Bachelor Thesis
A Comparative Study Of Current Theories Of Polysemy In Formal Semantics

Sven Lauer
tired.philanthropist@gmail.com

December 16, 2004
Abstract

This thesis compares three current theories of polysemy by examining

(i) how well they capture the generalizations that can be made concerning
the senses of polysemous nouns,

(ii) how they account for cases in which a single token of one of these nouns
is able to express more than one sense of the noun and

(iii) whether they are able to explain the apparent similarity of such occur-
rences to certain phenomena involving (apparently) monosemous words
referring to entities that are not included in their conventional denotation.

The three accounts compared are Geoffrey Nunberg’s account of Meaning
Transfer, Manfred Bierwisch’s proposal of a two-stage system of interpretation
and James Pustejovsky’s theory of The Generative Lexicon.

The conclusion is drawn that, in view of the data considered in this thesis,
the accounts of Nunberg and Bierwisch are more suitable than Pustejovsky’s,
and it is made plausible that this is mainly due to the fact that the latter does
not take into account the role pragmatic factors play in the interpretation of
polysemous words.

Finally, two proposals concerning the nature of pragmatic constraints on the
contextual phenomena under discussion are briefly examined.
## Contents

1 Introduction 4
1.1 The Data 7
   1.1.1 A Puzzle Concerning Polysemous Nouns 7
   1.1.2 Metonymic Predication 7
   1.1.3 Metonymic Reference 9
   1.1.4 Summary 11
1.2 Not The Data 12

2 Three (Partial) Solutions 15
2.1 Nunberg: Meaning Transfer 16
   2.1.1 Metonymic Predication = Meaning Transfer On Verbs
       And VPs 16
   2.1.2 Metonymic Reference = Meaning Transfer on Common
       Nouns 18
   2.1.3 Polysemous Nouns = Conventionalized Meaning Transfers? 19
   2.1.4 A Methodological Problem 20
   2.1.5 Summary 21
2.2 Bierwisch’s two-level system of interpretation 22
   2.2.1 Introduction 22
   2.2.2 Polysemous Nouns: Where sem and m come apart 22
   2.2.3 Contextual Metonymies 25
   2.2.4 Summary 26
2.3 Pustejovsky: The Generative Lexicon 27
   2.3.1 Type Coercion 27
   2.3.2 Polysemous Nouns in a Generative Lexicon 28
   2.3.3 Contextual Metonymies 33
   2.3.4 Summary 36

3 Three Questions Revisited 38
3.1 The Representation of Polysemous Nouns 39
3.2 Metonymic Predication and Metonymic Reference 40
3.3 One occurrence, Two Senses 42
3.4 Summary 42
Section 1

Introduction

“Junge.”, replied my fifth-grade English teacher when I asked her what the word boy means. At the time, I was satisfied with the answer, at least after I had understood that she was answering, not chiding me. Nowadays, I think she was cheating. Or lying. Or maybe she just wanted to say that boy means the same as the German word Junge. Probably even. If two words can mean the same, it seems to follow that they share something, that they are similar, identical in some respect. They have the same meaning. But what do we mean (duh!) when we say such a thing? Firstly, we are probably not talking about a word token, but a word type, a lexeme, presumably. So the things in the lexicon have some part that specifies what they mean. And somehow, this meaning figures in the meaning of sentences that include the word in question.

In formal semantics, the idea is, at least initially and simplifying (more than) a little bit, that every lexical item invariably contributes the same “semantic value” and that rules of composition specify how these items combine to form the semantic value of more complex units of syntactic description, which again are combined via rules of composition, until the semantic value of the biggest unit of syntactic description, usually the sentence, is derived.

This is a very simple and attractive picture of how the meaning (or an aspect thereof, usually the truth conditions) of a sentence can be computed. Since the process is, in some sense, parasitic on the syntactic structure, it explains how the meaning of an infinite number of sentences can be computed by use of finite means – finitely many lexical meanings are combined along the lines of syntactic structure, which again is computed by finite means (that we leave for syntacticians to worry about).

Some lexical items, however, are special, in that they seem to make varying contributions on different occurrences: They are ambiguous. Bank\textsuperscript{1} on one

---

\textsuperscript{1}A note on typography: Words that are mentioned (as opposed to used) are given in bold face, while concepts are written in CAPITALS, sorts in SMALL CAPS and italics are reserved for emphasis and the first use of newly introduced technical terms. Since the senses of polysemous words can often be usefully distinguished by the sort of things they apply to, I will occasionally refer to a certain sense as “the Sort sense”.

4
occurrence is used to talk about the side of a river, and on another, it is used to talk about a financial institution. In order to save our simple picture of how interpretation works, we stipulate that there are in fact two words that just happen to be pronounced (and spelled) identically. For words like bank, this seems to solve the problem adequately: Not only seem the occurrences of the string of phonemes (or letters) partition into two classes, for each of which the semantic contribution seems to be constant (ignoring that the “financial institution” word can be used to talk about various, related things, of which more in a second), but intuitively, the two “senses” of the word seem to have nothing to do with each other, and even though the two bank words might have originated from the same word, it seems just as sensible to assume that the fact that they are pronounced identically is just an accident.

There are, however, cases where one word can be used to talk about varying things (has, in some sense of the word, varying meanings) and yet, simply saying that there are two words that just happen to sound the same (and are spelled identically) seems to be missing something. Consider the occurrences of the word school in the following two sentences.

(1.1) The school was an old brick building near the river.
(1.2) The school hired two more teachers.

(translated from Bierwisch (1983))

In (1.1), the phrase the school refers to a building, while in (1.2) it refers to some sort of institution. Still, we perceive the two “words” as somehow “related” beyond the fact that they are pronounced and spelled identically. That is probably due to what we know about the institution and the building talked about: We know the building in (1.1) is most probably in some way dedicated to an institution of just the sort as the one talked about in (1.2). Even more intimate is the relationship between the two “different words that just happen to be pronounced the same” that occur in the following sentences:

(1.3) The book is in the left drawer.
(1.4) The book might revolutionize formal semantics.

The book in (1.3) clearly refers to some sort of physical object (composed of pieces of paper, attached to each other in a typical way), while the same phrase in (1.4) hardly can refer to a physical object. It seems, rather, to refer to some abstract entity, some sort of “informational content”. Again, the intuitive relatedness seems to come from what we know about the physical object and informational content in question. The physical objects are usually, in some sense, containers for the informational content, and the informational content is (intended to be) held by the physical objects.

To distinguish these cases of ambiguity from words that are “merely homonymous” (like bank), we say that the multiple occurrences of book and school are all occurrences of the same word, but this word has different senses, it is
polysemous.\textsuperscript{2} With such a statement, the question arises how the meaning of these polysemous words is represented in the lexicon. For merely homonymous words, we could just assume two entries that have identical features for the phonological representation, but intuitively, that does not seem to be the best way to handle polysemous words.

It is not obvious, however, that there indeed is a problem of polysemy, or more specifically, a problem with the lexical representation and compositional behavior of polysemous words. Why should we not assume that each of the different senses of a polysemous word just has its own lexical entry? After all, the relatedness we perceive among the different senses seems to depend on what we know about the entities denoted, not on what we know about the words themselves. We also know that the things we talk about when using the words \textit{finance}, \textit{money} and \textit{deposit} are somehow related — yet we do not usually think this should have direct consequences on how these words are represented in the lexicon, over and above that the things denoted by these words in some sense belong to the same domain.

Saying that the different senses of \textit{school} and \textit{book} are just different words, though, seems to be missing a generalization: Many words that refer to institutions and organizations also can refer to the building or location associated with that institution: \textit{university}, the “financial institution” sense of \textit{bank} and \textit{opera}, to name just a few examples. Similarly, all sorts of words and names for printed publications can be used to both refer to the physical realization of the content and for this content itself. \textit{Newspaper}, \textit{journal}, \textit{leaflet} and \textit{dictionary} are some examples. And maybe one might even think of these words as similar to words for containers that can be used to talk about the contents of these containers, like \textit{bottle}, \textit{jar}, \textit{cup} or \textit{plate}. Words for publications that appear regularly or in a series (like \textit{newspaper} or \textit{journal}), again, often have a sense that refers to the content of an issue and if an organization is specifically dedicated to the creation of a publication, like with \textit{newspaper} and \textit{dictionary}, we often can use the word for the publication in order to refer to this organization. If we assume that the senses of polysemous words are lexicalized as distinct, unrelated lexical entries, regularities like these just noted cannot be captured in the lexicon.

Even if we, for the time being, assume that the senses of polysemous nouns are treated, from the side of the lexicon, just as instances of homonymy, it becomes a puzzle how some sentences arrive at their interpretation, as we will see in the next section.

\textsuperscript{2}What I call polysemy here has been called “logical” or “regular” polysemy, with the implication that there are other cases of polysemy that are not regular or less logical. For the rest of this thesis, I will ignore this and assume what distinguishes polysemy from homonymy is exactly that it is regular in a sense to be made precise. That is not to say that I claim that homonymy and regular polysemy are the only two ways in which a lexical item can refer to varying things, just that I have nothing to say about cases that can not be classified as one or the other.
1.1 The Data

1.1.1 A Puzzle Concerning Polysemous Nouns

If we assume a merely homonymous word to be in fact two words that sound the same, it is rather obvious that each occurrence of the string of phonemes has to be a token of one of the two word types – it can not be both. It might not be clear without context which of the two bank words is used in (1.5), but surely it is either one or the other. This is what makes it impossible to refer to both senses with one occurrence, as attempted in (1.6).

(1.5) I have to go to the bank.

(1.6) ?The east bank of the Hudson lent me a large sum.

It is clear that the east bank of the Hudson refers to a river bank, while a river bank cannot lend money. Financial institutions can, but these are not normally referred to by the phrase the east bank of the Hudson. The sentence just does not make sense. This is only to be expected if the two senses of bank are in fact different words that have nothing to do with each other.

However, in some cases, it seems to be possible to express more than one sense of school with only one occurrence of the word, as in (1.7).

(1.7) The school next to the sports field donated a large sum.\(^3\)

It seems that, on the one hand, the phrase next to the sports field fixes the denotation of the school to that of the BUILDING sense, as only a physical object can be located next to a sports field, but still, it is possible to apply the predicate denoted by donated a large sum to the denotation of the school - but buildings cannot donate money, only institutions or people can. Still, (1.7) is much more acceptable than (1.6), as the intended meaning is very clear.

1.1.2 Metonymic Predication

In some respects, (1.7) is quite similar to sentences like

(1.8) Steve is parked around the corner.

(1.9) Steve is published by Ballantine.

(adaptations of examples of Nunberg (1995))

In (1.8), the NP in subject position (Steve) seems to refer to a human being (if we neglect the possibility that an affectionate car owner christened her car Steve), while the VP parked around the corner seems to subcategorize for an argument of sort VEHICLE, very much as the school next to the sports field seems to refer to a building, while the VP donated a large sum subcategorizes

\(^3\)translated version of an example from Bierwisch (1983)
for an argument that can donate, a person or institution maybe, but surely not a building. What the sentence is intended to say, again, is clear: That Steve’s ear is parked around the corner.

(1.9) is a little different in that it is more easily interpreted if it has been established that the individual named Steve is a writer of some sort, but other than that, the sentence can be described in very much the same way as (1.8): is published by Ballantine seems to subcategorize for an argument of sort Written Work or something similar, while Steve seems to refer to a person. Once more, it is clear what the sentence is intended to express: That a book (or series of books, or journal, or, . . .) Steve wrote (or edited, or illustrated, . . .) is published by Ballantine.

One might tentatively describe these sentences as involving the predication of the property (conventionally) denoted by the VP of something that is not identical with the (conventional) denotation of the NP in subject position. The same can be said of the following sentences:

(1.10) Faulkner is hard to understand. 4

(1.11) I am in the Whitney. 5

(as uttered by a painter)

The sentence (1.10) has a reading on which it says that Faulkner’s books are hard to understand, not the person Faulkner himself. Similarly, if the speaker is known to be a painter, (1.11) will be naturally read as expressing that one of the speaker’s paintings is exhibited in the Whitney Museum.

