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SECOND EDITION

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WILLIAM J. FRAWLEY
Editor in Chief

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Semantic and Lexical Change–Zulu
Systematic Outline of Contents
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ABBREVIATIONS AND SYMBOLS

A adjective; agent; argument
A any syntactic category (in A-binding, A-over-A Principle)
AA Afroasiatic; Austro-Asiatic
abbr. abbreviation
abl. ablative
abs. absolutive
acc. accusative
ACH Association for Computers and the Humanities
ACL Association for Computational Linguistics
act. active; actor
AD Alzheimer's dementia
adess. adessive
adj. adjective
ADJP adjective phrase
adv. adverb(ial)
ADVP adverbial phrase
AE Achaemenid Elamite
AGR agreement
agt. agent(ive)
AI Artificial Intelligence
ALLC Association for Literary and Linguistic Computing
AM Ancient Mongolian
AMR Allomorphic Morphological Rule
AN Austronesian
an. animate
aor. aorist
AP adjective phrase
APG Arc Pair Grammar
API Association Phonétique Internationale
A-position argument position
AR Arumanian
Ar. Arabic
Arm. Armenian
ART article
ASL American Sign Language
ASP aspect
ASR Automatic Speech Recognition
ATN Augmented Transition Network
ATR advanced tongue root
AUX auxiliary
Av. Avestan
BCE Before Common Era (= B.C.)
BEAM Brain Electrical Activity Mapping
BI Bahasa Indonesia
BM Bahasa Melayu; Bokmål
BP bound pronoun; Brazilian Portuguese
B.P. Before Present
BS Balto-Slavic
BVC bound verb complement
C complement; complementizer; consonant
c. century
CA Classical Arabic; Componential Analysis; Contrastive Analysis; Conversational Analysis
ca. *circa*, approximately
CAP Control Agreement Principle
CAT Computerized Axial Tomography
caus. causative
c-command constituent command
CD Communicative Dynamism; Conceptual Dependency
CE Common Era (= A.D.)
CED Condition on Extraction Domain
CF Context-Free
CFG Context-Free Grammar
CFL Context-Free Language
chap. chapter
Ch.Sl. Church Slavic
CHO chômeur (in Relational Grammar)
CL Classical Latin; compensatory lengthening
clf. classifier
col. column
COMP complementizer
comp. comparative; complement
conj. conjunction; conjunctive
cont. continuative
cop. copula
CP Complementizer Phrase; Cooperative Principle
CR Comparative Reconstruction
CS Context-Sensitive
CSR Contemporary Standard Russian
c-structure constituent structure
CV cardinal vowel; consonant-vowel (syllable structure)
D dative; derivational; determiner; diacritic feature; dictionary
d. died
Da. Danish
DA Discourse Analysis
DAF delayed auditory feedback
dat. dative
dat.-acc. dative-accusative
DCG Definite-Clause Grammar
DD developmental dysphasia
decl. declension
def. definite
dem. demonstrative
deriv. derivative
desid. desiderative
DET determiner
dim. diminutive
dir. direction(al)
DM discourse marker
DO direct object
DP Determiner Phrase
DR Daco-Rumanian; discourse representation
DRS Discourse Representation Structure
DS marking Different Subject marking
D-structure an alternative conception to 'deep structure'
DTC Derivational Theory of Complexity
DTW Dynamic Time Warping

du. dual
DV dynamic verb
ɔe empty category
E externalized
EA Eskimo-Aleut
ECP Empty Category Principle
emph. emphatic
encl. enclitic
Eng. English
ENHG Early New High German
EP European Portuguese
EQUI Equi-NP Deletion
erg. ergative
EST Extended Standard Theory
etc. et cetera
ex. example
exx. examples
F fall; formant
f. feminine; and following
F-R fall-rise
f-structure functional structure
F_0 fundamental frequency
Fa. Faliscan
fact. factive
FCR Feature Cooccurrence Restriction
fem. feminine
ff. and following (plural)
fig. figure
fl. *floruit,* flourished, lived
FLRP Fixed Language Recognition Problem
FN first name
foc. focus
Fr. French
FSD Feature Specification Default
FSP Functional Sentence Perspective
fut. future
G gender; glide
Gael. Gaelic
GB Government/Binding
G/D genitive/dative
gen. genitive
Ger. German
ger. gerund
Gk. Greek
Gmc. Germanic
Go. Gothic
GPC grapheme-phoneme conversion
GPSG Generalized Phrase Structure Grammar
GR Grammatical Relation
GS Generative Semantics
Guj. Gujarati
H hearer; high; hold (ASL)
habit. habitual
Hitt. Hittite
HM Hmong-Mien
hon. honorific
HPSG Head Driven Phrase Structure Grammar
HR high rise
Hz Hertz (cycles per second)
I inflection; internalized
IA Indo-Aryan; Item-and-Arrangement
IC Immediate Constituent; Inherent Complement
ICA Initial Consonant Alternation
ICM Idealized Cognitive Model
ID Immediate Dominance
IE Indo-European
iff if and only if
IG intonation group
II Indo-Iranian
IL Intensional Logic
ill. illative
imper. imperative
impers. impersonal
impf. imperfect(ive)
inan. inanimate
incl. including, inclusive
ind. independent
indef. indefinite
indic. indicative
inf. infinitive
INFL inflection
inst. instrumental
interj. interjection
intrans. intransitive
invol. involuntary
IO indirect object
IP Inflection Phrase; Item-and-Process
IPA International Phonetic Association or Alphabet
IR Internal Reconstruction
Ir. Iranian
irreg. irregular
IS Interactional Sociolinguistics
Ital. Italian
KA Krama Andhap (= Middle Javanese)
KI Krama Inggil (= High Javanese)
km kilometer(s)
L language; location (ASL); low
L1 first language
L2 second language
LA Latin America; linguistic area
La. Latin; Latvian
LAD Language Acquisition Device
LBH Late Biblical Hebrew
LF Lexical Function; Logical Form
LFG Lexical-Functional Grammar
LGA Local Government Area
LH left hemisphere
Lh. Lhasa
Li. Lithuanian
LIC lower incisor cavity
LIPOC language-independent preferred order of constituents
lit. literally
Lith. Lithuanian
LM Literary Mongolian
l-marking marking a lexical category
LN last name
loc. locative
LP Language Planning; Linear Precedence
LPC Linear Prediction Coefficient
LR low rise
LSA Linguistic Society of America
LSP Language for Specific Purposes
LU lexical unit
Lyc. Lycian
M mid; movement (in ASL); modal; mot (in Metrical Phonology)
m. masculine
MA Meso-American
masc. masculine
m-command maximal command
MCS Mildly Context-Sensitive
MDP Minimal Distance Principle
ME Middle English
MG Montague Grammar
MH Middle/Mishnaic Hebrew
MHG Middle High German
MIA Middle Indo-Aryan
mid. middle
MIT Massachusetts Institute of Technology
MK Mon-Khmer
MLU mean length of utterance
MM Middle Mongolian
Mod. modern
Mod.E. Modern English
MOP Maximal Onset Principle
MP Malayo-Polynesian; Middle Persian
MPR Mongolian People's Republic; morphophonological rule
ms millisecond
ms. manuscript
MSA Modern Standard Arabic
MSC Morpheme Structure Constraint
MSK Modern Standard Khmer
mss. manuscripts
MST Modern Standard Telugu
MT Machine Translation
N noun; number
n. note
NA North America; Northern Athabaskan
N/A nominative/accusative
NC Niger-Congo
NCC North Central Caucasian
n.d. no date

