

represented are meaningful even though they do not directly affect informational significance. Our guess is that the aspect of meaningfulness that we have called cognitive significance has important implications for how conveyed information is processed. Chapter 6 discusses approaches to semantics that relate the informational significance of sentences to contextual factors and to the functioning of sentences in discourse, and in chapter 7 and part of chapter 8 we discuss some interesting proposals about the form of semantic representations.

### 3 Intuitions about Semantic Properties and Relations

As we noted earlier, native speakers of a language have certain intuitions about properties of expressions and ways expressions are related to one another that seem to reflect semantic knowledge. These intuitive judgments can often be systematically elucidated by applying various kinds of empirical tests. In what follows, we will point out and classify some such intuitions and tests. As you think about what follows, keep in mind that judgments are not always straightforward, in part because of complications that arise when we distinguish forms from utterances of them. Also, semantic intuitions, just like syntactic ones, sometimes differ because of idiolectal variation. Yet like syntactic intuitions, semantic judgments are not simply given but can be supported by various kinds of evidence.

We begin by discussing two important kinds of judgments about *implication* relations between the meanings of sentences (Ss): *entailment* and *pre-supposition*. We next consider judgments of *referential connections* between interpretations assigned to different noun phrases (NPs). We then turn to judgments of *ambiguity*, a property that can hold of expressions in many different syntactic categories.

We close this section with a look at three other kinds of phenomena that are often mentioned in the semantics and pragmatics literature: *contradiction* (which is related to entailment), *anomaly* (a semantic analogue of ungrammaticality, which may be related to presupposition), and *appropriateness* (the explicitly pragmatic relation of expressions to the contexts in which they are used).

#### 3.1 Entailment

Consider the following examples.

- (11) a. This is yellow.  
b. This is a fountain pen.  
c. This is a yellow fountain pen.

- (12) a. This is big.  
b. This is a sperm whale.  
c. This is a big sperm whale.

Imagine yourself uttering the sentences in (11) with reference to a particular object, perhaps a pen, perhaps something else. In such a situation you know that if your assertions of (11a) and (11b) are true (if the object is indeed yellow and indeed a fountain pen), then your assertion of (11c) is also true. It would be contradictory to assert the first two sentences and then deny the third; we discuss contradiction below. Any native speaker of English knows that the information conveyed by uttering (11c) is somehow already included in the information conveyed by uttering (11a) and (11b). This knowledge seems to be part of knowing what these sentences mean: we need know nothing about the object indicated by *this* beyond the fact that it is the same object for all three utterances. We say that the pair of sentences (11a) and (11b) *entails* sentence (11c).

Now imagine yourself uttering the sentences in (12), again keeping fixed what *this* refers to in all three utterances. Matters become very different. Suppose you take yourself to be pointing at a sperm whale. Sperm whales are pretty big creatures, so you might well assert that (12a) and (12b) are true. Suppose in addition that you judge that this particular specimen is not especially distinguished in size among its fellow sperm whales, that it's one of the smaller ones. In such circumstances it would be quite reasonable to deny (12c). In this case the *a* and *b* sentences do not entail the *c* sentence.

We would find the same difference in the two sets of sentences if we used *automobile* instead of *fountain pen* and used *galaxy* instead of *sperm whale*. *Yellow* (along with other adjectives like *round*, *featherless*, *dead*) behaves differently from *big* (and other adjectives like *strong*, *good*, *intelligent*), and this difference seems semantic in nature. (See chapter 8, section 3, for discussion of this difference.)

As we have noted, the relation between the pair (11a, b) and (11c) is usually called *entailment*. Together (11a) and (11b) entail (11c), whereas (12a) and (12b) do not entail (12c).

An entailment can be thought of as a relation between one sentence or set of sentences, the entailing expressions, and another sentence, what is entailed. For simplicity we equate a set of entailing sentences with a single sentence, their conjunction, which we get by joining the sentences using *and*. The conjunction is true just in case each individual sentence in the set is true, and it describes exactly those situations that can also be described by each one of the individual sentences. We could, for example, simply look

at the English sentences "This is yellow, and this is a fountain pen" and "This is big, and this is a sperm whale" in cases (11) and (12) above.

Theoretically, entailment relations might depend solely on the syntactic structure of sentences. However, the contrast between (11) and (12) (and a host of other such sentences) demonstrates that they cannot be simply a matter of surface syntax. Entailments seem to involve the information conveyed by sentences: if English sentence *A* entails English sentence *B*, then translating *A* and *B* into Finnish sentences *A'* and *B'* with the same informational significance will preserve the entailment relation.

Asked to define entailment, you might come up with any of the following:

- (13) *A* entails *B* =<sub>df</sub>
- whenever *A* is true, *B* is true
  - the information that *B* conveys is contained in the information that *A* conveys
  - a situation describable by *A* must also be a situation describable by *B*
  - *A* and not *B* is contradictory (can't be true in any situation)

We will later discuss more formal characterizations of the entailment relation, but for the time being you can adopt any of the preceding definitions.

We can find countless examples where entailment relations hold between sentences and countless where they do not. The English sentence (14) is normally interpreted so that it entails the sentences in (15) but does not entail those in (16).

(14) Lee kissed Kim passionately.

- (15) a. Lee kissed Kim.  
 b. Kim was kissed by Lee.  
 c. Kim was kissed.  
 d. Lee touched Kim with her lips.

- (16) a. Lee married Kim.  
 b. Kim kissed Lee.  
 c. Lee kissed Kim many times.  
 d. Lee did not kiss Kim.

Looking at entailments shows, by the way, that what are conventionally treated as translation equivalents are not always informationally equivalent. The English sentence (17a) entails (17b), but the Finnish sentence (18), which most texts would offer as a translation of (17a), does not entail anything about the femaleness of the person or animal said to be big, the Finnish third-person pronoun *hän* being completely neutral as to the sex of its referent.

- (17) a. She is big.  
 b. Some female is big.

(18) Hän on iso.

Thus, although sentence (18) can be used to describe any situation (17a) describes, the Finnish can also be used to describe situations not describable by (17a), for example, to say of some man that he is big. That is, (18) is also a translation of (19a), but unlike (19a) it does not entail the information conveyed by (19b).

- (19) a. He is big.  
 b. Some male is big.

In particular contexts, the use of translations that are not informationally equivalent, translations where entailments are not preserved, may be unproblematic, since other information is available to ensure that only the desired information is actually conveyed. But neither (17a) nor (19a) is an informationally equivalent translation of the Finnish sentence (18), which is informationally equivalent to something like (20).

(20) She or he is big.

In everyday English, when *A* entails *B* we often say that *A* implies *B*. Or we say that someone's assertion of *A* implies *B*, or that the speaker uttering *A* has implied *B*. Entailment is one species of the more general relation of implication. To imply *B* is to suggest that *B* is true or to offer support for the inference that *B* is true. An especially strong way to suggest that *B* is true is to assert a sentence *A* that actually entails *B*, which amounts to saying that *B* is true. The inference that *B* is true is supported directly by that information's being a part of the information *A* conveys; given *A*, we can deduce *B*. We discuss later some other varieties of the broader relation of implication, but our present focus is on the more restricted notion of entailment.

You might object to our claim that (14), "Lee kissed Kim passionately," entails (15d), "Lee touched Kim with her lips," by pointing out that sentence (21) can be true in a situation where (15d) is false.

