

## **Review of Sebastian Löbner (2013), *Understanding Semantics* (2. rev. ed.) (Taylor&Francis Ltd.).**

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**The following is a translation of my German review** of the German version of this second edition which appeared two years later (Carstensen, Kai-Uwe (2017): **Rezension von "Löbner, Sebastian (2015): Semantik: Eine Einführung. 2., aktualisierte und stark erweiterte Auflage. Berlin/Boston: DeGruyter", *Linguistische Berichte* 250, 247-262).**

Note that each edition of the book originally appeared in English and only later in a German version. The versions are nearly identical, so the German review of the second edition applies to the corresponding English version, too.

The translation back to English is not necessarily word-by-word, but mostly equivalent. I have marked the few exceptions of notable differences, as well as comments, by brackets („[...]“).

Comments are welcome!

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With respect to text sorts, the following text – a review of the second edition of Sebastian Löbner's introduction to semantics – is a hybrid between review and experience report. For years, I have been performing my German introductions to semantics based on chapters of his book, since this year with the second edition. This indicates that I regard it as very appropriate for this purpose. Yet, there are some critical aspects that might be overlooked in cursory readings. The following discussion makes it possible to go into details that would be omitted in corresponding shorter reviews.

Löbner's book is exceptional in at least four respects. First, it clearly distinguishes the three important levels ‚linguistic expression‘, ‚conceptual meaning‘, and ‚things of the world‘, makes the elements on each level identifiable, and points out their relationships. His opinion on this is even better expressed in the preface of the German version: „I regard this distinction as the alpha and omega of each semantic consideration and therefore attach great importance to a clear terminology“ (my translation). I fully agree with him on this, as terminological flaws definitely lead to lack of clarity, impreciseness, mistakes and misunderstandings, and ultimately to incomplete mastering of this field by the students.

Second, the book (especially with the second edition) covers most of the semantic phenomena. That is, Löbner does not (like many other introductions) focus on either lexical or compositional semantics, but treats both subfields with equal measure (although lexical semantics actually uses much more textual space due to the sheer number of its phenomena). In doing so, his level of detail can be regarded as unrivaled among introductions to semantics (both in in depth and breadth of treatment).

Third, semantics is viewed in the book both from the cognitive and the formal perspective. Again, this is remarkable, because books interested in lexical semantics use to choose the cognitive perspective (remaining informal), while books interested in compositional semantics typically are formal and non-cognitive. At the same time, Löbner takes a clear stance towards the role of cognition in the preface: „linguistic meaning is ultimately a matter of conceptualizing the things we talk about“ (and is even more clear in the preface of the German version: „This introduction starts off with the intuition that meanings are something conceptual ‚in the head‘ of a language user“). This attitude is in stark contrast to formal semantic introductions in which

„semantics“ is restricted to the compositional aspect of meaning and in which the cognitive level of conceptual meaning descriptions is regarded as irrelevant and misleading. Such a view is advanced for example in Zimmermann/Sternefeld (2013), who without further ado ignore (or leap backwards over) a century of insights in modern linguistics and cognitive science, praising a correspondingly old view according to which a mentalistic semantics must be marked as „psychologistic“, „associative“, „subjective“, „restricted“, and „privative“ (cf. the section „A Farewell to Psychologism“ in *ibid.*:60f). I do not know of any field holding a similar view (i.e., to negate the naturalness of some phenomenon and to try to explain it on a different level), except parapsychology.

Fourth, the book is didactically exemplary in large part. Aside from informative depictions and tables, good examples, clear definitions and helpful exercises, it is especially the well-structured organization of the content and its lucid textual presentation that facilitate and secure understanding. [translation of exceptions in the German version skipped]

A short note on the (development of) the structure of the book. The first edition was divided into two parts: „Basic concepts and phenomena“ with chapters on general aspects of meaning and semantics, kinds of meaning, ambiguity (meanings and readings), the relationship of meaning and logic, meaning relations, and predication; „theoretical approaches“ with chapters on decomposition (meaning components), cross-linguistic aspects (meaning and language comparison), cognitive semantics (meaning and cognition), and finally on sentence meaning and formal semantics.

In many respects, the second edition is improved and extended (except some (added) typos and bugs in figures and text). Apparently, some of the critical points put forward in Bohnemeyer (2005) regarding the first English edition were respected here, to the benefit of the book. Typographically, the text is better readable, and the figures and definitions are optimized (the latter being more exposed). Löbner also supplemented some chapters with small, clarifying sections. Most notably, he added whole chapters and restructured the book accordingly. The following chapters are new: „meaning and context“ (chapter 4) with subchapters on „deixis“, „determination“, and „presuppositions“ (~44 pages), „verbs“ (chapter 6, ~33 pages), and „frames“ (chapter 12, ~24 pages). With these extensions, the second edition (in which the coarse two-part division has been given up, by the way) gives an impressive overview of the field of semantics on introductory level.

