Cognitive Semantics

Meaning and Cognition

Edited by Jens Allwood
and Peter Gärdenfors

COGNITIVE SEMANTICS

MEANING AND COGNITION

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COGNITIVE SEMANTICS

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Jens Allwood and Peter Gärdenfors (eds)

Cognitive Semantics. Meaning and Cognition.

Preface

Interest in semantics during the 20th century has displayed a succession of different foci. The century started with a strong interest in historical semantics, often combined with an interest in the cognitive processes connected with historical change. The main focus was nonetheless on historical change rather than on cognition. Some of the researchers associated with this trend were the German Christian Reisig, the Frenchman Michel Breal and the Swede Gustaf Stern.

The impact of Ferdinand de Saussure's linguistic structuralism meant that the focus shifted from diachronic to synchronic studies in semantics as well, but the strong interest in the cognitive processes underlying linguistic structures often survived. In Saussure's own work, the interest in the psychological processes underlying language was explicit while, in later structuralist writers, it was often more implicit, perhaps in response to the strong behaviorist tendencies of American linguistic structuralism.

The third and perhaps strongest influence on semantics in this century does not come from historical or structural linguistics but from ideas originating in the philosophy of logic and mathematics. Ever since the proposals made by Alfred Tarski in the 1940s, an increasing number of successful attempts have been made to treat semantics with formal methods. Unfortunately, this interest in formalizing semantics has often been connected with a lack of interest in, or an unwillingness to, investigate meaning as a cognitive phenomenon over and above the models investigated in formal semantics.

For this reason, we can now see that toward the end of the century, there is a dissatisfaction with the semantics offered by existing formal linguistic theories and a growing interest in explicitly focusing on meaning as a cognitive phenomenon. Cognitive linguistics and, more specifically, cognitive semantics have appeared as labels for a number of slightly different approaches to linguistics and semantics. One thing they have in common, however, is their desire to focus on the relation between language, meaning and cognition. Some do so with the aid of concepts developed in connection with information technology, others do so entirely without any such links.

In this book, which represents Scandinavian work in cognitive semantics, we shall look at some of these approaches in eight articles, all of which are concerned with semantics and cognition. They present extensions of, and critical commentaries on, existing approaches, as well as attempts to develop new approaches integrating semantics and cognition.

Jens Allwood presents an operational approach to semantics which is characterized by being cognitive, dynamic and context-sensitive. The meanings of utterances in context are produced through a combination of the meaning potentials of the words in the utterances constrained by semantic operations and various types of available contextual information. The approach is an attempt to create a cognitive semantics which is relevant to understanding how meaning is determined in linguistic interaction between several interlocutors. It thus represents a more pragmatic and social approach than has often been the case in the dominant school of cognitive semantics.

Peter Gärdenfors examines the relations between cognitive semantics and recent approaches in the philosophy of language. He contrasts cognitive semantics with standard formal extensional and intensional semantics. He then examines six basic tenets of cognitive semantics and outlines a first step in developing a cognitive semantics based on conceptual spaces. He argues that semantics is a relation between language and cognitive structure, and that the appropriate framework for cognitive structures is a conceptual space. He also argues that cognitive semantics must take in social aspects of language, in particular power relations, and that this invalidates Putnam's argument that meanings must refer to something non-cognitive.

Peter Harder discusses the relation between functionalism and cognitive semantics. He relates functional meaning to communicative interaction, which he claims is evolutionarily older than cognition. In his view, ability to carry functional meanings still characterizes human language, but functional meanings now form a basis for conceptual meanings. He develops a "layered model of the clause", where this relation is made explicit and provides a model for how cognition is embedded in interaction.

Sören Sjöström and *Åke Viberg* provide examples of how cognitive semantics can be developed by being extended to new empirical material. Sören Sjöström describes and discusses the polysemy of lexical expressions (verbs, nouns and adjectives) connected with vision in Swedish. He uses his analysis to explore the relation between vision and cognition. For example, he claims that light metaphorically represents knowledge and that, accordingly,

perception of light represents understanding, non-perception of light lack of understanding, illumination, explanation etc.

