Sentence Relations and Truth

4.1 Introduction

In the last chapter we looked at some of the semantic relations which hold between words and at the network effect that this gives to the lexicon. In this chapter we move on to semantic relations that may hold between sentences of a language. As we shall see, sometimes these relations are the result of particular words in the sentences, but in other cases the relations are the result of syntactic structure. As an example of an attempt to represent these relations, we will look at an approach to meaning based on the notion of **truth,** which has grown out of the study of logic. In particular we examine how successfully a truth-based approach is in characterizing the semantic relations of **entailment** and **presupposition.** We begin by going back to our early, deceptively simple question: what is meaning?

Many linguists would argue (see for example J. D. Fodor 1983) that there is no answer to this question and that in this it is like the question 'what is a number?' in mathematics, or 'what is grammaticality?' in syntax. The only true answers to such questions, it is argued, are whole theories: so one has to have a syntactic theory to give a substantive answer to the question: 'what is grammaticality?' Otherwise, it is claimed, we are reduced to empty answers like: 'Grammaticality is a property assigned to sentences by a grammar' (J. D. Fodor 1983). One way around this problem is to identify the kinds

of phenomena a theory of semantics must cover. As we have seen, generative linguists orient their explanation in terms of a native speaker's competence. In this approach, the question then becomes: what kind of knowledge about the meaning of his or her language does the native speaker have? Answers to this question differ but there is a consensus in the literature that for sentence meaning, a semantic theory should reflect an English speaker's knowledge:[1]

4.1 That a and b below are **synonymous:**
- a. My brother is a bachelor.
- b. My brother has never married.

4.2 That a below **entails** b:
- a. The anarchist assassinated the emperor.
- b. The emperor is dead.

4.3 That a below **contradicts** b:
- a. My brother Sebastian has just come from Rome.
- b. My brother Sebastian has never been to Rome.

4.4 That a below **presupposes** b, as c does d:
- a. The Mayor of Manchester is a woman.
- b. There is a Mayor of Manchester.
- c. I regret eating your sandwich.
- d. I ate your sandwich.

4.5 That a and b are necessarily true, i.e. **tautologies:**
- a. Ireland is Ireland.
- b. Rich people are rich.

4.6 That a and b are necessarily false, i.e. **contradictions:**
- a. ?He is a murderer but he's never killed anyone.
- b. ?Now is not now.

We shall be looking at some of these relations in more detail in this chapter but for now we can give a rough characterization of each, as follows:

4.7 A is synonymous with B: A has the same meaning as B.

4.8 A entails B: we know that if A then automatically B.

4.9 A contradicts B: A is inconsistent with B.

4.10 A presupposes B: B is part of the assumed background against which A is said.

4.11 A is a tautology: A is automatically true by virtue of its own meaning, but informationally empty.

4.12 A is a contradiction: A is inconsistent with itself, i.e. asserts and denies the same thing.

The problem for semantics is to provide a more rigorous account of these and similar notions. In the following sections we look at how a notion of truth might be used to do this.

4.2 Logic and Truth

In this section, we take a brief excursion into the realm of logic. In doing this we are following a number of writers, like Richard Montague (1974) who have hypothesized that the tools of logic can help us to represent sentence meaning. We won't be going very far on this excursion and the interested reader is referred to an excellent introduction to logic in Allwood et al. (1977). We will go on to look at logic-based semantics in more detail ourselves in chapter 10.

The study of logic, of course, comes down to us from the Classical Greek world, most famously from Aristotle. The beginnings of logic lie in a search for the principles of valid argument and inference. A well-known example is Aristotle's **modus ponens,** a type of argument in three steps, like the following:

4.13
- a. If Arnd left work early, then he is in the pub.
- **b.** Arnd left work early.
- **c.** Arnd is in the pub.

If steps a and b (called the premises) are true then step c (the conclusion) is also guaranteed to be true.