So far, so (very) good. Now I would like to address some aspects in more detail. For example, the **structure** of the first edition was entirely satisfactory insofar as the first part perfectly matched the temporal constraints of my seminars. I use to start with an overview part on the development of (cognitive) semantics and with a motivation for compositional semantics (I'll come back to that). I typically skip an elaborate treatment of formal and more marginal topics (cross-linguistic aspects, feature-based approaches, aspects of cognitive semantics), which cannot be dealt with in the seminar anyway if all aspects are expected to be discussed and understood in some depth.

With the second edition, the following happens: the first two new chapters „disturb“ the well-rehearsed seminar schedule and hence are skipped. Apart from that, they appear misplaced as specific/intricate phenomena like deixis, quantification, presuppositions and aspect would have to be treated before basic/canonical topics like meaning oppositions or lexical fields. Besides, the chapter 5 „predication“ still is placed<sup>1</sup> after the specific „meaning and context“ issues while it should be closer to chapter 2 where reference and denotation are discussed. Since Löbner does not offer possible and reasonable walkthroughs for seminars himself, I would propose to regard the new chapters together with „meaning and language comparison“ (realistically, „formal semantics“, too) as special/advanced topics that can be left out (at least initially) and that should appear later in a new edition of the book. Earlier, and more prominently, I would expect a chapter that displays the historical development from classical feature-based to cognitive semantics, and from logical to

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<sup>1</sup> I am correcting a mistake in my German review here, where I wrongly assert that „predication“ has been placed aback in the book. The opposite is true: it is now chapter 5 instead of 6. Still, it comes too late in my opinion.

formal compositional semantics. Some of the content certainly can be supplied by chapter 9 „meaning components“ and by chapter 11 „meaning and cognition“, the rest of which would become advanced topic( chapter)s.

The clear distinction of **levels** (expression, utterance and speech act) **and dimensions** (descriptive, social, expressive) **of meaning** is excellent in itself, but is also realized didactically very good. Löbner makes subclassifications clear(er) recognizable, like those of strong expressions (*tough guy*), negative/pejorative/swearing expressions (*fucking guy*) and positive expressions (*nice guy*). By assuming non-descriptive dimensions of meaning, the term *connotation* – often overloaded with these aspects – is reduced to mere cultural associations which, when negative, can be regarded as the source of euphemisms. In addition to that, Löbner impressively shows with Japanese examples that the *descriptive* meaning of a sentence can be determined by the *social* aspects of meaning of some of its parts (section 2.3.2). Finally, he is able to show that semantics *cannot* be reduced to the denotational/truth conditional relationship of language and world (unlike what is typically assumed in formal semantics), because there can be differences in other dimensions of meaning (cf. subchapters 2.6 and 7.6).

With this very plausible approach, Löbner extends semantics by aspects that are also investigated in pragmatics, which also holds for other topics of the book (deixis, presuppositions, speech act meaning). However, while some introductions to pragmatics [the German introduction of J. Meibauer is mentioned in the review here] have a separate chapter in which the relationship of the field to other fields of linguistics/grammar is explicitly discussed, something of that kind (e.g., a chapter titled „The relation of semantics and pragmatics“) is missing. For example, it might not be so evident (and therefore necessary to discuss) to treat an expression like *ouch* as one *having* expressive meaning, because in pragmatics it is treated as one *indicating* an expressive speech act. Likewise, a (exclusively) *semantic* analysis of presuppositions has not turned out to be helpful/successful, either.

The treatment of „ambiguity“ is also exemplary, in general. An exception of that is the presentation of **vagueness**. Here, Löbner tries to prevent the impression that vagueness has anything to do with unsharp boundaries of categories (especially when interpreted as graded membership in those categories), an alleged assumption of the so-called *prototype semantics* he extensively discusses (and criticizes) later in the book. Yet his definition „A lexical meaning is vague if it allows for flexible adaption to the given context of utterance“ is equivocal and quite incomprehensible for beginners. Take *quadrilateral*, for example. Shouldn't this be regarded as vague according to the definition, as its meaning can be flexibly adapted to rectangles, squares, rhombs etc.? This, however, is in contrast to the fact that the word('s meaning) is not vague!

