elephants, male whales, male seals, male alligators, etc. The initial plausibility of Table 1 and (19) is due to the fact that it describes the prototypical or stereotypical bull (see above). The world of the English speaker is such that *bull* is much more likely to denote a bovine than any other species of animal, which is why *bull elephant* is usual, but *bull bovine* is not. This reduces (19) to something more like (20).

(20) For any entity x that is properly called a *bull*, it is the case that x is male and probably bovine.

What is uncovered here is that even lexical semantics is necessarily dependent on truth conditions together with the probability conditions that are nonmonotonic inferences sometimes equated with implicature (see below).

Formal semantics

Since about the time of Cresswell (1973) and Keenan (1975) there have been many linguists working in formal semantics. Formal semantics interprets formal systems, in particular those that arise from the coalescence of set theory, model theory, and lambda calculus (models and lambda calculus are briefly illustrated below)[7] with philosophical logic – especially the work of Richard Montague (Montague 1974; see also Dowty, Wall and Peters 1981), and the tense logic and modal logic of such as Prior (1957) and Kripke (1963; 1972). By and large, formal

7. See also Chapter 20 in this volume, and Gamut (1991); McCawley (1993); Allan (2001) for explanations of these terms. (L.T.F. Gamut is a collective pseudonym for Johan F. A. K. van Benthem, Jeroen A. G. Groenendijk, Dick H. J. de Jongh, Martin J. B. Stokhof, and Henk J. Verkuyl.)

semantics has ignored the semantics of lexemes such as nouns, verbs, and adjectives – which are typically used as semantic primes (but see Dowty 1979). It does, however, offer insightful analyses of secondary grammatical categories like number and quantification, tense, and modals.

"Event-based semantics" was initiated by Davidson (1967a). The idea is to quantify over events; thus *Ed lifts the chair* is represented in terms of "there is an event such that Ed lifts the chair". In *Ed hears Jo call out* there is a complex of two events as shown in (21), where there is the event *e* of Jo's calling out and the event *e′* of Ed hearing *e*; ∃ is the existential quantifier "there is".

(21) $\exists e$[call out(Jo, e) ∧ $\exists e'$ hear(Ed, e, e')]

Following a suggestion by Parsons (1980; 1990) thematic roles can be incorporated as in (22), *Max drinks the beer*.

(22) $\exists e$[drink(e) ∧ agent(e, Max) ∧ patient(e, the beer)]

There is always the question of how the meanings of complex expressions are related to the simpler expressions they are constructed from: this aspect of 'composition' is determined by model theory in Montague semantics, which is truth conditional with respect to possible worlds. Truth is evaluated with respect to a particular model of a state of affairs. For instance if a model consists of Harry, Jack, and Ed, and Harry and Ed are bald but Jack is not, and if Harry loathes Ed, then we can evaluate the truth of such statements as *Not everyone is bald, Someone loathes someone who is bald*, and so forth. Where traditional predicate (and propositional) logic is concerned only with extension (existence) in the (real) world, intensional logic allows for existence in a possible (hypothetical) world. Just as intensions are comparable with 'sense', extensions are comparable with 'reference' or, better, denoting something within a particular model (or set of models). In Montague semantics, semantic structure is more or less identical with syntactic structure.

In later developments (see Gamut 1991; Chierchia and McConnell-Ginet 2000) valuation functions were proposed. Suppose there is set of men *a, b*, and *c* (Arnie, Bob, Clive) who constitute the domain of a model world at a particular time, M, in which *a* and *c* are bald. The extension of baldness in M is represented $[\![\text{bald}]\!]^{M}$. Let *x* stand for any member of {*a, b, c*}. A valuation function takes a sentence *x is bald* as its domain and assigns to it a value in the range {0,1} where 1 is true and 0 is false. So the function $[\![\text{bald}]\!]^{M}$ applies in turn to every member of the domain X in model M to assign a truth value. The extension of *being bald* in M is $[\![\text{bald}]\!]^{M}$ = {*a, c*}. Put another way: in M, bald(x)=1 ↔ x∈ {*a, c*} "*x is bald* is true if, and

only if, *x* is a member of the set {*a, c*}". To evaluate *Someone is not bald* in M, a variable assignment function would check all assignments of *x* until one instance of *x is not bald* is found to be true (in our model, when *x* is assigned to *b*).