NE New English (= Modern English)
neg. negative
neut. neuter
Ng. Ngoko (= colloquial Javanese)
NGP Natural Generative Phonology
NHG New High German
NIA New Indo-Aryan
NL natural language
NLI Natural Language Interface
NLP Natural Language Processing
NM Natural Morphology
NN Nynorsk
No. Norwegian
nom. nominative
NOM nominal(ization)
nonfin. non-finite
NP New Persian; noun phrase
NS Nilo-Saharan
n.s. new series
NWC Northwest Caucasian
O object
obj. object
obl. oblique
obs. obsolete
OCS Old Church Slavic
OE Old English
OG Old Georgian
OHG Old High German
OI Old Iranian
OIA Old Indo-Aryan
OK Old Khmer
OM object marker
ON Old Norse
OP Old Persian; Old Portuguese; Old Prussian
OP null operator
OPer. Old Persian
opt. optative
ORuss. Old Russian
Os. Oscan
o.s. old series
OT Optimality Theory
P person; patient; phrase; predicator; preposition; position (in ASL)
PA Proto-Australian
PAE Proto-Athabaskan-Eyak
PAN Proto-Austronesian
PAn. Proto-Anatolian
PAS Preferred Argument Structure
pass. passive
pat. patient
PC pronominal clitic
PCA Pacific Coast Athabaskan
PCF Phonetically Consistent Form
pcl. particle
pcpl. participle
PCU Preferred Clause Unit
PD Proto-Dravidian
PDP Parallel Distributed Processing
Per. Persian
perf. perfect(ive)
pers. person
PET Positron Emission Tomography
PF Phonetic Form
pf. perfect(ive)
PGmc. Proto-Germanic
Phryg. Phrygian
PIE Proto-Indo-European
Pkt. Prakrit
pl. plural
PLD Primary Linguistic Data
PLu. Proto-Luvian
plupf. pluperfect
PM phrase-marker; Proto-Mayan
PN predicate nominal
PNC Proto-Niger-Congo
PNI Proto-Northern Iroquoian
POc. Proto-Oceanic
Pol. Polish
pol. polite
poss. possessive
postpos. postposition
PP prepositional phrase
PR Phonological Representation; Phonological Rule
PRED predicate
pref. prefix
prep. preposition
pres. present
prev. preverb
PRO pronoun, pronominal
prog. progressive
pron. pronoun
prt. particle
P-rule phonological rule
PS Phrase Structure; Preference Semantics
PSG Phrase-Structure Grammar
PST Proto-Sino-Tibetan
PT patient-trigger; Proto-Tai
PTB Proto-Tibeto-Burman
Q quantifier; question
QH Qumranic Hebrew
q.v. *quod vide,* which see
qq.v. *quae vide,* which see (plural)
R root
RC relative clause
RE Recursively Enumerable
real. realis
redup. reduplication
refl. reflexive
rel. relative
rem. remote
repr. reprinted
REST Revised Extended Standard Theory
rev. revised
R-expression referring expression
RG Relational Grammar
RH right hemisphere
RN Relational Network
RP Recognition Problem; Received Pronunciation; referential pronoun
RR Readjustment Rule
R-rule Redundancy Rule
RT reading tradition
RTN Recursive Transition Network
Ru. Russian
S sentence; speaker; subject
SA stem augment
SAAD simple active affirmative declarative (sentence)
SBH Standard Biblical Hebrew
SC small clause; South Caucasian; Structural Change
Sc. Scandinavian
SCC Strict Cycle Condition
SD South Dravidian; Structural Description
SEA Southeast Asia(n)
sec. secondary; section
ser. series
SFH Semantic Feature Hypothesis
SG Stratificational Grammar; Standard Gujarati
sg. singular
SGML Standard Generalized Markup Language
SH Standard Hausa
SHWNG South Halmahera-West New Guinea
Skt. Sanskrit
Sl. Slavic
SM series marker
soc. sociative
SP Semantic Parsing; subject pronoun
Sp. Spanish
SPE *The Sound Pattern of English*
SS marking Same Subject marking
S-structure shallow structure
ST Sino-Tibetan
stat. stative
sub. subordinator
SUBCAT subcategorization
subj. subject
subjunc. subjunctive
subord. subordinate, subordinative
subst. substantive
superess. superessive
SUR Speech Understanding Research
SV stative verb
Sw. Swedish
SWITCH switch reference
syn. synonym, synonymous

