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7 Lexical decomposition: Foundational issues

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Abstract: Theories of lexical decomposition assume that lexical meanings are complex. This complexity is expressed in structured meaning representations that usually consist of predicates, arguments, operators, and other elements of propositional and predicate logic. Lexical decomposition has been used to explain phenomena such as argument linking, selectional restrictions, lexical-semantic relations, scope ambiguities, and the inference behavior of lexical items. The article sketches the early theoretical development from noun-oriented semantic feature theories to verb-oriented complex decompositions. It also deals with a number of theoretical issues, including the controversy between compositional and atomistic approaches to meaning, the search for semantic primitives, the function of decompositions as definitions, problems concerning the interpretability of decompositions, and the debate about the cognitive status of decompositions.

1 The purpose of lexical decomposition

1.1 Composition and decomposition

The idea that the meaning of single lexical units is represented in the form of lexical decompositions is based on the assumption that lexical meanings are complex. This complexity is expressed as a structured representation often involving predicates, arguments, operators, and other elements known from propositional and predicate logic. For example, the noun *woman* is represented as a

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predicate that involves the conjunction of the properties of being human, female, and adult, whereas the verb *empty* can be thought of as expressing a causal relation between *x* and the becoming empty of *y*.

- (1) a. *woman*: $\lambda x[\text{HUMAN}(x) \ \& \ \text{FEMALE}(x) \ \& \ \text{ADULT}(x)]$
 b. *to empty*: $\lambda y \lambda x[\text{CAUSE}(x, \text{BECOME}(\text{EMPTY}(y)))]$

The structures involved in lexical decompositions resemble semantic structures on the phrasal and sentential level. There is of course an important difference between semantic decomposition and semantic composition; semantic complexity on the phrasal and sentential level mirrors the syntactic complexity of the expression while the assumed semantic complexity on the lexical level – at least as far as non-derived words are concerned – need not correspond to any formal complexity of the lexical expression.

Next, we give an overview of the main linguistic phenomena treated within decompositional approaches (section 1.2). Section 2 looks at the origins of the idea of lexical decomposition (section 2.1) and sketches some early formal theories on the lexical decomposition of nouns (sections 2.2, 2.3) and verbs (section 2.4). Section 3 is devoted to a discussion of some long-standing theoretical issues of lexical decomposition, the controversy between decompositional and non-decompositional approaches to lexical meaning (section 3.1), the location of decompositions within a language theory (section 3.2), the status of semantic primitives (section 3.3), the putative role of decompositions as definitions (section 3.4), the semantic interpretation of decompositions (section 3.5), and their cognitive plausibility (section 3.6). The discussion relies heavily on the overview of frameworks of lexical decomposition of verbs given in article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition* that can be consulted for a more detailed description of the theories mentioned in the present article.

1.2 The empirical coverage of lexical decompositions

Which phenomena lexical decompositions are supposed to explain varies from approach to approach. The following have been tackled fairly often in decompositional theories:

- (i) Argument linking: One of the main purposes for decomposing verbs has been the attempt to form generalizations about the relationship between semantic arguments and their syntactic realization. In causal structures like those given for *empty* (1b) the first argument of a CAUSE relation becomes the subject of the sentence and is marked with nominative in nominative-accusative

languages or absolutive in ergative-absolutive languages. Depending on the linking theory pursued, this can be expressed in different kinds of generalizations, for example, by simply claiming that the first argument of CAUSE always becomes the subject in active sentences or – more general – that the least deeply embedded argument of the decomposition is associated with the highest function in a corresponding syntactic hierarchy.

- (ii) Selectional restrictions: Lexical decompositions account for semantic co-occurrence restrictions. The arguments selected by a lexical item are usually restricted to particular semantic classes. If the item filling the argument position is not of the required class, the resulting expression is semantically deviant. For instance, the verb *preach* selects an argument filler denoting a human being for its first argument slot. The decompositional features of *woman* (1a) account for the fact that *the woman preached* is semantically unobtrusive while *the hope / chair / tree preached* is not.
- (iii) Ambiguity resolution: Adverbs often lead to a kind of sentential ambiguity that was attempted to be resolved by reference to lexical decompositions. In a scenario where Rebecca is pointing a gun at Jamaal, sentence (2a) may describe three possible outcomes.

- (2) a. Rebecca almost killed Jamaal.
b. kill: $\lambda y \lambda x [\text{DO}(x, \text{CAUSE}(\text{BECOME}(\text{DEAD}(y))))]$

Assuming a lexical decomposition for *kill* as in (2b), ambiguity resolution is achieved by attaching *almost* to different predicates within the decomposition, yielding a scenario where Rebecca almost pulled the trigger (ALMOST DO ...), a scenario where she pulled the trigger but missed Jamaal (ALMOST CAUSE ...), and a scenario where she pulled the trigger, hit him but did not wound him fatally (ALMOST BECOME DEAD ...).

- (iv) Lexical relations: Lexical decompositions have also been employed in the analysis of semantic relations like hyperonymy, complementarity, synonymy, etc. (cf. Bierwisch 1970: 170). For example, assuming that a lexeme A is a hyperonym of a lexeme B iff the set of properties conjoined in the lexical decomposition of lexeme A is a proper part of the set of properties conjoined in the lexical decomposition of lexeme B, we derive that *child* (3a) is a hyperonym of *girl* (3b).

- (3) a. *child*: $\lambda x [\text{HUMAN}(x) \ \& \ \neg \text{ADULT}(x)]$
b. *girl*: $\lambda x [\text{HUMAN}(x) \ \& \ \neg \text{ADULT}(x) \ \& \ \text{FEMALE}(x)]$

- (v) Lexical field structure: Additionally, lexical decompositions have been used in order to uncover the structure of lexical fields (cf. section 2.2).

- (vi) Inferences: Furthermore, lexical decompositions allow for semantic inferences that can be derived from the semantics of primitive predicates. For example, a predicate like *BECOME*, properly defined, allows for the inference that Jamaal in (2a) was not dead immediately before the event.