Åke Viberg is interested in investigating the semantic structure of verbs in Swedish from a crosslinguistic perspective. In his paper, he investigates the semantic field of "physical contact verbs" e.g. *stryka* (stroke), *smeka* (caress), *kittla* (tickle), *skava* (abrade) and *slå* (strike/hit/beat). According to Viberg, verbal semantic fields are usually organized around one (sometimes several) "nuclear verb/s". The verb *slå* is such a verb for physical contact verbs, and Viberg claims that other verbs of the field can in fact be seen as elaborations or specializations of some aspects of *slå*. In this way, the analysis of the nuclear verb *slå* can be used to impose a structure on the whole field of physical contact verbs. However, some verbs in the field, Viberg claims, belong to other fields as well, especially those verbs which also pattern as "sound-source verbs". Furthermore, Viberg shows that physical contact verbs are related to action verbs and motion verbs, a fact which is then revealed in the meaning extensions of physical contact verbs.

Elisabeth Engberg Pedersen extends the realm of cognitive semantics even further by discussing how it can be used to analyze deaf sign language. Her topic is the use of metaphor in spoken language and sign language. She first discusses spatio-temporal expressions in spoken languages and then gives a description of uses of space to express time in Danish Sign Language. She shows that linguistic means used to express temporal relations and means to express spatial relations are related in systematic ways. Using Gibson's psychology as a point of departure, she argues that although time and space are not distinct perceptual domains, it is possible to distinguish conceptualizations of time and space at some cognitive levels. Neither time nor space can, however, necessarily be seen as a metaphorical extension of the other. What is seen as a metaphorical extension depends on the language user's sense of the basic meaning of individual expressions.

Kenneth Holmqvist and *Jordan Zlatev* discuss two different possibilities of implementing a cognitive semantics approach using computer programs. Kenneth Holmqvist first presents a computer model of Langacker's cognitive grammar. The first part of the model involves a model of "image schemata". The second part of the model consists of a semantic composition process modeling composition as image superimposition. This process is seen as incremental and as involving "semantic expectations". The point of the model is that it allows for an experimental investigation of the processing order of

different mechanisms of superimposition, which in turn allows for a gradual refinement of the model as a whole.

Jordan Zlatev then uses computer modeling in order to give an account of how linguistic expressions are grounded in experience. He presents an approach which he calls "situated embodied semantica", in which meaning emerges from a pairing of linguistic expressions with situations. Connectionist modeling is used to test the feasibility of the approach and for gaining insights into such issues as learning categories without necessary and sufficient conditions for membership, the context dependence of meaning and the ability to utter and comprehend novel expressions.

All in all, we believe this book well represents some of the basic lines of work for extending cognitive semantics — theory construction, new empirical domains and formal modeling on a computer.

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Contents

Semantics as Meaning Determination with Semantic-Epistemic Operations

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1. Introduction

This paper develops and summarizes an approach to semantics which has so far only been available in Swedish, cf. Allwood (1989). The approach is characterized by the fact that it is cognitive, dynamic and context-sensitive. Meaning and concepts are primarily taken to be cognitive phenomena and are studied in terms of operations on information rather than as static entities. The operations are context-sensitive, so that meaning is seen as determined by operations which are sensitive to and make use of linguistic and extralinguistic context. The 1989 paper also gives an analysis of the nature of meaning and of concepts and of the relation between that analysis and classical theories of meaning. Ways of determining concepts and meanings are discussed, and a number of conceptual or cognitive operations for doing this are proposed. There is also a discussion of the linguistic counterparts of these operations and of how they can be used to determine the meaning of linguistic expressions in context. Finally, the paper presents a number of examples of how different linguistic constructions can be analyzed.

2. Background

The approach makes the following assumptions:

i. All conventionalized linguistic expressions (morphemes, words, idioms, phrases etc.) are connected with "meaning potentials", cf. Rommetveit

(1974). A meaning potential is basically a person's memory of the previous uses of a particular expression and can be seen as the union of all the information the person can associate with the expression. The semantic part of this information will include both what is sometimes called "encyclopedic" and "lexical" information concerning the phenomenon the expression refers to or is otherwise associated with. Philosophical arguments for this position can be found in Quine (1953), and more linguistically flavored arguments can be found in Haiman (1980) and Langacker (1987).

ii. When used, a linguistic expression activates its meaning potential. The context-free meaning of a linguistic expression is seen as an activation potential, i.e. as a potential to activate (parts of) the meaning potential associated with a particular expression.

iii. The actual meaning of the expression is determined through cognitive operations, the function of which is to achieve compatibility between the meaning potential of a particular expression, the meaning potential of other expressions, and the extralinguistic context. Actual determinate meanings of linguistic expressions thus result from partial activations of the meaning potentials of the expressions guided by cognitive operations.