Syr. Syriac
ɔt trace
T title; *tu* (familiar address)
TAP tense-aspect pronoun (Hausa)
TB Tibeto-Burman
TBU Tone-Bearing Unit
TG Transformational Grammar; Tupí-Guaraní
Tib. Tibetan
TK Tai-Kadai
Toch. Tocharian
TOP topic
tr. transitive
trans. transitive
trig. trigger
T-rule transformational rule
TV transitive verb
U utterance
UA Uto-Aztecan
UC ultimate constituent
UG Universal Grammar
Ukr. Ukrainian
Um. Umbrian
URP Universal Recognition Problem
V verb; vowel; *vous* (polite address)
Ved. Vedic (Sanskrit)
ver. version
VH vowel harmony
VL Vulgar Latin
voc. vocative
vol. volume
VOT voice-onset time
VP verb phrase
W word
WFR Word-Formation Rule
WH Western Hausa
WH-word question-word (*what*, etc.)
W* language non-configurational language
WMP Western Malayo-Polynesian
WP Word-and-Paradigm
WT Western Tibetan
X any syntactic category (in X-Bar Theory)
Ø zero (covert element)
1 first person; subject (Relational Grammar)
2 second person; direct object (Relational Grammar)
3 third person; indirect object (Relational Grammar)
* non-attested form (hypothetical or reconstructed); Kleene star
< comes from
> becomes
→ is rewritten as (phrase structure rule)
⇒ is transformed into
α alpha, a variable
Δ delta, a dummy element in syntax
μ theta, thematic (role)
σ sentence; syllable
Σ sentence; stress

S

CONTINUED

SEMANTIC AND LEXICAL CHANGE. *See* Language Change; Historical Linguistics; Semantics; *and* Grammaticalization.

SEMANTIC FIELD. *See* Semantics; Componential Analysis; *and* Ethnosemantics.

SEMANTIC PRIMITIVES. *See* Semantics; Ethnosemantics; *and* Componential Analysis.

SEMANTIC RECONSTRUCTION. *See* Reconstruction; Historical Linguistics; Language Change; *and* Grammaticalization.

SEMANTIC ROLE. *See* Semantics; Transitivity and Voice; *and* Case.

SEMANTICS. [*This entry includes the following subentries:*

Overview

Semantics is the study and representation of the *meaning* of every kind of constituent and expression in language, and also the meaning of relationships among them. To say "His frown means he's angry" is to talk about the frown as a sign of anger; however, a language expression is not the sign of its meaning, but an arbitrary (though conventional) *symbol* for the meaning. Semantics studies the interpretation of these symbols.

A dictionary gives the decontextualized *sense* of a word, abstracted from innumerable usages of it. Dictionary users must puzzle out its reference, that is, what a S[peaker] or writer uses the word to mean in $M^{w,t}$, the model of a world and time evoked by a text in which the word appears. To give the sense of a language expression E_o in the natural language being described, that is, the *object language*, is to translate it into a language expression E_m in the *metalanguage*—the language of the semantic representation, which may be the same as the object language; thus *dog* (E_o) means 'canine quadruped' (E_m).

People refer to things (physical objects, abstract entities, places, states, events) that have existed (happened) in the past, things that exist (are happening) at present, and things that they predict will exist (happen) in the future. They also talk about things that could be or could have been if the world were different than it was, is, or is expected to be. They talk about things in fictional worlds and times of books and films; about things represented in paintings and photographs; about things that they deny exist; even about impossible things such as *the largest prime number* or *My brother is an only child.* Semantics must meet the challenge of connecting the language expressions used to talk about all these different kinds of things to the very things spoken about, that is, link language to $M^{w,t}$. The sense of E_o arises from its *denotation*, the things or events that E_o is used to talk about—not just the world we live in, but any world, w, and time, t, that may be spoken of. A speaker refers to,

say, *a poodle* by using the senses of the words to evoke a particular kind of denotatum (breed of dog) one instance of which the speaker is talking about in $M^{w,t}$.

Meaning is compositional. The meaning of a text or discourse is composed from the meanings of its constituent utterances, including their punctuation or *prosody*—stress, pause, intonation, tone of voice—and the sense of the sentences used in each utterance. Therefore, reference depends on sense. The senses of phrases and sentences are computed from the senses of their constituents, with the most primitive chunks of meaning being taken from a lexicon or dictionary. The lexicon contains every language expression whose sense cannot be computed from its constituent parts. Within 20th-century linguistics, studies of meaning progressed from lexical semantics (restricted to word meaning), to assigning senses to sentences, to assigning denotations to sentences, to assigning meanings to utterances via speech act theory, and have culminated in studies of discourse (text) meaning. The last two or three stages in this development rely on insights from pragmatics—the context-dependent assignment of meaning to language expressions used in acts of speaking and writing.

Semantics has traditionally been concerned only with literal meaning; yet much everyday language relies for its communicative force on sound symbolism, metaphor, and connotation. The first two are relevant to the creation and interpretation of many novel expressions, the last to social and stylistic aspects of meaning.

1. The nature of semantic representations. Human languages are the objects studied in semantics. Hence, the language under investigation is known as the *object language*. The language which a linguist uses to describe and analyze the object language is called the *metalanguage*. The basic requirement of a metalanguage is to satisfactorily communicate the meaning of E_o—that is, any expression in the object language, whether it is a word, a phrase, or a sentence—in terms of an expression "E_m" in the metalanguage. A metalanguage is just another language, often an artificial and not a natural one.

One important practical constraint on a metalanguage is that (mostly) it needs to be understood by human beings who normally communicate in a N[atural] L[anguage] of which they have fluent command. If you understand neither Polish nor Swahili, there is little point using Swahili as a metalanguage for the semantic analysis of Polish (or vice versa); for example, to say *To jest pies* means 'Ni mbwa' will not help you at all. *To jest pies* (in Polish), meaning 'It's a dog', uses English as a metalanguage. In practice, scholars either provide NL glosses for exotic metalanguage expressions or assume some existing knowledge of the semantics of the symbols and expressions being used: for example, $\forall$ means 'for all', $\leftrightarrow$ means 'if and only if', $\wedge$ means 'logical and', $\lambda y(P(y))(x)$ means 'x is a member of set P'.

Ideally, a semantic metalanguage would be a *formal language*. A clue to the difference between a formal and an informal metalanguage is given by comparing (1) with (2).