2 The early history of lexical decomposition

2.1 The roots of lexical decomposition

The idea that a meaning of a word can be explained by identifying it with the meaning of a more complex expression is deeply rooted not only in linguistics but also in our common sense understanding of language. When asked to explain to a non-native speaker what the German word *Junggeselle* means, one would probably say that a *Junggeselle* is an *unmarried man*. A decompositional way of meaning explanation is also at the core of the Aristotelian conception of word meaning in which the meaning of a noun is sufficiently explained by its genus proximum (here *man*) and its differentia specifica (here *unmarried*). Like the decompositions in (1), this conception attempts to define the meaning of a word. However, the distinction between genus proximum and differentia specifica is not explicitly expressed in lexical decompositions: From a logical point of view, each predicate in a conjunction as in (1a) qualifies as a genus proximum.

The Aristotelian distinction is also an important device in lexicographic meaning explanations as in (4a), where the next superordinate concept (*donkey*) of the lexical item in question (*jackass*) and one or more distinctive features (*male*) are given (cf. e.g., Svensén 1993: 120ff). Interestingly, meaning explanations based on genus proximum and differentia specifica have provoked some criticism within lexicography (Wiegand 1989) as well, and a closer look into standard monolingual dictionaries reveals that many meaning explanations are not of the Aristotelian kind represented in (4a): They involve near-synonyms (4b), integration of encyclopaedic (4c) and pragmatic information (4d), extensional listings of members of the class denoted by the lexeme (4e), pictorial illustrations (cf. numerous examples, e.g., in Harris 1923), or any combinations thereof.

- (4) a. **jackass** [...] 1. male donkey [...] (Thorndike 1941: 501)
 b. **grumpy** [...] surly; ill-humoured; gruff. [...] (Thorndike 1941: 413)

- c. **scimitar** [...] A saber with a much-curved blade with the edge on the convex side, used chiefly by Mohammedans, esp. Arabs and Persians. [...] (Webster's, Harris 1923: 1895)
- d. **Majesty** [...] title used in speaking to or of a king, queen, emperor, empress, etc.; as, Your Majesty, His Majesty, Her Majesty. [...] (Thorndike 1941: 562)
- e. **cat** [...] 2. Any species of the family Felidae, of which the domestic cat is the type, including the lion, tiger, leopard, puma, and various species of tiger cats, and lynxes, also the cheetah. [...] (Webster's, Harris 1923: 343)

This foreshadows some persistent problems of later approaches to lexical decomposition.

2.2 Semantic feature theories and the semantic structure of nouns

As we have seen, the concept of some kind of decomposition has been around ever since people began to systematically think about word meanings. Yet, it was not until the advent of Structural Semantics that lexical decompositions have become part of more restrictive semantic theories. Structural Semantics emerged in the late 1920s as a reaction to the semantic mainstream, which, at the time, was oriented towards psychological explanations of idiolectal variation and the diachronic change of single word meanings. It conceived of lexical semantics as a discipline that revealed the synchronic structure of the lexicon from a non-psychological perspective. The main tenet was that the meaning of a word can only be captured in its relation to the meaning of other words.

Within Structural Semantics, lexical decompositions developed in the form of breaking down word meanings into semantic features (depending on the particular approach also called 'semantic components', 'semantic markers', or 'sememes'). An early analysis of this sort can be found in Hjelmslev's *Prolegomena* from 1943 (Hjelmslev 1963: 70) who observed that systematic semantic relationships can be traced back to shared semantic components (cf. Tab. 7.1). He favored a strict decompositional approach in that (i) he explicitly conceived of decompositions like the ones in Tab. 7.1 as definitions of words and (ii) assumed that content-entities like 'ram', 'woman', 'boy' have to be eliminated from the inventory of content-entities if they can be defined by decompositions (Hjelmslev 1963: 72ff).

Following the Prague School's feature-based approach to phonology, it was later assumed that semantic analyses should be based on a set of functional oppositions like [$\pm$ human], [$\pm$ male], etc. (cf. also article 1 [Semantics: Lexical Structures

Tab. 7.1: Semantic components (after Hjelmslev 1963: 70)

	'he'	'she'
'sheep'	'ram'	'ewe'
'human being'	'man'	'woman'
'child'	'boy'	'girl'
'horse'	'stallion'	'mare'

and Adjectives] (Bierwisch) Semantic features and primes). Semantic feature theories developed along two major lines. In Europe, structuralists like Pottier (1963, 1964), Coseriu (1964), and Greimas (1966) employed semantic features to reveal the semantic structure of lexical fields. A typical example for a semantic feature analysis in the European structuralist tradition is Pottier's (1963) analysis of the lexical field of sitting furniture with legs (French *siège*) that consists of the lexemes *chaise*, *fauteuil*, *tabouret*, *canapé*, and *pouf* (cf. Tab. 7.2). Six binary features serve to define and structure the field: s^1 = avec dossier 'with back', s^2 = sur pied 'on feet', s^3 = pour 1 personne 'for one person', s^4 = pour s'asseoir 'for sitting', s^5 = avec bras 'with armrest', and s^6 = avec matériau rigide 'with rigid material'.

Tab. 7.2: Semantic feature analysis of the lexical field *siège* ('seat with legs') in French (Pottier 1963: 16)

	s^1	s^2	s^3	s^4	s^5	s^6
<i>chaise</i>	+	+	+	+	–	+
<i>fauteuil</i>	+	+	+	+	+	+
<i>tabouret</i>	–	+	+	+	–	+
<i>canapé</i>	+	+	–	+	+	+
<i>pouf</i>	–	+	+	+	–	–

In North America, Katz, Fodor, and others tried to develop a formal theory of the lexicon as a part of so-called Interpretive Semantics that constituted the semantic component of the Standard Theory of Generative Grammar (Chomsky 1965). In this tradition, semantic features served, for example, as targets for selectional restrictions (Katz & Fodor 1963). The semantic description of lexical items consists of two types of features, 'semantic markers' and 'distinguishers', by which the meaning of a lexeme is decomposed exhaustively into its atomic concepts: "The semantic markers assigned to a lexical item in a dictionary entry are intended to reflect whatever systematic semantic relations hold between that item and the rest of the vocabulary of the language. On the other hand, the distinguishers

assigned to a lexical item are intended to reflect what is idiosyncratic about its meaning.” (Katz & Fodor 1963: 187). An example entry is given in Tab. 7.3.