Here we follow the tradition of separating the premises from the conclusion by a horizontal line. Other rules of valid inference include the **modus tollens** exemplified in 4.14 below, the **hypothetical syllogism** in 4.15 and the **disjunctive syllogism** in 4.16:

4.14
- a. If Arnd has arrived, then he is in the pub.
- b. Arnd is not in the pub.

- c. Arnd has not arrived.

4.15
- a. If Arnd is in the pub, then he is drinking beer.
- **b.** If Arnd is drinking beer, then he is drinking Guinness.

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c. If Arnd is in the pub, then he is drinking Guinness.

4.16
- a. Arnd is in the public bar or he is in the lounge.
- **b.** Arnd isn't in the public bar.

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c. Arnd is in the lounge.

A part of this study is a concern for the truth of statements and whether truth is preserved or lost by putting sentences into different patterns. Truth here is taken to mean a correspondence with facts, or in other words, correct descriptions of states of affairs in the world.[2] For the most part this truth is said to be **empirical** (or **contingent),** because we have to have some access to the facts of the world to know whether <a statement is true or not. Thus the truth or otherwise of the sentence:

4.17 My father was the first man to visit Mars.

depends on facts about the speaker's father's life: if her father did go to Mars and was the first man there, then the sentence is true; otherwise it is false. In the same way the empirical truth of 4.18 below:

4.18 The earth revolves around the sun.

depends upon the facts of the universe.

Semanticists call a sentence's being true or false its **truth-value,** and call the facts that would have to obtain in reality to make a sentence true or false, its **truth conditions. A** simple example of a linguistic effect on truth-value comes from negating a sentence. If we have a sentence like a below in English, adding *not* will reverse its truth-value:

4.19 a. Your car has been stolen.
b. Your car has not been stolen.

If a is true then b is false; also if a is false then b is true. To show that this relationship works for any statement, logicians use a schema called **logical form,** where a lower case letter **(p, q, r,** etc.) stands for the statement and a special symbol for negation. So the logical form for 4.19a is 4.20a and for 4.19b is 4.20b:

4.20 **a. p**
b. ¬ p

The effect of negation on the truth-value of a statement can be shown by a truth table, where T represents 'true' and F 'false', as below:

4.21

p	**¬p**
T	F
F	T

This table shows that when p is true (T), -p is false (F); when p is false (F), —ip is true (T).This is then a succinct way of describing the truth effect of negation.

The truth-value of other linguistic elements is studied in logic in the same way. A number of connectives are especially important to logicians because they have a predictable effect on the truth conditions of compound statements. For example the truth-value of a compound formed by using *and* to join two statements is predictable from the truth of the constituent statements. See, for example:

4.22 a. The house is on fire.
b. The fire brigade are on the way.
c. The house is on fire and the fire brigade are on the way.

If 4.22a and b above are true, then the compound c is also true. If however either of a or b is false then the compound will be false. This can be shown by designing a truth table for *and*> and representing it by a special symbol A:

4.23

p	**q**	**p ^ q**
T	T	T
T	F	F
F	T	F
F	F	F

This table tells us that only when both statements connected by A are true will the compound be true. So 4.22c above will be false if the house is on fire but the fire brigade are not on the way, and also false if the fire brigade are on their way but to a false alarm: the house is not on fire. Most obviously of all, 4.22c is false if there is no fire and no fire brigade on the way.

The study of the truth effects of connectives like -i and A is called **proposiyt- ositional logic,** and logicians have studied the truth effects of a number of other connectives, for example those corresponding to the English words *or* and *if then.* We can look briefly at these here and we will come back to
them again in chapter 10.

There are two logical connectives which can correspond to English *or.* The first is called **disjunction** (or alternatively **inclusive or)** and is symbolized as v, thus giving logical forms like **p** v **q.** The truth table for this connective is as follows:

4.24

p	**q**	**p v q**
T	T	T
T	F	T
F	T	T
F F F		

Thus a compound created with v is true if one or both of the constituent sentences is true. This connective corresponds to the use of English *or* in sentences like the following:

4.25 I'll see you today or tomorrow.

Sentence 4.25 is true if either *I'll see you today* or *FU see you tomorrow* is true, or both. It is only false if both are false.