(1) $\forall x[\mathbf{dog}'(x) \leftrightarrow \lambda y(\mathbf{animal}'(y) \wedge \mathbf{canine}'(y))(x)]$

(2) dog *means 'canine animal'*

Strictly, a formal language has a fully defined vocabulary and syntax. Ideally, the vocabulary would be a specified set of symbols whose forms and correlated meanings are fully defined; all possible combinations of vocabulary items in the metalanguage would be generated from fully specified syntactic axioms and rules of syntax; and the meanings of syntactically well formed structures would be fully specified by semantic axioms and rules for the metalanguage. All systems of *formal semantics* (see Gamut 1991, McCawley 1993 for overviews) attempt to create exactly such formal languages whether they be couched in terms of propositional logic, predieate logic, truth conditional semantics, possible worlds semantics, intensional logic, model theoretic semantics, situation semantics, dynamic semantics, and discourse representation theory. A formal metalanguage for NL semantics must have the same expressive power as a NL because (i) The metalanguage is in effect a translation of the object language and the object language is a NL; (ii) for the metalanguage to be understood and used by human beings, it must be communicable and hence translate into a NL. The ideal formal semantic metalanguage would be a deliberately contrived artificial language of the same notational class as a NL that reflects genuine properties of human perceptions of the real world as well as other aspects of human cognition. Contriving such a metalanguage would be a triumph for human ingenuity and might, as a by-product, reveal something about the nature of human languages. However, it will not in other respects be superior to a NL used as a semantic metalanguage. In sum, a metalanguage expression "E_m" used in the semantic definition of a NL expression E_o will always be equivalent to the NL expression through which it is interpreted.

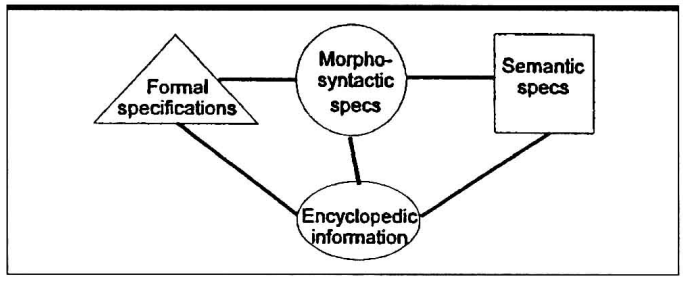
The advantages of a formal semantic metalanguage are

the explicit definition of primitives and standards of rigor and exactitude that tend to be ignored when an informal metalanguage such as a NL is used. Furthermore, proper formalization of the metalanguage should permit proofs of particular conclusions about semantic structure and so prevent mistaken conclusions derived from faulty assumptions, inference procedures, or both. However, none of these advantages of a formal system is necessarily unobtainable when an informal system like a NL metalanguage for semantics is used.

Weinreich 1962 argues that a NL can rightfully function as its own metalanguage if one stratifies the vocabulary in the manner of an onion, with a core subset whose members are definable only circularly and by ostension. Each successive outer stratum uses definitions containing only items from strata within it, without further circularity or ostension. Anna Wierzbicka has identified a set of so-called "semantic primitives" corresponding to Weinreich's core vocabulary. Her inference-based, commonsensical approach to semantic analysis is generally laudable; however, she does not yet define the metalanguage syntax, and it is questionable that the metalanguage vocabulary is fully defined in terms of her primitives.

An important question for linguistic semantics is, How much information is necessary for a complete semantic representation? The answer has favored parsimonious dictionary knowledge against elaborated encyclopedic knowledge. However, attempts in the field of artificial intelligence—to program a machine to interpret a text so as to answer questions on it, or to provide a summary for it—show clearly that the project requires input from what Schank and Abelson 1977 call "scripts," and Lakoff 1987 calls "idealized cognitive models"; and these include encyclopedic knowledge. The encyclopedia functions as a structured database containing exhaustive information on many (perhaps all) branches of knowledge. A semantic system that merely translates one set of symbols into another set of symbols can be as parsimonious as we like; but if it is to make any pretense of representing the meaning of an expression *E* as what humans (potentially) understand by *E*, then it will need to activate and access what has often been thought of as encyclopedic knowledge. Leech writes (1981:84), "the oddity of propositions like 'The dog had eighty legs' is something that zoology has to explain rather than conceptual semantics." But Leech uses the wrong case: we should look to zoology to explain for the encyclopedia why species of higher animals have no more than four legs, but we should look to linguistic semantics to recognize that, if S is speaking of the real world, the statement *The dog had eighty legs* is either false or identifies an incredibly abnormal creature. This is surely a matter that an adequate linguistic semantics should not fail to deal with. Allan 2001:ch. 3 proposes a lexicon-encyclopedia networked as in Figure 1.

FIGURE 1. *Components of the Lexicon within the Encyclopedia*



Given two metalanguages which apparently have the same descriptive and explanatory capacities, the only way to choose between them is to be guided by gut feeling: favor the one you are happier with. Remember that a metalanguage is the product of an analyst's mind; the analyst not being God, every metalanguage is limited by the beliefs, perspectives, and purposes of its creator.

The metalanguage is the language of the semantic theory. The principal function of the theory is to explain data (words, sentences) from NL. The goal of the theory is to explain all the data that it was constructed to explain; therefore, limitations on its range need to be clearly stated. A theory should have predictive power insofar as it raises expectations about data that have not yet come to light. It is absolutely necessary that a theory be internally consistent. But what about its external relations? No theory of semantics can completely ignore syntax and phonology, and the ideal semantic theory will integrate with theories of both these components of a grammar. Semantic theory should also integrate with theories of pragmatics which seek to explain meaning in social and cultural contexts and with theories of discourse structure. A semantic theory should not only make useful revelations about the nature of human language but also about human cognition, because meaning is often a reflex of human perception and conception.

All theories, without exception, are abstractions from reality; so the relation of theory to reality "is not analogous to that of soup to beef but rather of check number and overcoat" (Einstein 1973:294). Like any other kind of theory, semantic theory is developed by applying the analyst's experience and intuitions to inferences drawn

from occurrences of actual speech events to create a demonstrably rational account of their structures and causes.

2. Lexical semantics. Aristotle divided human experience into ten categories, each associated with a grammatical class (Cooke 1938). He believed that the nature of the mind determines that all humans have similar phenomenal and conceptual experiences. This belief was adopted by 17th-century rationalists like Wilkins 1668, who created symbols which characterize and label each thing or notion so as to represent its place in the natural order relative to all other things and notions. Wilkins proposed a pronunciation system and a syntax for this "philosophical language" and wrote a dictionary translating English words into it, to produce a comprehensive componential analysis of the language.