(21) In her imagination Lee kissed Kim passionately.

Does your example defeat the claim that (14) entails (15d)? No. We could counter by claiming that if (15d) is false in the situation in which (21) is true then (14) is false in that same situation, and we might further claim that (21) entails (22).

(22) In her imagination Lee touched Kim with her lips.

On the other hand, if you manage to persuade us that Lee's mouthing of a kiss in Kim's direction from a distance of ten feet counts as her kissing him, then we have no good defense of our claim that (14) entails (15*d*) (since we agree that she is unable actually to touch him from that distance). Or your scenario might be romance via computer where Lee types in "I am kissing you passionately," addressing herself to Kim's computer. If we agree to accept either of your cases as real kissing, then our only possible line of defense is that there are different interpretations of *kiss* involved, only one of which requires that the kisser touch the kissee with her lips. In other words, we could accept one of your cases and continue to maintain that (14) entails (15*d*) only if we also argue that (14) is ambiguous, that it has more than one meaning. In this case, the string (14) could entail (15*d*) on one interpretation of *kiss* but not have that entailment on the interpretation your cases involve. We discuss later what considerations support claims of ambiguity.

Similarly, we claim that (14), "Lee kissed Kim passionately," does not entail (16*c*), "Lee kissed Kim many times." You might deny this by noting that the passionate kisser is unlikely to stop with a single kiss. We can agree with that observation and may even agree with you that assertion of (14) does strongly suggest or imply the truth of (16*c*) but nonetheless disagree that the implication is an entailment. For example, we might want to maintain that a situation with one or a few kisses can nonetheless involve passionate kissing, perhaps persuading you by showing a film of a single kiss which you will agree is a passionate one. You might still maintain that Lee herself would never stop short of many kisses once she succumbs to passion, and thus that (14) would never be true without (16*c*) also being true. We must now take a slightly different tack, noting that this is a matter of what Lee happens to be like rather than a matter of what the sentences mean. Or perhaps we would remind you of the possibility that Lee could begin her round of passionate kissing but be allowed only one passionate kiss before Kim breaks free and runs away.

What we should not do in the face of your objections is simply to reiterate our initial claims. Judgments about entailment relations can be defended and supported by evidence. As in the case of any linguistic phenomenon, there may be areas of real diversity within the community of language users, dialectal and even idiolectal differences. This complication must not, however, obscure the important fact that judgments about semantic phenomena are interconnected, and thus that there is relevant evidence to be offered in support of such judgments. In learning to do semantics as a linguist, one must learn to develop semantic arguments and explore

semantic intuitions systematically. And one must learn to discriminate between the strict notion of the entailment relation and looser varieties of implication. Test yourself on the following examples. Sentences (23*a*) and (24*a*) imply (23*b*) and (24*b*) respectively, but only one of the implications is an entailment. Try to discover for yourself which is which and why before reading the discussion that follows the examples.

- (23) *a.* Mary used to swim a mile daily.  
       *b.* Mary no longer swims a mile daily.
- (24) *a.* After Hans painted the walls, Pete installed the cabinets.  
       *b.* Hans painted the walls.

Sentence (23*a*) implies but does not entail (23*b*). Although in many contexts we would infer from an utterance of (23*a*) that (23*b*) is true, notice that (23*a*) could be used by someone familiar with Mary's routine last year but no longer in contact with her. It might be true that Mary still swims a mile daily, and the speaker we've imagined could make clear that (23*b*) should not be inferred by continuing with something like (25).

- (25) I wonder whether she still does [swim a mile daily].

In contrast, (24*a*) not only implies but entails (24*b*). Suppose that Hans did not paint the walls. Then even if Pete did install the cabinets, he did not do so after Hans painted the walls. That is, sentence (26) is contradictory.

- (26) After Hans painted the walls, Pete installed the cabinets, but Hans did not paint the walls.

There is one further preliminary point that it is important to make about entailments; namely, that there are infinitely many of them. That is, there are infinitely many pairs of sentences *A*, *B* such that *A* entails *B*. Here are a couple of ways to construct indefinitely many such pairs. Intuitions are fairly sharp, for example, that (27*a*) entails (27*c*) and also that (27*b*) entails (27*c*).

- (27) *a.* Lee and Kim smoke.  
       *b.* Lee smokes and drinks.  
       *c.* Lee smokes.

We can easily keep conjoining noun phrases (*Lee and Kim and Mike and Susan and ...*), adding descriptions like *the other Lee* or *the woman I love* should our stock of distinct proper names be exhausted. We can also, of course, just keep conjoining verb phrases: *smokes and drinks and has bad breath and lives in Dubuque and ...*). Either way we get more sentences that

entail (27c), and we need never stop. That is, we have intuitions that seem to involve the meanings of indefinitely many sentences, a potential infinity. Only finitely many such intuitions could possibly be stored in memory. How, then, are such judgments possible? Here we see again the general issue of the productivity of meaning, which we introduced in 2.1.

**Exercise 1** For each pair of sentences, say whether the *a* sentence entails the *b* sentence and justify your answers as well as you can. Where proper names or pronouns or similar expressions are repeated in *a* and *b*, assume that the same individual is referred to in each case; assume also that temporal expressions (like *today* and the present tense) receive a constant interpretation.

- (1) *a.* Today is sunny.  
*b.* Today is warm.
- (2) *a.* Jane ate oatmeal for breakfast this morning.  
*b.* Jane ate breakfast this morning.
- (3) *a.* Jane ate oatmeal for breakfast this morning.  
*b.* Jane ate something hot for breakfast this morning.
- (4) *a.* Juan is not aware that Mindy is pregnant.  
*b.* Mindy is pregnant.
- (5) *a.* Every second-year student who knows Latin will get credit for it.  
*b.* If John is a second-year student and knows Latin, he will get credit for it.
- (6) *a.* If Alice wins a fellowship, she can finish her thesis.  
*b.* If Alice doesn't win a fellowship, she can't finish her thesis.
- (7) *a.* Maria and Alberto are married.  
*b.* Maria and Alberto are married to each other.
- (8) *a.* Only Amy knows the answer.  
*b.* Amy knows the answer.
- (9) *a.* Mary is an Italian violinist.  
*b.* Some Italian is a violinist.
- (10) *a.* Some student will not go to the party.  
*b.* Not every student will go to the party.
- (11) *a.* Allegedly, John is a good player.  
*b.* John is a good player.
- (12) *a.* John knows that pigs do not have wings.  
*b.* Pigs do not have wings.

- (13) *a.* John believes that pigs do not have wings.  
*b.* Pigs do not have wings.
- (14) *a.* Oscar and Jenny are rich.  
*b.* Jenny is rich.
- (15) *a.* Oscar and Jenny are middle-aged.  
*b.* Jenny is middle-aged.
- (16) *a.* Not everyone will get the correct answer.  
*b.* Someone will get the correct answer.

### 3.2 Presupposition

Like entailment, *presupposition* involves a kind of implication. If a sentence *A* (or its use or user) presupposes *B*, then *A* implies *B*, suggests that *B* is true. But presupposition involves more than simple implication: if *A* presupposes *B*, then *A* not only implies *B* but also implies that the truth of *B* is somehow taken for granted, treated as uncontroversial. If *A* entails *B*, then asserting that *A* is true commits us to the truth of *B*. If *A* presupposes *B*, then to assert *A*, deny *A*, wonder whether *A*, or suppose *A*—to express any of these attitudes toward *A* is generally to imply *B*, to suggest that *B* is true and, moreover, uncontroversially so. That is, considering *A* from almost any standpoint seems already to assume or presuppose the truth of *B*; *B* is part of the background against which we (typically) consider *A*.