iv. A subset of the operations can be characterized as semantic-epistemic operations, i.e. as operations which have both a linguistic expression and a conceptual-epistemic effect. It is these operations which motivate the use of the term "semantic-epistemic operation". The basis for these operations are cognitive operations such as discrimination, similarity abstraction, typification and reification, which exist independently of language but are expanded and elaborated by being connected with language.

v. The linguistic expressions of the semantic-epistemic operations are mostly what are known as "syncategorematic" expressions, e.g. conjunctions, prepositions, pronouns, quantifiers, some adverbs, some interjections, inflectional and derivational affixes.

vi. Another part of the vocabulary is made up of "categorematic" roots and stems (the roots and stems of nouns, verbs, adjectives, and some interjections and adverbs). The meaning potentials of such roles are claimed to serve as arguments for various semantic-epistemic operations. The interplay between the meaning potentials of categorematic roots and stems and syncategorematic operations is further claimed to be a major facet of

linguistic competence, playing an important role in the production, comprehension and acquisition of language.

Below I will illustrate this by first discussing two of the eight types of semantic-epistemic operations proposed in Allwood (1989). I will then illustrate these two types of operations by examining their role in the determination of the concepts of conflict, war and peace.

In Allwood (1989), eight types of semantic-epistemic operations were proposed. Each type includes a set of operations, making up a total of about 90 operations. The operations are linguistic and/or cognitive regularizations of underlying spontaneous cognitive processes. Each operation can be seen in two modes, as a process and as an end state, with a category resulting from the operation. We might say that all the operations can be seen both as processes and as products resulting from these processes. The types are the following:

i. Basic semantic-epistemic categories
ii. Basic conceptual structure
iii. Anchoring in time and space
iv. Relations
v. Processes
vi. Roles derived from relations and processes
vii. Properties
viii. Quantity, modality and evaluation

Below I will now try to illustrate the approach by discussing two types of operations:

i. Basic semantic-epistemic categories and
ii. Roles derived from relations and processes

The operations can be jointly or successively applied to meaning potentials in a way which sometimes involves reiteration or recursion.

To avoid confusion, however, let me first briefly comment on the types which are not illustrated in this paper. Under the heading of "basic conceptual structure", one can find, for example, operations of typification, part-whole structure and instantiation.These can be used together with basic categorization operations to elaborate and give a concept further structure. Under the headings "relations", "processes" and properties", one can find operations which can be used together with the basic category operations of "relations", "processes" and "properties" to further specify these categories. Operational

types (iii), (vi) and (viii) are, in a similar way, used to further elaborate and structure concepts in the contexts where this is relevant.

3. Basic semantic-epistemic categories

Language provides support for the conceptual structuring of the world in many ways. One of them is by providing support for a fundamental classification of real phenomena. Below, I will present six categories which have turned out to be useful in conceptual-semantic analysis of many languages. They have also often been pointed out by philosophers engaged in conceptual analysis, cf. Aristotle (1938), Kant (1975), Husserl (1913), Barwise and Perry (1983).

The six categories are not, in the present approach, primarily assumed to be ontological. Instead, they are assumed to be semantic-epistemic, i.e. conceptual categories supported by linguistic mechanisms. Whether they also have an ontological status is left open. The categories are the following:

i. Entity e.g. substances like *water*, concrete objects like *trees*, abstract objects/substances like *freedom*, collective objects like *police*, holistic objects like *nature*
ii. Property e.g. *blue* or *strong*
iii. Relation e.g. *between* or *and*
iv. Process e.g. *run* or *give*
v. State e.g. the state of *being strong* or the state *that X is between Y and Z*
vi. (Course of) events e.g. single events like *X closed the door*, and courses of events like *building a house*

The relations between the categories can be depicted as in the following figure:

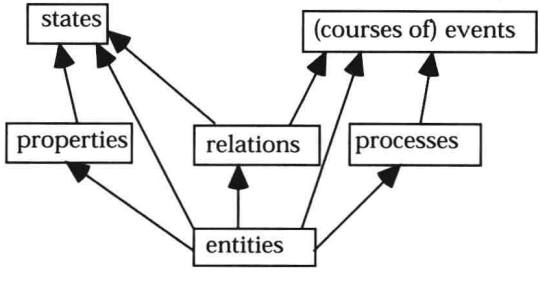

Figure 1. Relations between semantic-epistemic categories.