What the denotation of the VP in these sentences seems to be predicated of is not the denotation of the NP in subject position, but rather something that stands in some relation to this denotation. This is classical metonymy: The NP denotation standing in for something that it is related to. Curiously, though, not everything that can be predicated of Steve’s car can be predicated of Steve himself, even if we keep the context constant. In most (if not all) contexts, it would be impossible to utter

(1.12) Steve may not start.

in order inform someone that Steve’s car may not start. Similarly, a painter would hardly use

(1.13) I am painted in oil.

4This example is taken from Bierwisch (1983)
5Taken from Nunberg (1995)

8 to say that one of her paintings is painted in oil, and so on.

Contextual and world knowledge play at least some role in determining whether or not such a “metonymic predication” is possible: (1.11) gets the metonymic reading more readily if we know that the speaker herself is not in the Whitney Museum (but we still assume that she said something true) and
that she is a painter, for example. But even if a metonymic predication is possible in a context, that does not mean that all things that can be said about the “hidden argument” can be said about the NP denotation that “stands in” for it.

This is again similar to sentences that involve more than one sense, but only one occurrence, of a polysemous noun. Consider the sentence

(1.14) The letter is lying on top of the newspaper John works for.

As it is, the sentence sounds a little odd, though the intended meaning is clear, but it becomes much better if we assume that there are a large number of newspaper copies around and that the speaker cannot remember the name of the newspaper in question (which may be indicated by a lapse after of). On the other hand, a conjunction of two predicates that clearly modify different senses of a polysemous noun does not go down so well:

(1.15) The newspaper is lying on my desk and endorses Senator Kerry.

But that is not generally the case, especially if we add some context:

(1.16) Here is why I got a subscription: The newspaper always contains funny comic strips, is delivered to my doorstep free of charge, and John works for it!

So while anything that can be said of a copy of (an issue of) a newspaper can be said of a newspaper, and everything that can be said about the organization dedicated to the publication of the newspaper in question can be said about a newspaper, there are some restrictions on when both senses can be invoked in a sentence that features only one occurrence of a newspaper.

1.1.3 Metonymic Reference

There are some cases that, at first glance, can be seen as some sort of metonymic predication, but looking closer, we discover that what is going on seems to be something quite different. Consider (1.17), as uttered by a waiter towards a colleague:

(1.17) The ham sandwich wants to pay.

What the sentence is intended to express in the context of use is, once more, clear: The customer who ordered (or ate) a ham sandwich wants to pay. But

---

6 The rhetoric purpose of the alternatives given in parenthesis all over this introduction is to stress that the relations between the conventionally denoted entities and the entities and the proper arguments of the predicates denoted by the VPs is highly depended on the context, and each stipulated content here should be read as a default reading. In fact, for (1.17) it might as well be that the customer brought the ham sandwich with him and just ate it at the restaurant, or that he just wears a t-shirt on which a ham sandwich is depicted. The sentence does not seem to say anything at all about how the person talked about is related to a ham sandwich, just that it is.
does it make sense to say that this is an instance of metonymic predication as in
the examples above? Not quite. Here is why: In the previous examples, it seems
that the NP in subject position unambiguously refers to the NP’s conventional
denotation and that it is the predication that is somehow metonymic. On the
contrary the ham sandwich does not seem to refer to a ham sandwich at all.
For example, we can use a pronoun in order to anaphorically refer to the person,
not the ham sandwich. The situation is different for the metonymic predications
we had previously, where a pronoun can refer to the conventional denotation
of the NP, but not to the entity of which the property denoted by the VP is
predicated:

(1.18) The ham sandwich wants to pay. He/she/?it is getting impatient.
(1.19) Steve is parked around the corner. He/?it could give you a ride.
(1.20) Steve is parked around the corner. ?It may not start.

Furthermore, if the metonymic reading is possible at all, there seem to be
no restrictions on what can be predicated of the person talked about:

(1.21) The ham sandwich is a generous tipper / gives you 'the eye' / is
incredibly cute / went to the toilet / just had a heart attack / is a jerk / . . . .

Also, it seems that it is not possible to invoke the “literal” reading of the
ham sandwich and the metonymic reading by conjoining two predicates that
apply to sandwich and orderer, respectively (as in (1.22)), while it is possible
to modify ham sandwich by an expression that applies to the literal meaning
of the word, even if the VP of the main clause denotes a property that applies
to the orderer (but not vice versa):

(1.22) ?The ham sandwich is seasoned with mustard and a generous tipper.
(1.23) The ham sandwich with extra mustard is a generous tipper.
(1.24) ?The ham sandwich that is a generous tipper is seasoned with mustard.

No such restriction seems to apply to the examples of metonymic predication:

(1.25) Steve is parked around the corner and might give you a ride / and is a
good driver / . . . .
(1.26) I am in the Whitney and have won numerous awards.
(1.27) Steve is published by Ballantine, but (he) does not consider himself a
professional writer.
So in these examples, **ham sandwich** seems to be much like **school** and **newspaper** in that anything that can be said of the ham sandwich orderer can be said of the **ham sandwich**, and in that there are some restrictions on when and how two predicates that apply to “different senses” (the metonymic and literal reading) can be applied to a single occurrence of the word; but it is like the examples of metonymic predication in that this is only possible in special contexts of use. Furthermore, it seems that the NP here refers not to what it would refer usually, but rather to the thing that the conventional denotation of the NP stands in for. I will call this phenomenon *metonymic reference* in order to distinguish it from what I have called metonymic predication. Note that the differences are not (only) due to the fact that (1.17) involves a definite noun phrase where the other examples had proper nouns and pronouns:

(1.28) The director is parked around the corner / ?may not start. He might give you a ride.

(1.29) The blonde painter is in the Whitney / ?painted in oil. She is very talented.

(1.30) My favorite poet is hard to understand (but it is worth the effort) / ?written in sprung rhyme.

A curious fact about metonymic reference is that there seems to be a problem if the conventional denotation and the actual denotation do not agree in number. Assume one person ordered and ate two ham sandwiches. In such a situation, it seems to be kind of strange to say something like

(1.31) ?The ham sandwiches want to pay.

Similarly, in languages that have grammatical gender, there is at least a problem with anaphora if the sex of the person referred to does not tally with the gender of the word that occurs in the sentence. Consider the following German example, where a waiter speaks about a man who ordered and ate a soup (**Suppe**, feminine).

(1.32) Die Suppe will bezahlen. Sie / Er wird ungeduldig.

The-FEM soup wants to pay. She / He becomes impatient.

‘The soup wants to pay. She / He is getting impatient.’

The intuitions vary, but for most speakers, both possibilities for the personal pronoun seem to be odd or plainly wrong if the person talked about is a man.

### 1.1.4 Summary

Four questions emerge:

1. Is there a way to capture the generalizations that can be made about related senses of polysemous nouns?
2. How can the interpretation of instances of metonymic predication and metonymic reference be accounted for in a way that explains the different kinds of constraints on both phenomena?

3. How does the interpretation of sentences that involve only one occurrence, but two senses of polysemous noun come about?

4. What are the contextual constraints on metonymic predication and metonymic reference?

The problems are clearly related: The answer to question 3 should explain the (apparent) similarity of the constraints on sentences that involve two senses, but only one occurrence, of a word to the constraints on metonymic predication and transfer. The similarities between metonymic reference and polysemous nouns suggest that it might be possible to formulate a coherent account that covers both and if so, that might well provide an answer to question 1, as the correspondence between conventional denotation and actual denotation in metonymic reference seem to be just the sort of correspondences between the senses of polysemous nouns.

In the section 2, we will examine three accounts that each give answers to (some of) the questions above. The general aim will be to examine where these accounts differ and how the differences affect the treatment of the phenomena outlined in this section.

Before we proceed, I want to briefly mention two things that I want to explicitly exclude from the discussion in this thesis.

1.2 Not The Data

Deferred Ostension

Firstly, I do not want to discuss deferred ostension. This term was introduced by Quine (1969, p. 40) and applies to instances where the use of a demonstrative is accompanied by the demonstration of something that stands in some relationship of the thing talked about (e.g. pointing to a picture of Frege in order to refer to Frege himself). Examples of deferred ostension seem to be similar to metonymic reference in a number of ways and it may well be that a common mechanism underlies both. I still want to exclude it from discussion. Intuitively, the two phenomena differ in that, in the examples under discussion here, with deferred ostension, only the demonstrative gesture is involved in the metonymy. From the viewpoint of linguistics, the utterance is indistinguishable from one where the ultimate referent is demonstrated directly. To adopt another of Geoffrey Nunberg’s examples: Assume that I point to a car key and utter (1.33):

(1.33) This is parked out back.

(1.33) This is parked out back.
The sentence would be identical if I pointed to the car directly. There is also no requirement for agreement in number or gender: As Nunberg (1995, p. 110) points out, if the key fits more than one car, the demonstrative pronoun would be these instead of this. Conversely, if there would be more than one key for one car (say, one to open the door locks, one to start the engine), one would still use this and not these.

And in languages that mark demonstratives for grammatical gender, the demonstrative in such a case is typically marked for the gender of the car, not for that of the key. Nunberg gives an example from Italian (where chiave (key) is feminine, but camion (truck) is masculine):

\[(1.34)\] 

\[\text{Questo} \quad è \quad \text{parcheggiato} \quad \text{in dietro}.\]

This-MASC-SING is parked-MASC-SING in back.

‘This is parked out back.’

(Nunberg 1995)

Furthermore, pointing at the key, I might say (1.35) instead of (1.33), but hardly (1.36),

\[(1.35)\] 

This car is parked out back.

\[(1.36)\] 

This key is parked out back.

Finally, while deferred ostension presupposes the existence of an object that “stands in” for the actual referent of the demonstrative pronoun, this is not necessarily the case for metonymic reference:

When a customer orders a ham sandwich, this does not imply that there is a ham sandwich that he ordered. Assume, for example, that a customer ordered a ham sandwich, but for some reason, ham sandwiches cannot be served. The waiter goes to inform the customer and upon returning to the kitchen, she utters

\[(1.37)\] 

The ham sandwich now wants an omelette.

In the situation outlined above there is no actual ham sandwich involved, in fact it is a crucial part of the utterance context that there is no ham sandwich (at hand). So it does not make any sense to stipulate that the ham sandwich refers to a particular ham sandwich and then, through some process of deferred reference, to a human individual that stands in a certain relation to that ham sandwich (namely that of ordering).

So, even if deferred ostension may be similar to metonymic reference in some respects, and they certainly can exploit the same kind of conceptual relations, there are still some differences between the two phenomena. In order to keep the discussion focussed, I will say no more about deferred ostension.

Of course, a demonstrative pronoun can be the subject of a sentence that involves metonymic predication e.g. if I point to Steve and say

\[(1.38)\] 

He is parked around the corner.

To avoid confusion of the two phenomena, I will not use any examples that involve demonstrative pronouns.
Grinding And Similar Alternations

Geoffrey Nunberg uses his account of what I call metonymic predication and metonymic reference to explain occurrences like the following, in which, contrary to the examples so far, not only the interpretation of words is changed, but also their syntactical behavior (In these examples, mass nouns are turned into count nouns, or vice versa):

(1.39) We had chicken for dinner.

(1.40) He drank a beer.

I want to exclude such occurrences from the discussion in this thesis. Alternations like these are subject to considerable cross-lingual variation and obviously depend on the way mass nouns and count nouns are treated by syntax. Their exclusion should, once again, not be seen as a claim that they have no bearing on the issues at hand but only as a simplification that allows for a more focussed discussion.
Section 2

Three (Partial) Solutions

In this section, we will examine the accounts of three authors that each purport to address a subset of the issues raised in section 1.