C[omponential] A[nalysis] in the 20th century owes nothing to Wilkins. One source was the Prague School's distinctive feature analysis of inflectional morphology. Another was anthropology, where universal concepts like BE-THE-MOTHER-OF were used in giving the meaning of kin terms for which there were no translation equivalents in Indo-European languages. A third was semantic field theory; Trier 1934 wrote, "The value [*Geltung*] of a word can only be determined by defining it in relation to the value of neighboring and contrasting words" (quoted in Lyons 1977:251).

Such apparently closed fields as case inflections or kin terms should permit exhaustive CA in which every term within the field is characterized by a unique subset of the universal set of semantic components defining the field. But an exhaustive CA of the entire vocabulary of a language is unachievable, because it proves impossible to define the boundaries, and hence all the components, of every field. Even "closed" fields like kinship terminology leak into other fields when meaning extension and figurative usage are considered; compare *mother*, *stepmother*, *surrogate mother*, *mother superior*, *mother earth*, *mother mode*, and so on. Furthermore, there is a problem with the notion "component": for example, male is not a component of *bull,* but an inferred property of a prototypical or stereotypical bull (some abstraction from potential denotata of *bull*)—thus, *If something is a bull, then it is male.* CA does not correlate sense with denotation as is done in prototype or stereotype semantics. And even if CA were satisfactory for lexical semantics, it is inadequate for sentence and utterance meaning.

3. Assigning meanings to sentences. Serious investigation of the ways in which the meanings of lexical items are combined to give senses for sentences has blossomed since 1963, either inspired or provoked by the work of Katz (see Katz and Fodor 1963, Katz 1972, 1977). However, Katz says nothing about the use of senses in referring. His work is important because he attempted to establish a semantic theory integrated with theories of syntax and phonology—one which not only identifies the meaning components in which semantic properties and relations may be stated, but also seeks to show how they combine to project senses onto phrases and sentences. In practice, the output of Katz's projection rules has sets of meaning descriptions side by side, offering degenerate English paraphrases of NL expressions. His theory founders for three reasons: (A) He fails to explicitly define his metalanguage. (B) Katz, like many others, relies on *selection restrictions* to state well-formedness conditions on concatenated senses of language expressions. To create the full set of selection restrictions needed for a NL would require predicting every potential W by trying every conceivable combination of lexical items in every conceivable context—an impracticable, perhaps impossible task. It is not acceptable to postulate a theoretical device such as selection restrictions when there is no method for identifying them. A more useful course of action is to systematically describe semantic *frames* for every lexicon item along the lines of Fillmore 1975, 1982 or Pustejovsky's (1995) *lexical semantic structures.* (C) Katz's 1972 theory was designed to be an integral part of the transformational grammar described by Chomsky 1965—even though Chomsky and other syntacticians had abandoned it, because of its perceived inadequacies.

Both Chomsky 1965 and Katz favored an *interpretative semantics* which assigned meanings to the output of syntactic rules. Jackendoff's (1983, 1987, 1990, 1992) *conceptual semantics* is also interpretative and intended to operate on the output of syntactic and phonological rules derived from the work of Chomsky. It forms part of a general theory of the mind in which linguistic, sensory, and motor information are integrated. Jackendoff has concentrated on the semantic decomposition of clause predicates. Although his "lexical conceptual structures" do not employ standard logical formulae, they are mostly compatible with predicate calculus.

Jackendoff is an exponent of *cognitive semantics*, which assumes that language is constrained and informed by the relations that human beings (a) perceive in nature—particularly in relation to themselves; (b) have experience of in the world they inhabit; (c) conceive of in abstract and metaphysical domains. Most cognitivists, but not

Jackendoff, would approve the functional view that grammatical structure is not "autonomous" but can only be understood and explained with reference to its semantic and communicative functions (see Harder 1996). An alternative to Jackendoff's analysis of clause predicates is found in the work of the functionalist Van Valin, whose Role and Reference Grammar integrates semantics, phonology, syntax, and pragmatics (see Van Valin and LaPolla 1997). Van Valin recognizes the significance of lexical aspect in the semantic classification of predicates. Others, too many to mention, have recognized and examined the contribution made to the meanings of sentences by all manner of grammatical categories and constructions such as tense, mood, definiteness, thematic role, and complementation.

Dissatisfaction with interpretative semantics led to the development of *generative semantics*. Except as practiced by Weinreich 1966, this was a programmatic theory of syntax, using purported meaning components as primitive constituents in structures which were a hybrid of first-order predicate logic and Chomsky-type phrase structure rules. It failed partly because no one ever adequately explained how these sketchy structures were to transform into normal surface structures, and partly because the syntactic phrase markers used do not properly reflect semantic structure.

More or less contemporaneous with the rise of linguistic semantics in the second half of the 20th century, was the intensive development of formal semantics inspired by the founder of mathematical logic, Gottlob Frege 1960. This gave rise to possible worlds, and intensional, model theoretic, situation, and dynamic semantics. These use formal methods such as were described earlier to all manner of linguistic structures, but perhaps preeminently quantifiers and determiners. Formalists tend to believe that functionalist and cognitivist accounts of semantic structure lack the rigor necessary for proper scientific inquiry. Cognitivists counter that formal semanticists prefer abstract semantic representations which are psychologically unreal. The following charitable interpretation of the opposed positions suggests considerable overlap: (A) Formal representations are created by human minds and are interpretable by human minds. Therefore, they have cognitive reality. Moreover, formal models of meaning are models of human reason as it is expressed in language—which is an aspect of human cognition. (B) The informal semantic metalanguages of the cognitivists—for example, Jackendoff's Conceptual Semantics and Wierzbicka's Natural Semantic Metalanguage—are creations of deliberate, consciously contrived artifice, just as much as any formal metalanguages are. (C) Formalists, cognitivists, and functionalists all use contrived metalanguages that have cognitive reality.