The different types of entities are regarded as the base of the categories. They serve as bearers (or arguments) of properties, relations and processes. When entities are combined with properties or relations, the result is a state. When they are combined with processes or dynamic relations, the result is an event or a course of events. The arrows going directly from entities to states or courses of events are there, since, as we shall see below, it is possible, by a process of repeated abstraction and reification, to linguistically create entities which encapsulate states or courses of events.
From a linguistic point of view, it is convenient to divide the categories into basic and derived, simple and complex in the following manner:

1. *Basic categories*

A:	**Simple**		
	Entity:	objects	e.g. tree
		substances	e.g. water
		collections	e.g. police
		holistic	e.g. nature
	Property:		e.g. blue, strong
	Relation:	static	e.g. in, and
		dynamic	e.g. give, hug (Dynamic relations are also classified as processes.)
	Process:		e.g. run, give
B:	**Complex**		
	State:		e.g. X is blue
	(course of events)		e.g. X closed the door, X built a house

2. *Derived categories*

Entity:	blueness, strength, inclusion, running
Property:	watery, natural, included, running
Relation:	bluer than, being in love with
Process:	to water, strengthen, include

The derived categories are linguistically derived from the basic categories by iterative (recursive) morphological or syntactic processes. Structurally this means that the semantic-epistemic categories themselves should be seen as

operations which can be applied to sensory (cognitive) input to support a basic linguistic level of categorization of cognitive and sensory data.

It is not assumed that such categorization must always be supported by language, or that it must take place at all. Perception can involve non-linguistically organized experience and even non-conceptual experience. The term "basic" here primarily refers to the fact that, linguistically, we are dealing with morphologically simple roots rather than derived or compounded stems. It is not assumed that such roots always correspond to cognitively basic structures. They can be associated with one or more different processes and products of typification, e.g. prototypes, stereotypes or ideal types (cf. Allwood 1989), but do not need to be. Thus, rather than seeing prototype formation (cf. Berlin and Kay 1969, Rosch 1977 or Lakoff 1987) as the fundamental mode of cognitive organization, it is seen as one of the important types of cognitive operations which are compatible with language.

Semantic-epistemic category operations can be applied either to categories on the basic level or to categories on a derived level to form new derived categories. From a conceptual-semantic point of view, this is achieved by a combination of the general cognitive operations of instantiation, abstraction and reification with the operations which correspond to the semantic-epistemic categories and with additional semantic-epistemic operations based on similarity or causality. Compare, for example,, *watery*, which has been formed by similarity-based property extraction from the substance water, or *blacken*, which has been formed to allow an association of a causative or inchoative relational process with "being black" as a resulting state.

The nature of the linguistic processes is not the same in all languages. In Swedish, for example,, *blacken* would correspond, on the one hand, to *svärta* (cause to become black) and, on the other hand, to *svartna* (to become black). In English, to maintain this distinction would require the use of syntactic rather than morphological means, e.g. "cause to become black" and "become black", respectively. In Chinese, most derivations that in English or Swedish are done with the help of morphology would be done by compounding or syntax.

4. Roles derived from relations and processes

Language does not only support the formation of basic semantic-epistemic categories, it also supports the act of relating entities through static or dynamic

relations (processes). In principle, each expression of a static or dynamic relationship between entities, when it is used, highlights properties of the entities which are required for the relation to be applicable and make sense. Simultaneously, compatible properties of the relation and the entities involved are highlighted. The properties which by a particular process or relation are required for a specific argument can be called the role constituting properties. Since there is no a priori limit to how fine-grained these properties may be, there are, in principle, as many roles as there are different relational expressions. It is, however, possible to generalize and to create a list of role types. (This list can be short or long.) In Fillmore (1970), a fairly short list was proposed, while Allwood (1989) suggested a slightly longer list, which is presented below. The roles are grouped together if they have a common component. Since they also have differentiating components, they can be separated whenever there is a need for this.

A. Cause - motive - reason - origin
B. Result - function - product - effect
C. Direction - purpose - goal
D. Need (of agent, instrument, process, patient)
E. Object - material
F. Agent (agent types in e.g. perception, cognition, emotion or different types of movement)
G. Potential (of e.g. agent, instrument or process, such as dispositions)
H. Resource (resource agent, resource source)
I. Patient - other participants (who potentially can become agents)
J. Instrument
K. Manner - organization
L. Surrounding (except time and space), e.g. physical, social, generic and unspecified

The list is not exhaustive but includes some of the most important role types. Since the role designations are somewhat general and vague, explicit definitions are needed to make the roles mutually exclusive. The roles can be used to distinguish different kinds of processes from each other, e.g. the criterion of intentional control (i.e. possible agency) can be used to distinguish activities that require intentional control from other processes. We can picture the roles as in Figure 2.

Each relation/process highlights a specific set of roles. For example,, in