Consider, for example, the sentences in (28). Any one of (*a*–*d*) seems to imply (*e*) as a background truth. These implications are triggered by the occurrence of the phrase *the present queen of France*, a definite description. It is generally true of definite descriptions that they license such implications.

- (28) *a.* The present queen of France lives in Ithaca.  
*b.* It is not the case that the present queen of France lives in Ithaca (or more colloquially, the present queen of France does not live in Ithaca).  
*c.* Does the present queen of France live in Ithaca?  
*d.* If the present queen of France lives in Ithaca, she has probably met Nelly.  
*e.* There is a unique present queen of France.

Or consider (29). Again (using) any of (*a*–*d*) will generally imply (*e*). In this case, the implications are attributable to *regret*, which is a so-called factive verb. Factive verbs generally signal that their complements are presupposed. Other examples are *realize* and *know*.

- (29) a. Joan regrets getting her Ph.D. in linguistics.  
 b. Joan doesn't regret getting her Ph.D. in linguistics.  
 c. Does Joan regret getting her Ph.D. in linguistics?  
 d. If Joan regrets getting her Ph.D. in linguistics, she should consider going back to graduate school in computer science.  
 e. Joan got her Ph.D. in linguistics.

Look next at (30). Once again, each of the quartet (*a-d*) implies (*e*). In this case it is the quantifying determiner *all* that is responsible. A number of quantificational expressions serve to trigger presuppositions.

- (30) a. All Mary's lovers are French.  
 b. It isn't the case that all Mary's lovers are French.  
 c. Are all Mary's lovers French?  
 d. If all Mary's lovers are French, she should study the language.  
 e. Mary has (three or more?) lovers.

Finally, look at (31), where we find the same pattern. In this case it is the cleft construction that is responsible.

- (31) a. It was Lee who got a perfect score on the semantics quiz.  
 b. It wasn't Lee who got a perfect score on the semantics quiz.  
 c. Was it Lee who got a perfect score on the semantics quiz?  
 d. If it was Lee who got a perfect score on the semantics quiz, why does she look so depressed?  
 e. Someone got a perfect score on the semantics quiz.

A distinguishing empirical feature of presupposition, then, is that it involves not just a single implication but a family of implications. By this we mean that not only assertive uses of sentence *A* (the affirmative declarative) imply *B* but also other uses of *A* where something is, for example, denied, supposed, or questioned. That we are dealing with a family of implications derives from the fact that the presupposition is background. Each of (*a-d*), what we will call the *A* family, is said to presuppose (*e*) because uttering each (typically) implies (*e*) and also implies that (*e*) is being taken for granted. It is convenient for testing purposes to identify the *A* family in syntactic terms: an affirmative declarative, the negative of that declarative, the interrogative, and the conditional antecedent. In semantic/pragmatic terms, these represent a family of different sorts of attitudes expressed towards *A*. We can thus informally characterize when *A* presupposes *B* as follows:

- (32) *A* presupposes *B* if and only if not only *A* but also other members of the *A* family imply (and assume as background) *B*.

Presuppositions come in families, even if sometimes certain members of the family may be stylistically odd.

Notice that we have said that *A* and other members of its family *imply B* when *A* presupposes *B*. We do *not* require that these implications be entailments. As we have defined entailment, it is not even possible for all these relations to be entailments. However, it is possible that some member of the family entails *B*. Sentence (31*a*), for example, not only presupposes (31*e*); it also entails (31*e*). If (31*a*) is true, then (31*e*) must also be true. The negation, (31*b*), also presupposes (31*e*) but does not entail it. The implication to (31*e*) is *defeasible*; that is, there are contexts in which it can be defeated, contexts in which (31*b*) is asserted yet (31*e*) is not assumed to be true. We might take (33) as a discourse context that defeats the implication from (31*b*) to (31*e*).

- (33) *Speaker 1*: I wonder whether it was Lee or someone else who got a perfect score on the semantics quiz.

*Speaker 2*: It wasn't Lee who got a perfect score [on the semantics quiz]. I happen to know that Lee scored only 70 percent. I wonder if anyone managed to get a perfect score.

Speaker 2 has taken issue with speaker 1's presupposing that someone got a perfect score by suggesting that (31*e*) may be false and asserting that (31*b*) is indeed true. Of course, speaker 2 chooses this way of conveying the information that Lee did not get a perfect score because speaker 1 has already implied that someone did do that.

We need only look at noncleft counterparts of the sentences in (31) to see that *A* may entail *B* yet not presuppose *B*.

- (34) a. Lee got a perfect score on the semantics quiz.  
 b. Lee didn't get a perfect score on the semantics quiz.  
 c. Did Lee get a perfect score on the semantics quiz?  
 d. If Lee got a perfect score on the semantics quiz, why does she look so depressed?  
 e. Someone got a perfect score on the semantics quiz.

If focal stress is not placed on *Lee*, then none of (34*b-d*) typically imply (34*e*), even though (34*a*) entails (34*e*). Someone's getting a perfect score on the semantics quiz is not part of the usual background for talking about Lee's achieving the feat in question, as stated by (34*a*). Indeed, it seems reasonable to say that a major semantic difference between the subject-verb-object (S-V-O) sentence (34*a*) and its cleft correlate (31*a*), "It was Lee who got a perfect score on the semantics quiz," is that the former but

not the latter carries a presupposition that someone got a perfect score. Whether this difference can ultimately be explained in terms of some other difference between the two is an issue we cannot answer here.

What the sentences in (34) show is that *A* can entail *B* without other members of the *A* family also implying *B*. Presupposition and entailment are thus quite distinct. *A* may entail *B* but not presuppose it, as in (34); conversely, *A* may presuppose *B* but not entail it, as in (31). And given the way we have defined entailment and presupposition, it is also possible for *A* both to entail and to presuppose *B*. (Some accounts of presupposition do not admit this possibility; we will discuss this and related issues in more detail in chapter 6.)

Presupposition requires a family of implications, not all of which can be licensed by an entailment. Interrogatives, for example, would never entail other sentences, since they are not ordinarily valued as true or false; use of an interrogative may, however, imply something. Thus, one important question presupposition raises is about the nature of implications that are not backed by entailment relations. We will consider implications not grounded in entailments in chapter 4, relating them to general principles that seem to govern the actions we perform in speaking.

A related issue is the speaker's responsibilities with respect to what the utterance presupposes. What is presupposed in a discourse is what is taken for granted. Thus, a speaker who says *A*, presupposing *B*, in a context where *B* is at issue has thereby spoken inappropriately in some sense. For example, suppose that Sandy is on trial for selling illicit drugs and the prosecuting attorney asks question (35).

(35) Sandy, have you stopped selling crack?

As we know, the question is unfairly loaded, since it presupposes (36), which is very much at issue.

(36) Sandy has sold crack.

If Sandy simply answers yes or no, the presupposition is unchallenged, and she appears to go along with the implication that (36) is true. A defensive answer must explicitly disavow that implication:

(37) Since I never did sell crack, I have not stopped selling crack.