The first will be Geoffrey Nunberg’s account on what I have called metonymic predication and metonymic reference. He proposes a mechanism called Meaning Transfer that is able to account for both phenomena and their differences. What Nunberg does not offer, at least not explicitly, is an account of how polysemous nouns like school are represented in the lexicon, and how the generalizations that can be made about the nature of such nouns can be captured. We will see, however, that he is still able to provide an account on how the interpretation of and constraints on sentences that involve only one occurrence, but multiple senses of a polysemous noun come about, by virtue of the accounts he gives on metonymic reference and metonymic predication.

The second in line will be Manfred Bierwisch, whose two-stage system of interpretation allows to adequately describe a lot of the data presented in section 1, both for metonymic reference and predication and includes a proposal on the representation of polysemous nouns.

Finally, James Pustejovsky’s theory of the Generative Lexicon offers an account on the representation of polysemous nouns that is intended to capture the generalizations that can be made concerning their senses and is, to some extent, able to explain how it is possible that one occurrence of a noun expresses more than one of its senses. I will examine this account and try to determine whether the mechanism of coercion that figures prominently in the theory can also be used to analyze occurrences of metonymic predication and metonymic reference.

In the next section, then, I will return to the first three of the four questions posed at the end of section 1 and see how the three accounts compare in their treatment of the data at hand. Afterwards, in section 4, I will briefly examine Nunberg’s Noteworthiness Criterion, which purports to constitute an answer to the fourth question that emerged from the discussion in section 1.
2.1 Nunberg: Meaning Transfer

2.1.1 Metonymic Predication = Meaning Transfer On Verbs And VPs

Geoffrey Nunberg’s account of the phenomenon that I labeled metonymic predication developed from his account of a quite different phenomenon, namely that of deferred ostension or, to use Nunberg’s term, deferred indexical reference\(^1\). In an early paper (Nunberg 1979), he analyzed sentences like (1.8), here repeated as (2.1), as involving a mechanism of deferred reference, parallel to that of deferred ostension, i.e., he assumed that Steve does not in fact refer to the individual Steve, but rather to Steve’s car.

(2.1) Steve is parked around the corner.

In later articles (Nunberg 1995, 2004), he revised his account in light of a number of facts that we already encountered in section 1: We can use a pronoun to refer back to Steve, but not to refer back to his car; not everything that can be said about Steve’s car can be predicated of the referent of Steve and while there seem to be no restrictions on conjoining is parked around the corner with other VPs that predicate something of Steve, there are severe restrictions on conjoining VPs that predicate something of Steve’s car. Nunberg’s solution is to assume that not the NP in subject position has a deferred reading of some sort, but rather that the VP has a transferred meaning. Meaning Transfer\(^2\), according to Nunberg, is a productive linguistic mechanism that creates a new predicate that, in this case, instead of referring to a property of cars, refers to a property of people who have a car parked out back. The same goes for all of the examples of what I have called metonymic predication: be in the Whitney is transferred to a predicate that refers to a property of painters that have paintings exhibited in the Whitney Museum (instead of on of paintings that are in the Whitney), is hard to understand is transferred to a predicate that refers to a property of authors whose works are hard to understand, and so on. More generally:

(2.2) Let \(h\) be a salient function from a set of things \(A\) to another (disjoint) set of things \(B\). Then for any predicate \(F\) that denotes a property \(P\) that applies to something in \(A\), we can represent the meaning of a derived predicate \(F'\), spelled like \(F\), as in either (a) or (b).

\[
\begin{align*}
(a) & \quad \lambda P. \lambda y (\forall x_{\text{dom} h}. h(x) = y \rightarrow P(x)) \\
(b) & \quad \lambda P. \lambda y (\exists x_{\text{dom} h}. h(x) = y \wedge P(x))
\end{align*}
\]

---

\(^1\)As the name suggests, Nunberg’s account on this phenomenon is not only concerned with demonstratives, but also with other kinds of indexicals, such as I, we, now, etc. See Nunberg (1993) for details on Nunberg’s theory of indexicals and deferred indexical reference.

\(^2\)In Nunberg (1995), this phenomenon is labeled Predicate Transfer. Even though the treatment of the phenomena presented here is largely identical in Nunberg (1995) and Nunberg (2004), I will quote mainly from the more recent article, which is why adopt its terminology where they differ.
A consequence of this definition is that transferred predicates are usually ambiguous between an “existential” and a “universal” reading. This is obviously necessary, as (1.10) clearly is not true (if understood as being a claim about the author’s books) if only one book written by Faulkner is hard to understand (unless, that is, if only one book is relevant in the context of use), while (1.11) does not imply that more than one, let alone even all (relevant) paintings of the speaker are exhibited in the Whitney. Furthermore, there are sentences that do exhibit both readings. Nunberg (2004, p. 348) gives the example of an accountant using (2.3) to talk about her firm:

(2.3) We are in Chicago.

If read as being a claim about the firm’s offices, the sentence could be intended to mean that all offices of the firm are located in Chicago, or merely that the firm has one local office there.

Both types of readings are intended to be instantiations of the more general schema of **Meaning Transfer**:

(2.4) Let $P$ and $P'$ be sets of properties that are related by a salient function $g_t : P \rightarrow P'$. Then if $F$ is a predicate that denotes a property $p \in P$, there is also a predicate $F'$, spelled like $F$, that denotes the property $p'$, where $p' = g_t(p)$

(Nunberg 2004, p. 348, here reproduced with minor typographic changes)

So what is necessary for a Meaning Transfer to take place is a salient transfer function between the property denoted by the untransferred version of the predicate and the property denoted by the transferred version of the predicate. In case of metonymic Meaning Transfer, this correspondence between the two properties is mediated by a function relating the properties’ bearers (which is what at first glance suggests that the expression that refers to the bearer has a transferred reading).

Nunberg gives this general definition in order to enable his account to extend to other “figurative” uses of predicates, where the relation between the properties is not mediated by a metonymic relationship between the bearers of the properties, but rather is based on some relationship between the properties themselves (as in metaphor or synaesthesia). Since I am only concerned with metonymic Meaning Transfers here, I will stick to definition (2.2) and will have nothing to say about other kinds of transfer.

Note that Meaning Transfer does not necessarily operate on lexical expressions: While it might be plausible to say that the Meaning Transfer in (1.8) takes place on the verb **parked**, in (1.11) it seems that the transferred predicate is the one expressed by the whole VP (**be in the Whitney**) rather than any part of it.
Besides being intuitively appealing (for is one not doing, in some sense, something to Faulkner himself when one is reading *Faulkner*?), Meaning Transfer on verbs and verb phrases seems to enable us to account for metonymic predication in a plausible way: As the denotation of the NP in subject position remains untouched, it is hardly surprising that we can refer back to its referent via a pronoun. Similarly, it is no puzzle why we can conjoin VPs that predicate something of the conventional referent of the NP in subject position (as that is exactly what the transferred predicate does). Finally, by putting additional constraints on Meaning Transfer, we can fine tune which things can be predicated metonymically in a context (= which predicates can be transferred) and which cannot. But what about metonymic reference?

2.1.2 Metonymic Reference = Meaning Transfer on Common Nouns

Definition (2.2) can not only be applied to verbs and verb phrases, but also to other property-denoting expressions, such as common nouns. And that is precisely what Nunberg suggests is going on in cases like (1.17), repeated below as (2.5): *ham sandwich* does not denote the property of being a ham sandwich, but rather the property of being a ham sandwich-related person.

(2.5) The ham sandwich wants to pay.

We already saw (in Section 1.2) that what is going on here cannot be some sort of deferred reference on the NP *the ham sandwich*, as the phrase could be used if no ham sandwich existed. For the same reason, it is impossible to assume that *wants to pay* has a transferred meaning and denotes a property of ham sandwiches. The only option left is that *ham sandwich* does not refer to the property of being a ham sandwich, but rather to the property of being a ham sandwich orderer, so *the* can do the job it is supposed to do according to your favorite theory of definite descriptions, pretty much as if the NP would be something like *the person who ordered a ham sandwich*.

Metonymic Reference seems to be accounted for by Meaning Transfer on common nouns in a straightforward way: It is not surprising that, given that

---

3In order to account for *reading Faulkner*, of course, we have to change the definition in (2.2) to also include predicates that denote relations, not just those that denote properties. However, such an extension could be straightforwardly made.

4It might be argued that *the ham sandwich* has some sort of generic reading as in (2.6) The ham sandwich is a traditional dish originating from northern Phantasia.

and that *the ham sandwich* in such a case refers to some sort of kind-level individual. Then one might stipulate that an orderer stands in some relation to this kind level individual and a process of deferred reference exploits this relation, enabling the phrase to refer to the orderer. This would leave us puzzled, however, how phrases like *the first ham sandwich* and *the other ham sandwich* achieve to refer to differing, yet unique, ham sandwich orderers, given that all orderers stand in the same relation to the kind-level individual in question (and, in fact, *the other ham sandwich* has no sensible generic interpretation in the contexts under discussion).
the Meaning Transfer is possible at all, anything that can be predicated of a ham sandwich orderer can be predicated of the referent of the ham sandwich (as the orderer is the referent), and it is also clear why expressions that predicate something of a ham sandwich (with extra mustard, for example) can modify the head of the noun phrase, even if the VP in the main clause predicates something of the orderer: We can just assume that the Meaning Transfer operates on the complex predicate denoted by the modified noun instead of that of on the noun itself. And finally, the context dependence of metonymic predication can be accounted for by putting contextual constraints on Meaning Transfer.

2.1.3 Polysemous Nouns = Conventionalized Meaning Transfers?

As noted before, Nunberg does not provide an explicit account of the lexical representation of polysemous nouns like school and or book. In Nunberg (1995), he calls such words densely metonymous. Dense Metonymy is defined as follows:

(2.7) Given several disjoint sorts of things A, B, . . . and several classes of predicates F, G, . . . such that members F literally apply only to things of sort A, members G literally apply only to things of sort B, and so on, a word W is densely metonymous iff:

1. W has distinct uses to refer to things of sorts A, B, . . . and
2. When W is applied to something of sort A, it often happens that predicates belonging to G can be applied to W under transferred readings, and when W is applied to something of sort B it often happens that predicates belonging to F can be applied to W under transferred readings, and so on.

(Nunberg 1995, p. 126)

As it is, this definition says nothing about how the predicates F, G, . . . are represented in the lexicon, or if they are represented at all. They might just be listed as unrelated entries, or it might be that only one of them is listed, while the others are always derived by a Meaning Transfer. Nunberg points out that in case of "truly dense metonymies" it is often not possible to single out one of the uses as being more "basic" than the others, so that it would be hard to tell which of the uses is lexical and which are derived (book may serve as an example: Is the reading on which the word refers to a physical object more basic or the one referring to the informational content?). He adds that he suspects that "these problems are in large measure the artifacts of our theoretical approaches", of our "desire to distinguish sharply between lexical representation and knowledge representation" and proposes that "we might think of newspaper as listed in the lexicon in association with a constellation or ring of interrelated concepts" (Nunberg 1995, p. 126f, my emphasis). It is worth noting that in the next section, when we look at Manfred Bierwisch’s account, we
will find a very similar idea, in a framework that sharply distinguishes between linguistic and conceptual knowledge.

The fact that the different senses of school do not seem to underly any contextual restrictions (at least not as long as only one of the senses is expressed by one occurrence) make Nunberg stipulate that the word has "a single lexical meaning that allows it to denote both a building and the people who use or run it", and he adds "Following Pustejovsky (1995), we could say that school has a 'dot object' structure, which provides for its use to refer to things of different types, though nothing turns on this particular form of analysis" (Nunberg 2004, p. 357). Pustejovsky’s proposal on the lexical representation of polysemous nouns will be discussed in section 2.3, but here I want to draw attention to the fact that one might view these dense metonymies as a case of conventionalized (or lexicalized) Meaning Transfer. The Meaning Transfers in examples like (1.17) are clearly extra-lexical processes and Nunberg classifies them as "pragmatic": They are possible only in specific contexts, and nobody would want to claim that there is a lexical entry that specifies that the ham sandwich can refer to a person that ordered a ham sandwich. In cases like school, the idea that all of its senses are lexicalized in some way does not seem to be so absurd. If they are, it does not seem implausible to assume that these senses began their life as results of Meaning Transfers. Even if we assume that all senses are listed in the lexicon as distinct and unrelated entries, this does not invalidate the conceptual relationship that originally caused (say) the building belonging to a school-institution to be referred to using the word school. And if this conceptual relationship is still present, it seems plausible to assume that the lexicalization of the Meaning Transfer further enhances the salience of this relationship, and that it thus can be exploited by the process of Meaning Transfer in many contexts: This is what explains how some occurrences are able to express more than one sense of a word, as in (1.7), here repeated as (2.8).