4. Assigning meanings to utterances. Austin 1962 noted that people actually perform acts through certain forms of utterance; for example, they make promises by saying *I promise,* offer thanks with *Thank you,* and so on. Searle 1975 identified five macro-classes of such speech acts in the following words: "We tell people how things are, we try to get them to do things, we commit ourselves to doing things, we express our feelings and attitudes, and we bring about changes through our utterances." The way S achieves such aims is described in the theory of speech acts.

Aristotelian logic has concentrated on entailments of propositions; thus Frege 1892 drew attention to their (or S's) presuppositions. Consider this example:

(1) *Max has stopped smoking.*

This entails that Max no longer smokes only if it is true. Whether (1) is true or false, it (or S) presupposes there is someone in $M^{w,t}$ identifiable as "Max," and that "Max" used to smoke. Allan 2001 identifies presupposition with preconditions (preparatory conditions) on utterances. Problems with presupposition are summarized by Levinson 1983:ch. 4.

Grice 1975 recognized that standard logics inadequately account for what is normally understood from many NL utterances, and proposed that the residue be dealt with in terms of *conversational* and *conventional implicatures*. Conversational implicatures arise from conventions for cooperation in social interaction. The primary motivation for the cooperative principle is arguably the resolution of face concerns between interactants; Sperber and Wilson 1995 see it as motivated by a principle of "relevance." Semantic theory must incorporate the contribution of the Cooperative Principle to utterance and discourse meaning.

5. Discourse meaning. Understanding discourse requires the hearer or reader to construct $M^{w,t}$ a mental model of the world(s) and time(s) spoken or written of in the discourse or text. Evidence for the constructive nature of discourse understanding includes the following:

(a) The proven use of inferences and speculations, which enable the hearer or reader to predict what is likely to happen next.

(b) The effect of titles and headings on discourse interpretation.
(c) Experimental evidence for the realignment of scrambled stories in both summary and recall; and the replacement of abnormal by normal events, but not vice versa, in recall situations.

Roughly speaking, a discourse is judged coherent where $M^{w,t}$ is internally consistent and generally accords with accepted human knowledge. Discourse semantics must be able to represent $M^{w,t}$ as a product of the meaningful contributions of such formal strategies as choices of vocabulary, syntactic construction, and prosody. A model of communicative behavior explaining exactly how discourse meaning is composed from the language expressions within it would require input from many branches of linguistics, but the most significant part of it would be a semantic parser. Here is a challenge which semanticists have yet to meet successfully.

[*See also* Componential Analysis; Discourse; Information Structure; Lexicon; Metaphor and Semantics; Parsing; Pragmatics and Contextual Semantics; Language Change; Grammaticalization; Philosophy of Language; Psycholinguistics; Neurolinguistics; Ethnosemantics; *and* Text.]

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KEITH ALLAN

Sense, Reference, Denotation, Extension, and Intension

This article is about a language expression *E* (morpheme, word, clause, etc.) and what is meant by *What* E *means*. The Fregean tradition often makes a binary opposition *sense* vs. *reference* or—almost equivalently—*intension* vs. *extension* (see Lyons 1977); but this article distinguishes meanings for all five terms: *sense, denotation, reference, intension*, and *extension*.

The sense of *E*, is *E*'s decontextualized meaning, abstracted from innumerable usages of it. The sense of E_0 is a description of its informational content in terms of some other language expression E_M. Identity of sense defines the translation equivalence of *ájá* (Yoruba), *cane* (Italian), *dog, canine quadruped* (English), *Hund* (German), *kare* (Hausa), *mbwa* (Kiswahili), *pies* (Polish)—though each of these words may have other senses, too.

The sense of *I totaled my car yesterday* is 'S[peaker] did irreparable damage to his or her car the day before this sentence was uttered.' The reference will depend on who makes the utterance (which determines between "his" or "her" car) and when it was uttered (which dates *yesterday*). Referring is something that S does: the reference of *E* is 'what S is talking about when using *E*'. S refers to particular entities, events, places, and times within the world and time he or she is speaking of. The world spoken of is a mental model of an actual or recalled or imagined world at some time; we symbolize it $M^{w,t}$ in which "w" is a world paired with a time "t." This pair is referred to as an *index*.

S refers to things that the constituents of S's utterance *denote*. Denotation is the relation between *E* and things or events in $M^{w,t}$. *Denotation* is a convenient cover term for *extension* and *intension*.

E *has* EXTENSION *in* $M^{w,t}$ means '*E* denotes something that exists in the world w at time t'. A single utterance may evoke more than one world and/or time.

(1) *If Max owned a Rolls-Royce, he'd be a lucky man.*
(2) *Nimoy plays Spock in* Star Trek.
(3) *President Clinton was a baby in 1946.*

(1) evokes an actual world where S presupposes that Max does not own a Rolls, but imagines a hypothetical world in which he does. In (2) S refers to the fictional world of *Star Trek* in which Spock exists and which is to be found within the actual world in which Leonard Nimoy exists. In (3) the person who was the baby in 1946 became the US president in 1993. The same individual may occupy different worlds; two worlds that include the same people and places may exist at different times (3) or in different realities (1–2).

The *intension* of *E* is all the attributes perceived in or conceived of the typical denotatum of *E* when *E* is used in a conventional manner within the language (Allan 2001; for a different take on *intension*, see Frawley 1992). There is a close relationship between *sense* and *intension*:

(4) The intension of *red* is a color prototypically that of blood, an electromagnetic wave between 590 and 700 nanometers, and focally around 695 nanometers.
(5) The sense of *red* is 'color prototypically that of blood, an electromagnetic wave between 590 and 700 nanometers, and focally around 695 nanometers'.

Senses are essentially translations or paraphrases: sense is presented in a metalanguage expression 'E_M' it *is language*. Intension—even though it is intangible—provides the nonlanguage basis for sense. *Intensions are the content of concepts*. Concepts are cognitive entities, and intensions are abstract entities. Intension is not tied to a particular world or time; and S uses the intension of *E* in speaking about a particular world at a particular time (or a set of worlds and/or times).

Two *E*s that have the same extension do not necessarily have the same intension. For instance, according to Frege 1892, the brightest astral body in the evening sky is the planet Venus, known to the ancients as *the evening star*.

