Lexical Meaning in Context

This is a book about the meanings of words and how they can combine to form larger meaningful units, as well as how they can fail to combine when the amalgamation of a predicate and argument would produce what the philosopher Gilbert Ryle called a “category mistake”. It argues for a theory in which words get assigned both an intension and a type. The book develops a rich system of types and investigates its philosophical and formal implications, for example the abandonment of the classic Church analysis of types that has been used by linguists since Montague. The author integrates fascinating and puzzling observations about lexical meaning into a compositional semantic framework. Adjustments in types are a feature of the compositional process and account for various phenomena including coercion and copredication. This book will be of interest to semanticists, philosophers, logicians, and computer scientists alike.

Nicholas Asher is Directeur de Recherche CNRS, Institut de Recherche en Informatique de Toulouse, Université Paul Sabatier, and Professor of Philosophy and of Linguistics at the University of Texas at Austin. He is author of Reference to Abstract Objects in Discourse (1993) and co-author of Logics of Conversation (2003) with Alex Lascarides.
Lexical Meaning in Context
A Web of Words

NICHOLAS ASHER
CNRS, Institut de Recherche en Informatique de Toulouse
and
University of Texas at Austin
Contents

Preface

PART ONE  FOUNDATIONS

1 Lexical Meaning and Predication
   1.1 Types and presuppositions
   1.2 Different sorts of predication
   1.3 The context sensitivity of types
   1.4 The main points of this book

2 Types and Lexical Meaning
   2.1 Questions about types
   2.2 Distinguishing between types
   2.3 Strongly intensional types
   2.4 Two levels of lexical content
   2.5 Types in the linguistic system

3 Previous Theories of Predication
   3.1 The sense enumeration model
   3.2 Nunberg and sense transfer
   3.3 Kleiber and metonymic reference
   3.4 The Generative Lexicon
   3.5 Recent pragmatic theories of lexical meaning

PART TWO  THEORY

4 Type Composition Logic
   4.1 Words again
   4.2 The basic system of types
Contents

4.3 Lexical entries and type presuppositions 106
4.4 The formal system of predication 114
4.5 A categorial model for types 121

5 The Complex Type •
5.1 A type constructor for dual aspect nouns 130
5.2 Some not-so-good models of • types 137
5.3 The relational interpretation of • types 149
5.4 Subtyping with • 160

6 • Type Presuppositions in TCL 163
6.1 How to justify complex type presuppositions 163
6.2 Applications 169
6.3 • Types and accidentally polysemous terms 185

PART THREE DEVELOPMENT 189

7 Restricted Predication 191
7.1 Landman’s puzzle 193
7.2 More puzzles 194
7.3 Extensional semantics for as phrases 195
7.4 A new puzzle 197
7.5 As constructions in TCL 201
7.6 Proper names in as phrases revisited 211
7.7 An aside on depictives 213

8 Rethinking Coercion 214
8.1 Re-examining the data 214
8.2 Coercion and polymorphic types 219
8.3 Discourse and typing 236
8.4 Discourse-based coercions in TCL 240

9 Other Coercions 246
9.1 Noise verbs 246
9.2 Coercions from objects to their representations 247
9.3 Freezing 248
9.4 Cars and drivers, books and authors 249
9.5 Verbs of consumption 251
9.6 I want a beer 252
9.7 Evaluative adjectives 256
9.8 Coercions with pluralities 261
9.9 Aspectual coercion and verbal modification 262
## Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Syntax and Type Transformations</td>
<td>272</td>
</tr>
<tr>
<td>10.1</td>
<td>The Genitive</td>
<td>272</td>
</tr>
<tr>
<td>10.2</td>
<td>Grinding</td>
<td>280</td>
</tr>
<tr>
<td>10.3</td>
<td>Resultative constructions</td>
<td>281</td>
</tr>
<tr>
<td>10.4</td>
<td>Nominalization</td>
<td>284</td>
</tr>
<tr>
<td>10.5</td>
<td>Evaluating TCL formally</td>
<td>296</td>
</tr>
<tr>
<td>11</td>
<td>Modification, Coercion, and Loose Talk</td>
<td>300</td>
</tr>
<tr>
<td>11.1</td>
<td>Metonymic predications</td>
<td>300</td>
</tr>
<tr>
<td>11.2</td>
<td>Material modifiers</td>
<td>301</td>
</tr>
<tr>
<td>11.3</td>
<td>Loose talk</td>
<td>305</td>
</tr>
<tr>
<td>11.4</td>
<td>Fiction and fictional objects</td>
<td>309</td>
</tr>
<tr>
<td>11.5</td>
<td>Metaphorical predication</td>
<td>312</td>
</tr>
<tr>
<td>12</td>
<td>Generalizations and Conclusions</td>
<td>315</td>
</tr>
<tr>
<td>12.1</td>
<td>Integrating ordinary presuppositions</td>
<td>315</td>
</tr>
<tr>
<td>12.2</td>
<td>Conclusions: a sea of arrows</td>
<td>318</td>
</tr>
</tbody>
</table>