(2.8) The school next to the sports field donated a large sum.

2.1.4 A Methodological Problem

From the viewpoint of the discussion so far, (2.8) presents a problem, not because we have no way to derive the truth conditions of the sentence, but because we have too many. There are at least three possibilities:

1. School refers to the Building sense of the word, so that it can combine with next to the sports field as usual, after which a Meaning Transfer operates on school next to the sports field, transferring it to refer to a property of Institutions.

2. School refers to the Institution sense, and a Meaning Transfer operates on next to the sports field, so that the expression expresses a property

---

5Nunberg uses the word “pragmatic” in a very wide sense that includes reasoning from contextual and world knowledge, commonsense reasoning, as well as conversational implicatures
of institutions instead of buildings.

3. School refers to the Building sense and donated a large sum is transferred to a property of buildings (that are dedicated to institutions).

One can invoke tests involving co-predication and anaphor in order to decide between the third possibility and the first two. The idea is that there are usually contextual constraints on Meaning Transfer, so in case the VP has a transferred reading, it cannot be conjoined with (all) other predicates that predicate something of a building, nor can a pronoun that refers back to the referent of the NP be an argument to (all) other predicates that could be applied to the Building sense of the word. But even if this were the case, there would still be no way to decide between the first two possibilities. The truth conditions are the same in both cases, as is the reference of the subject NP. And such an "ambiguity" arises in each case where an expression modifies an occurrence of a polysemous noun that occurs in an NP that ultimately has a transferred reading. Nunberg calls the difficulties in deciding which expression is the one that undergoes a Meaning Transfer a "methodological question for semantic analysis" (Nunberg 1995, p. 123) and maybe one just might solve it by appeal to a heuristic (e. g. "assume as few Meaning Transfers as possible" or "always assume a Meaning Transfer on the biggest unit possible") but the fact that the analysis predicts the regular occurrence of an ambiguity that has no observable consequence might be taken as an indication that the analysis is not as explanatorily adequate as one would desire.

2.1.5 Summary

Nunberg’s account of the phenomena that I have called metonymic predication and metonymic reference is able to capture the different constraints on each phenomenon, while accounting for them with the same mechanism. The differences conveniently emerge as natural consequences from the rules of composition, as they can be explained by the different role nouns (and noun phrases) and verbs (and verb phrases) play in the process of deriving the truth conditions of a sentence. The mechanism of Meaning Transfer is also able to account for the interpretation of sentences that involve only one occurrence, but multiple senses of a polysemous noun, simply by analyzing such sentences as involving a metonymic predication or metonymic reference. In such cases, though, certain problems arise for linguistic analysis, which might be classified as mere methodological problems, but might also hint at the possibility that a slightly different analysis would be more appropriate. Furthermore, even though Meaning Transfer in principle could be used to derive the truth conditions of sentences involving polysemous nouns even if only one of the senses of the nouns were lexicalized (thus removing the need of accounting for the generalizations pertaining to the behavior of these nouns in the lexicon), such an analysis would be problematic as it would require to single out one of the uses as more basic then the others, a task that seems to be counter-intuitive to accomplish in many cases.
2.2 Bierwisch’s two-level system of interpretation

2.2.1 Introduction

The account Manfred Bierwisch gives of problems like the ones outlined in section 1 emerges from his general analysis of the interpretation of linguistic utterances. He proposes a three-fold distinction of “knowledge systems” (Kennisysteme) that are involved in the processing of natural language utterances: A language-specific system $G$ of grammatical elements and rules of a particular language (determining grammatical representations that combine phonological, morphological, syntactic and semantic representations), a language-independent conceptual system $C$ of conceptual elements and rules (determining conceptual representations that incorporate contextual and extra-linguistic knowledge) and a system $I$ of knowledge about social interactions, determining interaction structures that incorporate knowledge about social interactions, speech acts etc. (Bierwisch 1979, Bierwisch 1983, p. 66f). As the third system does not seem to play an important role for the problem at hand, in what follows, I will limit the discussion to the systems $G$ and $C$.

The semantic part $SEM$ of a word’s lexical entry determines the contribution of this word to the semantic representation $sem$ of utterances containing it. Both $SEM$ and $sem$ are of course represented in terms of the grammatical system $G$. $sem$ again determines, together with a context $ct$ the meaning-in-context $m$ (kontextinterpretierte Bedeutung) of the utterance in question. Both the context and the meaning-in-context are “determined by” (represented in terms of) the conceptual system $C$ (Bierwisch 1983, p. 69).

2.2.2 Polysemous Nouns: Where sem and m come apart

With this terminology in place, we can describe the behavior of nouns like school as follows: While school has only one lexical entry (and hence, one $SEM$), the meaning-in-context varies from (1.1) to (1.2), repeated below.

(2.9) The school was an old brick building near the river
(2.10) The school hired two more teachers.

Put differently: The representations determined by $G$ ($SEM$, $sem$) involve the same item for all sentences, while the different "senses" of school are differentiated on the conceptual level (in the representations determined by $C$, $ct$ and $m$).

The second halves of the preceding two sentences are rather uncontroversial: If one accepts Bierwisch’s general model of interpretation, it is clear that the various senses of school are distinguished (at least) on the conceptual level. The first part needs justification: Why not assume distinct lexical entries for each of the senses of school? One reason is that the conceptual system $C$ can provide us with generalizations about the multiple uses of polysemous nouns:
For a word like *school*, we can assume that the conceptual system provides a, as Bierwisch calls it, everyday-theory (*Alltagstheorie*) of institutions (Bierwisch 1983, p.82), which specifies, for example, that institutions often have buildings dedicated to them, thus connecting institutions with buildings or locations and enabling speakers and hearers to exploit this connection in constructing and interpreting utterances containing *school*, *university*, the financial institution sense of *bank*, etc. An everyday-theory of written works might tell us, similarly, that the informational content of a written work needs some physical realization, connecting the physical object reading and the informational content reading of words like *book*, *newspaper*, *dictionary* and so on. If we would now require one lexical entry for each of the items of the conceptual representation that may be referred to by a use of an "institution word" or a "written work word", these generalizations would be ignored and not captured in the lexicon (though the everyday-theories would still be useful as a way to explain why the multiple senses of the words seem to be intuitively connected). What Bierwisch proposes, rather, is that the multiple items of the conceptual representation correspond to only one item in the lexicon and that the differing meanings-in-context are generated through a process of *Conceptual Shift*.

This raises the question whether the lexical entry for a word like *school* is identical to the fully specified conceptual representation of a "primary" interpretatory variant and then gets transferred into its "derived" variants by a set of transfer functions or if the lexical entry of a word like *school* determines not one, but the set of all conceptual items that a (non-metaphorical) occurrence of the word can refer to, after which a set of conceptual schemata serves to transform the SEM into fully specified concepts (Bierwisch 1983, p. 85ff).

Bierwisch argues for the latter possibility, on grounds that it is often not possible to single out one of the interpretatory variants as "primary" (A problem that was mentioned briefly in the previous section, as a problem in accounting for polysemous nouns by appeal to Meaning Transfer) and that the other variants would get the status of being "derived", even though one would, intuitively, not say that, e. g., one of the two uses of *book* (the Physical Object and the Informational Content reading) is interpreted any less direct or literal then the other.

Another important reason for an underspecified lexical representation is that the applicability of the transfer functions or schemata has to be, to some extent, lexically constrained, which, in case SEM determines a fully specified variant that can be shifted away, would require to extend the lexical entries with additional information unneeded in an analysis that involves underspecification. A point in case is Bierwisch’s observation that there are words for institutions that cannot be used as names for buildings (like *government*). If we assume that the SEM for *government* is specific enough to exclude the interpretation as a building, while those of other "institution words" are not, we are done. If we assume that all "institution words" only determine the INSTITUTION sense of the word and that there are transfer functions operating on these in order

---

6This would be pretty much what Nunberg proposes.
to produce the interpretation variants, there would have to be an additional, otherwise unmotivated, indicator in the lexical representation of government that excludes this possibility for the word.

So Bierwisch proposes that the SEM of words like school determines (through its contribution to sem) not one, but a set of related items in the conceptual representation, a concept family. The system of conceptual knowledge then has to provide conceptual schemata (as part of the "everyday-theories") that transform the concept family into more specific concepts (Bierwisch 1983, p. 87).

Before I exemplify Bierwisch’s proposal, it is worth noting that the concept family of school seems to comprise more members than just the institution and location senses. Consider (2.11)-(2.14).

(2.11) The school made a major donation.
(2.12) The school has a flat roof.
(2.13) He enjoys school very much.
(2.14) School is one of the pillars of our civilization.

In each of these sentences, the NP containing the word school refers to a different kind of thing: (2.11) and (2.12) exhibit the previously mentioned institution and location readings, in (2.13), school refers to something that might approximately be called an ensemble of processes (Bierwisch’s term), and in (2.14) the word seems to refer to something like an abstract institution type. According to Bierwisch’s proposal, all instances of school are instances of the same lexical entry and hence share one SEM, which looks approximately like

\[(2.15) \lambda x [\text{PURPOSE}(x, W)]^8 \]

where \( W = \text{PROCESSES\_OF\_TEACHING\_AND\_LEARNING} \)

Note that this SEM does not classify school as an institution or building or ensemble of processes or the like. That is the job of conceptual schemata like the following:

\[(2.16) \lambda x [\text{INSTITUTION}(x) \land SEM(x)] \]
\[(2.17) \lambda x [\text{BUILDING}(x) \land SEM(x)] \]

---

7The translations of Bierwisch’s examples into English are either taken from or directly inspired by Bosch (1991), where Bierwisch’s proposal is exemplified on this set of examples. Bosch stresses that Bierwisch’s examples involve the German word Schule instead of the English word school and that, in German, Schule is used with the definite article in all of the examples. While it seems plausible that this difference has implications on the issue at hand, it is unclear which properties of English and German definite descriptions make the definite article obligatory in one case and forbids its use in the other. I will, therefore, ignore the issue in this thesis.

8As Bierwisch notes, at least INSTITUTION and PROCESSES OF TEACHING AND LEARNING are nothing but tentative abbreviations and should be replaced in a more careful analysis. They are sufficient, however, to illustrate the general point here.
Applying the schema in (2.16) to the \textit{SEM} in (2.15), we get the meaning-in-context of the occurrence of \textit{school} in (2.11):

\begin{equation}
\lambda x [\text{PROCESS}(x) \land \text{SEM}(x)]
\end{equation}

\begin{equation}
\lambda x [\text{ENTITY}(x) \land \text{SEM}(x)]
\end{equation}

The meanings-in-context for the other example sentences can be generated in the same fashion.

The schemata above are not restricted by language-specific knowledge, but are rather part of the conceptual system. They are available, if you like, not because of our knowledge of English, but because of what we know about things whose purpose it is to facilitate processes of teaching and learning and by what we know about institutions in general.

Note that these schemata do only make reference to \textit{SEM}, not to \textit{school} directly. They could, in principle, be applied to the \textit{SEM} of any word, thus yielding the more or less identical family of readings for \textit{university} or the "financial institution" sense of \textit{bank}. It is the job of the conceptual representation to keep this system from overgenerating, by excluding, for example, an institution reading for \textit{bottle} in most contexts. Similarly, words that refer to institutions that cannot be used to refer to buildings or locations, need to exclude this possibility. The \textit{SEM} for \textit{government}, e. g., could be something like

\begin{equation}
\lambda x [\text{INSTITUTION}(x) \land \text{PURPOSE}(x, W)']
\end{equation}

where \(W'\) stands for whatever we take to be the distinctive properties of governments. If we then assume that the conceptual representation specifies that a thing cannot be an institution and a location at the same time, a LOCATION reading for \textit{government} is prevented (Bierwisch 1983, p.82).