Tab. 7.3: Readings of the english noun *bachelor* distinguished by semantic markers (in parentheses) and distinguishers (in square brackets) (Katz, after Fodor 1977: 65)

bachelor, [+N, ...],
-- (Human), (Male), [who has never married]
-- (Human), (Male), [young knight serving under the standard of another knight]
-- (Human), [who has the first or lowest academic degree]
-- (Animal), (Male), [young fur seal when without a mate during the breeding time]

Besides this feature-based specification of the meaning of lexical items, Interpretive Semantics assumed recursive rules that operate over syntactic deep structures and build up meaning specifications for phrases and sentences out of lexical meaning specifications (Katz & Postal 1964).

As we have seen, semantic feature theories make it possible to tackle phenomena in the area of lexical fields and selectional restrictions (cf. also article 6 [Semantics: Lexical Structures and Adjectives] (Cann) *Sense relations*). They can also be used in formal accounts of lexical-semantic relations. For example, expression *A* is incompatible with expression *B* iff *A* and *B* have different values for at least one of their semantic features: *boy* [+HUMAN, -ADULT, -FEMALE] is incompatible with *woman* [+HUMAN, +ADULT, +FEMALE]. Expression *A* is complementary to expression *B* iff *A* and *B* have different values for exactly one of their semantic features: for instance, *girl* [+HUMAN, -ADULT, +FEMALE] is complementary to *boy*. Expression *A* is hyperonymous to expression *B* iff the set of feature-value assignments for *A* is included in the set of feature-value assignments for *B*: thus, *child* [+HUMAN, -ADULT] is hyperonymous to *boy*.

In European structuralism, the status of semantic features was a matter of debate. They were usually conceived of as part of a descriptive, language-independent semantic metalanguage, but were also treated as cognitive entities. In Generative Grammar, Katz conceived of semantic features as derived from a universal conceptual structure: “Semantic markers must [...] be thought of as theoretical constructs introduced into semantic theory to designate language invariant but language linked components of a conceptual system that is part of the cognitive structure of the human mind.” (Katz 1967: 129). In a similar vein, Bierwisch (1970: 183) assumed that the basic semantic components “are not learned in any reasonable sense of the term, but are rather an innate predisposition for language acquisition.” Thus, language-specific semantic structures come about by the particular combination of semantic features that yield a lexical item.

2.3 Some inadequacies of semantic feature analyses

Semantic feature theories considerably stimulated research in lexical semantics. Beyond that, semantic features had found their way into contemporary generative syntax as a target for selectional restrictions (cf. Chomsky 1965). Yet, a number of empirical weaknesses have quickly become evident.

- (i) **Relational lexemes:** The typical cases of semantic feature analyses seem to presuppose that all predicates are one-place predicates. Associating *woman* with the feature bundle [+HUMAN, +ADULT, +FEMALE] means that the referent of the sole argument of *woman(x)* has the three properties of being human, adult, and female. Simple feature bundles cannot account for relational predicates like *mother(x,y)* or *devour(x,y)*, because the argument to which a semantic feature attaches has to be specified. With *mother(x,y)*, the feature [+FEMALE] applies to the first, but not to the second argument.
- (ii) **Structure of verb decompositions:** Semantic feature analyses usually represent word meanings as unordered sets of features. However, in particular with verbal predicates, the decomposition cannot be adequately formulated as a flat structure (cf. section 2.4).
- (iii) **Undecomposable words:** It has been criticized that cohyponyms in larger taxonomies, such as *lion*, *tiger*, *puma*, etc. as cohyponyms of *cat* (cf. 4e) or *rose*, *tulip*, *daffodil*, *carnation*, etc. as cohyponyms of *flower*, cannot be differentiated by semantic features in a non-trivial way. If one of the semantic features of *rose* is [+FLOWER], then what is its distinguishing feature? This feature should abstract from a rose being a flower since [+FLOWER] has already been added to the feature list. Moreover, it should not be unique for the entry of *rose* or else the number of features threatens to surpass the number of lexical entries. In other words, there does not seem to be any plausible candidate for *P* that would make $\forall x[\text{ROSE}(x) \leftrightarrow (P(x) \ \& \ \text{FLOWER}(x))]$ a valid definition (cf. Fodor 1977: 150; Roelofs 1997: 46ff for arguments of this sort). Besides cohyponymy in large taxonomies, there are other lexical relations as well that cannot be adequately captured by binary feature descriptions, for instance the scalar nature of antonymy and lexical rows like *hot* > *warm* > *tepid* > *cool* > *cold*. In general, it is simply unclear for many lexical items what features might be used to distinguish them from near-synonyms (cf. *grumpy* in (4b)).
- (iv) **Exhaustiveness:** For most lexical items, it seems to be impossible to give an exhaustive lexical analysis, that is, one that provides the features that are necessary and sufficient to distinguish the item from all other lexical items of the language without introducing features that are used solely for the

- description of this one particular item. Katz's distinction between markers and distinguishers does not solve the problem. Apart from the fact that the difference between 'markers' as targets for selectional restrictions and 'distinguishers' as lexeme-specific idiosyncratic features is not supported by the data (cf. Bierwisch 1969: 177ff; Fodor 1977: 144ff), this concession to semantic diversity weakens the explanatory value of semantic feature theories considerably since no restrictions are provided for what can occur as a distinguisher.
- (v) Finiteness: Only rarely have large inventories of features been assembled (e.g., by Lorenz & Wotjak 1977). Moreover, semantic feature theory has not succeeded in developing operational procedures by which semantic features can be discovered. Thus, it has not become evident that there is a finite set of semantic features that allows a description of the entire vocabulary of a language, in particular that this set is smaller than the set of lexical items.
 - (vi) Universality: Another point of criticism has been that the alleged universality of a set of features has not been convincingly demonstrated. As Lyons (1968: 473) stated, cross-linguistic semantic comparisons of semantic structures rather point to the contrary. However, the search for a universal semantic metalanguage has continued and has become a major topic in particular among the proponents of Natural Semantic Metalanguage (cf. article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*, section 8).
 - (vii) Theoretical status: The often unclear theoretical status of semantic features has drawn some criticism as well. Among other things, it has been argued that in order to express that a mare is a female horse it is not necessary to enrich the metalanguage by numerous features. The relation can equally well be expressed on the level of object language by assuming a meaning postulate in form of a biconditional: $\Box \forall x [\text{mare}(x) \leftrightarrow \text{horse}(x) \ \& \ \text{female}(x)]$.