**PART FOUR CODA**

*References* 323

*Index* 331
Just over fifty years ago with the publication of “Two Dogmas of Empiricism”, W. V. O. Quine launched a persuasive and devastating attack on the common sense notion of word meaning and synonymy, according to which two terms were synonymous just in case they had the same meaning. Quine’s legacy continues to hold sway among much of the philosophical community today. The theory of word meaning is often thought either not to have a subject matter or to be trivial—*dog* means dog. What else is there to say? Well, it turns out, quite a lot. Linguists like Charles Fillmore, Igor Mel’cuk, Maurice Gross, Beth Levin, Ray Jackendoff, James Pustejovsky, and Len Talmy— to mention just a few, as well as researchers in AI who have built various on-line lexical resources like WORDNET and FRAMENET, have provided rich and suggestive descriptions of semantic relations between words that affect their behavior. And this has led to several proposals for a theory of word meaning.

Against this rich descriptive background, however, problems have emerged that make it not obvious how to proceed with the formalization of lexical meaning. In particular, something that is commonly acknowledged but rarely understood is that when word meanings are combined, the meaning of the result can differ from what standard compositional semantics has led us to expect: in applying, for instance, a property term ordinarily denoting a property *P* to an object term ordinarily denoting *a*, the content of the result sometimes involves a different but related property *P’* applied to an object *b* that is related to but distinct from the original denotation of *a*. While the choice of words obviously affects the content of a predication, the discourse context in which the predication occurs also affects it. The trick is to untangle from this flux a theory of the interactions of discourse, predication, and lexical content. That is what this book is about.\(^1\)

---

\(^1\) I owe many people thanks for help with this book: Alexandra Aramis, Alexis, Elizabeth, and Sheila Asher, Tijana Asic, Christian Bassac, David Beaver, Stephano Borgo, George
In this book, I argue that the proper way to understand the meaning of words is in terms of their denotations and the restrictions that other words impose on them. And it is the latter that govern how words interact semantically. I begin with the widely accepted observation according to which a predication will succeed only if the selectional restrictions the predicate imposes on its arguments are met. I provide an analysis of selectional restrictions by assigning words types. Meeting a selectional restriction is a matter of justifying a lexical presupposition, the presupposition that a term has a certain type. This analysis yields a theory of lexical meaning: to specify the type and the denotation of a word is to give its lexical meaning. The mechanisms of presupposition justification developed in dynamic semantics in recent years lead to an account of how predication adds content to the “ordinary” contents of the terms involved, which will provide my account of meaning shifting in context. The theory I will develop in this book has implications for compositional semantics, for example for the architecture of verbal and nominal modification. It also unifies analyzes in compositional semantics of presuppositions with my analysis of type presuppositions; for instance, the presuppositions of factive verbs or definite noun phrases are just special cases of type presuppositions.

The idea that there are non-trivial semantic interactions between words that affect the content of a predication is intuitive and perhaps obvious. But working out a precise theory, or even an imprecise one, of this phenomenon is difficult. I begin with some basic questions, distinctions, and observations.

What is a word? In some sense the answer is obvious: words are the things dictionaries try to define. On the other hand, the answer is not so simple. Words in many languages come with inflection for case, for number, for gender, among other things. Furthermore, there are morphological affixes that can transform one word into another like the nominalization affixes in English: an
affix like -ion turns a verb like afflict into the noun affliction. Morphological affixes and prefixes can often affect the meaning of a word; they can also determine how their host words combine with other words, as we shall see later on in this book. Even inflections like the plural are not always semantically innocent. Thus, the notion of a word quickly becomes a theoretical term; the meaningful parts of the lexicon may include things that we ordinarily would think of as bits of words, and basic word stems (the elements to which affixes and prefixes attach) may not end up looking like ordinary words at all.

Despite these complications, I will continue to speak (loosely) of words. What is it to give the meaning of a word? There are a number of answers in the literature on lexical semantics or theories of word meaning. Cognitive semanticists like Len Talmy and Tom Givon, among others, think that meanings are to be given via a set of cognitively primitive features—which might be pictorial rather than symbolic. According to these semanticists, a lexical theory should provide appropriate cognitive features and lexical entries defined in terms of them. Others in a more logical and formal framework like Dowty (1979) (but also Ray Jackendoff, Roger Shank, and other researchers in AI) take a specification of lexical meaning to be given in terms of a set of primitives whose meanings can be axiomatized or computationally implemented. Still others take a “direct” or denotational view; the function of a lexical semantics is to specify the denotation of the various terms, typically to be modelled within some model theoretic framework.

All of these approaches agree that a specification of lexical meaning consists in the specification of some element, whether representational or not, formal or not, that, when combined with elements associated with other words in a well formed sentence, yields a meaning for a sentence in a particular discourse context. Whatever theoretical reconstruction of meaning one chooses, however, it should be capable of modelling inferences in a precise manner so that the theory of lexical meaning proposed can be judged on its predictions. In addition, the theoretical reconstruction should provide predictions about when sentences that are capable of having a truth value are true and when they are not. This drastically reduces the options for specifying lexical meaning: such a specification must conform with one of the several ways of elaborating meaning within the domain of formal semantics; it must specify truth conditions, dynamic update conditions of the sort familiar from dynamic semantics (Kamp and Reyle (1993), Groenendijk and Stokhof (1991), Asher (1993), Veltman (1996)), or perhaps provability conditions of the sort advocated by Martin-Löf (1980) and Ranta (2004), among others.