\subsection*{2.2.3 Contextual Metonymies}

With respect to (1.10), here repeated as (2.22)

\begin{equation}
\text{Faulkner is hard to understand.}
\end{equation}

Bierwisch observes that there are at least three different readings of the sentence, paraphrased in (2.23)-(2.25):

\begin{equation}
\text{Faulkner’s pronunciation is hard to understand.}
\end{equation}

\begin{equation}
\text{Faulkner’s behavior is hard to understand.}
\end{equation}

\begin{equation}
\text{Faulkner’s books are hard to understand.}
\end{equation}
With respect to the variation in the interpretation of Faulkner, Bierwisch assumes that what happens is just what happens in the case of school, discussed in the previous section: A conceptual shift operates on the SEM of Faulkner in order to yield the intended meaning-in-context (Faulkner’s pronunciation, behavior or books, respectively).

It is not entirely clear whether it is correct to say that it is indeed the name Faulkner that has some derived or shifted interpretation here, but just as Nunberg’s Meaning Transfer, Conceptual Shift can be applied to the semantic representation of multiple categories, so that a shift of hard to understand from a property of books to a property of the author of these books is equally possible.9

Thus, even tough Bierwisch does not discuss them, the differences in what I have called metonymic reference and metonymic predication can be captured with Conceptual Shift in the same way as in Nunberg’s account on Meaning Transfer, by having the mechanism apply to different parts of a sentence.

2.2.4 Summary

Bierwisch’s account seems to be similar to Nunberg’s in a number of ways: In both, one mechanism is able to account for both metonymic predication and metonymic reference, by virtue of applying to different parts of a sentence. They differ slightly in the formalization of the mechanism that accomplishes this, as Bierwisch has his “conceptual schemata” where Nunberg has transfer functions. Furthermore, Bierwisch distinguishes between conceptual representation and lexical representation and, by ascribing the varying specifications of polysemous nouns to the conceptual representation, is able to provide an account that allows to capture the generalizations pertaining to polysemous nouns while keeping them, conveniently, out of the lexicon.

9Note that this is distinct from the mechanism that Bierwisch calls conceptual differentiation, which is a mechanism that accounts for the differences in the meaning of hard to understand in (2.23)-(2.25): Pronunciations, behaviors and books are hard to understand in quite different ways. One might describe these differences as understanding acoustically, morally and intellectually, resp.

This variation differs from the Conceptual Shifts that occurred for school and Faulkner in that, as Bierwisch (1983, p. 77) puts it they “are just differentiated in different ways, but fall – in a sufficiently plausible sense – under a common ‘super-concept’” (“... nur unterschiedlich differenziert sind, aber – in einem hinreichend einleuchtenden Sinn – unter den gleichen ‘Oberbegriff’ fallen”). Bierwisch calls this phenomenon conceptual differentiation and models it formally as the instantiation of an existentially qualified variable. His preliminary proposal for the SEM of understand reads as

\[ \lambda x[\lambda y[\exists z[M\text{ENTAL}\_\text{STRUCTURE}(z) \land \text{ASSOCIATE}(y, x, z)]]]] \]

The operation called conceptual differentiation, then, supplies a value for z, thus specifying in which way the argument x is understood (and hence, in sentence (1.10), in which way it is hard to understand).
2.3 Pustejovsky: The Generative Lexicon

In a number of publications (Pustejovsky 1991, Pustejovsky 1993, Pustejovsky and Boguraev 1993, Pustejovsky and Bouillon 1995, Pustejovsky 1995, among others)\(^{10}\), James Pustejovsky and others have developed the theory of the Generative Lexicon, a theory of lexical representation that proposes, in a nutshell, that lexical entries are typically much more complex than is standardly assumed and that this complexity allows to reduce the total number of lexical entries necessary beyond the reduction that can be achieved with simple redundancy rules. A number of generative devices is thought to operate on the (complex) lexical entries in order to produce multiple syntactic and semantic realizations of one particular entry, thus enabling us to assume only one lexical entry for a number of occurrences of a word, that, on an intuitive level, seem to be related. This has not only the advantage of cutting down on the number of lexical entries, but offers also a way to capture the relatedness we perceive in polysemous words: They seem to be related because they are generated from one and the same lexical entry.

At this point, it is worth to pause for a second and think about how this compares to Bierwisch's proposal: He, as well, proposes a way to capture the relatedness of polysemous words, and in his story the multiple readings for a word are, as well, somehow derived from one and the same lexical entry. But while Pustejovsky chooses to enrich the lexical entry in order to do so, Bierwisch proposes to underspecify them, (to impoverish them, so to speak). This is, of course, an important difference between the two proposals, to which I will return during the discussion in section 3.

2.3.1 Type Coercion

The most prominent of the generative mechanisms that work on the lexical entries in order to produce their distinct syntactic and semantic realizations is that of type coercion, defined as follows:

\[
\text{(2.26) Type Coercion: a semantic operation that converts an argument to the type which is expected by a function, where it would otherwise result in a type error.}
\]

\[(\text{Pustejovsky 1995, p. 111)}\]

The idea is that “each expression \(\alpha\) may have available to it, a set of shifting operators, which we call \(\Sigma_\alpha\), which may operate on \([\alpha]\), changing its type and denotation” (Pustejovsky 1995, p. 111) and that these operators can be applied to \(\alpha\) if it is in argument position, to accommodate the subcategorization frame of the function that is to be applied to the denotation of \(\alpha\).

\(^{10}\)The details of the examples for lexical entries differ considerably from publication to publication, although the exemplified theory seems to remain pretty much the same. To avoid confusion, in what follows, I will only cite from Pustejovsky (1995).
These type shifting operators can be referenced directly by the rules of composition. Pustejovsky gives (2.27), evidently intended to replace the rule of function application in a type-driven system of interpretation like the one described in Heim and Kratzer (1998).

(2.27) Function Application with coercion: If \( \alpha \) is of type \( c \), and \( \beta \) is of type \( < a, b > \), then,

(i) if type \( c = a \), then \( \beta(\alpha) \) is of type \( b \),
(ii) if there is a \( \sigma \in \Sigma_\alpha \) such that \( \sigma(\alpha) \) results in an expression of type \( a \), then \( \beta(\sigma(\alpha)) \) is of type \( b \).
(iii) otherwise, a type error is produced.

(Pustejovsky 1995, p. 111)

A question immediately arises: Where do these type shifting operators come from? Of course, they cannot just be listed in the lexicon, even for expressions that are in fact lexicalized (let alone for phrasal expressions). Such a solution would not amount to more than an enumeration of word senses.

Although Pustejovsky never gives a principled account on the origin of the \( \Sigma_\alpha \) sets of shifting operators, it seems that they are supposed to be the result of other generative devices operating in the lexicon. One example is qualia pumping, a mechanism that allows an expression to take on the type (and semantic value) of one of the expression’s qualia roles (see below). Generally, these mechanisms exploit the rich structure a lexical entry has in order to provide the adequate shifting operators for that expression.

Note that, even though the term coercion seems to suggest that the denotation of the expression denoting the argument of the functional application is changed (or that expression itself), according to (2.27), what changes is the function (or, more precisely: the way the function is applied to its argument): Instead of being “monomorphic” (accepting only one type of argument), the function now accepts multiple types of arguments (is “polymorphic”). What is changed, however, is not the semantic content, but only the restrictions on the argument. The way in which the argument as expressed on the surface level is related to the one originally selected for by the function on the other hand is determined by the argument. While this at first seems to be an opportune distribution of labor inside the lexicon, we will see that it in fact is too inflexible to account for all the data discussed here.

### 2.3.2 Polysemous Nouns in a Generative Lexicon

**Representing Nouns**

According to Pustejovsky (1995, p.61), a lexical entry of a word comprises (at least) four different levels of representation: *Argument Structure*, specifying the number, type and syntactical realization of logical arguments, *Lexical Inheritance Structure*, specifying inheritance relations that serve to organize the
lexicon into (a number of) hierarchical structures, Event Structure, specifying the event type of the lexical items, where types include things like state, process and transition and, most interesting for the matter at hand, Qualia Structure, which is supposed to represent "modes of explanation” of the entities denoted by instances of the lexical expression. To this end, each entry may have values for four qualia roles, each representing a different mode of explanation:

1 **Constitutive**: The relation between an object and its constituents, or proper parts (material, parts and component elements, . . .)

2 **Formal**: That which distinguishes the object within a larger domain (orientation, magnitude, shape, dimensionality, color, position, . . .)

3 **Telic**: Purpose and function of the object (purpose an agent has in performing an act, built-in function or aim, . . .)

4 **Agentive**: Factors involved in the origin or "bringing about” of an object (creator, whether object is an artifact or natural kind, . . .)

Pustejovsky (1995, p. 85)

Lexical entries are represented as typed feature structures. A schematic lexical entry for a non-polysemous noun (what Pustejovsky calls a "simple type") α is supposed to look like (2.28):

\[
\begin{align*}
\alpha \\
\text{ARGSTR} = & \left[ \text{ARG1} = x : \tau \right] \\
\text{QUALIA} = & \left[ \begin{array}{c}
\text{Const} = \phi \\
\text{Formal} = x \\
\text{Telic} = R_T(e, y, x) \\
\text{Agentive} = R_A(e, y, x)
\end{array} \right]
\end{align*}
\]

where \( \tau \) is a sort, acting as a sortal restriction on the argument (which again serves as value for the Formal quale) and usually the supersort of the concept expressed by the noun, thus locating it in a concept lattice, \( \phi \) is a conjunction of predicates specifying what parts the denoted objects have and what the denoted objects are a part of and \( R_T \) and \( R_A \) are relations that relate the arguments, typically an event, an agent and the thing acted upon, which again typically is identical with the denotation of the nominal.

To my knowledge, Pustejovsky himself never gives an example for a complete qualia structure of a "simple type" noun. As an illustration, I extend the partial entry he gives for the noun beer (Pustejovsky 1995, p. 100)):

\[
\begin{align*}
\alpha \\
\text{ARGSTR} = & \left[ \text{ARG1} = x : \tau \right] \\
\text{QUALIA} = & \left[ \begin{array}{c}
\text{Const} = \phi \\
\text{Formal} = x \\
\text{Telic} = R_T(e, y, x) \\
\text{Agentive} = R_A(e, y, x)
\end{array} \right]
\end{align*}
\]

---

11All example of lexical entries I give will be partial in that Event Structure is omitted, both because it is not relevant for the issue at hand and because it would be empty in most (or all) cases, as none of the examples involves an event-denoting nominal expression.

12There are a number of issues, here. For one, some of Pustejovsky’s examples suggest that the sortal restriction on the argument should be the most specific supertype and what he says about the Formal quale, which has the purpose of specifying what "distinguishes [the
As the example shows, the qualia structure encodes knowledge that is usually considered as world knowledge and not as linguistic knowledge (e.g. that the purpose of beer is to be drunk). Furthermore, it should be clear that the values of the telic (and to some extent, the agentive) quale provide at best defaults for the purposes of the entities denoted by a word. Beer might serve an infinite number of purposes that have nothing to do with drinking (e.g. as a hair styling product). One objection that is frequently raised against Pustejovsky’s approach is that his sketch of a interpretational system fails to take into account the default nature of this information and thus has problems to accommodate uses in contexts where these defaults are overridden (but see Lascarides and Copestake (1998) for a treatment of qualia structure that takes into account the default nature of the knowledge encoded).

Representing Polysemous Nouns

One way to describe the differences in the various “senses” of polysemous nouns like school, book and newspaper is to say that the words (or, rather, the entities they denote) can be sorted in more than one way: The newspaper in (2.30) is an Institution or Organization, while the newspaper in (2.31) and the book in (2.32) are Physical Objects of some sort, and the book in (2.33) might be said to be some sort of Information\textsuperscript{13} and so on.