Variables in logical systems function in a manner similar to pronouns in natural languages and linguistic treatments of anaphora have borrowed from systems of logic when analyzing anaphors.

The semantics and pragmatics of anaphora

Early transformational grammarians (such as Lees and Klima 1963; Langacker 1969) posited only syntactic constraints on pronominalization: e.g. *he* and not *she* is the pronoun for *man* because *man* carries the syntactic feature [+ masculine]. Then Weinreich (1966) and McCawley (1968a) argued that pronominal gender is semantic not syntactic, and Stockwell, Schachter and Partee (1973: 182) concluded that "English tolerates discrepancies between formal and referential identity of certain sorts in certain environments, not easily describable in simple syntactic terms." Anaphora typically results from making successive references to the same entity and this is what led Ross (1970) to propose a performative clause to underlie every utterance in order to account for the first and second person pronouns and their reflexives in e.g. (23) where the underlying performative would be the highest clause *I say to you … .*

(23) a. Only Harry and myself wanted to see that movie.
b. Max said nothing about yourself, but he did criticize me.

Although Ross's hypothesis was principally a syntactic device, it opened the gate to pragmatic constraints on pronouns relevant in exophora, i.e., when referring to something in the outside world (*Just look at her!* said of a passing woman) and recognizing the most likely actor (the 'biter') in *I took my dog to the vet and she bit her*. Huang (2000) has argued that pragmatics accounts for what Chomsky (1981) identified as syntactic binding conditions on anaphors. Intuitively, argument binding is a matter of semantics and pragmatics rather than syntax, e.g. the pronoun *her* appropriately refers to, say, *Amy* for semantic not syntactic reasons. In German, *das Mädchen* "girl" is rendered neuter by its diminutive suffix *-chen* but is normally pronominalized in colloquial speech on a pragmatic basis by the feminine *sie* and not the neuter *es*, although the matter is hotly debated and in the written language the use of the neuter pronoun is the norm. The choice of what are generally referred to as anaphoric forms in texts has been discussed under: the "familiarity hierarchy" (Prince 1981); "centering theory" (Grosz 1977; Sidner 1979); "topic continuity" (Givón 1983); and the "accessibility

theory" (Ariel 1988; 1990). These all emphasize the importance of context (see below) in selecting what form of anaphor to use.

As a rule, any two successive references to an entity involve some kind of change on the second reference, see (24).

(24) Catch [a chicken$_1$]. Kill [it$_2$]. Pluck [it$_3$]. Draw [it$_4$]. Cut [it$_5$] up. Marinade [it$_6$]. Roast [it$_7$]. When you've eaten [it$_8$], put [the bones$_9$] in the compost.

All nine subscripted NPs refer to the creature identified in 'a chicken$_1$', which refers to a live chicken. By 2 it is dead, by 3 featherless, by 5 dismembered, by 7 roasted, and by 8 eaten. 9 refers to the chicken's bones after the flesh has been stripped from them. Thus 7, for instance, refers not to the chicken in 1, but to the caught, killed, plucked, drawn, cut up, and marinaded pieces of chicken. Heim (1983; 1988) described this as "updating the file" on a referent. These successive states of the chicken are presented as changes in the world–time pair spoken of: although the world stays constant throughout (24), each clause corresponds to a temporal change: time$_1$, time$_2$, ... time$_9$. The aim of Heim's file change semantics has much in common with that of "Discourse Representation Theory" (DRT, Kamp 1981; Kamp and Reyle 1993) where the interpretation of one in a sequence of utterances (a discourse) is dependent on co-text such that the next utterance is an update of it. DRT has been especially successful in capturing the complex semantics of so-called 'donkey sentences', originating in Walter Burley's "*Omnis homo habens asinum videt illum",*'Every man who has a donkey sees it' of 1324 (Burley 2000). Consider, for instance, (25) – which paraphrases as (26).