For proponents of a direct interpretation of English, a denotational approach to lexical meaning suffices. Most semanticists, however, use a logical language
to state the meanings of natural language expressions. The logical representations of sentential meanings are typically called *logical forms*. Within such a framework a lexical entry for a word should specify a logical representation that when combined together with the contributions of other words in a well-formed sentence will yield a logical form with well-defined contents. I shall follow formal semantic tradition and use a logical language with a well-defined model theoretic interpretation to provide as well as to construct logical forms.2

Thus, at a minimum, lexical semantics should be concerned with the lexical resources used to construct logical forms in a language with a precise model theoretic interpretation. But what are those resources? Clearly the syntactic structure of a clause is necessary for constructing a logical form for the clause, but that is not the province of lexical semantics. One that is, however, is argument structure. Most words—verbs, adjectives, nouns, determiners, and adverbs—have arguments, other words or groups of words, that they combine with; and the meaning of such words must specify what other kinds of words or groups of words they can combine with to provide larger units of meaning. But an account of lexical meaning must do more than this; it must also specify what the process of combination is when the representation of one word meaning combines with other word meaning representations licensed by their argument structures. It must couple its representation of a word’s meaning with a mechanism for combining this representation with the representations of the meanings of its arguments or of the words to which it is an argument. The construction of logical form and the lexical resources used to construct it thus inevitably involve the notion of predication; when one bit of logical form functions as an argument to another, a predication relation holds between a property denoting term and its argument. A satisfactory theory of lexical meaning must yield an account of predication, and the choice of a model of predication affects the choice of how to represent lexical meanings. I turn now to a basic formal model of predication and the representation of lexical meaning.

2 Cognitive semantics lexical theories will not figure in this book, because they do not really have the resources to provide logical forms for sentences capable of defining truth conditions or update conditions. Gärdenfors (1988) has provided a formal model of the cognitive semantics view of lexical meaning by taking the cognitive features to form the basis of a vector space. Lexical meanings are then represented as vectors or sets of vectors in this space. Such a theory can give us a potentially interesting measure of similarity in meaning by appealing to distances between points in this feature space. Certain lexical inferences can also be accounted for as Gärdenfors (1988) shows. But the compositional problem, that is, the problem of showing how these meanings compose together to get meanings of larger units, is unsolved, and it is not at all obvious how one could solve it within the vector or feature space framework for anything more than the simplest of fragments of natural language.
PART ONE

FOUNDATIONS
Lexical Meaning and Predication

To build a formal model of predication and to express lexical meaning, I will use the lambda calculus. The lambda calculus is the oldest, most expressive, and best understood framework for meaning representation; and its links to various syntactic formalisms have been thoroughly examined from the earliest days of Montague Grammar to recent work like that of de Groote (2001), Frank and van Genabith (2001). Its expressive power will more than suffice for our needs.1

The pure lambda calculus, or λ calculus, has a particularly simple syntax. Its language consists of variables together with an abstraction operator λ. The set of terms is closed under the following rules: (1) if v is a variable, then v is a term; (2) if t is a term and v a variable, then λvt is also a term; (3) if t and t’ are terms, then the application of t to t’, t[t’], is also a term. We can use this language to analyze the predication involved when we apply a predicate like an intransitive verb to its arguments. The meaning of an intransitive verb like sleeps is represented by a lambda term, λx sleep’(x); it is a function of one argument, another term like the constant j for John that will replace the λ bound variable x and yield a logical form for a larger unit of meaning under the operation of β reduction. β reduction, also known as β conversion, is a rule for inferring one term from another. β reduction is the formal counterpart in the λ calculus of the informal operation of predication. One can also think of reduction as the rule governing application, and so I shall call it the rule of Application.2 I’ll write such a rule in the usual natural deductive format.

---

1 There are other formalisms that can be used—for instance, the formalism of attribute value matrices or typed feature structures with unification. This formalism, however, lacks the operation of abstraction, which is crucial for my proposals here.

2 Besides Application, there are other rules standardly assumed for the λ calculus—for example, α conversion, which ensures the equivalence of bound variables, rules for equality, and the following rules which validate a rule of Substitution that I shall introduce subsequently:
Lexical Meaning and Predication

• Application:

\[ \lambda x \phi[\alpha] \]

\[ \phi\left(\frac{\alpha}{x}\right) \]

The \( \lambda \) calculus as our representational language tells us in principle what our lexical entries should look like. For example, if we decide that a word like *cat* is a one place predicate, then our lexical entry for this word should have the form \( \lambda x \text{cat}'(x) \), where *cat' is an expression in our language for logical forms that will, when interpreted, assign the right sort of denotation to the word and contribute to the right sort of truth conditions for sentences containing the word. Of course, there are lots of decisions to be made as to what *cat' should be exactly, but we will come back to this after we have taken a closer look at predication.