(2.30) The newspaper fired the editor.

denotation of the word] in a larger domain”, seems to support this view (“[…] the typing of an argument for a nominal may exhaustively define the information contributed by the Formal quale. In fact, for nouns denoting simple types […] the Formal is itself the typing restriction on the argument structure (i.e. the one referential argument)” (Pustejovsky 1995, p. 95). In this case, it seems that a more appropriate sortal restriction would be something like Beverage. One might argue that the information that identifies the denotation of beer as a beverage (alcoholic beverage?) is provided by the values of the qualia roles, and that therefore the typing restrictions on the arguments make reference to a very simple, flat sortal structure. In that case it seems to be strange, though, that sometimes, the sortal restrictions are quite specific, like Tool for knife (Pustejovsky 1995, p. 100) or limb for hand (ibid., p. 99).

\textsuperscript{13}The names for the sortal categories used here are Pustejovsky’s. In some cases, the specific name might be debatable, especially since neither Pustejovsky, nor I give a comprehensive account on the sortal structure (presumably, a concept lattice) that underlies the categorization, and hence, the names of the categories have to be read as being suggestive of this structure. I can (and will) not go into the specifics of these sortal structures (albeit an exploration of these is of course necessary to fully understand the issues at hand), but focus on the linguistic problems posed by the multiple sortal categories that can be assigned to polysemous nouns. While it may be not entirely clear what the different sortings of book are, the fact that there is more than one sorting is intuitively clear.
(2.31) The newspaper fell off the table.

(2.32) He tore a page from the book and burned it.

(2.33) His latest book is full of novel insights.

(2.34) I read the book yesterday.

Somewhat puzzling, the **book** in (2.34) seems to be both **INFORMATION** and **PHYSICAL_OBJECT**: In order to be read, information has to be physically realized in some way. Conversely, only physical objects that “contain” information can be read. This is what leads Pustejovsky to propose that **book** is in fact a **composite type** composed of simple types. The generalizations pertaining to these composite types are captured in **meta-entries**, so-called **lexical conceptual paradigms** (**LCPs**). **LCPs** act as **type constructors**: They take two simple types, like **INFO** (for information) and **PHYS_OBJECT** (for physical object) and combine them into one composite type, notated as **INFO·PHYS_OBJECT**. The resulting type is "implicitly relational", i.e. it takes (at least) as many arguments as the number of simple types it contains and relates them to each other, even though these arguments might never be realized on the surface level. Take the proposal of a lexical entry for **book**, given by Pustejovsky (1995, p. 101):

\[
\begin{array}{l}
\text{book} \\
\text{ARGSTR} = \begin{bmatrix}
\text{ARG1} = x : \text{INFO} \\
\text{ARG2} = y : \text{PHYS_OBJECT}
\end{bmatrix} \\
\text{INFO·PHYS_OBJECT}_{lcp} \\
\text{QUALIA} = \begin{bmatrix}
\text{FORMAL} = \text{hold}(y, x) \\
\text{TELIC} = \text{read}(e, w, x \cdot y) \\
\text{AGENTIVE} = \text{write}(e, v, x \cdot y)
\end{bmatrix}
\end{array}
\]

**INFO·PHYS_OBJECT}_{lcp}, here, represents the **type cluster** associated with the LCP in question and is defined as:

**INFO·PHYS_OBJECT}_{lcp} = \{\text{INFO·PHYS_OBJECT, PHYS_OBJECT, INFO}\}

i.e. it contains the simple types involved in the construction of the complex type, and the complex type itself. It is not clear what the inclusion of the type cluster in the qualia structure of the lexical entry is supposed to effect, but I assume it is just there to signal that an LCP was involved in the construction of the type. The relation between the two arguments (the informational content and the physical object, respectively) is specified as the value of the **FORMAL** quale, which in this case is some relation **hold** that holds between the informational content and the physical object that holds it. Note that the **AGENTIVE** and **TELIC** quale make reference to the **dot object** \(x \cdot y\), as reading and writing are activities that involve both the physical object and the informational content.

The base type of **book** is the dotted type, **INFO·PHYS_OBJECT**, and a verb like **read** in (2.34) just can demand an argument of this type. Other verbs subcategorize for simple types, as in (2.32) and (2.33), where the verb demands
an argument of type Phys_Object and Info, respectively. In these cases, a coercion is supposed to take place that "brings out" the simple type contained in the dotted types, i.e., the Σ set of coercion operators associated with a dotted type always contains operators that transform the dotted type into its constituent types.

Pustejovsky does not commit himself to a position concerning the question whether dot object construction is always a binary operation, combining exactly two types, or whether any number of types might be combined by one LCP. In case the operation is inherently binary, more complex dotted types can be constructed by LCPs that relate not only simple types, but also complex types. Take, for example, his entry for newspaper, which contains a dotted type that combines the simple type Org (for organization) and the complex type resulting from the print matter LCP that was also used in the construction of the dotted type for book above:

\[
\begin{align*}
\text{newspaper} & \\
\text{Argstr} & = \left[ \begin{array}{c}
\text{Arg1} = x : \text{Org} \\
\text{Arg2} = y : \text{Info-Phys_Object} \\
\text{Org-Info-Phys_Object_lcp} \end{array} \right] \\
\text{Qualia} & = \left[ \begin{array}{c}
\text{Formal} = y \\
\text{Telic} = \text{read}(e_2, w, y) \\
\text{Agentive} = \text{publish}(e_1, x, y) \end{array} \right]
\end{align*}
\]

(Pustejovsky 1995, p. 156)

According to Pustejovsky, what is at work here is the product/producer LCP, in which, in contrast to the book example above, the Formal quale does not specify the relationship that holds between the simple objects combined in the dot object, but rather specifies only the product part of the LCP, while the Agentive quale makes reference to both of them, thus specifying the relation. Pustejovsky (1995, p. 156f) writes: "The dot object itself does not appear in the qualia except to define the type itself [. . .] Hence, although newspaper is logically polysemous, it cannot denote the complete dot object, as can book. Rather, one sense or the other is available for interpretation, but not both". It remains unclear whether the inability to refer to the "complete dot object" is cause or effect of the lack of reference to this object in the qualia structure, i.e., whether there is an interpretational principle forbidding reference to a dot object not occurring in the qualia, or whether the fact that the dot object is never argument to a relation is reflected in the fact that it does not occur in the qualia structure.

Aside from the unclear details of the proposal, though, the general idea should be clear: There are LCPs that encode the generalizations pertaining to the senses of polysemous nouns. These LCPs seem to function both as type constructors and as templates for the lexical entries derived from them (specifying, for example, which quale encodes the relationship between the denoted objects). Furthermore, the LCPs provide coercion operators that allow the word to denote objects of the simple types contained in the complex ("dotted") types,
and in some instances, even an instance of the complex type can be denoted. This way, the generalizations pertaining to the types are captured, although the details of the proposal are unclear (It is, e. g., not really clear how the LCPs are represented, and whether they are supposed to be part of the lexicon).

But how about instances where only one occurrence of a polysemous noun refers to both senses of the word? Some instances probably can be dealt with by allowing reference to the dotted type, but that does not solve the problem for cases where multiple predicates are applied to the noun, and each of the predicates selects for a specific simple type. Coercion can help in instances of coordination of the predicates, as in

(2.37) The school is located next to the sports field and donated a large sum.

In this case, one could just assume that located next to the sports field coerces the school to be of the type LOCATION, while donated a large sum coerces its argument to be of type INSTITUTION (assuming that school is of type INSTITUTION-LOCATION, generated by some Institution/Location LCP). In cases where one of the predicates modifies the head of the subject noun phrase, though, as in (1.7), here repeated as (2.38), things become more complicated.

(2.38) The school next to the sports field donated a large sum.

If we assume next to the sports field to coerce its argument to be of type LOCATION, it seems that the whole noun phrase would be of that type, instead of the complex type INSTITUTION-LOCATION. There is no reason, though, why an expression of type LOCATION should have a coercion operator that allows it to be coerced into an INSTITUTION, other than, maybe, a principle that says that a phrase inherits all of the coercion operators of its head, regardless of any coercions that happen during the process of compositionally deriving the interpretation of the phrase.

If one assumes such a principle, though, it is hard to see how coercion can be kept from overgenerating. In any case, a coercion analysis of this phenomenon leaves us wondering why some of these occurrences are unexceptional, some seem to need a specialized context and some seem to be plainly impossible. The problem is that coercion, as defined by Pustejovsky, relies on lexical information alone (even though this lexical information encompasses much more than standardly assumed), while the phenomena at hand seem to be constrained by pragmatic or conceptual factors. This also is the one of the main problems in accounting for metonymic predication and reference by appeal to coercion, as we will see in the next section.

### 2.3.3 Contextual Metonymies

Some of the examples that concern us here could principally be analyzed as involving a type coercion as defined in (2.26), if we allow the typing requirements of functions to be specific enough: For (4.1), here repeated as (2.39), we must assume that that parked out back does require an argument of type VEHICLE
or the like. This is consistent with Pustejovsky’s view: When discussing “subtype coercion”, a mechanism that allows an expression to be coerced to a type to which it stands in a lexical inheritance relation, the subtyping requirements that trigger the coercion are just of this sort (Pustejovsky 1995, p. 113f).

(2.39) I am parked out back.

The case is different with (2.40):

(2.40) I am in the Whitney Museum of Art.

Here, even the most specific subtyping requirement would not do the trick. In fact, (2.40) has a “literal” reading on which the speaker is physically located in the Whitney Museum. Without a process of type coercion, no type error would ensue, the sentence would be merely false in (most or) all situations where it would be appropriate to utter (2.40). In order to analyse the sentence as involving a type coercion, then, (2.26) would have to be adapted so as to not demand a type error to trigger the coercion process. Indeed, one might read the first two elements in the enumeration in (2.27) as a disjunction and assume that an ambiguity arises whenever the uncoerced argument denotation fulfills the typing requirements.

The examples above do illustrate another problem for an analysis that appeals to a coercion operation: Where does I get the necessary shifting operators from? The problem applies generally to all pronouns in argument position, and to proper names, as well: It is impossible to generate the shifting operators from the lexical entries, neither can they be listed there, nor could they be generated on the basis of their lexical entry by some sort of generative device. However rich one assumes the lexical representation of a pronoun to be, it is ridiculous to assume that it includes information about potential cars the denoted individual has, potential paintings the denoted individual painted, etc.

Roughly the same goes for proper names - why should they have lexical entries that detail all the possible relations their referent could have to cars, paintings, works of art and so forth? One might think for a second that Faulkner is sorted as being of type AUTHOR and inherits the necessary shifting operators, but what about (1.8)? Is Steve sorted as being of type CAR_OWNER? Surely not. And properties like that of being an author can be communicated as part of a discourse, or even within the same sentence that makes use of this information: Assume I introduce my friend Hans and utter

(2.41) Hans is a writer and published by Ballantine.

If we try to explain the meaning of sentences like (2.41) by appeal to lexical properties of Hans, we have to assume that the lexical representation is extremely unstable and can change even during the interpretation of a single sentence.

Note also that on such an account, any pronoun or proper name would have an incredible number of derived senses, and more often then not, the typing
requirements of the function denoted by most VPs would be of no great help to reduce the number of senses at hand. This problem gets even worse in languages that have grammatical gender and allow the use of personal pronouns to refer to inanimate objects of the corresponding gender (German might serve as an example).

One way to describe this problem for the coercion analysis of sentences like (2.39) is to say that the division of labour between function-denoting expressions and argument-denoting expressions is too inflexible: In case of a pronoun, it seems to make much more sense to assume that the function accommodates to the pronoun and that it does so on its own, without the help of a shifting operator provided by the argument-denoting expression.