In many contexts, however, it is perfectly appropriate for a speaker to say *A*, presupposing *B*, even though the speaker does not believe that *B* is taken for granted by other discourse participants. For example, (38) might be uttered by a passenger to the airline representative, who can hardly be thought to know anything about the passenger's personal habits. Although

the last clause in (38) presupposes the clause that precedes it in square brackets, it would seem unduly verbose to express that presupposed information overtly.

(38) I don't want to be near the smoking section because [I used to smoke and] I've just stopped smoking.

An obvious difference between the airline passenger and the prosecuting attorney is that the latter knows full well that what the utterance presupposes is controversial, whereas the former can safely assume that the reservations clerk has no opinion about what is being presupposed (and no real interest in the matter). With no reason to suppose otherwise, the clerk can quite reasonably be expected to accept the passenger's presupposition as if it were already taken for granted and discourse should proceed unproblematically. What happens in such cases is called *accommodation*.

We have barely begun to explore the topic of presupposition, and we will consider some of these phenomena in more detail in chapter 6. But it is clear already that presupposition raises questions not just about individual sentences and their truth or falsity but also about the uses of sentences in connected discourse (including uses of interrogatives, which are generally not said to be either true or false).

## Exercise 2 Consider the following:

- (1) a. That John was assaulted scared Mary.  
b. Mary is animate.  
c. John was assaulted.  
d. That John was assaulted caused fear in Mary.
- (2) a. That John was assaulted didn't scare Mary.  
b. Mary is animate.  
c. John was assaulted.  
d. That John was assaulted didn't scare Mary.
- (3) a. John didn't manage to get the job.  
b. It was kind of hard for John to get the job.  
c. John didn't get the job.

In each of these examples, the *a* sentences presuppose and/or entail the other sentences. Specify which is a presupposition and which a simple entailment and which is both an entailment and a presupposition. Explain what test convinced you of your answer.

What relationship holds between the sentences in the following examples? Explain why you think that that relation holds.

- (4) a. It is false that everyone tried to kill Templeton.  
b. Someone did not try to kill Templeton.
- (5) a. That John left early didn't bother Mary.  
b. John left early.
- (6) a. Someone cheated on the exam.  
b. John cheated on the exam.
- (7) a. If John discovers that Mary is in New York, he will get angry.  
b. Mary is in New York.
- (8) a. Seeing is believing.  
b. If John sees a riot, he will believe it.

### 3.3 Referential connections and anaphoric relations

Consider the sentences in (39).

- (39) a. *She* called me last night.  
b. Did you know that *he* is a Nobel Prize winner?  
c. I had a terrible fight with *that bastard* yesterday.

Each of the italicized expressions is used to *refer* to someone, to pick out an individual about whom something is being said, but a pointing gesture or a nod or some similar nonlinguistic means may be needed to indicate who this is. These same expressions, however, can be used in contexts where such pointing is unnecessary because they are linked to other *antecedent* expressions. In (40) speakers judge that the bracketed italicized expressions can be understood as *coreferential* with, having the same reference as, the bracketed unitalicized expressions that serve as their antecedents, and furthermore, they can be understood as dependent for their reference on the reference assigned to their antecedents. Intuitive judgments are quite clear-cut in these cases: the italic expressions are *referentially dependent* on the unitalicized expressions.

- (40) a. If [*she*] calls, please tell [Teresa] I've gone to the pool.  
b. [The computer repairman] insists that [*he*] found nothing wrong.  
c. I talked to [Kim] for an hour, but [*that bastard*] never once mentioned the gift I sent him from Peru.

Expressions are said to be interpreted *anaphorically* when their reference is derived from that of antecedent expressions. The italicized expressions in (40) illustrate this. There are some expressions that can only be interpreted anaphorically and not through anything like pointing. The reflexive pronoun *herself* falls in this category; compare (41a), where *she* can serve as antecedent, with (41b), where there is no antecedent for *herself*.

- (41) a. [She] is proud of [*herself*].  
b. \*Be proud of herself.

In the syntactic literature, coindexing, as in (42), is the commonest device for indicating coreference.

- (42) a. If [*she*]<sub>i</sub> calls, please tell [Teresa]<sub>i</sub> I've gone to the pool.  
b. [The computer repairman]<sub>j</sub> insists that [*he*]<sub>j</sub> found nothing wrong.  
c. I talked to [Kim]<sub>k</sub> for an hour but [*that bastard*]<sub>k</sub> never once mentioned the gift I sent [*him*]<sub>k</sub> from Peru.  
d. [She]<sub>i</sub> is proud of [*herself*]<sub>i</sub>.

Chomsky (1981) discusses indexing as a formal process in some detail, but its informal use for this purpose far predates contemporary government-binding (GB) theory (see, for example, Postal (1971)).

What are called judgments of coreference in the literature typically involve judging not sameness of reference as such but dependence of reference of one expression upon that assigned to another.<sup>5</sup> Directed linking is another device sometimes used to show nonsymmetric dependence relations;<sup>6</sup> (43) shows a notation for linking.

- (43) a. If [*she*] calls, please tell [Teresa] I've gone to the pool.  
b. [The computer repairman] insists that [*he*] found nothing wrong.  
c. I talked to [Kim] for an hour, but [*that bastard*] never once mentioned the gift I sent [*him*] from Peru.  
d. [She] is proud of [*herself*].

Referential connections may be somewhat more complex. Much of chapter 3 is devoted to making precise the nature of the dependencies speakers recognize as possible in (44), where the dependencies are indicated by coindexing, just as in the simpler cases above. In (44) the anaphorically interpreted NPs (*she*, *her*, *himself*, *his*, and *themselves*) are said to be *bound* by their antecedent NPs.

- (44) a. [Every woman]<sub>i</sub> thinks that [*she*]<sub>i</sub> will do a better job of child rearing than [*her*]<sub>i</sub> mother did.  
b. [No man]<sub>j</sub> should blame [*himself*]<sub>j</sub> for [*his*]<sub>j</sub> children's mistakes.  
c. [Which candidates]<sub>k</sub> will vote for [*themselves*]<sub>k</sub>?

In (44) repetition of an index does not indicate straightforward sameness of reference, as it did in (42). Expressions like *every woman*, *no man*, and

which candidates do not refer in the intuitive sense, though their relations to anaphors are often called "coreference." Although *she* in (44a) is not used to refer to any individual, the interpretation of (44a) can be understood in terms of sentences in which NPs in the analogous positions both refer to the same individual. Roughly, (44a) says that if we point to any particular woman and say (45), where each of the indexed NPs refers to that woman, then what is said will be true, no matter which woman we pick.

- (45) [*She*]<sub>i</sub> thinks that [*she*]<sub>i</sub> will do a better job of child rearing than [*her*]<sub>i</sub> mother did.

Linguistic questions about the nature of anaphoric relations provided a major impetus for exploration of how classical logical theories might shed light on natural language semantics. In exploring how syntactic structures affect the possibilities of interpreting expressions, linguists and philosophers have discovered other cases of so-called coreference where referential dependency may be somewhat different both from simple sameness of reference and from the standard binding relations elucidated by quantification theory.

- (46) a. Kath caught [*some fish*]<sub>i</sub>, and Mark cooked [*them*]<sub>i</sub>.  
 b. If [*a farmer*]<sub>j</sub> owns [*a donkey*]<sub>i</sub>, [*he*]<sub>j</sub> beats [*it*]<sub>i</sub>.  
 c. [*Gina*]<sub>i</sub> told [*Maria*]<sub>j</sub> that [*they*]<sub>i+j</sub> had been assigned clean-up duty.