2.4 Lexical decomposition and the semantic structure of verbs

The rather complex semantic structure of many verbs could not be adequately captured by semantic feature approaches for two reasons: They focused on one-place lexemes, and they expressed lexical meaning in flat structures, that is, by simply conjoining semantic features. Instead, hierarchical structures were needed. Katz (1971) tackled this problem in the form of decompositions that also included aspectually relevant features such as 'activity' (cf. Tab. 74).

While this form of decomposition never caught on, other early verb decompositions (cf. Bendix 1966, Fillmore 1968, Bierwisch 1970) look more familiar to semantic representations still employed in many theories of verb semantics (5).

Tab. 7.4: Decomposition of *chase* (after Katz 1971: 304)

chase → Verb, Verb transitive, ...;

((Activity) (Nature: (Physical)) of X, ((Movement) (Rate: Fast))
 (Character: Following)), (Intention of X: (Trying to catch ((Y
 ((Movement) (Rate: Fast))))); (SR).

- (5) a. *give*(x,y,z): x CAUSE (y HAVE z) (after Bendix 1966: 69)
 b. *persuade*(x,y,z): x CAUSE (y BELIEVE z) (after Fillmore 1968: 377)

It was the rise of Generative Semantics in the late 1960s that caused a shift in interest from decompositional structures of nouns to lexical decompositions of verbs. The history of lexical decompositions of verbs that emerged from these early approaches is reviewed in article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*. Starting from early generative approaches, verb decompositions have been employed in theories as different as Conceptual Semantics (cf. also article 4 [Semantics: Theories] (Jackendoff) *Conceptual Semantics*), Natural Semantic Metalanguage, and Distributed Morphology (cf. also article 5 [Semantics: Interfaces] (Harley) *Semantics in Distributed Morphology*).

3 Theoretical aspects of decomposition

3.1 Decompositionalism versus atomism

Directly opposed to decompositional approaches to lexical meaning stands a theory of lexical meaning that is known as lexical atomism or holism and whose main proponent is Jerry A. Fodor (1970, 1998, Fodor et al. 1980). According to a decompositional concept of word meaning, knowing the meaning of a word involves knowing its decomposition, that is, the linguistic or conceptual entities and relations it consists of. Fodor's atomistic conception of word meaning rejects this view and assumes instead that there is a direct correspondence between a word and the mental particular it stands for. A lexical meaning does not have constituents, and – in a strict formulation of atomism – knowing it does not involve knowing the meaning of other lexical units.

Fodor (1998: 45) observes in favor of his atomistic, anti-definitional approach that there are practically no words whose definition is generally agreed upon – an argument that cannot be easily dismissed. Atomists are also skeptical about

the claim that decompositions/definitions are simpler than the words they are attached to: “Does anybody present really think that thinking BACHELOR is harder than thinking UNMARRIED? Or that thinking FATHER is harder than thinking PARENT?” (Fodor 1998: 46).

Discussing Jackendoff’s (1992) compositional representation of *keep*, Fodor (1998: 55) comments on the relation that is expressed in examples as different as *someone kept the money* and *someone kept the crowd happy*: “I would have thought, saying what relation they both instance is precisely what the word ‘keep’ is for; why on earth do you suppose that you can say it ‘in other words’?” And he adds: “I can’t think of a better way to say what ‘keep’ means than to say that it means *keep*. If, as I suppose, the concept KEEP is an atom, it’s hardly surprising that there’s no better way to say what ‘keep’ means than to say that it means *keep*.” More detailed arguments for and against atomistic positions will appear throughout this article.

The controversy between decompositionists and atomists is often connected to the question whether decompositions or meaning postulates should be employed to characterize lexical meaning. Meaning postulates are used to express analytic knowledge concerning particular semantic expressions (Carnap 1952: 67). Lexical meaning postulates are necessarily true. They consist of entailments where the antecedent is an open lexical proposition (6a).

- (6) a. $\Box \forall x [\text{BACHELOR}(x) \rightarrow \text{MAN}(x)]$
 $\Box \forall x [\text{BACHELOR}(x) \rightarrow \neg \text{MARRIED}(x)]$
 b. $\Box \forall x [\text{BACHELOR}(x) \leftrightarrow (\text{MAN}(x) \ \& \ \neg \text{MARRIED}(x))]$
 c. *bachelor*: $\lambda x [\text{MAN}(x) \ \& \ \text{UNMARRIED}(x)]$

Meaning postulates can also express bidirectional entailments as in (6b) where the biconditional expresses a definition-like equivalence between a word and its decomposition. I will assume that in the typical case on a pure lexical level of meaning description decompositionist approaches like (6c) conceive of word meanings as bidirectional entailments as in (6b) while atomistic approaches involve monodirectional entailments as in (6a) (cf. similarly Chierchia & McConnell-Ginet 1990: 360ff). Thus, meaning postulates do not per se characterize atomistic approaches to meaning, but it is rather the kind of meaning postulate that serves to distinguish the two basic stances on word meaning. Informally, one might say that bidirectional meaning postulates provide definitions, monodirectional ones single aspects of word meaning in form of relations to other semantic elements. Three caveats are in order here: (i) Semantic reconstruction on the basis of meaning postulates is not uniformly accepted either in the decompositionist or in the atomistic camp. Some proponents of decompositionist

approaches do not adhere to a definitional view of decompositions; they claim that their decompositions do not cover the whole meaning of the lexical item (cf. section 3.4). At the same time, some radical approaches to atomism reject lexical meaning postulates completely (Fodor 1998). (ii) Decompositions and bidirectional meaning postulates are only equivalent on the level of meaning explanation (cf. Chierchia & McConnell-Ginet 1990: 362). They differ, however, in that in decompositional approaches the word defined (*bachelor* in (6c)) is not accessible within the semantic derivation while the elements of the decomposition ($MAN(x)$ & $UNMARRIED(x)$) are. This can have an effect, for example, on the explanation of scope phenomena. (iii) Furthermore, decompositions as in (6c) and bidirectional meaning postulates as in (6b) can give rise to different predictions with respect to language processing (cf. section 3.6).