1.1 Types and presuppositions

Sometimes predications go wrong. This is something that lexical semantics has to explain.

(1.1) a. ?That person contains an interesting idea about Freud.
   b. That person has an interesting idea about Freud.
   c. That book contains an interesting idea about Freud.
   d. That person is eating breakfast.
   e. That book is red.
   f. #That rumor is red.
   g. # The number two is red.
   h. # The number two is soft.
   i. # The number two hit Bill.
   j. The number two is prime.
   k. John knows which number to call.
   l. *John believes which number to call.

The predications in (1.1f,g,h) or (1.1i) are malformed—each contains what Gilbert Ryle would have called a category mistake. Numbers as abstract objects can’t have colors or textures or hit people; it’s nonsensical in a normal

- \( t = t' \rightarrow t[t''] = t'[t''] \)
- \( t = t' \rightarrow f[t] = f[t'] \)
- \( t = t' \rightarrow \lambda x \ t = \lambda x \ t' \)

Church (1936) shows how to encode Boolean functions within the \( \lambda \) calculus, once we have decided on a way of coding up truth functions.
1.1 Types and presuppositions

conversation to say something like the number two is red, soft, or that it hit Bill.\(^3\) The mismatch between predicate and argument is even more blatant in (1.11).

One has to exercise some care in understanding why a predication like (1.1a) sounds so much odder than (1.1b–d). In some sense people can contain information: spies have information that they give to their governments and that counter-spies want to elicit; teachers have information that they impart to their students. But one can’t use the form of words in (1.1a) to straightforwardly convey these ideas. The predication is odd; it involves a misuse of the word *contain*. If it succeeds at all in making sense to the listener, it must be subject to reinterpretation.

It’s important to distinguish between necessary falsity and the sort of semantic anomaly present in (1.1a) and (1.1f–i). In the history of mathematics, many people, including famous mathematicians, have believed necessarily false things. But competent speakers of a language do not believe propositions expressed by a sentence with a semantically anomalous predication. (1.1a) or (1.2c,d) are semantically anomalous in a way that (1.1b–d) or (1.2a,b) below are not.\(^4\)

(1.2) a. Tigers are animals.
   b. Tigers are robots.
   c. #Tigers are financial institutions.
   d. #Tigers are Zermelo-Frankel sets.

Many philosophers take (1.2a) to be necessarily true and (1.2b) to be necessarily false.\(^5\) Nevertheless, according to most people’s intuitions, a competent speaker could entertain or even believe that tigers are robots; he or she could go about trying to figure this out (e.g., by dissecting a tiger). It is much harder to accept the possibility, or even to make sense of, a competent speaker’s believing or even entertaining that tigers are literally financial institutions, let alone ZF style sets. Thinking about whether a competent speaker could entertain or believe the proposition expressed by a sentence gives us another means to distinguish between those sentences containing semantically anomalous expressions and those that do not.

---

\(^3\) As the attentive reader may have already guessed, besides “normal” conversations, there are also “abnormal” discourse contexts—contexts that would enable us to understand these odd sentences in some metaphorical or indirect way, or that even enable us to reset the types of words. More on this later.

\(^4\) Thanks to Dan Korman for the first two examples.

\(^5\) The reason for this has to do with a widely accepted semantics of natural kinds due to Hilary Putnam and Saul Kripke, according to which *tigers* picks out a non-artifactual species in every possible world.
The reason why (1.1a), (1.1f–i) or (1.2c,d) are semantically anomalous, while the other examples above are not, is that there is a conflict between the demands of the predicate for a certain type of argument and the type of its actual argument. People aren’t the right type of things to be containers of information, whereas tapes, books, CDs, and so on are. Rumors aren’t the right type of things to have colors, and tigers aren’t the right type of things to be sets or financial institutions.

We can encode these humdrum observations by moving from the pure lambda calculus to a typed lambda calculus. The reason why some predications involve misuses of words, don’t work, or require reinterpretation, is that the types of the arguments don’t match the types required by the predicates for their argument places. (1.1a) involves a misuse of the language. *Contain*, given the type of its direct object, requires for its subject argument a certain type of object—a container of information; and persons are of not of this type—they don’t contain information the way books, journal articles, pamphlets, CDs, and the like do. On the other hand, there is no such problem with (1.1b); books are the sort of object that are containers of information. (1.1c) is also fine, but that is because the verb *have* doesn’t make the same type requirements on its arguments that *contain* does.

The typed lambda calculus, developed by Church (1940), assumes that every term in the language has a particular type. This places an important constraint on the operation of Application. Assume that every term and variable in the lambda calculus is assigned a type by a function $\text{type}$.

- **Type Restricted Application:**

  $$\frac{\lambda x \phi [\alpha]}{\phi (\frac{\alpha}{x})}$$

  provided $\text{type}(x) = \text{type}(\alpha)$.

  $\lambda x \phi [\alpha]$ is undefined, otherwise.

In what follows, I’ll encode $\text{type}$ with the usual colon notation; $\alpha: a$ means that term $\alpha$ has type $a$.