(In (46c) the plural pronoun *they* has what have been called *split antecedents*; the index  $i + j$  indicates referential dependence on both the distinct indexes  $i$  and  $j$ . The notation  $i, j$  is often used for indicating split antecedents, but we want to reserve this notation for cases where an expression may be linked either to something with index  $i$  or to something with index  $j$ . In the rest of this section we ignore split antecedents.)

These and many other examples have been widely discussed in the recent syntactic and semantic literature. Though there continues to be debate on the appropriate analysis of particular anaphoric relations, there is no question that speakers do recognize the possibility of some kind of interpretive dependencies in all these and indefinitely many other cases. Judgments of coreference possibilities (broadly understood) are fundamentally important semantic data.

There are also indefinitely many cases where the intuitive judgments are that such dependencies are not possible. These are usually called judgments of *disjoint reference*, a kind of independence of reference assignment. The terminology was introduced in Lasnik (1976), but as with "coreference," it must be understood somewhat loosely. The asterisks in (47) mean that the

indicated referential dependencies are judged impermissible. The NPs in question are, according to speakers' judgments, necessarily interpretively independent of one another and are not anaphorically relatable.

- (47) a. \*Behind [*Teresa*]<sub>i</sub>, [*she*]<sub>i</sub> heard Mario.  
 b. \* [*He*]<sub>i</sub> insists that [the computer repairman]<sub>i</sub> found nothing wrong.  
 c. \*If [*that bastard*]<sub>i</sub> calls, tell [*Kim*]<sub>i</sub> I've gone to Peru.  
 d. \* [*Herself*]<sub>i</sub> is proud of [*her*]<sub>i</sub>.

Sentences (47a–c) are bad with the indicated coindexing; they can be used only if the underlined expressions are interpreted nonanaphorically (through pointing or something similar). Sentence (47d) is unusable because *herself* happens to be an expression that requires anaphoric interpretation.

Much interesting recent linguistic research in semantics has tried to elucidate and systematize judgments about referential relations, and such data have figured prominently in developing theories of the map between syntactic structures and their interpretation.

**Exercise 3** Each of the following sentences contains some nonpronominal NPs and a pronoun (in some cases, a possessive pronoun). Assign a distinct index to each nonpronominal NP. Copy all such indices on the pronoun in the sentence, and star those indices copied from NPs that cannot be antecedents for the pronoun. For example,

- (1) a. John believes that few women think that they can be successful.  
 b. John<sub>1</sub> believes that [*few women*]<sub>2</sub> think that they<sub>2,\*1</sub> can be successful.  
 (2) a. They know few women.  
 b. They<sub>\*1</sub> know [*few women*]<sub>1</sub>.  
 (3) She thinks that Barbara is sick.  
 (4) If she is sick, Barbara will stay home.  
 (5) When he is unhappy, no man works efficiently.  
 (6) Neither of Ann's parents thinks he is adequately paid.  
 (7) That jerk told Dick what Mary thinks of him.  
 (8) If she wants to, any girl in the class can jump farther than Mary.  
 (9) Her mother is proud of every woman.  
 (10) Her mother is proud of Lisa.  
 (11) My friends think that Joan's parents met each other in college.  
 (12) John promised Bill to help him.



- (13) John persuaded Bill to help him.
- (14) Every girl on the block jumps rope, but she knows few rhymes.
- (15) The man who likes him will meet Bill tomorrow.
- (16) John needs to talk to Bill about himself.
- (17) John needs to talk to Bill about him.
- (18) She does not realize that every girl is talented.

### 3.4 Ambiguity

*Ambiguity* arises when a single word or string of words is associated in the language system with more than one meaning. Each of the sentences in (48) illustrates a different way in which a single expression may be assigned multiple interpretations.

- (48) a. You should have seen the bull we got from the pope.
- b. Competent women and men hold all the good jobs in the firm.
- c. Mary claims that John saw her duck.
- d. Someone loves everyone.

Sentence (48a) illustrates what is called lexical ambiguity: the form *bull* can be assigned at least three quite different interpretations (roughly, a papal communication, a male cow, or nonsense). The sentence is ambiguous because *bull* is ambiguous. To understand sentences containing that form, to identify their entailments, we need to know which of its three interpretations is being used. Lexical disambiguation is exactly like knowing which word has been used, like knowing, for example, that someone has uttered *cow* rather than *sow*. That is, an ambiguous lexical item can be thought of as several different lexical items that happen to be written and pronounced in the same way.

Sentence (48b) shows a simple kind of structural, or syntactic, ambiguity. We need not interpret any individual word as ambiguous but can attribute the ambiguity to distinct syntactic structures that give rise to distinct interpretations. Is *competent* modifying the conjunction *women and men*, or is the NP *competent women* conjoined with the single-word NP *men*? One interpretation entails that the men holding the good jobs are competent, whereas the other does not. The English sentences in (49) unambiguously convey the two possible interpretations and thus allow us informally to disambiguate the original sentence.

- (49) a. Women who are competent and men hold all the good jobs in the firm.

- b. Women who are competent and men who are competent hold all the good jobs in the firm.

Example (48c) illustrates both syntactic and lexical ambiguity. Is Mary claiming that John saw the bird she possesses or that he saw her lowering herself? These two interpretations are associated with radically different syntactic structures (*her duck* is in one case like *me jump* and in the other case like *my dog*) and also with distinct lexical meanings (the noun and the verb *duck* have the same spelling and pronunciation but quite distinct interpretations).

Sentence (48d) illustrates scope ambiguity. We can interpret the sentence as simply assigning some lover to each person (there is always the person's mother!) or as saying that someone is a universal lover (perhaps a divinity). The ambiguity here arises from the relation between *someone* and *everyone*: a scope ambiguity is not lexical but structural. But (48d) differs from (48b) and (48c) in having only a single surface syntactic structure. There have been arguments offered that sentences like (48d) do have multiple syntactic structures at some nonsurface level; we adopt such an approach in chapter 3. It is controversial, however, whether all scope ambiguities reflect syntactic ambiguities. If there are sentences whose ambiguity is nonlexical and that do not involve distinct syntactic structures, then structures or constructional principles that play no syntactic role are needed for semantic interpretation. We leave it as an open question whether there are any nonlexical, nonsyntactic ambiguities of this kind.

For linguistic purposes, ambiguity (multiplicity of interpretations assigned by the language system) is distinguished both from vagueness and from deixis or indexicality.

*Vagueness* is a matter of the relative looseness or of the nonspecificity of interpretation. For example, *many linguists* is noncommittal as to the precise number of linguists involved. It seems to be part of what we know about *many* that it is imprecise in this sense. We discuss semantic imprecision in chapter 8. Virtually all expressions are general: *kiss* does not specify whether the kiss lands on the lips or cheek, etc., of the one kissed. But neither *many linguists* nor *kiss* would count as having multiple meanings on these grounds (that is, as synonymous with, for example, *350 linguists*, *400 linguists*, *379 linguists*, or again with *kiss on the lips*, *kiss on the cheek*).