3.2 Decompositions and the lexicon

One of the most interesting differences in the way verb decompositions are used in different language theories concerns their location within the theory. Some approaches locate decompositions and the principles and rules that build them up in syntax (e.g., Generative Semantics, Distributed Morphology), some in semantics (e.g., Dowty's Montague-based theory, Lexical Decomposition Grammar, Natural Semantic Metalanguage), and others in conceptual structure (e.g., Conceptual Semantics) (cf. article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*). Decompositions are sometimes constrained by interface conditions as well. These interface relations between linguistic levels of representation are specified to a different degree in different theories. Lexical Decomposition Grammar has put some effort into establishing interface conditions between syntactic, semantic, and conceptual structure. In syntactic approaches to decomposition (Lexical Relational Structures, Distributed Morphology), however, the relation between syntactic decompositions and semantic representations often remains obscure – one of the few exceptions being von Stechow's (1995) analysis of the scope properties of German *wieder* 'again' in syntactic decompositions (cf. article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*).

The way decompositions are conceived has an impact on the structure of the lexicon and its role within the architecture of the language theory pursued. While some approaches advocate rather rich meaning representations (e.g., Natural Semantic Metalanguage, Conceptual Semantics), others downplay semantic representation and reduce it to a rather unstructured domain of encyclopaedic knowledge (Distributed Morphology) (cf. the overview in Ramchand 2008). Meaning representation itself can occur on more than one level. Sometimes the distinction

is between semantics proper and some sort of conceptual representation (e.g., Lexical Decomposition Grammar); sometimes different levels of conceptual representation are distinguished such as Jackendoff's (2002) Conceptual Structure and Spatial Structure. Theories also differ in how much the lexicon is structured by rules and principles. While syntactic approaches often conceive of the lexicon as a mere inventory, other approaches (e.g. Levin & Rappaport Hovav's Lexical Conceptual Structures, Wunderlich's Lexical Decomposition Grammar, Pustejovsky's Event Structures) assume different kinds of linking principles, interface conditions and structure rules for decompositions (for references, cf. article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*).

3.3 Decompositions and primitives

Decompositional approaches to lexical meaning usually claim that all lexical items can be completely reduced to their component parts; that is, they can be defined. This requires certain conditions on decompositions in order to avoid infinite regress: (i) The predicates used in the decompositions are either semantic primitives or can be reduced to semantic primitives by definitions. It is necessary that the primitives are not reduced to other elements within the vocabulary, but are grounded elsewhere. (ii) Another condition is that the set of primitives be notably smaller than the lexicon (cf. Fodor et al. 1980: 268). (iii) Apart from their primitivity, it is often required that predicates within decompositions be general, that is, distinctive for a large number of lexemes, and universal, that is, relevant to the description of lexemes in all or most languages (cf. Löbner 2002: 132ff) (cf. also the discussion in article 4 [Semantics: Lexical Structures and Adjectives] (Levin & Rappaport Hovav) *Lexical Conceptual Structure*).

The status of these primitives has been a constant topic within decompositional semantics. Depending on the particular theories, the vocabulary of semantic primitives is located on different levels of linguistic structure. Theories differ as to whether these predicates are elements of the object language (e.g., Natural Semantic Metalanguage), of a semantic metalanguage (e.g., Montague Semantics) or of some set of conceptual entities (e.g., Lexical Conceptual Semantics). A finite set of primitives is rarely given, the notable exception being Natural Semantic Metalanguage. Most theories obviously assume a core of the decompositional vocabulary, including such items as CAUSE, BECOME, DO, etc., but they also include many other predicates like ALIVE, BELIEVE, IN, MOUTH, WRITE. Since they are typically not concerned with all subtleties of meaning, most theories often do not bother about the status of these elements. They might be conceived of as definable or not. While in Dowty's (1979) approach CAUSE gets a counterfactual

interpretation in the vein of Lewis (1973), Lakoff (1972: 615f) treats CAUSE as a primitive universal and, similarly, in Natural Semantic Metalanguage BECAUSE is taken as a primitive.

However, no matter how many primitives a theory assumes, something has to be said about how these elements can be grounded. Among the possible answers are the following: (i) Semantic primitives are innate (or acquired before language acquisition) (e.g., Bierwisch 1970). To my knowledge, no evidence from psycholinguistics or neurolinguistics has been obtained for this claim. (ii) Semantic primitives can be reduced to perceptual features. Considering the abstract nature of some semantic features, a complete reduction to perception seems unlikely (cf. Jackendoff 2002: 339). (iii) Semantic primitives are conceptually grounded (e.g., Natural Semantic Metalanguage, Conceptual Semantics). This is often claimed but rarely pursued empirically (but cf. Jackendoff 1983, Engelberg 2006).

3.4 Decompositions and definitions

If lexical decompositions are semantically identified with biconditional meaning postulates, they can be regarded as definitions: They provide necessary and sufficient conditions. It has been questioned whether word meaning can be captured this way. The non-equivalence of *kill* and *cause to die* had been a major argument against Generative Semantics (cf. article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*, section 2). It has been observed that the definitional approach simply fails on a word-by-word basis: “There are practically no defensible examples of definitions; for all the examples we’ve got, practically all words (/concepts) are undefinable. And, of course, if a word (/concept) doesn’t have a definition, then its definition can’t be its meaning.” (Fodor 1998: 45) Given what was said about lexicography in section 2.1, we must concede that even by a less strict view on semantic equivalence, the definitional approach can only be applied to a subgroup of lexical items. Atomistic and prototype-based approaches to lexical meaning thrive on these observations. Decompositionalist approaches to word meaning have reacted differently to these problems. Some have just denied them: Natural Semantic Metalanguage claims that based on a limited set of semantic primitives and their combinatorial potential a complete decomposition is possible. Other approaches, in particular Conceptual Semantics, point to the particular descriptive level of their decompositions. They claim that CAUSE does not have the same meaning as *cause*, the former being a conceptual entity. This allows Jackendoff (2002: 335f) to state that decompositions are not definitions since no equation between a word and a synonymous phrasal expression is attempted. However, the meanings of the decompositional

predicates employed are all the more in need of explanations since our intuition about the meaning of natural language lexemes does not account for them anymore. As Pulman (2005) puts it in a discussion of Jackendoff's approach: "[...] if your intuition is that part of the meaning of 'drink' is that liquid should enter a mouth, then unless there is some explicit connection between the construct MOUTH and the meaning of the English word 'mouth', that intuition is not accounted for." Finally, some researchers assume that decompositions only capture the core meaning of a word (e.g., Kornfilt & Correra 1993: 83). Thus, decompositions do not exhaust a word's meaning, and they are not definitions. This, of course, poses the questions what they are decompositions of and by what semantic criteria core aspects of lexical meaning can be identified. In any case, a conception of decompositions as incomplete meaning descriptions weakens the approach considerably. "It is, after all, not in dispute that some aspects of lexical meanings can be represented in quite an exiguous vocabulary; some aspects of anything can be represented in quite an exiguous vocabulary," Fodor (1998: 48) remarks and adds: "It is supposed to be the main virtue of definitions that, in all sorts of cases, they reduce problems about the defined concepts to corresponding problems about its primitive parts. But that won't happen unless each definition has the very same content as the concept it defines." (Fodor 1998: 49) In some approaches the partial specification of meaning in semantic decompositions results from a distinction between semantic and conceptual representation (e.g., Bierwisch 1997). Semantic decompositions are underspecified and are supplemented on the utterance level with information from a conceptual representation.