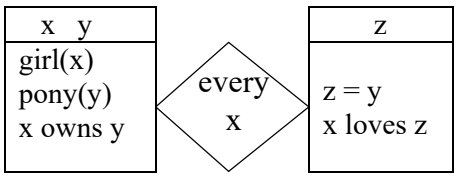
(25) Every girl who owns a pony loves it.
(26) If a girl owns a pony, she loves it.

First take (26): its discourse representation structure (DRS) is (27). The arrow indicates that the second box is a consequence of the first. The left-hand box is interpreted first, then the right-hand box. Because it shows movement from one state to another, (27) can be thought of as a dynamic model.

(27)

x y		z
girl(x) pony(y) x owns y	⇒	z = y x loves z

Notice that the anaphor for a-pony-loved-by-the-girl-who-owns-it is 'z', and it does not occur in the left-hand box. We now turn to (25) for which the DRS is (28).

(28) 

DRT is undergoing extensions in the twenty-first century, see Asher and Lascarides (2003); Jaszczolt (2005).

Aspects of Pragmatics

This section focuses on the importance of context for any account of meaning in language and for the understanding of indexicals (e.g. *now, you, here*).

There are at least two ways in which the meaning of a new word can be revealed by whoever coins it: it may be formally defined – a rare procedure in everyday language use -- or the hearer or reader is left to figure out the meaning from its use in the prevailing context. The term 'context' denotes any or all of at least four things: the world and time spoken of; the co-text (i.e. the text that precedes and succeeds a given language expression); the situation of utterance; and the situation of interpretation. The meaning ascribed by use in particular contexts will take precedence over any formally defined meaning. As Wittgenstein (1953: 43) famously wrote: "the meaning of a word is its use in the language." Assignment of meaning by ordinary use is phylogenetically and ontogenetically prior to defined meaning – but for words (lexemes) not sentences, because at any one time the set of lexemes is bounded, but the set of sentences is not. However the ways in which the meanings of sentences are constructed are determined by use, so although no speaker could literally and truthfully say *I've just been decapitated* (in other words it has no extension), the meaning is readily interpretable via its intension (including a metaphorical interpretation). One problem with describing meaning in terms of usage is that it risks confusing denotation with connotation: the denotations are the same of *urine* and *piss* or *my mum* and *the woman who bore me*, but the connotations are different. Each of these two pairs can be used of the same referent, but the contexts of use are normally different. Roughly speaking, denotation is what a lexeme is normally used to refer to, whereas the connotations of a language expression are pragmatic effects that arise from encyclopedic knowledge about its denotation (or reference) and also from experiences, beliefs, and prejudices about the contexts in which the expression is typically used (see Allan 2007).

The anthropologist Malinowski (1923) coined the term "phatic communion*"* to refer to the social-interactive aspects of language (greeting, gossip, etc.) and to focus on the importance of the "context of situation" in representing meaning. This view was adopted by J. R. Firth,

the most celebrated British linguist of his generation (see chapter 15). Firth, who was also influenced by the Prague school functionalists (Mathesius 1964 [1936]; Vachek 1964; see chapter 14, Part two), emphasized the importance of studying meaning in the context of use, taking into account the contribution of prosody (Firth 1957, 1968). His own work in these areas is less significant than the effect it had on one of his students, Michael A. K. Halliday, who worked on prosody and also developed a polysystemic grammatical theory on Firthian lines, originally called System-Structure Grammar, then Scale and Category Grammar, and now Systemic Functional Grammar (SFG) (see *The Collected Works of M.A.K. Halliday,* Halliday 2002-2009, see chapter 18). Halliday and his school have always been interested in the grammatical analysis of text and discourse and the Hallidayan approach has been taken up in Rhetorical Structure Theory (RST), which offers an account of narrative structure (see Halliday & Hasan 1976, 1989 [1985]; Mann et al. 1992; Mann & Thompson 1986; Matthiessen & Thompson 1988). Hallidayan theory has also been adopted by critical discourse analysts, who focus on the fact that all language is socio-culturally and ideologically situated (e.g. Hodge & Kress 1988; Kress & van Leeuwen 2001, see chapter 18). An important Hallidayan contribution to linguistic terminology is the labeling of "metafunctions" (see also chapters 15 and 18)..