The second connective which can correspond to English *or* is called **exclusive or,** which we can symbolise as v_e.This connective has the truth table in 4.26 below:

4.26

p	**q**	**P v_c q**
T	T	F
T	F	T
F	T	T
F	F	F

From 4.26 we can see that **p** v_c **q** is only true if just one of its disjuncts is true. This connective corresponds to the use of English *or* in sentences like 4.27 below:

4.27 You will pay the fine or you will go to jail.

This exclusive *or* seems to have an implicit qualification of 'but not both'. Thus if a judge said sentence 4.27 to a defendant, it would seem very unfair if the defendant paid the fine and then was still sent to jail, as would be consistent with inclusive *or*.

The next connective we will look at here is the **material implication,** symbolized as —This connective has the truth table in 4.28:

4.28

p	**q**	**p → q**
T	T	T
T	F	F
F	T	T
F	F	T

As 4.28 shows, the expression **p** —> **q** is only false when **p** (the **antecedent)** is true and **q** (the **consequent)** is false. This connective is something like my use of English *if*.. . *then* if I utter a sentence like 4.29:

4.29 If it rains, then I'll go to the movies.

We can identify the *if*-clause in 4.29 as the antecedent and the tfort-clause as the consequent. This conditional sentence can only be false if it rains and I don't go to the movies, i.e. **p = T, q** = F. If it doesn't rain **(p** = F), my conditional claim cannot be invalidated by whatever I do: whether I go to the movies **(q** =T) or not **(q** = F). We can describe this relation by

saying that **p** is **a sufficient condition** for **q** (rain will cause me to go) but not a **necessary condition** (other things might make me go; it might snow!).

This relation is a little hard to grasp and the reason is because we intuitively try to match it with our ordinary use of conditional sentences in English. However conditionals in real languages often have more to them than this truth-conditional connective shows. For example, there is often an assumption of a causal connection between the antecedent clause (the *if*-clause) and the consequent (the *then*-clause), as in 4.30 below:

4.30 If Patricia goes to the party, then Emmet will go too.

A natural implication of sentence 4.30 is that Emmet is going **because** Patricia is. This is partly like our connective -> because if Patricia goes to the party but Emmet doesn't **(p** = T, **q** = F) then the conditional sentence is false, as the truth table for -> suggests. However because of the causal implication, we might feel that if Patricia doesn't go **(p** = F) the conditional 4.30 implies that Emmet won't go. Thus we might feel that if he does go (q = T), the claim is invalidated. The logical connective, however, doesn't work like this: as 4.28 shows, if the antecedent is false, the compound is true, whatever the truth-value of the consequent.

This truth-conditional relation also seems to miss our intuitions about another ordinary language use of conditional *if .....then* constructions: **counterfactuals,** where the speaker overtly signals that the antecedent is false, for example:

4.30 If wishes were money, then we'd all be rich.[3]

The lack of fit here with our intuitions can be shown by the sentences in 4.31 below:

4.32 a. If I were an ostrich, then I would be a bird.
b. If I were an ostrich, then I would not be a bird.

Let us interpret each of these conditionals as the p —> q relation: since I am not in fact an ostrich, we might take p in 4.32a to be false, and if we follow the reasoning of the conditional then q might seem to be true. Thus, by the truth table in 4.28 the sentence 4.32a is true. This seems a reasonable fit with our intuition about 4.32a. The problem is that assuming the same antecedent p in 4.32b to be false means that 4.32b also has to be true, according to our truth table 4.28. Even if we accept the less likely 4.32b as true, it is uncomfortable to try and hold both 4.32a and b to be true for the same speaker in the same context. It seems likely that the material implication relation simply doesn't fit our use of counterfactuals. We will not follow this issue any further here; for a discussion of logical implication and ordinary language conditionals, see Lewis (1973) and the

overview in Haack (1978). What we can say is that the logical relation of material implication captures some but not all aspects of our use *of if... then* in English.