**Shifting Operators from Pragmatics?**

While we will see that the fact that coercion is always controlled by the predicate is problematic for other reasons later on, the specific problem posed by proper names and pronouns in argument position can also be phrased in a way that allows us to keep a “coercive” analysis, albeit one that is very different from Pustejovsky’s initial proposal: The relations exploited by sentences like (2.39) (the relation between car and its owner, a painting and its painter, . . .) are not relations between words, but relations between the individuals denoted by these words. Instead of assuming that the shifting operators have to be derived from lexical knowledge, then, one might assume that the shifting operators can be provided by pragmatic processes, exploiting features of the context, world knowledge, etc. That would also allow to take into account the “pragmatic” restrictions that seem to apply in many of these cases. Note, though, that thereby, the notion of coercion is changed considerably:

Initially, it was a lexically restricted process, triggered by mismatching information in the lexical entries of words in composition, which allowed a word to refer to a set of entities other than its conventional denotation, where this set was determined by lexical information alone. Now coercion does not need to be triggered at all, and the set of entities an expression can refer to can (arbitrarily?) extended by pragmatic processes.

**Minimal Coercion as an Alternative**

When discussing sentences like (2.42), which he sees as involving a coercion of John into a proposition, Pustejovsky proposes a type of coercion that might be used to explain the “pragmatically licensed” coercions discussed in the preceding section: *minimal coercion* (Pustejovsky 1995, p. 121f).

(2.42) Mary believed John.

Since, as Pustejovsky notes, the way in which John communicated the proposition that Mary believes is neither expressed by nor inferable from the sentence, he assumes that the coercion is minimal in so far it only serves to change the type of John, while leaving open the relation between the individual and the
proposition to which it is coerced. He gives the following example for the semantics of the coercion rule\textsuperscript{14}:

\[
\text{john} \Rightarrow \exists \phi \exists R[\phi \land [R(\text{john}, \phi)]]
\]  

Semantics, according to Pustejovsky, specifies (at most) that “\(R\) is sortally restricted to communicative acts,”\textsuperscript{15} while the specific nature of the communicative act is supposed to be “out of the domain of linguistic knowledge and properly part of default reasoning and abduction.”

Why then, one might ask, not assume that \(R\) is not restricted semantically at all, and that the fact that John communicated (or rather: asserted) the proposition is also in the domain of non-linguistic knowledge and reasoning processes? A minimal coercion that only specifies that the proper argument and the individual denoted by the argument expression stand in some (salient) relation would be powerful enough to account for the problematic cases discussed in the previous section, provided that minimal coercion is available for all kinds of expressions in argument position, including pronouns and proper names.

Such a mechanism of generally available minimal coercion would hardly deserve the name of coercion anymore:

On the semantic side of things, it does not even involve the argument, it is somehow dependend on the demands of the function (in that it may specify the type of the “coerced” argument), and it changes the way the function applies to its argument - but not the argument itself. In fact, it is pretty similar to Nunberg’s predicate transfer in many ways, except that it can only apply in cases where the predicate acts as a function, rather than an argument.

As we have seen, though, the reason that Nunberg was able to account for the differences between metonymic predication and metonymic reference was that the mechanism he proposed could be applied to varying constituents of a sentence. It seems, hence, that type coercion, even though it initially might seem to be apt for the task, is unable to adequately account for the phenomena, even if it is extended so as to exploit non-lexical information.

2.3.4 Summary

The theory of the Generative Lexicon provides an elaborate account of the representation of logically polysemous nouns, that, it seems, allows to capture the generalizations that can be made about the phenomenon, although some details of this proposals are unclear.

\textsuperscript{14}I have to admit that I do not fully understand how the right part is supposed to behave in composition. In (2.42), it might be asserted that Mary believes a proposition that was communicated by John, but that John communicated the proposition seems to be presupposed or asserted, but not part of what Mary believes.

\textsuperscript{15}It seems that if communicative acts are to be represented as relations, they should be represented at least as three-place relations, as there usually is a speaker (or agent), some sort of audience and a content. I will ignore this issue here, among some others, as the topic is not the technicalities of this specific case of minimal coercion, but it might be more appropriate to say that the relation is sortally restricted to relations that represent the assertion of propositions.
The mechanism of coercion has been shown to be unable to account for metonymic predication and metonymic reference, and it not clear whether it is able to account for all cases that involve one occurrence, but multiple senses of a polysemous noun, and it seems that it fails to capture the conceptual constraints on such occurrences.
Section 3

Three Questions Revisited

In this section, I will revisit the first three of the four questions posed at the end of section 1 and compare to what extent the accounts discussed in the previous section are able to provide answers for them.

As noted in Section 2.2.4, the accounts of Bierwisch and Nunberg are very similar. They differ slightly in the details of the formalization, in that Nunberg proposes transfer functions that transform conventional meanings into transferred meanings, while Bierwisch provides conceptual schemata that can be applied to (possibly underspecified) lexical meanings. It seems, though, that this difference does not have any impact on how the two accounts function. Bierwisch’s proposal for the schema that transforms the $SEM$ of words such as school into the Institution sense, repeated below as (3.1) might just as well be represented as the function in (3.2):

\begin{align*}
(3.1) & \quad \lambda x [INSTITUTION(x) \land SEM(x)] \\
(3.2) & \quad \lambda P [\lambda x [INSTITUTION(x) \land P(x)]]
\end{align*}

This would be a function that takes predicates into predicates, just as the functions in Nunberg’s general definition for Meaning Transfer in (2.4). The interpretation of polysemous nouns would then come out as a variant of Meaning Transfer (although the word “transfer” is not entirely appropriate anymore), while there is no need to single out one use as primary. So it seems that the accounts of Nunberg and Bierwisch are not only similar, but, with respect to the data considered here, almost identical, or at least could be made compatible with each other.\footnote{The picture would possibly be different for cases where the transfer has syntactic consequences, as in the examples that were briefly mentioned in section 1, involving the names for animals being used to refer to the meat derived from the corresponding animal, thus turning a count noun into a mass noun. As Bierwisch’s Conceptual Shift is operating on the output of the grammatical system $G$, it is not clear how such cases could be treated in his framework. I have not discussed cases like this, but I think it is at least not obviously implausible to assume that what is going on in these cases is different from the kind of occurrences discussed in this thesis.}
In what follows, I will, for the most part, ignore the differences between the two accounts and contrast them with Pustejovsky’s. For ease of talking, I will usually name only one of the two authors and use the corresponding terminology, depending on which one has the more elaborate account for the issue at hand (Bierwisch for the representation of polysemous nouns, Nunberg for metonymic predication and reference).

3.1 The Representation of Polysemous Nouns

The accounts on the representation of polysemous nouns proposed by Bierwisch and Pustejovsky differ markedly in their assumptions concerning the distribution of knowledge between the lexicon and other, more general, conceptual structures.

Both authors seem to accept that such a distinction is adequate: In Bierwisch’s account, the distinction is the very basis for the analysis of the data under discussion here, and, even though the qualia structure of the kinds of lexical entries Pustejovsky proposes encodes a lot of what has traditionally been considered non-linguistic knowledge, he claims that the rich lexical representations he proposes are “still language-specific in identifiable ways” and that “there are clear and obvious means to interface lexical knowledge with commonsense and pragmatic inference” (Pustejovsky 1995, p. 233).

The two authors disagree, though, on which side of the boundary between linguistic and conceptual knowledge the various senses of polysemous words are represented. In Pustejovsky’s view, all senses are explicitly represented in a lexicon, though not as separate entries or sub-entries, but rather in the dot object structure of one lexical item, and linguistic mechanisms like that of coercion have to operate on these entries in order to produce the multiple semantic realizations of this entry. In Bierwisch’s view, the lexical entry of a polysemous word is simply underspecified with regard to the sense in question, and the multiple senses are only distinguished on the conceptual level. Accordingly, the mechanism that “spells out” the underspecified lexical entry to its meaning-in-context is in some sense non-linguistic – Conceptual Shift is a mechanism of the conceptual system.

Both accounts are, in principle, able to capture the generalizations that can be made concerning the senses of polysemous nouns: In Pustejovsky’s account, these are captured through LCPs that serve as templates for lexical entries, and in Bierwisch’s story, they are captured in the conceptual system (the “everyday-theories”). While the status of the LCPs in Pustejovsky’s account is not entirely clear, when discussing the lexicalization of LCPs, he makes it clear that the mere existence of a LCP does not imply that it is realized in the lexicon (Pustejovsky 1995, p. 177ff). This is obviously necessary if one assumes the LCPs to be as general as product-producer or institution/location, given that there are words for institutions that cannot (normally) be used to refer to the corresponding location (such as government). So it seems that there has to be information in the lexical entry of each word, specifying in which LCPs it takes part.
However, this is counter-intuitive in some cases. Take the example of the product/producer LCP applied to printed publications: The LCP allows us to use dictionary and newspaper to refer to the organization that publishes the product in question (the producer), but the LCP does not seem to figure in the construction of the lexical representation of words for other kinds of printed publications, such as novel or cookbook. A treatment that just lexicalizes the two classes of words differently does not take into account that the availability of the organization reading is contingent on a conceptual correspondence between the organization and printed publication in question: Newspapers and dictionaries usually have organizations dedicated to their publication, while novels and cookbooks do not. This, however, is a contingent fact and it might well be, that at some point in the future, cookbooks are typically published by dedicated organizations, allowing us to talk about, say, the cookbook John works for. Considering this possibility, Nunberg (2004, n. 18) sensibly observes, “the lexical meaning of cookbook would not have changed”. It seems odd to say that when we learn that cookbooks are published by dedicated organizations, we learn something new about the word cookbook.

In Bierwisch’s picture, the impossibility to use the word for certain printed publication in order to refer to its publisher can be seen as due to the conceptual representation of cookbooks (and their publishers), and a change in this representation would explain the new use of the word, without any change in the lexical entry for cookbook. In other cases, where the conceptual representation on its own does not prevent a Conceptual Shift that results in an impossible reading, the lexical entry can just be taken to be more specific than the ones for words denoting similar entities: If we assume that nothing in the conceptual representation of government prevents it being shifted to a LOCATION interpretation\footnote{I suspect that this is not the case, and Bierwisch, when discussing the parallel example of the German word Regierung, acknowledges this possibility. For the sake of the example, however, I assume that it is just a fact of English that government cannot be used refer to a location.}, we can just assume that the lexical entry for the word is more specific than those for other words denoting institutions of some kind (like parliament, school and so forth), thus excluding the impossible readings from the side of the lexicon, as discussed in Section 2.2.2. This way, language-specific variation can be attributed to the lexicon, while differences in the conceptual representation do not have to be mirrored in the lexicon, as is the case in Pustejovsky’s proposal.

3.2 Metonymic Predication and Metonymic Reference

As we have seen in section 2, Geoffrey Nunberg’s proposed mechanism of Meaning Transfer is able to account for the truth conditions of sentences involving metonymic reference and metonymic predication in a straightforward way and the differences in constraints on the two phenomena emerge logically from the
application of Meaning Transfer to common nouns, noun phrases, verbs and verb phrases.

The mechanism of coercion, proposed by Pustejovsky, turned out to be limited too rigidly to lexical information, since metonymic predication and transfer, as exemplified in section 1, depend mainly on non-lexical knowledge. Even if coercion is allowed to exploit contextual or pragmatic reasoning, it is still unable to account for differences between metonymic reference and metonymic predication, as the division of labour between argument-denoting expressions and function-denoting expressions is too inflexible.

Pustejovsky (1995, p.234) indeed claims that “what distinguishes [metonymic reference and predication] from logical polysemey is the lexically idiosyncratic nature of the ambiguity, as well as the semi-productive status such extensions have in language”, suggesting that he would claim that another, newly introduced mechanism has to be at work here.3

Postulating a separate mechanism that treats occurrences of metonymic predication and transfer, though, would amount to claiming that the similarities that exist between such occurrences and occurrences of polysemous nouns are purely accidental. Furthermore, if such a mechanism is available, one might sensibly ask why it should not be used to generate the multiple senses of polysemous words: An obvious way to avoid the lexicalization of, say, the fact that a publication is published by a dedicated organization would be to assume that the uses of newspaper that refer to an organization are to be explained by the mechanism that explains metonymic predication and transfer – but the same thing can be said about all the examples of polysemous nouns discussed in this thesis. The only remaining problem would be that one of the senses has to be singled out for lexicalization. Pustejovsky’s complicated account involving LCPs and dot objects would become unnecessary (except maybe for words like book, which can denote “the complete dot object”) if one assumes an additional process that handles metonymic predication and reference.