Indexicals

The situations of utterance and interpretation provide anchors for deictic or indexical categories such as tense, personal pronouns (like *I, you, we*), deictic locatives *(here, there*) and demonstratives (*this, that)* (see also chapters 19 and 20). The term 'deixis*'* derives from the Stoic δειξις (demonstration, indicated referent); "indexical", in this sense, was introduced by Peirce (1931: Chapter 2). Although study of these grammatical categories had been proceeding for more than two millennia, there was an upsurge of interest after World War II (see Benveniste 1971 [1956], 1971 [1958]; Jakobson 1962; Lyons 1977; Levinson 1983; Fillmore 1966, 1997 [1971-75]). Many languages have, corresponding to their personal pronoun systems, the speaker as first person (*I*), the hearer as second person (*you)*, all others as third person *(he, she, it)*, as well as parallel locatives meaning roughly "near speaker" (*here*), "near hearer" (*there*), "not-near either speaker or hearer" (*yonder*). The situations of utterance and interpretation may determine choices of adverbials and directional verbs relative to the location of speaker and hearer; e.g. the choice among the verbs *come, go, bring, come up, come down, come over*, etc. Situation of utterance and assumptions about the hearer also play a role in determining the topic and the linguistic register or jargon – that is, the variety of language associated with a particular occupational, institutional, or recreational

group: for instance, legalese, medicalese, cricketese, linguisticalese, and so forth (Biber & Finegan 1989; Allan & Burridge 1991, 2006). They influence politeness factors such as terms of address and reference to others (see Brown & Gilman 1972 [1960]; Ervin-Tripp 1972; Geertz 1972; Shibatani 2006); and kinesic acts such as gesture, facial expression, and the positions and postures of interlocutors (Hall 1959; Argyle 1988; Clark 1996; Danesi 2006).

Scripts

Beyond earliest childhood, very little we encounter is totally new in all its aspects. Most of what we hear and read can be interpreted wholly or partially in relation to structured knowledge arranged into modules of information[8]. A speaker presupposes this common ground when constructing a text so that understanding (30) is to invoke the restaurant script (Schank and Abelson 1977; Schank 1982; 1984; 1986) as a set of inferences, some of which are defeasible (can be cancelled without contradiction).

(29) *Sue went to a restaurant last night with her boyfriend.*

From (29) we infer that, most probably: (a) Sue intended to eat at the restaurant with her boyfriend; (b) Sue entered the restaurant with her boyfriend; (c) Sue and her boyfriend sat down; (d) They ordered food; (e) The food was brought to them; (f) They ate it; (g) Either Sue or her boyfriend or both of them paid the bill; (h) Then they left the restaurant. In (29) many of the inferences in the first clause are cancelled by what follows:
(30) *Sue went to a restaurant last night with her boyfriend, but as soon as they'd got inside the door they had a huge fight and left before even sitting down.*

It is confirmed that they entered and exited but it implicitly denied that they sat down, ordered, ate, and paid.

As can be seen from the example above, scripts contain structured information about dynamic event sequences. Regular components of a script are predictable and deviations from a script are potentially newsworthy. Scripts have personae, props, and action sequences. A restaurant script has customers, servers, cooks, etc. The props include tables, chairs, menus, cutlery, plates, food. The events include the customer entering the restaurant, ordering food, the food being brought by the server, the eating of the food, the requesting, presentation, and paying of the bill, and the customer leaving the restaurant. The vocabulary used in the script evoked by going to a restaurant indicates its semantic associations and their relationships.