Löbner himself argues mostly with dimensional adjectives like *big* as exemplars of vague expressions. However, the distinct value of vagueness in semantics becomes more evident if it is detected in other expressions, too, for example in „normal“ nouns like *mother* (as cognitive semanticists do). Imagine a woman who marries a man with children. If this marriage is divorced, is she (still) a „mother“? Irrespective of the details of the expert discussions [...], a beginner should be made aware of this specific lack of clarity. If „unsharp boundaries“ is the wrong notion then perhaps „unclear boundaries“ does the trick. Besides, Löbner has the means with his semantic terminology to do it, for example: „A lexical meaning is vague if in some case it is unclear whether an entity is described by it or whether it is in the denotation of the corresponding expression“.

The presentation of **meaning shifts** is also excellent in general, especially so in the description of their relation to polysemy. There are two aspects that bother me here, however. First, Löbner presents „differentiation (of meaning)“ as a subcase of „meaning shift“ while I would have thought both to be incompatible. Second, he fails to mention the fundamental problem of distinguishing meaning shifts and meaning differentiation. While he uses the different readings of *university* to illustrate metonymic shifts, this is the classical example of Manfred Bierwisch for *differentiation*: Bierwisch simply denies that a primary meaning can be clearly identified which might serve as a start for a meaning shift. Confusingly, this stance is implicitly represented in the text: „Let us

*assume* that the word lexically denotes a certain kind of educational institution.“ (p. 51, my emphasis [in the German version, *lexically* is even replaced by *primarily*]).

I have already emphasized that Löbner rightly attaches importance to a clear **terminology**. Differentiating the levels language, concepts, and world, he manages to clarify the meanings of technical terms like *expression*, *meaning*, *concept*, *reference*, *denotation*, *entity*, *category*, *predicate*, *argument* and so on. [in the German version, a paragraph criticizing the unclear use of *Begriff* follows].

In the chapter „predication“, Löbner uses established terminology that is evidently inadequate. After presenting the fact that some expressions *refer* to entities of the world, he discusses the fact that others **predicate** on entities. The latter are *predicate expressions* (language level) of *predicates* (concept level). The reader then is astonished when realizing (and the lecturer is having problems to explain) that *arguments* are not placed on the concept level but on the world/referential level (as is also depicted in figure 5.4, p. 110). Earlier in the book, the synonymy of *complement* and *argument term/expression* is introduced. From that it follows (wrongly!) that a complement of a verb „expresses an entity“. Instead it would be right to place *argument* (as the term corresponding to *predicate*) on the conceptual level, and to change the manner of speaking: predicate expressions might „predicate on referents of argument expressions“ with the meanings of the argument expressions being the (conceptual-level) arguments of the corresponding predicate. [to be more explicit on that point, there are no conceptual representations of entities in Löbner’s scheme!] Also, dictions like „how many arguments a given lexical item has“ (p.111) should be systematically changed, and the book should be scanned for similar linguistic inaccuracies, for example „the term **event** is commonly used in semantics for the referents of verbs“ (p. 113, emphasis in the text): is it the verb or the verb phrase that refers?

In the same chapter „predication“, Löbner introduces different **types of arguments**. First, the „**normal**“ arguments of a predicate, then **referential** arguments, the latter being presented with respect to nouns and only later with respect to verbs. This presentation follows plausibly the historical development of these theoretical constructs, yet it is confusing for novices. Unfortunately, Löbner does not know newer semantic works according to which the assumption of referential arguments for other parts of speech (adjectives, adverbs, prepositions) is more than probable (cf., e.g., Carstensen 2013, 2015). Accordingly, the presentation of this type of argument could be presented didactically in a more general way.

For adjectives, which borrow their argument from their respective noun, Löbner introduces a third type: „In cases like these, I propose to talk of a **parasitic** argument“ (p. 110, emphasis in the text). This proposal is unfortunate in several respects. As examples like *a given promise* show, this type is not restricted to pure adjectives but in that case (of deverbal adjectives), one would then have to assume a *change of argument type* [from normal to parasitic]. [...] In predicative constructions, there is also a change of argument type according to this logic: with APs or PPs from parasitic to normal, and with NPs from referential to normal. In the case of restrictive relative sentences, this classification does not fit at all, because the relative pronoun as a complement already provides a normal argument while parasitically using the referential one of the modified noun. Actually, therefore, the situation may be better conceived as follows: there are only two types of argument (normal, referential), but instead there are various grammatically determined kinds of *functor-argument relationships* (e.g., complementation, modification). According to this view, non-referential argument( variable)s can –in semantic composition– be saturated/instantiated by the referential variable of a complement or a modified head.