*Deixis*, or *indexicality*, is involved when the significance of an expression is systematically related to features of the contexts in which the expression is used. For example, the first-person pronoun *I* is an indexical expression, but it is hardly ambiguous simply because it is sometimes interpreted as referring to Gennaro, sometimes to Sally, sometimes to you.

It is not always as easy to distinguish ambiguity from vagueness and indexicality as our examples might suggest, and we will return to these topics in later chapters. One test of ambiguity is the existence of distinct paraphrases for the expression in question, each of which conveys only one of the interpretations in question. An expression is a paraphrase of a declarative sentence for these purposes if it expresses exactly the same information as the original does on one way of understanding it; paraphrases will share all entailments with the given interpretation. Distinct paraphrases will usually have distinct entailments. The distinct interpretations must not be explicable in pragmatic terms; for example, "I'd like a glass of water" probably does not count as ambiguous, because how it is understood depends on pragmatic factors: on what an utterance of it is intended to accomplish. In general, expressions that are ambiguous can be used only with one of their meanings in any given situation. Exceptions are cases of punning and are clearly very special. There are many clear cases of lexical, structural, and scope ambiguities, and there are also some instances where intuitions do not settle the question of how different interpretations should be analyzed. For now, however, we simply want to emphasize that ambiguity is an important semantic phenomenon and that it is distinct from both vagueness and indexicality.

**Exercise 4** For each of the following sentences, state whether you judge it to be ambiguous, and for ambiguous sentences, disambiguate them by providing unambiguous distinct paraphrases of their possible interpretations.

- (1) Everyone didn't like the movie.
- (2) Someone came.
- (3) Joan should be in New York.
- (4) The missionaries are too hot to eat.
- (5) The students are revolting.
- (6) A lot of people came to Chomsky's lecture.
- (7) Andrea is feared.
- (8) Mindy likes Cynthia better than Jonathan.
- (9) Visiting relatives can be tedious.
- (10) Elizabeth didn't finish her thesis to please Jim.
- (11) She was upset.
- (12) John hit a boy with a book.

- (13) John left early and Bill left early or Sue left early.
- (14) Zelda ran the Boston marathon.
- (15) Every faculty member was met by two student guides.
- (16) Every student thinks that she is a genius.

### 3.5 Synonymy

In discussing ambiguity, we mentioned the notion of one expression's being a paraphrase of another, or synonymous with it. Judgments of *synonymy*, or semantic equivalence—that distinct expressions have the same meaning—turn out to be somewhat complex: they are relative to certain purposes or restricted to certain domains. If explicit content, that is, informational significance, is all that is at stake, then the sentences in (50) count as synonymous with one another: they share all their entailments, which is what we required of a disambiguating paraphrase.

- (50) a. Those women at the corner table look ready to order.
- b. Those ladies at the corner table look ready to order.
- c. Those dames at the corner table look ready to order.

Suppose that one of these sentences is uttered by the head waiter to his underling. She doesn't quite catch what was said and asks another one of the servers, who, to report what was said, might perfectly well reply,

- (51) He said that...

and choose any one of the sentences in (50) to complete (51). It is irrelevant to the server's immediate purposes how the other server identifies the customers that the head waiter says are ready to place an order, so long as she does so accurately. Even if the report is not the same sentence that the head waiter actually uttered, the reporter has not misrepresented the content of what he said. She has made a judgment of synonymy, or semantic equivalence, that fits with judgments of other native speakers.

The notion of synonymy involved here we call *content synonymy*, and we can define it in terms of mutual entailment.

- (52)  $A$  is (content) synonymous with  $B =_{df}$   $A$  entails  $B$  and  $B$  entails  $A$ .

We could equally well have required that  $A$  and  $B$  share all their entailments, that is, that for any  $C$ , if  $A$  entails  $C$ , then  $B$  entails  $C$ , and vice versa. Two sentences will satisfy definition (52) if and only if they have all the same entailments. What content synonymy requires is just that  $A$  and  $B$  are true in exactly the same set of circumstances.

There is another sense in which speakers judge that the sentences in (50) have different meanings and thus are not (fully) synonymous. In choosing

to utter one rather than another of these sentences to describe a situation, speakers can convey something important about their attitudes toward that situation and those involved in it. The differences involved are traditionally said to be connotations or a matter of tone; they may ultimately be a matter of presuppositions. In any case, they can be quite consequential. Suppose, for example, that the head waiter must later defend himself in a sex-discrimination suit filed by the server who was told what he had said. In this case how he said it does indeed matter.

Let us turn to some different examples. Speakers judge that the sentences in (53) share the same informational significance; they are content synonymous.

- (53) a. The police searched Sarah.  
b. Sarah was searched by the police.

Again, this judgment seems to be grounded in the fact that (53a) entails (53b) and vice versa, that they share all their entailments. Yet doubt has been raised about the claim that passives are always content synonymous with the corresponding actives. Why? Precisely because in some cases it is not obvious that corresponding actives and passives do share all their entailments. For example, (54a), first discussed in Chomsky (1957), certainly does not entail (54b): (54a) is true, and (54b) false, if the circumstances are as described in (54c).

- (54) a. Everyone in this room speaks two languages.  
b. There are two particular languages such that all the people in the room speak those languages.  
c. There are four people in the room, one of whom speaks only Italian and English, another only Finnish and Swedish, another only Hebrew and Russian, another only Yoruba and French.

The question is whether (55), the passive counterpart of (54a), is also true in the situation described by (54c) or in any other situation where (54b) fails to be true.

- (55) Two languages are spoken by everyone in this room.

Here judgments are much less clear. What is clear is that the syntactic difference in (54a) and (55) leads to a difference in what an interpreter is likely to infer. From an utterance of (55) we are inclined to infer that the situation is not that described in (54c) but rather one where there are two particular languages that all speak, perhaps English and Japanese. Is this inclination a matter of entailment, or is it some less strong kind of implication? Here judgments are divided. The important point for our present

purposes is not whether (54a) and (55) are content-synonymous, whether they express the same literal content. What matters for this discussion is the strong link between negative judgments on equivalence of content and negative judgments on identity of entailments.

No one is likely to deny, of course, that the difference between the active and passive can be important in interpretation. As we have just noted, (55) certainly suggests something that (54a) does not. And even where an active and passive clearly entail one another, as in (53) and many other pairs, substitution of one string for the other in certain contexts may fail to preserve mutual entailments. The sentences in (56), for instance, clearly do not entail one another.

- (56) a. Unwillingly the police searched Sarah. [The mayor forced them.]  
b. Unwillingly Sarah was searched by the police. [They had to tie her down.]

In other words, how a sentence structures the content it expresses can apparently matter to the contribution that sentence makes to the content of sentences in which it is embedded. Even if *A* and *B* have exactly the same entailments, it seems that two sentences *C(A)* and *C(B)* that differ from one another only in that *C(B)* contains *B* where *C(A)* contains *A* may differ in their entailments.

There are other ways in which sentences that express the same content can, in some sense, differ in meaning. For example, consider the different utterances in (57), the first of which places focus on *Mary*, the second of which places focus on *cake* (CAPS indicate focal stress). The sentences in (58), while structurally different, are identical in focal structure (and arguably also in entailments) to those in (57).

- (57) a. MARY baked the cake.  
b. Mary baked the CAKE.  
(58) a. It was Mary who baked the cake.  
b. It was the cake that Mary baked.