The completeness question is sometimes tied to the attempt to distinguish those aspects of meaning that are grammatically relevant from those that are not. This is done in different ways. Some assume that decompositions are incomplete and represent only what is grammatically relevant. Others differentiate between levels of representation; Lexical Decomposition Grammar distinguishes Semantic Form, which includes the grammatically relevant information, from Conceptual Structure. Finally, some assume one level of representation in which only particular parts are grammatically relevant; in Rappaport Hovav & Levin (1998), general decompositional templates contain the grammatically relevant information whereas idiosyncratic aspects are reflected by lexeme-specific constants that are inserted into these templates.

However, the distinction between grammatically relevant and irrelevant properties within a semantic representation raises a serious theoretical question. It is a truism that not all subtleties of lexical meaning show grammatical effects. With *to eat*, the implied aspect of intentional agentivity is grammatically relevant in determining which argument becomes the subject while the implied aspect of biological food processing is not. However, distinguishing the grammatically

relevant from the irrelevant by assigning them different locations in representations is not more than a descriptive convention unless one is able to show that grammatically relevant meaning is a particular type of meaning that can be distinguished on *semantic* grounds from grammatically irrelevant meaning. But do all the semantic properties that have grammatical effects (intentional agentivity and the like) form one natural semantic class and those that do not (biological food processing and the like) another? As it stands, it seems doubtful that such classes will emerge. As Jackendoff (2002: 290) notes, features with grammatical effects form a heterogeneous set. They include well-known distinctions such as those between agent and experiencer or causation and non-causation but also many idiosyncratic properties such as the distinction between emission verbs where the sound can be associated with an action of moving and which therefore allow a motion construction (*the car squealed around the corner*) and those where this is not the case (**the car honked around the corner*) (cf. Levin & Rappaport Hovav 1996).

3.5 Decompositions and their interpretation

It is evident that in order to give empirical content to theoretical claims on the basis of lexical semantic representations, the meaning of the entities and configurations of entities in these semantic representations must be clear. This is a major problem not only for decompositional approaches to word meaning. To give an example from Distributed Morphology (DM), Harley & Noyer (2000: 368) notice that *cheese* is a mass noun and sentences like *I had three cheeses for breakfast* are unacceptable. The way DM is set up requires deriving the mass noun restriction from encyclopaedic knowledge (cf. article 2 [Semantics: Lexical Structures and Adjectives] (Engelberg) *Frameworks of decomposition*, section 10). Thus, it is listed in the encyclopaedia that “cheese does not typically come in discrete countable chunks or types”. However, to provide a claim like that with any empirical content, we need a methodology for determining what the encyclopaedic knowledge for *cheese* looks like. As we will see, lexical-semantic representations often exhibit a conflict when it comes to determining what a word actually means. If we use its syntactic behaviour as a guideline for its meaning, the semantic representation is not independently motivated but circularly determined by the very structures it purports to determine. If we use our naive everyday conception of what a word means, we lack an objective methodology of determining lexical meaning. Moreover, the two paths lead to different results. If we take a naive, syntax-independent look at the encyclopaedic semantics of *cheese*, a visit to the next supermarket will tell us that – contrary to what Harley & Noyer claim – all cheese comes in chunks

or slices, so does all sausage and some of the fruit. Thus, it seems that the encyclopaedic knowledge in DM is not arrived at by naively watching the world around you. If it were, the whole architecture of Distributed Morphology would probably break down since, as corpus evidence shows, the German words for ‘cheese’ *Käse*, ‘sausage’ *Wurst*, and ‘fruit’ *Obst* are different with respect to the count/mass distinction although their supermarket appearance with respect to chunks and slices is very similar: *Wurst* can be freely used as a count and a mass noun; *Käse* is a mass noun that can be used as a count noun, especially, but not only, when referring to types of cheese, and *Obst* is obligatorily a mass noun. Thus, the encyclopaedic knowledge about *cheese* in Distributed Morphology seems to be forced by the fact that *cheese* is grammatically a mass noun. This two-way dependency between grammar and encyclopaedia immunizes DM against falsification and, thus, renders a central claim of DM empirically void.

The neglect of semantic methodology and theory particularly in those approaches that advocate a semantically constrained but otherwise free syntactic generation of argument structures has of course been pointed out before: “Although lip service is often paid to the idea that a verb’s meaning must be compatible with syntactically determined meaning [...], it is the free projection of arguments that is stressed and put to work, while the explication of compatibility is taken to be trivial.” (Rappaport Hovav & Levin 2005: 275). It has to be emphasized that it is one thing to observe differences in the syntactic behaviour of words in order to build assumptions about hitherto unnoticed semantic differences between them but it is a completely different matter to justify the existence of a particular semantic property of a word on the basis of a syntactic construction it occurs in and then use this property to predict its occurrence in this construction. The former is a useful heuristic method for tracing semantic properties that would then need to be justified independently; the latter is a circular construction of explanations that can rob a theory of most of its empirical value (cf. Engelberg 2006). This becomes particularly obvious in approaches that distinguish grammatically relevant from grammatically irrelevant meaning. For example, Grimshaw (2005: 75f) claims that “some meaning components have a grammatical life” (‘semantic structure’) while “some are linguistically inert” (‘semantic content’). Only the former have to be linguistically represented. She then discusses Jackendoff’s (1990: 253) representation of *eat* as a causative verb, which according to Jackendoff means that *x* causes *y* to go into *x*’s mouth. While she agrees that Jackendoff’s representation captures what *eat* “pretheoretically” means, she does not consider causation as part of the representation of *eat* since *eat* differs from other causatives (e.g., *melt*) in lacking an inchoative variant (Grimshaw 2005: 85f). Thus, we are confronted with a concept of grammatically relevant causation and a concept of grammatically irrelevant causation, which apart from their grammatical relevance seem to

be identical. The result is a theory that pretends to explain syntactic phenomena on the basis of lexical meaning but actually just maps syntactic distinctions onto distinctions on a putatively semantic level, which, however, is not semantically motivated.