**Logic** (especially propositional and first-order logic) is a central topic in semantics and basic for its understanding. It is all the more alarming that its presentation in the book is insufficient for more than one reason. I will be talking about the *order* and *completeness* of its presentation, and about *understandability* in general.

Although first-order logic or **predicate logic (PL)** is more complex than propositional or **sentential logic (SL)**, PL is introduced in chapter 5.5 but SL not until chapter 7.4. This happens so

sudden that inexperienced readers are left in the dark about what (a) logic is, what it is good for, and what these strange notations (mixtures of partly bold-printed language-like words, and other symbols) mean. While PL is used on page 120 only as a demonstration of a formal account of predication, chapter 7 („meaning and logic“) only (!) introduces SL. It is not until chapter 13 that PL is treated in more depth.

One could call that didactically clever. If the emphasis is on correctness (as in the case of terminology), however, PL-formulae like those on page 121, in which variables are NOT bound by quantifiers (which haven't been introduced so far, by the way), are *cardinal errors*! Although some details of PL follow in chapter 13, even there only the existential quantifier is introduced, which is a bizarre restriction of semantic phenomena, as if only homonymy, but not polysemy, would be treated in the book. Yet it is just the different structure of formulae with quantifiers (conjunction with the existential quantifier, implication with the universal one) that every student of semantics should have seen and understood.

Löbner starts the chapter „meaning and logic“ with a semi-philosophical and quasi-donaldistic discussion of sentences like *Donald Duck is neither a duck nor a human being* (p.168) in order to introduce important concepts like ‚contradiction‘, ‚truth‘, ‚polarity‘, ‚negation‘ etc. On this basis, he defines logical properties of sentences (contingency, logical truth/falseness) and then logical relations between sentences (implication, equivalence, contrariety, contradiction). This procedure seems very plausible, and the following characterization of word relations via sentence relations even ingenious. Above all, Löbner not only clarifies the relationship of logical and meaning relations but also shows that and why the latter cannot be reduced to the former. He laudably ends this chapter with a discussion of the effect of **presuppositions** on the interpretation of sentences (recall that presuppositions have been included as a new topic in chapter 4).

From a practical point of view, and considering the understandability of SL, I regard this chapter as a failure, however. My first reason for this is based on the experience with discussing the donaldistic examples in the seminar. Quite often, it ends in a disaster when some student tries to reproduce the text with these examples, which are *not* easy to talk about (Donald as a duck acting like a human being in a non-real world). Those who did not read (and understand) the text before (and those are the most) usually are none the wiser afterwards.

Second –addressing the order of presentation–, Löbner explains logical properties and relations without having made clear what (a) logic is at all. What sounds like a minor fault actually cannot be excused. For example, all possible logical properties are explained by means of truth tables (1 and 2 for TRUE and FALSE), which are shortly introduced on page 173. Only later, the effective use of truth tables in SL is described („The truth conditions of complex SL sentences can be given in **truth tables**“, p. 184, emphasis in the text).

Third, this order is characterized by the fact that the semantic logical properties/relations are presented *before* the syntactic aspects of SL. Such a presentation with the corresponding symbols „=>“, „<=>“, „->“ (note that „<->“ is missing) as well as the discussion in terms of the „possibility“ of truth value combinations is hard to understand for beginners (as it is not explained *ad oculos* but on a meta level).

Fourth, there are alternatives in introducing logic one of which I actually practice. At some point after the basic parts, I usually first conduct a session „introduction to SL“ with the following structure/order of presentation: logic as a tool for formal representation and inference, examples of typical inferences (and fallacies), formalization (in general), SL-syntax, formula construction, truth functionality of logical connectives with truth tables, interpretation of complex formulae by means of these tables, demonstration (!) of logically true (column of ‚1's), logically false (columns of ‚0's) and contingent (mixed columns) formulae. It is mostly even possible to explain logical equivalence, logical entailment, and valid inference schemata on the basis of tautologies of corresponding formulae (typically ending with examples of logical inference using natural deduction). All that to build a theoretical frame in which new logical concepts can be anchored and better understood.

Of course, it is not necessary to go down that road. Instead, one *can* start with simple examples („Nero is dead or Nero is not dead“ vs. „Nero is dead and Nero is not dead“) and use them for the demonstration of basic logic principles. One would then introduce SL, and finally define entailment („implication“) as tautological subjunction, logical equivalence as tautological

bisubjunction (bisubjunction is not introduced in the book, however), as well as contrariety and contradiction, in an analogous manner. On that basis, it will probably be easier in a seminar for the teachers to discuss the interpretation of donaldistic sentences and for the students to understand the possibilities of truth-value constellations for some logical relation.