8. For a discussion of frames, scripts, and schema(ta) in the context of psychology, see chapter 27.

There is a distinction between the restaurant script – consisting of a dynamic structure of event sequences – and a restaurant frame (built from encyclopedic knowledge) identifying the characteristic features, attributes, and functions of a restaurant and its interaction with things necessarily or typically associated with it (see the discussion of 'restaurant' above in the section on frames). Scripts show how the features, attributes and functions are organized with respect to one another. Some are logically necessary: you cannot exit from a place before entering. Other parts of the script are simply conventional and can vary: in some establishments you pay before getting food; in some, the cooking precedes the ordering. There is a very large number of scripts; many overlap and there must be networking among them. For instance, entering a restaurant has much in common with entering any other business premises and is distinct from entering a private home. There is a hierarchy between scripts and scenes, for example: generally applicable script-like memory organizational packets have more specific scripts (like the restaurant script) and finer-grained scenes within them (e.g. ordering food). There is much research still to be done, but it seems certain that communication and language understanding make use of scripts (see, e.g. Minsky 1977; Rumelhart 1977; Lehnart and Ringle 1982; Garrod 1985; Ford and Pylyshyn 1996), and that the vocabulary used in describing the scripts constitutes a semantic field of words whose interrelationships are defined in terms of the frames and event sequences in the script.

Conversational implicature

Once the meaningful interpretation of a language expression makes recourse to context, pragmatics comes into play (see Gazdar 1979; Levinson 1983). The boundary between semantics and pragmatics was specifically defined by Grice (1975: 43) as a distinction between "what is said" – the truth-conditional aspects of meaning – and *"*what is implied, suggested, meant" – the non-truth-conditional pragmatic overlay that is implicated. Grice writes of the small conversation in (31), "B implicates that Smith has, or may have, a girlfriend in New York" (*ibid.* 51).

(31) A: Smith doesn't seem to have a girlfriend these days.
B: He has been paying a lot of visits to New York lately.

The implicature is inferred from what B actually says given the cooperative assumption that it is a rational response to A's remark, i.e. that it is relevant to the co-text. Implicatures (more precisely, conversational implicatures) are, for instance, the defeasible inferences discussed in respect of (29) and (30) above.

Grice (1975) described the cooperative principle in terms of four categories of "maxims": "Quantity", "Quality", "Relation", and "Manner" (? see also chapters 18, 20, 25). Quantity enjoins the speaker/writer to make the strongest claim possible consistent with his/her perception of the facts while giving no more and no less information than is required to make his/her message clear to the audience. Quality enjoins the speaker/writer to be genuine and sincere. The maxim of relation requires that an utterance should not be irrelevant to the context in which it is uttered, because that would make it difficult for the audience to comprehend. The maxim of manner requires that, where possible, the speaker/writer's meaning should be presented in a clear, concise manner that avoids ambiguity, and avoids misleading or confusing the audience through stylistic ineptitude. Such maxims are not laws to be obeyed, but reference points for language interchange – much as the points of the compass are conventional reference points for identifying locations on the surface of the earth. The cooperative maxims are fundamental to a proper account of meaning in natural language; even though they are pragmatic entities, to build a semantic theory that makes no reference to the implicatures that arise from cooperative maxims would be like building a car with square wheels. The perceptiveness of Grice's observations cannot be denied; much criticism has been leveled against various maxims but they fail if we interpret Grice charitably. One frequent objection is that Grice mistook the conventions of his own society to be universal; this is a common enough mistake and not fatal to the theory.

The four Gricean (categories of) maxims were reduced to three (Manner, Quantity, and Informativeness) in Levinson (1995; 2000), two (Relation and Quantity) in Horn (1984), and one (Relevance) in Sperber and Wilson (1995 [1986]); see the comparison in Table 2.