The typed lambda calculus has many pleasant semantic and computational properties. This has made it a favorite tool of compositional semanticists since Montague first applied it in developing his model theoretic notion of meaning in the sixties. I will model predication as type restricted application and lexical entries as typed lambda terms. This will require that each term gets a type in a given predicational context. Moreover, each term will place restrictions on the type of its eventual arguments. The data just discussed indicates that the set of
relevant types for a theory of predication and lexical meaning are quite fine-grained; in the next chapter we will see how this data and other data lead to the hypothesis of a great many more types than envisaged in Montague Grammar or standard compositional semantics.

Before addressing questions about types, I want to investigate some implications of Type Restricted Application for a theory of predication. There is a compelling analogy between the way types and type requirements work in the typed lambda calculus and the linguistic phenomenon known as presupposition. Linguists take certain words, phrases, and even constructions to generate presupposed contents as well as “proffered” contents; the latter enter into the proposition a sentence containing such items expresses, whereas the presupposed contents are conceived of as constraints on the context of interpretation of the sentence. For instance, in

(1.3) The dog is hungry

the definite determiner phrase (DP) the dog is said to generate a presupposition that there is a salient dog in the discourse context. If such a presupposition is satisfied in a discourse context, the presupposition is said to be bound; if it cannot be bound, the presupposition is accommodated by making the supposition that the discourse context contains such a salient dog. However, there is a certain cost to such suppositions; if there really is no salient dog in the context, (1.3) is difficult to interpret. Frege and Strawson proposed that in cases where no salient dog can be found, a sentence like (1.3) cannot be literally interpreted and fails to result in a well-formed proposition capable of having a truth value.6 This view of presupposition, though it has its detractors, is well established in linguistics and has received a good deal of empirical support and formal analysis (Heim (1983), van der Sandt (1992), Beaver (2001)). Type Restricted Application says something very similar to the doctrine of presupposition: a type concordance between predicate and argument is required for coherent interpretation. If an argument in a predication cannot satisfy the type requirements of the predicate, then the predication cannot be interpreted and fails to result in a well-formed logical form capable of having a truth value.

There are other similarities between presupposition and type requirements. A common test for presupposition is the so-called projection test: presuppositions “project” out of various operators denoting negation, modality, or mood. So if the type requirements of a predicate are a matter of presupposition, then semantically anomalous sentences like (1.1g,h) should remain anomalous

---

6 This is known as the “Frege-Strawson” doctrine.
when embedded under negation, interrogative mood or modal operators. This is indeed the case:

(1.4) a. # The number two could have been red.
b. # Is the number two soft?
c. # The number two didn’t hit Bill.\(^7\)

The sentences in (1.4) all convey presuppositions that are absurd and that cannot be met—namely, that the number two is a physical object. Other tests for presuppositions concern the non-redundancy of presupposed content and the inability to make certain discourse continuations on presupposed content.\(^8\) These tests apply to type requirements of predicates as well. It is not redundant to say *the abstract object two is prime* instead of *two is prime*, and it seems impossible to make discourse continuations on the type requirements, since the latter are not even propositional contents. Thus, it seems that the type requirements of predicates provide a kind of presupposed content. I shall call these *type presuppositions*.

Two features of presuppositions will be very important for the study of predication in this book. The first is the variability among terms that generate presuppositions to license accommodation. It is standardly assumed that the adverb *too* generates a presupposition that must be satisfied in the given discourse context by some linguistically expressed or otherwise saliently marked content. Thus, in an “out of the blue” context, it makes no sense to say

(1.6) Kate lives in New York too.

even though as a matter of world knowledge it is clear that the presupposition of *too* in this sentence is satisfied—namely, that there are other people besides Kate who live in New York. Even if the proposition that there are other people besides Kate who live in New York is manifestly true to the audience of (1.6), (1.6) is still awkward, unless the presupposed content has been made salient somehow in the context. The presupposed, typing requirements of the predicates in (1.1) and (1.4) resemble the behavior of the presupposition of *too*; they

---

\(^7\) A presuppositional view should allow that this sentence has a perfectly fine reading where the negation holds over the type requirements as well. But typically such readings are induced by marked intonation. If this sentence is read with standard assertion prosody, then it is as anomalous as the rest.

\(^8\) The continuation test says that one cannot elaborate or explain or continue a narrative sequence on presupposed content. Thus, one cannot understand the example below as conveying that John regretted that he yelled at his girlfriend and that then after fighting with her he went to have a drink.

(1.5) John regrets that he fought with his girlfriend. Then he went to have a drink.
have to be satisfied in their “predicative” context in order for the sentences containing them to receive a truth value. Accommodation of these type presuppositions is impossible. The sentences that fail to express a coherent proposition capable of having a truth value do so, because the relevant type presuppositions cannot be satisfied, given that the arguments and predicates therein mean what they standardly mean and have the types that they standardly do.