Generalizing a bit, one could and should assign logic a central status in the book. This might be realized with a chapter placed clearly before the advanced topics where the basics of SL and PL are explained completely (to the extent necessary for beginners) and intelligibly. In such a chapter (somehow an extension of chapter 7 „meaning and logic“), the lookaheads (chapter 5.5 „Predicate logic notation“) and latecomers (PL syntax in chapter 13) would be integrated.

Unfortunately, a major part of chapter 11, „meaning and **cognition**“, is a prime example of a straw man argument. Löbner spends a lot of textual space by presenting the so-called „**prototype theory**“ as an approach that construes categorization of an instance/exemplar as a comparison to the prototypical central exemplar („prototype“) of some category. He therefore claims something that George Lakoff (as early as) 1987 (by citing Eleanor Rosch from 1978) clearly refuted: „To speak of a *prototype* at all is simply a convenient grammatical fiction: what is really referred to are judgments of degree of prototypicality. [...] Prototypes do not constitute any particular processing model for categories“ (Lakoff 1987: 44, emphasis in the text). This is acknowledged by Löbner: „Meanwhile, many cognitive semanticists have abandoned the original PT model. [...] In this volume, we will not go into these more detailed developments of cognitive semantics.“ (p. 284). Yet he still argues with the outdated 30-year old conception of prototype theory, which is simply unscientific.

I already mentioned (and will not dwell on that further) that the discussion about **graded category membership to linguistic/semantic categories** in Cognitive semantics is not correctly reflected in Löbner’s book, which renders his presentation of *vagueness* unsatisfactory. With respect to a similar question of membership and delimitation, the characterization of **semantic knowledge**, I agree with Löbner that it can not and must not be *identified* with cultural and personal conceptual knowledge („world knowledge“). This is one of the basic assumptions of „two-level semantics“ (not mentioned by Löbner, by the way, cf. Lang/Carstensen/Simmons 1991 and Lang/Maienborn 2011) that actually may not be shared by all adherers to Cognitive semantics. One should, however, have a close look at what is *meant* by those who do not agree. In my opinion, this is often about the classical question concerning the *inventory* of the different kinds of knowledge, that is, concerning the delimitation of both. Here, now, a clearcut boundary cannot be drawn. For example, it can be the seemingly personal, subjective, hard-to-define feeling of being well cared for that is part of the family resemblance structure of the meaning of *mother*. This is why the divorced second wife still may count as a mother, if it applies to the children (let me add a fitting quotation: „Daddy, you’ve been a mother to me“, *Ankle deep*, Tom Petty). Correspondingly, such a flexible view on what counts as „semantic“ is quite incompatible with the typical notion of (a specific set of) semantic features/markers that *define* the semantic level.

The question what characterizes an entity as a referent of some linguistic expression also appears with concepts of individuals as meanings of names. Neuropsychological results (especially those related to the *Capgras syndrom*) show that it is often very personal emotional associations that contribute to the fact that the referent of some *Peter* is regarded as PETER, and not as some doppelgänger who just looks identical to him.

Obviously, this whole topic is extremely complex (and some aspects, like the discussion of Putnam’s discussion regarding expert knowledge, or stereotypes, are missing in the book). Löbner’s discussion of *apple juice*, a regular compound, as an example for a very abstract, simple semantic analysis (<juice made of apples>) may therefore be quite insignificant, because such an analysis might only pertain to the compositional meaning of the transparent composition, rather than to the meaning of the whole expression. Or else, how would we know when some liquid made of apples must be called „apple juice“, when „apple cider vinegar“?

Furthermore, the chapter „meaning and cognition“ lacks a subject that has become more and more important since the 1980ies: the „theory“ theory (or: „**mini theories**“). This subject is already addressed in Lakoff’s book title (hence: at least 30 years old): it concerns some expression

(*balan*) in Dyirbal, whose meaning cannot be captured by some descriptive content, but only in terms of explanatory principles given some specific linguistic/cultural context. Research, especially in language acquisition (cf. Szagun 2013), has shown that concept formation and meaning acquisition are not exclusively determined by perception, but are embedded in relational, functional contexts („something is an X because/in order to/...“) from early on. Accordingly, „mini theories“ can be regarded as complementary to what can be explained with feature and prototype theories. Besides, meaning does not appear from nowhere, but must be learned by using words in specific contexts (cf. the work of Tomasello) and generalized from different knowledge sources over time (i.e., with experience), which especially applies to the meanings of abstract words. The inadequate treatment of „meaning and cognition“ in the book is the main reason why I start my seminar with a separate overview of lexical semantics that hopefully clarifies some of these aspects.