Insert Table 2 here

It has become a matter of controversy whether or not there is a clear distinction between *what is said* and *what is meant*. Horn (1972) identified sets of scalar implicatures, e.g. *Ed has three children* implicates *Ed has exactly three children*; *Some felines don't have retractile claws* implicates *Not all felines have retractile claws*; *I think he'll apply* implicates *I don't know it for a fact that he'll apply*. Grice (1978) accepted these as "generalized conversational implicatures" because they do not rely on a particular context unlike the particularized implicature in (31). Grice (1978: 117) famously wrote: "Senses are not to be multiplied beyond necessity", described as "Modified Occam's Razor"'. This became known as "radical pragmatics" (see Cole 1981); it favors the underspecification of semantics, the additional meanings being supplied from pragmatics. For instance, in (32) we assume that the light came

on as a result of Sue flicking the switch, whereas in (33) Sue's flicking the switch seems to follow the light coming on.

(32) Sue flicked the switch and the light came on.
(33) The light came on and Sue flicked the switch.

These are pragmatic inferences that can be cancelled and, certainly out of context, (32) and (33) have the same truth conditions (because by the rules of propositional logic $(p \wedge q) \leftrightarrow (q \wedge p)$). However, according to Carston (1988), although they have the same logical form they have different truth conditions which are determined on the basis of pragmatic enrichment (e.g. (32) is true just in case Sue's flicking the switch caused the light to come on).

The fact that *It's raining* is necessarily understood as referring to rain in some particular locality has led Relevance Theorists (Sperber and Wilson 1995 [1986]; Carston 1988; 2002) to name this an "explicature" on the basis that it enriches logical form by making it more explicit. Bach (1994) calls it an "impliciture" because it results from expansion of what is implicit in the semantic content. Bach (2004) claims that semantics concerns the meanings of sentences, which may often fail to determine the meaning of propositions completely but these are semantic properties independent of anybody's act of uttering them. Pragmatics is concerned, not with sentences themselves, but with utterances of sentences in the course of communicating, and truth conditions apply to these utterances rather than to sentences out of context. The debate over the semantics~pragmatics interface continues (see, e.g. Allan and Jaszczolt 2012).

Summary Remarks

This chapter has reviewed developments in semantics and pragmatics from 1960 to the end of the twentieth century. Part I on lexical semantics began with a review of componential analysis in semantics which has a history dating back to the seventeenth century but was rediscovered in the mid-twentieth century inspired by the analyses of kinship systems in anthropology, distinctive feature analysis in Prague school phonology, and the extension of features to morphosyntactic analysis. Componential analysis was also encouraged by the recognition of semantic fields and the differential values of lexemes within them. The semantic components of lexemes derive from properties of the *denotata* (referents) of lexemes. Recognition of the fact that some *denotata* are more typical and better exemplars of a lexeme than others led to developments in prototype and stereotype semantics. Theories of semantics seek to identify the components of meanings, relate them to one another and to their formal representation in lexemes (more properly, the items listed in dictionaries), to

identify the network of meanings among them and combinations of them that give body to syntactic structures.

The difference in meaning between *The hunter killed a rhino* and *The rhino killed a hunter* arises from the syntactic differences and it is that aspect of meaning which was discussed in Part II. Katz's semantic theory was examined at some length because, for all its faults, it was the first comprehensive theory of linguistic semantics in generative grammar; Katz adumbrated the goals that should be met by any semantic theory and attempted to marry semantic interpretation to syntactic structure. Alternatives to Katz's theory such as generative semantics, conceptual semantics, the semantics and pragmatics of the functionalist Role and Reference Grammar, and then frame semantics and construction grammar were reviewed. One major problem facing attempts to predict the meaning of a syntactic structure is the difficulty of identifying the constraints on combining lexemes; it remains an unsolved problem, although the best proposal so far seems to be the identification of semantic frames and the recognition that interpretations are coerced by co-textual lexemes.