On the other hand, some presupposition introducing phrases like possessive DPs readily submit to accommodation. For instance, *Sylvain’s son* presupposes that Sylvain has a son, but this information is readily accommodated into the discourse context when the context does not satisfy the presupposition.

\[(1.7) \text{Sylvain’s son is almost three years old.}\]

Other definite descriptions can be satisfied via complex inferences. The example below, which features a phenomenon known as “bridging,” features such an inference; the definite *the engine* is “satisfied” by the presence of a car in the context—the engine is taken to be the engine of the car:

\[(1.8) \text{I went to start my car. The engine made a funny noise.}\]

In the following chapters we will see cases of type presuppositions that can either be satisfied in complex ways like the bridging cases or can be accommodated via a “rearrangement” or modification of the predicative context, if the latter fails to satisfy the type presuppositions in a straightforward way. Figuring out when presupposed typing requirements can be accommodated and when they cannot will be a central task of this book.

Another important property of presuppositions is their sensitivity to discourse context. For instance, if we embed (1.7) in the consequent of a conditional, the presupposition that projects out from the consequent can be bound in the antecedent and fails to project out further as a presupposition of the whole sentence (1.9):

\[(1.9) \text{If Sylvain has a son, then Sylvain’s son is almost three years old.}\]

A similar phenomenon holds for type presuppositions. Consider (1.4a) embedded as a consequent of the following (admittedly rather strange) counterfactual.

\[(1.10) \text{If numbers were physical objects, then the number two could have been red.}\]

The presupposition projected out from (1.4a) is here satisfied by the antecedent of the counterfactual and rendered harmless. Thus, category mistakes for the most part must be understood relative to a background, contextually supplied set of types, a background that may itself shift in discourse.
1.2 Different sorts of predication

Having introduced types as part of the apparatus of predication, let me come back to predication itself. I have spoken so far of predication as a single operation of applying a predicate to its arguments. But in fact predication takes many forms in natural languages, some particular to particular languages, others more general. Even among ordinary predications, linguists distinguish between:

- predication of a verb phrase to a subject or a transitive verb to an object
- adjectival modification with different types of adjectives—e.g., evaluative adjectives like *good rock, bad violinist*, material adjectives like *bronze statue, paper airplane*, and manner adjectives like *fast car, slow cigar*
- adverbial modification and modification of a verb phrase with different prepositional phrases or PPs—e.g., the distinction between *load the wagon with hay* and *load the hay on the wagon*.

Beyond these are more exotic forms of predication:

- metaphorical usage (extended predication)
  
  (1.11) John is a rock.

- restricted predication
  
  (1.12) John as a banker makes $50K a year but as a plumber he makes only $20K a year.

- copredication
  
  (1.13) The lunch was delicious but took forever.
  
  (1.14) The book has a purple cover and is the most intelligible introduction to category theory.
  
  (1.15) #The bank is rising and specializes in IPOs.

- loose predication
  
  (1.16) That’s a square (pointing to an unpracticed drawing in the sand).

- resultative constructions
  
  (1.17) a. Kim hammered the metal flat.
  
  b. *Kim hammered the metal gleaming.

  (1.18) depictives
  
  a. Pat swims naked.
  
  b. *Pat cooks hot.

- the genitive construction
1.2 Different sorts of predication

(1.19) a. Kim’s mother  
    b. Kim’s fish

- noun noun compounds

(1.20) a. lunch counter  
    b. party favor

Each one of these forms of predication presents its own challenges for lexical and compositional semantics; the lexical theory must assign to the words in these constructions the right sort of meaning and postulate the right sort of composition rules for predication so as to get the right result. In addition, a lexical theory must specify what morphological processes and elements affect meaning and how; it must give those processes and elements a meaning. A lexical theory using the typed lambda calculus can provide the right sort of picture to tackle these issues.

Let’s consider these forms of predication in a bit more detail. Loose predication is a difficult and well-known problem in philosophy. But other forms of predication mentioned above, which linguists think also provide challenges for lexical theory, have not received so much philosophical scrutiny or formal analysis. Copredication, for instance, which is a grammatical construction in which two predicates jointly apply to the same argument, has proved a major challenge. Languages, as we shall see in the next chapter, distinguish between events and objects; the predicates that apply the one type do not apply in general to the other type literally. It turns out that some objects, however, are considered both events and physical objects in some sense. Consider, for instance, lunches. Lunches can be events but they are also meals and as such physical objects. As a result, lunch supports felicitous copredications in which one predicate selects for the event sense of lunch while the other selects for the physical object or meal sense.

(1.21) Lunch was delicious but took forever.

It turns out that many words behave like lunch in (1.21) and denote objects with multiple senses or aspects. I will call predications like those in (1.21) aspect selections, and I will analyze these predications as predications that apply to selected aspects of the object denoted by the surface argument.

In trying to account for instances of copredication that involve aspect selection like (1.21), standard, typed theories of predication and lexical semantics confront some difficult if not unanswerable questions. How can a term have two incompatible types, as is apparently the case here? How can one term

---

9 Loose predication is related to vagueness, and vague predication might be considered another form to be studied. But I shall not do that here.
denote an object or set of objects to which apply two properties demanding different, even incompatible types of their bearers? It would have to be the case then that such an object must have, or belong to, two incompatible types. But how is that possible? Proponents of standard type theory have only one clear recourse, and that is to claim that terms associated with two incompatible types are ambiguous. But that deepens the mystery about copredications involving aspect selections: if *lunch* in (1.21) is ambiguous between a physical object reading and an event reading, then we must disambiguate the term in one way to make sense of the first predication but disambiguate it in a second way to make sense of the second predication; and the problem is that, on the surface at least, we have only one term to disambiguate—we have to choose a disambiguation, but such a choice will inevitably cause one of the predications in (1.21) to fail. At this point we might try a strategy of desperation and postulate a hidden “copy” of the problematic term, rewriting (1.21) in effect as

(1.21’) Lunch was delicious but lunch took forever.