As a cognition oriented linguist/semanticist I should be very pleased about chapter 12 („**Frames**“) in which Löbner, having settled the „meanings are concepts“ standpoint, tries to explicate „what these concepts are like“ (p. 301). It should be startling, therefore, that he does not succeed.

Löbner begins by saying that „[t]here is one theory of concepts in cognitive psychology which has come up with a concrete model of concepts: Lawrence W. Barsalou's theory of cognitive frames“ (ibid.). He then goes on by stating that ‚frame‘ „belongs to a family of similar notions [...] that came up in the 1970s in the fields of artificial intelligence and cognitive science.“ (ibid.) and says: „In the literature on artificial intelligence or cognitive linguistics, no precise formal definition[sic] are provided for a general format of such chunks of knowledge.[...] Barsalou was the first to come up with a model of considerable precision and with the claim that this is the actual format in which our minds organize concepts to represent the categories of things and phenomena in the world.“ (p. 302). So many quotations that I can say: such a nonsense.

First, there are two main different conceptions/uses of *frame*. One can be attributed to the linguist Charles Fillmore (cf. Fillmore 1977) and is basically semantic (and has become very popular in linguistics). He points to the fact that linguistic expressions impose a certain perspective on non-linguistic information, for example, that a certain change in ownership („scene“) can be portrayed either as selling or buying (each „framing“ the scene differently). The other conception by artificial intelligence (AI) researcher Marvin Minsky (Minsky 1974) characterizes (mainly, but not exclusively) *non-linguistic* knowledge about objects or situations to be schematic, structured, and connected in network-like structure, that way constituting frames for possible instances of a concept, or for plausible inferences given partial knowledge. Frames of this kind are the attribute-value structures which Löbner presents in his book, although he uses them in Fillmore's sense.

Second, there are, of course, different concept theories in cognitive psychology, one is rather spoilt for choice. Note that one has to approach cognitive phenomena on different levels (e.g., Marr's levels): while schematicity is an aspect on the knowledge level, it corresponds to different notions on the representation level (frames, semantic networks, logical representations, production rule systems), all of which may be somehow realized on the implementational level (symbolic, sub-symbolic etc.), cf. Carstensen (2010). Barsalou –in the papers cited by Löbner (both of them from the beginning of the 1990ies!)– rather takes up the multifaceted developments of the 1970ies and 1980ies, and integrates the various insights of the cognitive science community. The honor of having invented the first encompassing frame model, however, is due to Minsky.

The statement that AI has produced no precise formal definitions is simply wrong. Unfortunately, linguists in my experience often judge AI by unreliable statements made in glossy brochures or by popular authors (Kurzweil and the like), while in fact the field –as a sub-field of informatics– is as respectable as, for example, dermatology is within medicine, or astrophysics is within physics. At any rate, in the mentioned time period there were zillions of specific proposals for representing concept structures, among them a representational language **FRL** („Frame Representation Language“, cf. Roberts/Goldstein 1977). Furthermore, at least since the 1980ies, attribute-value structures belong to the methodic formal standard repertoire not only of AI, but also of computational linguistics and even of linguistics (just have a look at Head-Phrase-Structure Grammar).

Third, it is *not* the case that frames can be regarded as the Holy Grail in the search for a remedy for all representational problems. After many failures in designing frame structures, it turned out that one has to respect subtle distinctions within a *structural layer* of attributes and values (relating types and tokens, or characterizing fixed, variable, or *default* values). For example, it is often necessary to specify typical values for an attribute that may be overwritten in some context. In modelling knowledge of apple orchards, for instance, one may have to specify an attribute „soft drink“ with a typical value „apple juice“, where the latter might be overwritten with „grape juice“ as a possible exception. The (linguistic, definitional) concept ‚apple juice‘ must not allow such an exception, of course (which happened in early knowledge representation systems, however). Brachman illustrates this point with the following joke: „Q: What’s big and gray, has a trunk, and lives in the trees? A: An elephant – I lied about the trees“ (Brachman 1985).