Again, Pustejovsky’s problem is that his account on the representation of polysemous nouns is strictly lexical, while in fact, even though the behavior of these words might be constrained by lexical information, their uses also have a conceptual (or, in Nunberg’s way of using the term: pragmatic) component and blend seamlessly into uses that are obviously derived by extra-lexical processes, like instances of metonymic predication and transfer.

Bierwisch’s account, on the other hand, or a merge of the accounts of Bierwisch and Nunberg, seems to be very close to give a unified account of both phenomena.

---

3While it is clear what he means by “the semi-productive status” of such “extensions” (although it is a puzzle to me why he regards these uses as only semi-productive), I have to admit that I have no idea what “the lexically idiosyncratic nature of the ambiguity” is supposed to be.
3.3 One occurrence, Two Senses

It is pretty obvious that an account of metonymic predication and transfer also yields an account of how the interpretation of sentences that involve only one occurrence, but two senses, of a polysemous noun, comes about. One can just analyze the examples as involving a metonymic predication or a metonymic reference, so that each occurrence of a polysemous word itself has only one of its senses. This seems to be another reason to aim at an account that covers both contextual metonymic readings and the occurrences of polysemous nouns.

Pustejovsky might be able to account for some, or even all, occurrences of one token of a polysemous noun that involve more than one sense, be it by allowing reference to “the complete dot object” or by appeal to coercion, but, again, as coercion turned out to be unable to account for metonymic predication and reference, such a solution would be highly unsatisfying, given that the similarities between the two phenomena are even more obvious than in occurrences of polysemous nouns that involve only one sense.

3.4 Summary

The diagnosis is obvious: With regards to the representation of polysemous nouns, Pustejovsky achieves to capture the possible generalizations, at least in a descriptive manner, but his way of doing so, being intrinsically lexical, entails the necessity of lexicalizing information, that, it seems, is better kept in the domain of encyclopedic or world knowledge.

The mechanism of coercion he proposed seems at least to have some problems in accounting for occurrences that involve one occurrence, but multiple senses of a polysemous noun and is totally inadequate to explain instances of metonymic predication and metonymic reference, not only due to the fact that it is limited to exploiting lexical information, but also because it assumes a distribution of labor between function-denoting expressions and argument-denoting expressions that is too inflexible to capture the difference between the two phenomena.

As a consequence, Pustejovsky’s account is unable to explain the obvious similarities between the phenomena under discussion.

Bierwisch and Nunberg, on the other hand, provide accounts that are able to capture the phenomena by means of the same mechanism, or a set of similar mechanisms, thus not only covering the data, but also explaining the similarities of the processes involved. Their analyses are superior to Pustejovsky’s, mainly because they take into account the part the conceptual system plays in the interpretation of polysemous nouns instead of trying to explain the behavior polysemous word on a purely lexical basis.

The lesson seems to be that it is not possible to construct a theory of lexical representation without taking into account conceptual or pragmatic mechanisms, as the observations that can be made about the nature of word mean-
ing are always made on occurrences embedded in a context of use, and where lexical meaning is, hence, always potentially “contaminated” with contextual information. Developing a theory of lexical representation is only possible if it is conjoined with a theory of how lexical meanings are interpreted in context.

In the next section, we will have a quick look on Nunberg’s proposal concerning the nature of the pragmatic constraints (or constraints of the conceptual system) on metonymic predication and reference. An adequate account of these constraints is especially important once we acknowledge that an account of the lexical representation of polysemous words (and hence, any complete account of lexical representation) has to take into account conceptual processes and their effects on meaning in context.
Section 4

Contextual Constraints: Noteworthiness?

As noted in chapter 1, metonymic predication and metonymic transfer both are subject to contextual constraints – in contrast to the multiple senses of polysemous nouns, metonymic reference can often occur only in very specialized contexts, and metonymic predication typically works only for a limited number of predicates in a limited number of contexts. Geoffrey Nunberg tries to capture these contextual constraints by proposing the Noteworthiness Criterion. The other two authors are silent on this issue, Pustejovsky for the obvious reason that he is not discussing instances of contextual metonymic readings, and Bierwisch probably because he ascribes constraints like these to the conceptual representation, so that determining these constraints is one of the problems that “have to be delegated from linguistics to a theory of conceptual representation” (Bierwisch 1983, p. 81) and hence is rather a problem for researchers in cognitive psychology or artificial intelligence. The point of including this section here is therefore not to contrast the treatments of the different accounts, but to examine a solution to an open question that can be posed for every account that tries to deal with what I called metonymic predication and metonymic reference. For the sake of clarity, the discussion will be phrased in Nunberg’s terms.

Nunberg’s definition for (metonymic) Meaning Transfer in (2.2) offers a straightforward way to capture the truth-conditions of sentences involving metonymic predication and reference, but as it is, it seems to overgenerate: If there is a transfer function between two sets of things, any predicate conventionally denoting a property of an element of one set can be predicated of the corresponding member of the other set. This is obviously not correct: Assume that I approach a parking attendant, hold up my key (so as to make my car even more salient then it is in any conversation between parking attendant and customer) and utter (4.1)

(4.1) I am parked out back.
Now, as we have seen, according to (2.2) the felicity of the utterance indicates that there is, in this context, a salient transfer function that relates people to cars, and specifically, the speaker of (4.1) to his car, which is asserted to be parked out back. So why is it not possible, in the very same context, to say (4.2), in order to indicate that one’s car may not start?

(4.2) I may not start.

Nunberg’s answer to this question is that in order for the transfer to take place, the property denoted by the transferred predicate has to be “noteworthy, which is to say one that is useful for classifying or identifying its bearer relative to the conversational interests” (Nunberg 2004, p. 349).

So, according to Nunberg, the transfer in (4.1) is possible because the location of their respective cars is useful for classifying the customers relative to the purposes of a conversation with a parking attendant. The fact that a car may not start, though, is not helpful in distinguishing its driver from others from a parking attendant’s perspective, which bars the transfer in (4.2). Similarly, relative to the conversational purposes of waiters in a restaurant, customers are successfully identified by the (main) dishes they ordered, licensing the transfer in (1.17), repeated as (4.3):

(4.3) The ham sandwich wants to pay.

But what about the following example?

(4.4) American Express is in Singapore now.

It seems that the fact that they have a branch in Singapore is not likely to be useful to distinguish American Express from its competitors in many contexts where it would be appropriate to utter the sentence. As Nunberg has it, “in these cases the derived property has a more abiding interest or consequence for its bearer” (Nunberg 1995, p. 114). While it is, to some extent, intuitively plausible to say that having a branch in Singapore might be a noteworthy property for American Express to have, it is unclear whether and how such a vague notion of noteworthy could be captured in formal terms and how it relates to similar and related notions, such as relevance. Nunberg stresses that the two notions are distinct, and that the distinction is “intuitively clear” (Nunberg 2004, p. 350). While I admit that I do have an intuitive grasp of what it is for a property to be noteworthy, or a piece of information to be relevant, I cannot say that my intuitions are clear enough to be sure the two notions are distinct, and if so, in what respects they differ. Nunberg expresses hope that “a suitable version of relevance theory will be able to clarify this distinction” (ibd.).

One might, in fact, take the way out that Bierwisch opts for and say that the problem is not a linguistic one. One might argue that it is not a question of how language works, but of how salience and, if you will, noteworthyness are captured in the conceptual structures of human beings. If we assume, though, that noteworthyness has some bearing on the way language works, we either have to spell out the notion as clearly as possible or be silent about these dependencies while we sit and wait until the notion has been clarified.
An alternative to Noteworthiness: Bosch’s representation criterion

Bosch (1997) proposes another criterion: Representation. He demands that the bearers of the two properties (denoted by the transferred and the untransferred version of the predicate) are not just related by a salient transfer function, but that the bearer of the property denoted by the untransferred predicate is able to represent (in the context of use) the bearer of the property denoted by the transferred predicate. He provides a formalization of the notion of representation that seems to make the correct predictions in many cases, but has the failing of trying to reduce the two conditions on metonymic transfers (a salient transfer function between the properties’ bearers and noteworthiness of the property denoted by the transferred predicate) to one.

To adapt one of his examples: Assume that Fred has submitted a plant to a plant contest. In this context, it would be quite appropriate to utter (4.5) to indicate that the plant Fred submitted (owns/grew/...) is in the top ten of the plant contest, while it is not appropriate to utter (4.6) in a situation where a plant of Fred fell off the window sill.

(4.5) Fred is in the top ten.
(4.6) Fred fell off the window sill.

This is due, so Bosch, to the fact that while in the context of a plant contest, Fred’s plant is able to represent him, while in a context where a plant fell of the window sill, the plant is not able to represent Fred. This analysis seems to be on the right track, but it neglects the fact that the transfer is not only dependent on the context, but also on the predicate that is to be transferred: Even in the context of a plant contest, it would not be appropriate to utter (4.7) in case the plant Fred submitted fell off the table on which it is exhibited.

(4.7) Fred fell off the table.

Neither Nunberg’s noteworthiness criterion nor Bosch’s representation criterion seems to provide an adequate account on the contextual constraints on metonymic uses. Nunberg does not seem to do much more than giving the problem a name, and Bosch’s proposal, while being more substantive, ultimately fails to explain all the data. The problem is, I believe, that there is no substantive theory of conceptual representation, so that it is not even clear in what terminology the descriptions of a conceptual constraint should be framed.

A similar problem keeps us from answering certain questions about the exact content of lexical entries in a Bierwischian system of interpretation. The example involving the word government is such a case: As long as we do not know whether the conceptual representation excludes the LOCATION reading or not, it is unclear whether it has to be excluded from the side of the lexicon. In fact, one might phrase problems like this in Nunberg’s terms by asking whether being situated in a certain location or building is a noteworthy property for a government to have, and whether it is a less noteworthy property for governments than for schools and parliaments. But this question sounds decidedly
odd. Nunberg’s talk of “the noteworthiness criterion” implies that one criterion can be determined that is able to distinguish cases where metonymic predication or reference can occur from those where they cannot, while it in fact seems that the story is more complicated. What is badly needed is an empirically founded theory of conceptual representation that allows us to articulate constraints in a way that makes verifiable predictions. The construction of such a theory, of course, is not a task for linguists alone, but rather requires joint work from at least linguists, psychologists and researchers in artificial intelligence or logic.
Section 5

Conclusion

This thesis has compared three current theories of polysemy by examining in how far these theories are able to capture the generalizations that can be made pertaining to the senses of polysemous nouns and to what extent they can explain the similarities between certain contextual phenomena that bear a striking resemblance to occurrences involving polysemous nouns.

James Pustejovsky’s theory of the Generative Lexicon has been shown to have crucial failings due to the fact that it treats polysemy as a purely lexical phenomenon, keeping the account from explaining the similarities of contextual phenomena to occurrences of polysemous nouns, including contextual constraints on occurrences that involve one occurrence, but multiple senses of a polysemous noun.

The accounts proposed by Manfred Bierwisch and Geoffrey Nunberg turn out to be able to explain the observed similarities by appeal to a common underlying mechanism and Bierwisch proposes a plausible form of lexical representation that at least seems to be a step into the right direction towards an adequate theory of lexical representation. While Nunberg’s account does not include a proposal on the representation of polysemous nouns, the mechanism he proposes is similar enough to that of Bierwisch to allow to unite both accounts in a promising framework of lexical representation.

Certain questions about the details of lexical representation, as well as the precise nature of constraints on the contextual phenomena examined, remain unanswered and the thesis is put forward that this is mainly due to a lack of a substantive theory of conceptual representation. I might add that I believe that the point has been reached (or rather: passed) where any progress can be made concerning a theory of lexical meaning without first constructing (a sizeable fragment of) such a theory of conceptual representation.