This copying strategy now allows the proponent of standard type theory to proceed to disambiguate the two occurrences of *lunch* in different ways allowing the two predications to succeed. But the promise of the copying strategy is shortlived. Copying expressions will get us incorrect truth conditions in many cases. Consider (1.22), where *last* applies to events, while *tasted* applies only to objects (you can’t taste events except metaphorically):

(1.22) A lunch was gingerly tasted by Mary and then lasted three hours.

The copying strategy forces us to interpret (1.22) as

(1.23) A lunch was gingerly tasted by Mary and then a lunch lasted three hours.

It’s easy to see that (1.22) and (1.23) have different truth conditions; (1.22) is true only in those situations where Mary gingerly tasted the same lunch that lasted three hours, while (1.23) can be true in situations where Mary gingerly tastes one lunch but another lunch lasts three hours. Thus, it is not obvious how to deal with examples of copredication even from the standpoint of compositionality, if one’s lexical theory produces a rich system of types. Montague himself noted that there were copredications that were puzzling even within his much more impoverished system of types. In (1.24) *temperature* seems to have two aspects, one of which is a number on a scale, while the other is a function from times to numerical values.

(1.24) The temperature is 90 and rising.
Different sorts of predication

We’ll see many more examples of copredications and how to analyze them in chapters 5 and 6.

Restricted predications like the main predication in *John as a banker makes $50K a year* seem to predicate properties of certain parts or aspects of the “restricted argument” (in the example at hand, John). But it is not clear in what sense we should understand the word *part*. In the example, it’s not as though we’re predicating the making of a salary to some physical part of John, as in *John’s right arm has a bruise*. Restricted predication thus introduces some puzzles of its own.

Resultative constructions are another form of complex predication. (1.17a), for example, involves two predications on the term *the metal*—one by the adjective *flat* and one by the verb.10 But this construction also introduces a third predication, which features the causal relation between the hammering and the flatness of the metal. Genitive constructions also introduce a predication in which some relation is predicated of the objects described by the two noun phrases or DPs that make up the genitive construction. Sometimes this relation is given by the head noun as in (1.19a) but sometimes it is not as in (1.19b). The predication in the genitive also seems to add to or to change the content of the words in the construction. Finally, the semi-productive predication construction in English, known as noun-noun compounding, also seems to add to or transform the meanings of its constituents—sometimes in radical ways so as to produce idioms whose meaning is not derivable from the meanings of its constituent terms like *party favor*.

Besides these forms of predication, there are other factors that can influence the content of a predication. One is number. Some predicates with plural arguments require a *collective* or *group* predication, which requires the argument to be described in a certain way. Consider

(1.25) a. The students surrounded the building.

b. The students mowed the whole meadow.

(1.25a,b) exemplify collective predications where a property is predicated of the whole set of students but not of each student individually. Contrasting with collective predication is distributive predication, which occurs when a property or relation is predicated of each element of a plural group, as in

(1.26) The boys each worked hard.

There is a grammatically marked distinction between plurality and singularity, about which most lexical theories have nothing to say. Nevertheless, they

10 Syntacticians take the structure of this sentence to be quite complex, involving what is called a “small clause,” *the metal flat*, and the verb *hammer*. 
should, because an account of the lexical meaning of the word *disperse* or *surround* must mark it as requiring an argument that, if plural, must be interpreted collectively.

In many predications, interactions between the type presuppositions of the predicate and the types of its arguments also affect the content of the predication. (1.27) provides examples of this phenomenon, which is known as *coercion* in the literature. Coercion is so called because it appears that one word coerces another word (usually the second word is an argument of the first) to have a different meaning from its usual one.

(1.27) a. good lunch, good children
    b. Mouse isn’t very tasty unless you’re a cat.
    c. John started a cigarette, started a car, began the sonata, finished the novel.
    d. John liked the dress with the flowers/ liked the garden with the flowers.

The phenomenon observed with the adjectival predications in (1.27a) is a very general and diverse one. The predications therein show how adjectival modification can affect the type and meaning of the resulting noun phrase. A good lunch is one that tasted good. Pustejovsky (1995) and others have proposed that an adjective like *good* selects a component of the meaning of its argument—roughly, its purpose or *telic* role. Nevertheless, as many have noted, such adjectives also apply to arguments that don’t have purposes. For instance, children in and of themselves don’t have fixed purposes; yet when *good* modifies *children*, we understand different things: when someone says *those are good children*, we understand that the children are behaving well or that they have certain laudatory dispositions to behavior. There is a subtle, though undeniable, shift in meaning in these predications. A theory that simply says that *good* denotes the property of being good, that *children* denotes children and *lunch* denotes a meal and that says nothing about how these meanings combine in predication other than that the objects denoted by the one term have the property denoted by the other cannot make any headway explaining these nuances in meaning. Unfortunately, many philosophers and some linguists still hold such a theory to be true (for instance, see Fodor and Lepore (1998)).