Furthermore, there was a famous frame-based system –Cyc (Lenat/Guha 1989!)– that tried to prove the universal applicability of frames, but failed. Fact is that the list of problems does not get shorter once the frame format has been chosen. Among other things, the so-called *symbol grounding problem* appears: the question what all these attribute and value names (which can be arbitrarily chosen) *mean*. It also became apparent that frames are equivalent to –admittedly less structured– logical representations (although even first order predicate logic is not powerful enough to capture all linguistic phenomena).

Despite some optimism, Barsalou himself is quite careful with respect to the prospect of his proposal in the cited papers: „So far, the evidence for a fundamental frame-producing mechanism in human cognition rests mostly on informal examples and intuition“ (Barsalou 1992:67).

Fourth, reference to these papers is simply outdated because Barsalou meanwhile has undergone some kind of a Copernican Revolution. In Barsalou (1999), he said goodbye to the idea of a level of conceptual representation that is *independent* of sensorimotor aspects, although such a conception of *amodal* knowledge representation structures had been an axiom of standard concept theories. Presentations of frames as in Löbner’s book are rather related to such an GOFAI („Good Old Fashioned Artificial Intelligence“) approach in his recent publications, somehow halfheartedly, because he still uses the term *frame* and portrays linguistic meaning similarly. His new conception of concepts as „simulators (of perceptions)“ („simulation framework“) has found broad acceptance in the cognitive science community. Interestingly, however, it is based in part on the Cognitive semanticists (Lakoff, Langacker, etc.) discredited by Löbner. Furthermore, it negates the strict separation of abstract semantic knowledge and situation specific aspects.

It is questionable, therefore, whether frames constitute the most elaborated concept theory (and whether it can be attributed to Barsalou). It is doubtful whether frames constitute the one and only representational approach to semantics, given the simple examples discussed, the complexity of semantics (e.g., two levels, two frame concepts, polysemy), and phenomena like vagueness. Note that the examples could just as well have been presented with logic. The insinuation of the frame chapter that all these concerns are unjustified is therefore plainly astonishing.

What an irony, by the way, that I have also been a follower of Barsalou’s ideas for a long time. This applies particularly to the role of selective *attention* as an essential part of the construction of concepts. „Attention and semantics/meaning“ (cf., e.g., Carstensen 2015), however, does not figure in Löbner’s book at all.

As to chapter 13 „**Formal semantics**“, I would suppose that there are some who find it perfect: they will like the detailed, but exemplarily simplified, complex, but systemized, and complicated, but understandable, introduction to this topic. Löbner starts with an illustration of linguistic compositionality using the example of Japanese number expressions, which are most transparent in this respect. He then shortly presents the generic scheme of denotational compositional semantics, and the two-step interpretation model (language – formal language – world) in formal semantics, which in the rest of the chapter is systematically explained using a subset („fragment“) of English and its corresponding formal semantic inventory. The chapter ends with a survey of possible-worlds-semantics and a critical discussion of its scope and limits, contrasting it with mentalistic semantics.



Yet there will be readers of his book –including me– who rather find the presentation inadequate. Although the chapter has a clear didactic concept, it will hardly achieve its intended effect in each case. What may be an adequate presentation of the topic from an objective point of view, turns out to be a conceptual-terminological-typographical **information overload** for the average student. On and between the three levels there are various expressions, relations and rules that are abbreviated (**FB, IB, FR, IR, TB, TR**). This can be confusing: while FB is a set of expressions, IB and TB are mappings.

At the same time, typographical aspects (bold and italic type, underlining, small caps, two kinds of brackets, and a strange notation „| |<sub>-</sub>=x“ to which I will come back) have their special meaning. In addition to that, there technical terms like *fragment, translation, formula, interpretation, formation base, basic expressions, translation base, composition rule, translation rule, (possible, intensional, extensional) model, universe, c-predicate, m-predicate, term, proposition, individual concept, intension, extension, property, relation, (possible) world*. Finally, rule-based syntax is used, and there is a partial introduction to first-order logic.

[some nitpicking on some figures left out here]. Furthermore, the arrows labeled with **FR/TR** in these figures suggest a *constructive*/bottom-up interpretation of the rules (to form complex expressions out of simpler ones). Actually, the rules **T2, T5, T6** (p. 338) do the opposite: they *reduce* complex expressions/translations to simpler ones. This way, an intuitive understanding of compositionality gets lost before it even exists. What is more, the (usual) reader not used to principles might ask himself where all this leads to, if it is already that complex/complicated for a fragment of 13 words.