FIGURE 1. *Different models* $M^{wi,tm} \neq M^{wi,te}$ *(left)* $M^{wi,tm} = M^{wi,tm}$ *(right)*

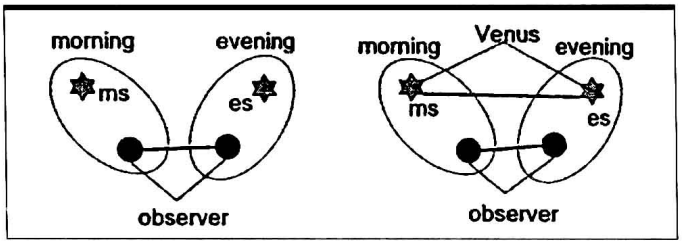


FIGURE 2. *The Co-extension of Max (m) and His Rolls (r) at Some Past Index in (6)*

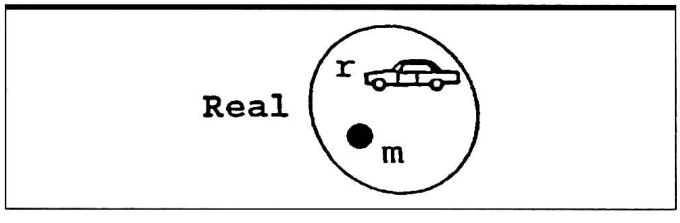
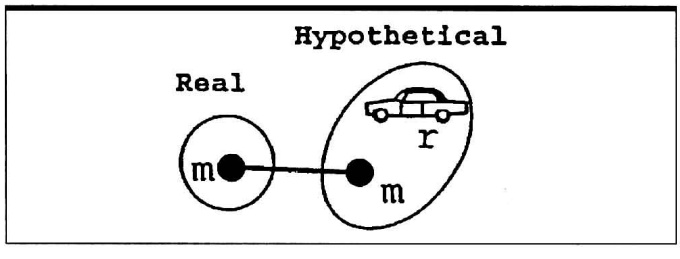


FIGURE 3. *Speaker's Model of the Two Worlds Evoked in (1)*



The brightest astral body just before the sun rises was known as *the morning star*; its extension is Venus also. This situation is illustrated (but not defined) in Figure 1, where the left diagram depicts the situation for the observer who does not know the identity between the morning star "ms" and the evening star "es," that is, $M^{wi,tm} \neq M^{wi,te}$. Each oval represents a world-time pair that, in this example, corresponds to an event. The solid line indicates identity across indexes. In the right-hand diagram, the observer does recognize the identity of "ms" and "es"; that is, $M^{wi,tm} = M^{wi,te}$. The figure as a whole represents Frege's model.

From an earthly perspective, it is true that *the evening star is the morning star*. But *The evening star means 'the morning star'* is false because *morning* and *evening* have different intensions. The intension of *the evening star* is the star that can be seen in the evening sky in all possible worlds—not just from earth. Two language expressions differ in intension when it is possible for them to differ in extension (problems with this notion are discussed in Allan 2001).

Subjunctives indicate nonextension in one world (usually the world spoken in) but hypothesize extension in some nonfactual world. Compare (6) with (1):

(6) *If Max owned a Rolls, he was a lucky man.*
(1) *If Max owned a Rolls-Royce, he'd be a lucky man.*

In (1) non-factuality is indicated by the clause-initial *if* plus the subjunctive verb forms. (6) means roughly 'If indeed it is the case (as you claim) that Max owned a Rolls, then he was a lucky man', in which S maintains a degree of skepticism, but nevertheless accepts Max's Rolls-Royce ownership as a fact—at least for the sake of argument. The model consists of just one world that contains Max and the Rolls; compare Figure 2.

In (1), however, there are two worlds evoked: (A) the reference world of the present in which 'Max' has extension, but not the fact of Max's Rolls-Royce ownership (i.e., it is not true that Max owns a Rolls-Royce); this is represented by the circle in Figure 3. There is also (B), a nonfactual world, the ellipse in Figure 3, in which S imagines that Max exists and that he does own a Rolls.

In (1), only the non-factual (elliptical) world is actually spoken of; the factual world is implied. Because of the contrast between these two worlds, (1) is *counter-factual*, a special type of non-factual. There are many difficulties with counter-factuals which we cannot discuss here (see Lewis 1973). To return to our main theme: in (1) S refers to Max, to a non-existent Rolls-Royce, and the non-factual event of Max's owning a Rolls-Royce; in (6) S refers to Max, to an existent Rolls-Royce, and to the factual event of Max's owning a Rolls-Royce. All language expressions (even proper names) have sense, though this is highly controversial in the case of some, for example, article *the*. An *E* without extension in any world, for example, *no one* and *a round square*, is apparently interpreted through the intensions of its component parts (Allan 2001).

[*See also* Philosophy of Language *and* Pragmatics and Contextual Semantics.]

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KEITH ALLAN

Connotation

The term "connotation" is employed in semantics as part of a typology of meaning. Two broad uses may be distinguished. In the first place, it was established as a technical term by John Stuart Mill, opposed to "denotation": for Mill 1843, an adjective such as *white* denotes the class of white things, but connotes, or implies, the attribute of whiteness which they share. This use, which approximates to the linguistic notion of "sense," is mainly restricted to philosophical semantics. In linguistics, "connotation" is usually applied more narrowly, much as in everyday language, to various aspects of the communicative value of linguistic units seen as lying outside their core, descriptive meaning (see Kerbrat-Orecchioni 1977 and Sansome 1986 for useful discussion). In this second use, the range and precision of the term vary widely, and many linguists explicitly avoid it. Among the phenomena commonly grouped under this heading, however, at least the following may be usefully distinguished.

First, the term is used with reference to *expressive* components of meaning, most obviously in the case of terms which carry "favorable" or "unfavorable" connotations. Many lexical units serve to express the attitudes or feelings of the speaker toward what they describe, as in Bertrand Russell's well known "paradigm" *I am firm, you are obstinate, he is pig-headed.* Here the adjectives may be seen as sharing a common core of descriptive meaning ("adhering strongly to opinions") but express different value-judgments—favorable in the case of *firm,* unfavorable in the case of *obstinate* and *pig-headed.* Expressive connotations vary in strength: *pig-headed* expresses stronger disapproval than *obstinate.* They also vary in the type of emotive involvement expressed; for example, diminutive and hypocoristic expressions (*doggie, Katie,* etc.) express affection, and many idioms (*a face like a fiddle* etc.) express jocularity. The encoding of such connotations is discussed by Stankiewicz 1964.