(1.27b) shows how the bare singular use of a count noun can in many circumstances change the type of the noun phrase from count to mass. This transformation is known as *grinding* in linguistics. The examples in (1.27c) show how aspectual verbs coerce their arguments into denoting some sort of event. Aspectual verbs require or presuppose that their direct object is some event involving their subject; when their direct objects are not event-like, a felicitous coercion sometimes occurs, and we infer defeasibly that some sort of
activity involving the subject of the aspectual verb serves as its internal argument. Thus, we understand *John started the car* as John’s started the running of the car’s engine. To start a cigarette is typically to start to smoke a cigarette. (1.27d) shows that coercions can happen with prepositional phrases—*the dress with the flowers* has at least one interpretation where a representation of flowers is stitched, printed, or drawn on the fabric of the dress, while *the garden with the flowers* does not have that interpretation, at least not nearly so saliently.\(^{11}\)

As we shall see, there are subtle differences with respect to the presuppositions in the typing requirements of various aspectual verbs and other coercing predicates.

Are such coercions really part of lexical semantics? That is, is it a defeasible but *a priori* inference that if John started the car, John started the engine of the car or that if Julie enjoyed the book, then (defeasibly) she enjoyed reading it? Do such inferences follow solely from one’s linguistic mastery of the language? Fodor and Lepore think that none of these inferences belong to lexical semantics but are rather part of encyclopaedic or world knowledge. However, most people can distinguish between the largely automatic interpretations that these predications seem to entail and those that require more conscious effort. One might take that to be a mark of the information as being present even during predication rather than inferred afterwards using background, nonlinguistic beliefs.

It is notoriously difficult to distinguish between what is properly a part of lexical meaning and what is world knowledge. Quine’s attack on lexical meaning can be seen as starting from the point that one cannot make this distinction in a principled way. Part of the difficulty is that, to some extent, the division between word meaning and world knowledge is a theory-internal distinction. For instance, if you’re an externalist for whom the meanings of two singular or natural kind terms \(t\) and \(t’\) are determined by their reference, it may be a fact of meaning that \(t = t’\) or not. Thus, *water is H\(_2\)O* would be a fact of meaning, and hence analytic, on such a view! Despite these difficulties, there is are tests one can use to see whether it is certain information conventionally associated with particular word meanings rather than just general world knowledge that gives rise to these inferences. For one thing, it seems pretty clear that the inferences given in (1.27c) are tied to particular predicates, particular verbs. Let’s suppose that *cigarette*, like *lunch*, always has associated with it a possible event reading. It should then be possible to access that appropriate event reading with other predicates that take events.

\(^{11}\) This example is due to Marliese Kluck.
Lexical Meaning and Predication

(1.28) a. Nicholas’s smoking of that cigarette will begin in 2 minutes.
    b. Nicholas’s cigarette break will begin in 2 minutes.
    c. ??Nicholas’s cigarette will begin in 2 minutes.

It’s quite clear that (1.28c) is semantically strange. The event associated with *cigarette* in *enjoy the cigarette, begin the cigarette, finish the cigarette*, just isn’t available with other event predicates. This strongly suggests that there is some particular conventional meaning that issues from the predication of the properties these verbs denote to the objects denoted by their arguments that isn’t available in other predicational contexts. That is, the eventuality of smoking isn’t just accessible with any predication involving *cigarette*; it is the result of combining *cigarette* as an object or internal argument of an aspectual verb or a verb like *enjoy*.

It is not only that such inferences are tied to particular verbs; they are tied to them independently of what the verb’s object is. Consider the use of a nonsense word like *zibzab*. 12 To say

(1.29) John enjoyed the zibzab

is to say that John enjoyed doing something to the zibzab. At this point, it’s really hard to understand how the inference to an event reading is part of world knowledge. It becomes clear that it is an *a priori* truth that to enjoy something is to be involved in some interaction with it—some eventuality. When the direct object argument of a verb like *enjoy* does not denote an eventuality as part of its standard meaning, coercion introduces somehow an appropriate eventuality. This militates strongly for placing coercion within the realm of linguistic knowledge, not contingent factual information about what the world is actually like.

A further question concerns how this eventuality involved in predications like those in (1.27c) is specified. While we’ll see that this is not true in all cases, some nouns like *cigarette* help to specify the eventuality induced by coercion when they are in the direct object of a coercing verb. To see this, consider replacing the word *cigarette* with the relevant part of its entry in *Webster’s New World College Dictionary*, which should at least roughly have the same content as the word *cigarette*.

(1.30) a. Nicholas enjoyed a cigarette.
    b. Nicholas enjoyed a small roll of finely cut tobacco wrapped in thin paper.

12 Thanks to Chris Kennedy for these sorts of examples.