Given this state of understandability, it is hardly comprehensible why the *standard* instrument/method of semantic composition, the **lambda calculus**, is not introduced and used for the presentation of semantic functor-argument applications. Without much additional effort, it should be possible to make the *idea* of semantic compositionality much more transparent, hence understandable. This idea starts with the concept of *abstracting* from a specific argument of some predication by replacing the corresponding constant by a variable that is bound by a dedicated lambda operator (so-called „lambda abstraction“), for example, converting ‚company(ibm)‘ into ‚lambda x company(x)‘. This can be read *intensionally* (that is, as the *property* „to be a company“) or *extensionally* („the set of companies“). Next, this predicate can be functionally applied to some argument term ‚lambda x company(x)(a)‘ (so-called „beta reduction“ or „lambda conversion“), which results in the specific predication ‚company(a)‘.

Quite simply, semantic compositionality can then be explained as a straightforward procedure in which each word of some language/fragment is mapped to some expression of the lambda calculus (in the lexicon), and in which the semantic composition of the words in a sentence happens as the application of lambda conversion along its syntactic structure. This results in a complex formula without lambdas corresponding to the meaning of the sentence. One can of course easily add details to this presentation, without losing the overall idea of compositionality and without having to expect complete understanding. For example, I use to demonstrate the value and systematicity of that idea/procedure by showing and explaining various readings of *She saw the man with the telescope on the hill* with a parallel presentation of a logical and pictorial representation of the corresponding situations.

Let us now have a look at what the compositional meaning of NP and VP in a sentence (can be) according to **T1** (p. 339): ‚ $\exists x (|_{NP} \wedge |_{VP} |_{-} = x)$ ‘. Here, the strange construct already mentioned appears that is needed to bind a free variable in the composition of NP and VP semantic expressions. According to Löbner „[t]he notation ‘|... |<sub>-</sub> = x’ stands for the expression that we obtain when we insert the variable x into the last empty slot of each predicate constant within |... |.“ (ibid.), here for the subject variable. There is also a rule featuring „|... |<sub>-</sub> =y“ (inserting y in the slot of the direct object, rule **T4**) and probably „|... |<sub>-</sub> =z“ (inserting z in the slot of the indirect object).

This already is a caricature of what can be systematically realized with lambda calculus by canonical abstractions and corresponding conversions. Unfortunately, inserting the variables in Löbner’s scheme is not compositional at all, and must be performed at the end, „first the inner insertions of y and then the outer insertions of x“ (p. 340). Even worse, however, is that translation

rules like T1 and T4 are only correct for the limited fragment with (only) the indefinite determiners! Sentences like *All children are asleep* will be interpreted incorrectly, as T1 does not „look into“ the NP. This shows, by the way, that a complete treatment of predicate logic (PL) is always necessary (and how dangerous fragment-based rule systems are). According to standard PL, to wit, the semantic structure of that sentence is  $\forall x (\text{child}(x) \rightarrow \text{asleep}(x))$ .

By giving a too complex, incorrect and incomplete portrayal of formal semantics, Löbner evidently does not succeed in pointing out its effective qualities, perspectives and problems (although he addresses a few of them at the end). At the beginning of the chapter, on the other hand, he is at least clear about its status as the „main framework in which sentence semantics has been developed“ (p. 325). Although the lineage via Montague back to Frege cannot be denied, this is not fully correct, either, because in Cognitive and Computational linguistics, other approaches using *unification* have become popular: „In traditional approaches to compositional semantics, the meanings of constituents are lambda expressions, and composition happens by function application. With a flat logical form, the only role function application plays is identifying variables with each other.“ (Hobbs 2013, 785). Like many semanticists having their roots in mathematics, Löbner is still bound to the firm conviction of Richard Montague that the compositional semantics of natural language can be treated analogously to the one of formal languages, i.e., by using PL with lambda theoretic extensions in a model theoretic framework. In contrast to that, I have tried to show (Carstensen i.prep.) that the required ontological basis is not given, that PL is defective, that lambda calculus is too powerful, and that there are too many phenomena (e.g., quantification, plural phenomena) which cannot be treated satisfactorily with current formal semantics. The prominent *Generalized Quantifier Theory (GQT)*, not mentioned by Löbner at all [again a correction: it is mentioned once (chapter 4, further readings), but it is not listed in the index of the German version], is no exception in these respects.

Summing up, Löbner's book stands out because of its excellent analytic presentation and broad coverage of semantic phenomena. Both with respect to cognition and with respect to formal aspects, it shows weaknesses, however, which have to be compensated by using other sources. For an adequate portrayal of semantics, an approach is needed that brings together the insights of the participating disciplines and does not just cite them fractionally. Anyhow, the following can be granted to the book: it is a big step in the right direction, and it is the best on the market as far as I can see.

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