Further problems arise if decompositions are adapted to syntactic structures: There is consensus among semanticists and philosophers that causation is a binary relation with both relata belonging to the same type. Depending on the theory, the relation holds either between events or proposition-like entities. In decompositional approaches, the causing argument is often represented as an individual argument, *CAUSE*(*x*,*p*), since purportedly causative verbs only allow agent-denoting NPs in subject position. When this conflict is discussed, it is usually suggested that the first argument of *CAUSE* is reinterpreted as ‘*x* does something’ or ‘that *x* does something’. Although such a reinterpretation can be formally implemented, it raises the question why decomposition is done at all. One could as well stay with simple predicate-argument structures like *dry*(*x*,*y*) and reinterpret them as ‘something that *x* does causes *y* to become dry’. Furthermore, the decision to represent the first argument of *CAUSE* as an individual argument is not motivated by the meaning of the lexical item but, in a circular way, by the same syntactic structure that it claims to explain. Finally, the assumption that all causative verbs require an agentive NP in subject position is wrong. While it holds for verbs like German *trocknen* ‘to dry’ it does not hold for verbs like *vergrößern* ‘enlarge’ that allow sentential subjects. In any case, the asymmetrical representation of causation raises the problem that two *CAUSE* predicates need to be introduced where one is reinterpreted in terms of the other. The problem is even bigger in approaches like Distributed Morphology that have done away with a mediating lexicon. If we assume that the bi-propositional (or bi-eventive) nature of causation is part of the encyclopaedic knowledge of vocabulary items that express causation, then causative verbs that only allow agentive subjects should be excluded from transitive verb frames completely.

Even if the predicates used in decompositions are characterized in semantic terms, the criteria are not always sufficiently precise to decide whether or not a verb has the property expressed. Levin & Rappaport Hovav (1996) observe that there are counterexamples to the wide-spread assumption that telic intransitive verbs are unaccusative and agentive intransitive verbs are unergative, namely, verbs of sound, which are unergative but not necessarily agentive nor telic (*beep*, *buzz*, *creak*, *gurgle*). Therefore they propose that verbs that refer to “internally caused eventualities” are unergative, which is the case if “[...] some property of the entity denoted by the argument of the verb is responsible for the eventuality” (Levin & Rappaport Hovav 1996: 501). If we want to apply this idea to the unaccusative German *zerbrechen* ‘break’ and the unergative *knacken* ‘creak’, which they

do not discuss, we have to check whether it is true that some property of the twig is responsible for the creaking in *der Zweig hat geknackt* ‘the twig creaked’ while there is no property of the twig that is responsible for the breaking in *der Zweig ist zerbrochen* ‘the twig broke’. In order to do that, we must know what ‘internal causation’ is; that is, we have to answer questions like: What is ‘causation’? What is ‘responsibility’? What is ‘eventuality’? Is ‘responsibility’, contrary to all assumptions of theories of action, a predicate that applies to properties of twigs? What property of twigs are we talking about? Is (internal) ‘causation’, contrary to all theories of causation, a relation between properties and eventualities? As long as these questions are not answered, proponents of the theory will agree that the creaking of the twig but not the breaking is internally caused while opponents will deny it. And there is no way to resolve this (cf. Engelberg 2001).

Similar circularities have been noticed by others. Fodor (1998: 51, 60ff), citing work from Pinker (1989) and Higginbotham (1994), criticizes that claims about linking based on interminably vague semantic properties elude any kind of evaluation. This is all the worse since the predicates involved in decompositions are not only expressions in the linguist’s metalanguage but are concepts that are attributed to the speaker and his or her knowledge about language (Fodor 1998: 59).

Stipulations about the structure of decompositions can diminish the empirical value of the theory, too. Structural aspects of decompositions concern the way embedded predicates are combined as well as the argument structure of these predicates. For example, predicates like CAUSE or POSS are binary because we conceive of causation and possession as binary relations. Their binarity is a structural aspect that is deeply rooted in our understanding of these concepts. However, it is just by convention that most approaches represent the causing entity and the possessor as the first argument of CAUSE and POSS, respectively. Which argument of multi-place predicates stands for which entity is determined by the truth conditions for this predicates. Thus, the difference between $\text{POSS}(x^{\text{POSSESSOR}}, y^{\text{ENTITY-POSSESSED}})$ and $\text{POSS}(x^{\text{ENTITY-POSSESSED}}, y^{\text{POSSESSOR}})$ is just a notational one. Whenever explanations rely on this difference, they are not grounded in semantics but in notational conventions. This is, for example, the case in Lexical Decomposition Grammar where the first argument of POSS falls out as the higher one – with all its consequences for Theta Structure and linking principles (Wunderlich 1997: 39).

In summary, the problems with interpreting the predicates used in decompositions and structural stipulations severely limit the empirical content of predictions based on these decompositions. Two ways out of this situation have been pursued only rarely. Decompositional predicates can be given precise truth conditions, as is done in Dowty (1979), or they can be linked to cognitive concepts that are independently motivated (e.g., Jackendoff 1983, Engelberg 2006).

3.6 Decompositions and cognition

Starting from the 1970s, psycholinguistic evidence has been used to argue for or against lexical decompositions. While some approaches to decompositions accepted psycholinguistic data as relevant evidence, proponents of particular lexical theories denied that their theories are about lexical processing at all. Dowty (1979: 391) emphasized that what the main decompositional operators determine is not what the speaker/listener must compute but to what he can infer. Similarly, Goddard (1998: 135) states that “there is no claim that people, in the normal course of linguistic thinking, compose their thoughts directly in terms of semantic primitives; or, conversely, that normal processes of comprehension involve real-time decomposition down to the level of semantic primitives.” It has also been suggested that in theorizing about decompositional versus atomistic theories one should distinguish whether lexical concepts are definitionally primitive, computationally primitive (pertaining to language processing), and/or developmentally primitive (pertaining to language acquisition) (cf. Fodor et al. 1980: 313; Carey 1982: 350f).