Sentences (57a) and (58a), which focus on *Mary*, might both be used, for example, to answer someone who uttered (59a), whereas (57b) and (58b), which focus on *cake*, strike us as badly suited for that job but just what is needed to answer someone who asks (59b).

- (59) a. Who baked the cake?  
b. What did Mary bake?

It is sometimes claimed that perfect synonymy does not exist. What is usually meant by this is that formally distinct expressions are nearly always

used in somewhat different ways, are appropriate in somewhat different contexts. This can involve their syntactic structure, their tone, what they suggest, the metaphoric possibilities they evoke, even matters of phonological and phonetic structure. If synonymy of distinct expressions means that we judge them appropriate in exactly the same range of contexts, effective for precisely the same purposes, then it is no surprise that plausible candidates are hard to find.

On the other hand, mutual entailment can be quite reliably judged, as can certain other properties relevant to semantic equivalence (for example, identity of focal structure). Mutual entailment, however, is basic; it generally provides the minimal basis for judgments of synonymy relied on in assessing accuracy of translations from one language to another and of second-party reports of what someone has said. Sometimes more is needed for an adequate translation or report, but mutual entailment is the necessary starting point.

### 3.6 Contradiction

*Contradiction* is intimately linked to entailment. When we said that (14), "Lee kissed Kim passionately," entails (15*d*), "Lee touched Kim with her lips," for example, we were guided by the judgment that (60), the conjunction of (14) with the negation of (15*d*), is contradictory.

(60) Lee kissed Kim passionately, but she [Lee] didn't touch him [Kim] with her lips.

What is meant by saying that (60) is contradictory? We can informally define contradiction in either of the following ways:

(61) *A* is *contradictory* =<sub>af</sub>

- *A* can never be true
- there is no possible situation describable by *A*

That is, in judging (60) to be contradictory, we deem that it is false no matter what the facts might be, that it describes no possible situation. Contradiction can also be thought of as a relation between sentences; the informal definitions in (62) can get us started.

(62) *A* and *B* are *contradictory* =<sub>af</sub>

- *A* and *B* cannot both be true; whenever *A* is true, *B* is false, and whenever *B* is true, *A* is false
- a situation describable by *A* cannot also be a situation describable by *B*

When we speak of one *person* *x* contradicting another *person* *y*, we mean that what *x* has asserted contradicts what *y* has asserted. Lois's response of no to her mother's assertion of *A* is tantamount to an assertion by Lois of "not *A*," which contradicts her mother. *A* and *B* are said to be contradictories if each contradicts the other; *A* and *not A* are contradictories par excellence. If a sentence is contradictory, it will have entailments that are contradictories. More specifically, among its entailments will be a pair of sentences one of which is the negative of the other.

As with intuitions about entailments, initial judgments about contradictoriness can be subjected to further tests. We can defeat a claim that *A* and *B* are contradictory by showing a situation to which they both apply.

Sometimes sentences that overtly express contradictions are used for other purposes. For example, (63*a*) might receive as an answer (63*b*), which looks like a contradiction but is interpreted along the (noncontradictory) lines suggested in (63*c*). We do not simply interpret the speaker who utters (63*b*) as committed to an impossibility.

(63) *a.* Is Andrea smart?

*b.* She [Andrea] is [smart], and she [Andrea] isn't [smart].

*c.* Andrea is smart in some respects but not smart in other respects.

We consider similar examples in more detail in chapter 8, section 5.

### 3.7 Anomaly

Contradictions are clearly incoherent; we might well say that (60) doesn't make sense because it entails contradictories. Few would be tempted to say that (60) is ungrammatical, however, or that it is completely meaningless. The problem seems to be that its meaning includes, in some sense, obviously incompatible parts, the two clauses that are conjoined. Each of the constituent clauses is, however, perfectly fine on its own; incoherence arises from combining them.

Incoherent sentences that are not surface conjunctions of contradictory sentences do not so blatantly generate contradictory entailments. Indeed, their incoherence is often such that we are hard pressed to see that they have any entailments at all. Linguists have spoken of *anomaly* in cases like those illustrated in (64).

(64) *a.* The square root of Milly's desk drinks humanity.

*b.* Colorless green ideas sleep furiously.

*c.* To laugh is very humid.

*d.* The fact that cheese is green skipped inadvertently.

*e.* Being a theorem frightens consternation.

f. My toothbrush is blonde and buxom.

g. That rock thinks it's too good to hold the door open.

Chomsky (1965) introduced the notion of selectional restrictions to mark such sentences as ungrammatical. A verb like *drink*, he noticed, carries the information that its object designates something drinkable—a liquid or semiliquid substance perhaps, but at the very least something concrete rather than abstract—and that its subject designates something that might be a drinker, minimally, an animate being, we might suppose. The idea, then, was to provide a mechanism to ensure that *drink* selects only arguments satisfying such restrictions. From information given in its lexical entry, *drink* would be marked by something like the following “selectional feature”:

(65) [+animate] — [—abstract]

This is a contextual feature indicating that *drink* must only be inserted where there is a preceding animate subject and a following nonabstract object. Subject and object NPs, it was assumed, would receive feature specifications from their head nouns; *humanity*, for example, would be marked [+abstract] and *square root* [—animate]. Violations of selectional restrictions would arise from mismatches between features and would be ungrammatical.<sup>7</sup>

Sentences like those in (64) do seem very strange, and their strangeness seems different from that of a simple contradiction like (60), “Lee kissed Kim passionately, but she didn’t touch him with her lips.” The constituent clauses in (60), “Lee kissed Kim passionately” and “she [Lee] didn’t touch him [Kim] with her lips,” are each semantically unproblematic; each describes a possible situation. The oddness of (60) is that passionate kissing and not touching with the lips are brought together in a single event. The anomalous sentences in (64) are not strange in precisely the same ways or to the same degree. Some of them even seem more susceptible to being put to good use than does (60). We can imagine ways of interpreting sentences like (64f) and (64g), for example (someone might, for instance, have a toothbrush that looks like a woman, or someone might pretend or even believe that rocks are thinking beings). Yet (64a) and (64e) seem virtually impossible to make any sense of (the very notion of square root would seem to preclude a desk’s having one or it’s being something that might drink, and similarly, consternation seems incomparable to the kinds of things that can be frightened: people and other sentient beings).

It has often been pointed out that poetic uses of language are sometimes anomalous if interpreted in the usual and most obvious ways. Personifica-

tion, for example, is a familiar poetic device, and (64f) and (64g) might easily be interpreted from that perspective. But the very fact that interpretation of these sentences typically suggests that their utterers are presenting toothbrushes and rocks as personlike calls for some explanation. Sentence (64b), famous from Chomsky’s use of it in *Syntactic Structures* to illustrate the possibility of divergence between grammatical and semantic well-formedness, is the final line of a poem by John Hollander, where it seems vaguely evocative.<sup>8</sup> Again, the question of how its appropriateness there is achieved needs to be addressed.

The point is not that the sentences in (64) are semantically acceptable (although some of them may be) but rather that they are semantically distinct from one another, and a theory that simply marks them all as meaningless does not reveal this. As in the case of straightforward contradictions, the individual words and the syntactic constructions are semantically unproblematic; what is odd are the combinations, and some are much odder than others.