Connotations may also reflect *social* or *situational* circumstances of use. Lexical units may function as markers of particular speech varieties, either in terms of the social affiliations of their typical users (such as regional provenance, class, occupation, sex, or age) or in terms of features of the situation in which they are typically used—such as the social relationships of participants, social setting, or genre of communication. Several of these factors may overlap. Thus technical terms connote the specialist occupational roles of their users, and are also characteristic of ingroup communication. Expressive terms illustrated above may also be situationally restricted: *pig-headed* is more colloquial than *obstinate,* and *doggie* is characteristic of baby talk. More widely, the use of vulgarisms or taboo terms is often socially unacceptable in the speech of certain groups (e.g. women) and in certain situations ("polite company"); these are terms with strong expressive and socio-stylistic connotations, typically arising from particular areas of meaning in a language (e.g. sex or death) which carry a heavy emotive charge (see Allan and Burridge 1991 for rich illustration).

Consideration of such areas of meaning highlights a third type of connotation, which derives from general *cultural associations* of what is denoted by the lexical unit. Such associations are often highlighted by cross-linguistic comparisons of translation equivalents. For example, English *octopus* and Japanese *tako* denote the same species of animal, but the cultural associations are quite different: weird, sinister *octopus* vs. endearing, edible *tako.* Features of this kind stem from knowledge and beliefs concerning referents and have sometimes been held to lie outside language; however, they frequently have clear linguistic reflexes. Thus octopuses, and by extension anti-social organizations, are in English said to have *tentacles,* but *tako* simply have *asi* 'legs'. Similarly, British Eng. *summer* and Japanese *natu* both denote the warmest season of the year; but the latter carries connotations of enervating heat reflected in expressions such as *natuyase* 'summer loss of weight' and *natubate* 'summer exhaustion'.

Connotations may result from associations of various kinds among lexical units themselves: in these cases, the communicative value of a lexical unit is influenced by other units to which it is in some way related. The clearest examples involve the influence of a taboo homonym. Thus *cock* 'male chicken' has been replaced by *rooster* in some varieties of English because of the presence of the formally identical taboo term meaning 'penis'; *rooster* is an example of a euphemism arising from connotations of this kind. Also relevant here are the vaguer phonesthetic affinities which link *twirl* with *curl* and *whirl* on the one hand and with *twist* and *tweak* on

the other; such elements often reinforce expressive connotations (cf. initial *sn-* in unfavorable terms such as *sneer, snigger, sneak,* etc.).

While connotations are commonly discussed with reference to the vocabulary, the notion is not limited in application to lexical units. Particular grammatical elements and constructions may carry expressive or sociostylistic connotations, and phonological and graphological features may serve to mediate communicative value over and above their basic distinctive function.

[*See also* Metaphor and Semantics; Sound Symbolism; Ethnosemantics; *and* Lexicography.]

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ANTHONY E. BACKHOUSE

Properties and Relationships

Words (more accurately, lexical items) bear sense relations to other words and may also have their own intrinsic sense properties, which reflect necessary aspects of their meaning. (Lexical items are whole single words in the case of morphologically isolating languages, and lexical roots in the case of inflecting and agglutinative languages.)

An elementary textbook introduction to sense relations and sense properties is to be found in Hurford and Heasley 1983; relevant, somewhat more advanced textbook discussions are found in Cruse 1986 and Kempson 1977. Lyons 1977 is an indispensable guide to the linguistic study of meaning, including sense relations and sense properties. Pustejovsky 1998 is an influential recent treatment covering much of this area, at a more technical level.

Commonly mentioned sense properties are *reflexivity* or *irreflexivity*, *symmetry* or *asymmetry*, and *semantic transitivity* or *intransitivity*. Thus English *taller* has the properties of irreflexivity (because, necessarily, nothing is taller than itself), asymmetry (if X is taller than Y, necessarily Y is not taller than X), and transitivity (if X is taller than Y, and Y is taller than Z, then necessarily X is taller than Z). A word like Eng. *equals,* which has all three "positive" properties—reflexivity, symmetry, and transitivity—is said to express an *identity* relation.

Many words actually have none of these properties, for example, *hate.* It is not necessarily the case that one hates or does not hate oneself. Nor, if X hates Y, does it necessarily follow that Y hates X. Finally, *hate* is neither semantically transitive nor intransitive. The prefix *non-* is commonly used to indicate the absence of a property; accordingly, *hate* is non-reflexive, non-symmetric, and non-transitive.

The six properties mentioned above are properties of items which correspond to *two-place predicates*, hence the possibility of definitions involving both X and Y. Syntactically transitive verbs, as well as most prepositions and some inherently relational nouns like *sister,* are two-place predicates. Items corresponding to *one-place predicates* (e.g. most common nouns, adjectives, and syntactically intransitive verbs) and *three-place predicates* (e.g. ditransitive verbs like *give,* or the preposition *between*) have no commonly mentioned sense properties, although such items may often bear sense relations to other items. However, a possible candidate for a sense property of words corresponding to one-place predicates is *sortality.* This is a property of a word which necessarily applies to an entity throughout its existence and cannot cease or begin to apply without the entity ceasing or beginning to exist. Thus *dog* is sortal, but *brown* and *young* are not. If something is a dog, it cannot cease to be a dog without ceasing to exist, as even dead dogs are still dogs. But a thing may change its color to or from brown without affecting its continuing existence. Imaginary happenings, such as princes becoming frogs, raise problems with the notion of sortality.

Ambiguity and *polysemy* probably should not be regarded as sense properties, since forms which have several meanings, as ambiguous and polysemous forms do, can actually be said to mask sets of distinct lexical items. For example, *bank,* which is ambiguous, corresponds to several different lexical items; each of these taken separately may have its own sense properties and bears its own sense relations to other items. This treatment is certainly more acceptable for cases of ambiguity than of polysemy, for example, *mouth* (of an animal, of a river), where it might be felt that dividing the form into distinct items loses the common element of meaning.

The most commonly occurring sense relation between