When lexical decompositions are interpreted in psycholinguistic terms, the typical assumption is that the components of a decomposition are processed each time the lexical item is processed. Lexical processing efforts should emerge as a function from the complexity of the lexical decomposition to processing time: The more complex the decomposition, the longer the processing time. Most early psycholinguistic studies did not produce evidence for lexical decomposition (cf. Fodor et al. 1980; Johnson-Laird 1983). Employing a forced choice task and a rating test, Fodor et al. (1980) failed to find processing differences between causative verbs like *kill*, which are putatively decompositionally complex, and non-causative verbs like *bite*. Fodor, Fodor & Garrett (1975: 522) reported a significant difference between explicit negatives (e.g., *not married*) and putatively implicit negatives (e.g., an UNMARRIED-feature in *bachelor*) in complex conditional sentences like (7).

- (7) a. If practically all men in the room are not married, then few of the men in the room have wives.
- b. If practically all men in the room are bachelors, then few of the men in the room have wives.

Sentences like (7a) that contain explicit negatives gave rise to longer processing times, thus suggesting that *bachelor* does not contain hidden negatives. Measuring fixation time during reading, Rayner & Duffy (1986) did not find any differences between putatively complex words like causatives and non-causatives.

Similarly, Roelofs (1997: 48ff) discussed several models for word retrieval and argued for a non-decompositional spreading-activation model.

More recent studies display a more varied picture. Gennari & Poeppel (2003) compared eventive verbs like *build*, *distort*, *show*, which denote causally structured events, with stative verbs like *resemble*, *lack*, *love*, which do not involve complex CAUSE/BECOME structures. Controlling for differences in argument structure and thematic roles, they carried out a self-paced reading study and a visual lexical decision task. They found that semantic complexity was reflected in processing time and that elements of decomposition-like structures were activated during processing. McKoon & MacFarland (2002) adopted Rappaport Hovav & Levin's (1998) template-based approach to decomposition and their distinction between verbs denoting internal causation (*bloom*) and external causation (*break*) (Levin & Rappaport Hovav 1995, 1996). They reported longer processing times for *break*-type verbs than for *bloom*-type verbs in grammaticality judgments, reading time experiments, and lexical decision tasks. They interpreted the results as confirmation that *break*-type verbs involve more complex decompositions than *bloom*-type verbs.

Different conclusions were drawn from other experiments. Applying a "release from proactive interference" technique, Mobayyen & de Almeida (2005) investigated the processing times for lexical causatives (*bend*, *crack*, *grow*), morphological causatives (*thicken*, *darken*, *fertilize*), perception verbs (*see*, *hear*, *smell*), and repetitive perception verbs with morphological markers (e.g., *re-smell*). If verbs were represented in the form of decompositions, the semantically more complex lexical and morphological causatives should pattern together and evoke longer processing times than perception verbs. However, this did not turn out to be the case. Morphological causatives and the morphologically complex *re*-verbs required longer processing than lexical causatives and perception verbs. Similar results have been obtained in action-naming tasks carried out with Alzheimer patients (cf. de Almeida 2007). That lead Mobayyen and de Almeida to the conclusion that the latter two verb types are both semantically simple and refer to non-complex mental particulars. Another line of psycholinguistic/neurolinguistic research concerns speakers with category-specific semantic deficits due to brain damage. Data obtained from these speakers have been used to argue for semantic feature approaches as well as for approaches employing meaning postulates in the nominal domain (cf. the discussion in de Almeida 1999). However, de Almeida (2001: 483) emphasizes that so far no one has found evidence for category-specific verb concept deficits, for example, deficits concerning features like CAUSE or GO.

Evidence for decomposition theories has also been sought in data from language acquisition. If a meaning of a word is its decomposition then learning a

decomposed word means learning its decomposition. The most explicit early theory of decomposition-based learning is Clark's (1973) semantic-feature based theory of word-learning. In her view, only some of the features that make up a lexical representation are present when a word is first acquired whereas the other features are learned while the word is already used. The assumption that these features are acquired only successively predicts that children overgeneralize heavily when acquiring a new word. In subsequent research, it turned out that Clark's theory did not conform to the data: (i) Overgeneralization does not occur as often as predicted; (ii) with recently acquired words, undergeneralization is more typical than overgeneralization, and (iii) at some stages of acquisition, the referents a word is applied to do not have any features in common (Barrett 1995: 375ff, cf. also the review in Carey 1982: 361ff). It has been repeatedly argued that meaning postulates are better suited to explain acquisition processes (cf. Chierchia & McConnell-Ginet 1990: 363f, Bartsch & Vennemann 1972: 22). However, even if Clark's theory of successive feature acquisition is not tenable, related data are cited in favor of decompositions to show that some kind of access to semantic features is involved in acquisition. For example, it has been argued that a meaning component CAUSE is extracted from verbs by children and used in overgeneralizations like *he falled it* (cf. the overview in Clark 2003: 233ff). Some research on the acquisition of argument structure alternations has been used to argue for particular decompositional approaches, such as Pinker (1989) for Lexical Conceptual Structures in the vein of Levin & Rappaport Hovav, and Brinkmann (1997) for Lexical Decomposition Grammar.

In summary, the question whether decompositions are involved in language processing or language acquisition remains open. Although processing differences for different classes of verbs have to be acknowledged, it is often difficult to conclude from these data what forms of lexical representation are compatible with these data.

4 Conclusion

From a heuristic and descriptive point of view, lexical decomposition has proven to be a very successful device that has made it possible to discover and to tackle numerous lexical phenomena, in particular, at the syntax-semantics interface. Yet, from a theoretical point of view, lexical decompositions have remained a problematic concept that is not always well grounded in theories of semantics and cognition:

- The basic predicates within decompositions are often elusive and lack truth conditions, definitions, or an empirically grounded link to basic cognitive concepts.
- The lack of semantic grounding of decompositions often leads to circular argumentations in linking theories.
- The cognitive status of decompositions is by and large unclear; it is not known whether and how decompositions are involved in lexical processing and language acquisition.

Thus, decompositions still raise many questions: “But even if the ultimate answers are not in sight, there is certainly a sense of progress since the primitive approaches of the 1960s.” (Jackendoff 2002: 377)

5 References

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