In some cases the oddness seems linked more to the structure of the world than to facts about linguistic meaning: rocks just aren’t the kind of thing that thinks, as it happens, but this seems less a matter of what *rock* and *think* mean than a matter of what rocks and thinking are like. People are inclined to say that someone might wonder or claim or wish that rocks think. The study of artificial intelligence has raised the possibility of machines’ thinking, a possibility that might well have been deemed as strange a century or so ago as that of rocks’ thinking. On the other hand, (64e) seems far more peculiar; because it is an abstract entity, consternation is completely outside the realm of things that might be frightened. We cannot begin to understand someone’s wondering whether consternation has been frightened. Someone who utters (64e) with apparent seriousness will be thought to have made a slip of the tongue or some other linguistic mistake (perhaps not knowing the meanings of some of the words used), to be suffering from some form of aphasia, to be mentally disturbed in some way. It would be quite strange for another to report the event by saying,

(66) Lindsey wonders whether being a theorem frightens consternation.

Sentence (66) seems hardly easier to interpret than sentence (64e). Similarly, sentence (64a) seems to resist any kind of interpretation: a desk is not a number and therefore in some fundamental way not the sort of thing that could have a square root, and numbers are not the sort of things that drink.

The correct conclusion may be that judgments of anomaly pick out a somewhat heterogeneous set of expressions, some of which are simply

contradictions (with the incompatible entailments perhaps less immediate than in the cases that are obvious contradictions), others of which describe situations that are bizarre because of how the world works, and others of which involve a kind of semantic incompatibility other than that of contradiction (perhaps a semantic analogue of the notion of a violation of selectional restrictions).

What might this special kind of semantic incompatibility be like? It might somehow be part of the meaning of *drink*, for example, that it is only predicable of a certain range or *sort* of object, a sort that does not (at least in normal or literal uses) include square roots. Though it might be difficult to decide for a particular sentence whether it is *sortally deviant* (what is often called a *category mistake* in the philosophical literature) or anomalous in some other way, semantic anomaly, as illustrated in (64), is quite pervasive, is apparently distinct from the other phenomena we have considered, and seems clearly to call for some kind of semantic account.

One proposal is that some kinds of anomaly involve incompatible presuppositions. This would make anomaly analogous to contradiction, which involves incompatible entailments. The problem of distinguishing (certain cases of) anomaly from contradiction would then reduce to the problem of distinguishing presupposition from entailment, a matter we have touched on already and will later take up in more detail.

### 3.8 Appropriateness

One characteristic of anomalous expressions is that they are inappropriate for use in most contexts. People seem able to judge that particular expressions are or are not *appropriate* for uttering in particular contexts, and some have tried to incorporate an account of appropriateness conditions into a theory of linguistic semantics. As we noted above in section 3.2, sentences are often judged inappropriate for contexts where their presuppositions are at issue or somehow controversial. Appropriateness is sometimes held to be a more general and useful notion for semantic theory than that of truth, or descriptive applicability, which was central to our discussion of entailments and contradictions. Only declaratives are sensibly said to describe a situation, or to be true of certain circumstances; interrogatives and imperatives are susceptible to the defect of inappropriateness rather than that of falsity. It is sometimes thought that a theory of appropriateness might replace a semantic theory based on truth. Appropriateness is often appealed to in explaining how speech acts are performed, how we manage to "do things with words": assert, inquire, promise, entreat, and the like. Some examples will illustrate. It is inappropriate for us to promise

you to do something that we do not believe ourselves capable of doing (teach you all there is to know about meaning) or to do something we have no intention of doing (resign our positions if you don't like our book). It is inappropriate to assert something that we do not ourselves believe or that we do not want to give you reason to believe. It is generally inappropriate to inquire whether pigs have wings if we know whether pigs have wings (though, of course, examiners in pig biology may put the question to their students, knowing full well its answer). In chapter 4, we discuss speech acts in some detail. To perform a certain speech act is, in part, to adopt a certain attitude toward the content of what one says and perhaps also sometimes to urge a certain attitude on the part of the hearer ("Is that a promise or a threat?").

A related but slightly different area where appropriateness is appealed to is in judgments of whether a particular expression fits in a particular discourse slot, whether the discourse itself is sensible, coherent. If you have just uttered (67a) to the instructor, then (67b) seems highly inappropriate as her response.

(67) a. Can I have a copy of the answer sheet?

b. Yes, and Joan is similar.

There are clearly many more factors involved in assessing discourse appropriateness than what linguistic expressions mean. For example, relevance is a factor in assessing discourse appropriateness, and knowing what is relevant may involve all kinds of nonlinguistic knowledge. It seems quite unlikely that we could explicitly specify for all sentences of the discourse all the contexts in which they might be appropriate, though for some expressions we might be able to characterize at least partially the class of inappropriate contexts (see the discussion of presupposition in chapter 6).

Appropriateness is also invoked in dealing with matters of stylistic register: certain forms are reserved for church services, others are appropriate for the locker room, others for family dinners. It is generally inappropriate to mix registers, to use them in the wrong contexts, just as it is inappropriate to wear tennis shoes with a ball gown or to wear a ball gown to your linguistics class. Appropriateness here seems linked to cognitive significance: choosing a certain style signals a certain attitude toward the speech situation.

The notion of appropriateness is thus something of a mixed bag. Appropriateness does not seem to be structured like truth. There is no generally recognized relation of one expression's being dependent on another for its

appropriateness parallel to the entailment relation, where one sentence must be true if another is. Nor does appropriateness seem to be readily amenable to a compositional treatment; certainly, no one has offered any general account of how to project appropriateness of (indefinitely many) complex expressions from appropriateness-related properties of their constituents. In other words, it does not seem that appropriateness will replace truth as a fundamental notion for semantic theory.

Nonetheless, recent work on such topics as presupposition has suggested that certain aspects of appropriateness may be characterizable in a much more rigorous way than was once thought possible. As we pointed out, the sentences "Lee got a perfect score on the semantics quiz" and "It was Lee who got a perfect score on the semantics quiz" entail one another; truth-based considerations do not distinguish them. The latter sentence, however, presupposes that someone got a perfect score, whereas the former does not. As we shall see in chapter 6, the presupposition of the cleft restricts the range of contexts in which its utterance is appropriate. It would be inappropriate to utter it in response to the question "Did anyone get a perfect score on the semantics quiz?" for example. Considerable progress is being made in developing empirically sound and theoretically sophisticated discourse theories that elucidate what is involved in such judgments for these and certain other kinds of cases. We will also see that something systematic can be said about how presuppositions of complex sentences relate to the presuppositions of constituent sentences.

#### 4 Summary

We have given the reader an indication of the main aspects of language that a theory of meaning must deal with. Meanings form a productive system in which new meanings can always be expressed. There are aspects of meaning that may be constant across all human languages. Furthermore, meaning encodes information about the world and plays a role in giving a shape to our mental states. A theory of meaning must shed light on all these issues. We have also discussed the different types of semantic judgments in which what we know about meaning manifests itself, and we have provided a preliminary classification of such judgments. We are capable of assessing certain semantic properties of expressions and how two expressions are semantically related. These properties and relationships and the capacity that underlies our recognition of them constitute the empirical base of semantics.

In presenting a theory of semantics that tries to shed light on all these aspects of meaning, we are guided throughout by what Jackendoff (1983, 13) dubs the "grammatical constraint": "prefer a semantic theory that explains otherwise arbitrary generalizations about the syntax and the lexicon." The adherence to this constraint is what perhaps most sharply distinguishes our approach from that of philosophical logicians.