Part III looked at the contribution of truth conditional and other accounts of linguistic meaning derived from philosophical logic. It was shown that even lexical semantics is necessarily dependent on truth conditions and the probability conditions expressed as nonmonotonic inferences that are sometimes equated with implicature. Event-based semantics and Montague semantics, which use model theory, possible worlds semantics, and lambda calculus were briefly reviewed. There was a short discussion of the fact that much anaphora can be accounted for on semantic or pragmatic bases. This led into file-update semantics and the dynamic semantics of discourse representation theory.

Part IV took up aspects of pragmatics, starting with the importance of context to the proper interpretation of linguistic meaning. We dallied briefly with the contribution from Halliday's systemic functional grammar, then switched to the discussion of indexicals. Scripts that capture recurrent dynamic event sequences are indispensable to the understanding of how linguistic meaning is normally very much underspecified in natural language discourse: a huge amount is left to be inferred (monotonically or nonmonotonically) by hearers and readers. That topic leads directly to a consideration of implicature and the controversy over the terms to be used to distinguish what is said from what is meant.

Of course much has been omitted in this short excursus: Lyons' book on semantics (1977) is unsurpassed as a handbook on many aspects of semantics: it presents a background for much of what has been discussed (see also Cresswell 1979 for an excellent review). Stephen Ullmann (1951; 1962; 1975) wrote on etymology and semantic relations among lexemes and

some grammatical morphemes. D. Alan Cruse's book (1986) became a standard introduction to lexical semantics. There are several histories of some aspects of semantics in late twentieth century America (the introduction to McCawley 1976; Newmeyer 1986; R. Harris 1993; Huck and Goldsmith 1995). Other works (such as Allan 2009, 2010; Horn and Ward 2004; Mey 1998) give surveys of semantics and pragmatics at or just after the end of the twentieth century.

Figures

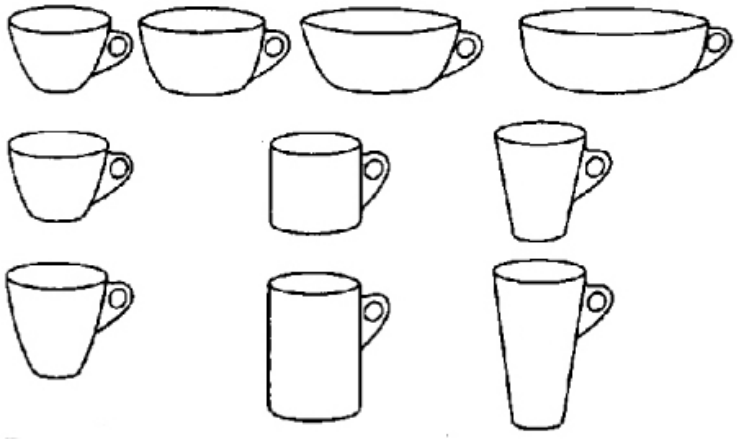


Figure 1. Half of Labov's cups, mugs, etc. (see Labov 1978)

Tables

Table 1. A componential table

BOVINE	*bull*	*cow*	*calf*
EQUINE	*stallion*	*mare*	*foal*
OVINE	*ram*	*ewe*	*lamb*
	MALE	FEMALE	YOUNG
	ADULT		

Table 2. Sources for implicatures in Grice, Levinson, Horn, and Sperber and Wilson

GRICE	LEVINSON	HORN	S. AND W.
Quality: Be truthful.			
Relation: Don't be irrelevant without cause.		R: Make your contribution necessary; say no more than you must (given Q).	Be optimally relevant.
Quantity: Say no more and no less than is necessary to get the point across.	Q: What isn't said, isn't.		
	I: What is expressed simply is stereotypically exemplified.	Q: Make your contribution sufficient; say as much as you can (given R).	
Manner: Don't be stylistically inept.	M: What's said in an abnormal way isn't normal.		