There is one other related connective we might mention here, the **bi-conditional,** symbolized by = (or alternatively <-»). This connective has the truth table in 4.33 below:

4.33

p	**q**	**P ≡ q**
T	T	T
T	F	F

As 4.33 shows, a statement **p = q** is true when **p** and **q** have the same truth-value. The name 'biconditional' reflects the fact that the **p = q** is equivalent to the compound conditional expression **(p ⟶ q) ^ (q ⟶ p),** which we can paraphrase as 'if **p** then **q** and if **q** then **p'.** This connective corresponds to the English words *if and only if* as in 4.34:

4.34 We'll leave if and only if we're forced to.

If we reverse the English clause order and identify the condition *if and only if we are forced to* as **p,** and the consequent *We'll leave* as **q,** then we can say that **p** is a **necessary condition** for **q,** i.e. **p** is the only possible cause for **q.** Given this, this connector is a plausible translation of the intended meaning of our earlier example 4.30 with *if. . . then.* In logic this relation **'p** if and only if **q'** is often abbreviated to **'p** iff **q'.**

This has been just a brief look at logical connectives and their English counterparts. As we have mentioned, in logic these connectives are important for the establishment of valid arguments and correct inductive reasoning. Using the symbols we have introduced in this section, we can represent the types of valid inference exemplified earlier in 4.13-16, as follows:

4.35 Modus Ponens

P ⟶ q
P

q

4.36 Modus Tottens

P ⟶ q
¬q

¬p

4.37 Hypothetical syllogism

p ⟶ q
q ⟶ r

p ⟶ r

4.38 Disjunctive syllogism

P v q
¬P

q

For our current purposes, what we need to hold onto are these ideas from logic: that statements have a truth-value; that this truth-value depends upon a correspondence to facts, and that different ways of connecting statements have different effects on the truth-value of the compounds produced.

4.3 Necessary Truth, *A Priori* Truth and Analyticity

As we have seen, the notion of empirical truth depends on a correlation to states of affairs in reality. Philosophers and logicians have identified another type of truth which seems instead to be a function of linguistic structure. For example, we know that the tautology:

4.39 My father is my father.

is always true (in its literal meaning) without having to refer to the facts of the world, as is a sentence like:

4.40 Either he's still alive or he's dead.

We do not have to check a pulse to find out whether this sentence is true.

In the same way, contradictions are false simply by virtue of their own meaning, e.g.:

4.41 ?She was assassinated last week but fortunately she's still alive.

This second kind of truth has been the focus of much investigation. The question of how it is that we might know a statement to be true without checking the facts of the world has been discussed by many philosophers[4] and various distinctions of truth have been made. For example, we started out by characterizing this type of truth in epistemological terms, i.e. in terms of what the speaker knows (or needs to know before making a judgement about truth). From this perspective, truth that is known before or

without experience has traditionally been called **a priori.** This *a priori* truth is contrasted with **a posteriori** truth: truth which, as in our examples 4.17 and 4.18 earlier, can only be known on the basis of empirical testing.

Another related concept is Leibniz's distinction between **necessary** truths, which cannot be denied without forcing a contradiction, for example the arithmetical statement *Two and two make four,* and **contingent** truths which can be contradicted, depending on the facts, for example the sentence *The dodo is extinct.* If someone unexpectedly found a dodo in a forest on Mauritius, this latter sentence would become false. It is difficult, on the other hand, to imagine circumstances in which *Two and two make four* would unexpectedly become false. This is similar to our *a priori/a posteriori* distinction but comes at truth from another viewpoint: not in terms of what the speaker knows but in terms of what the world is like. We can say that it is hard to think how our sentence about two and two making four could not be true without changing our view of the present facts of the world.[5] From this perspective a sentence like 4.40 is also **necessarily true** and a contradiction like 4.41 is **necessarily false.**

In another, related terminology tautologies like 4.39 are **analytic** while a sentence like *My father is a sailor* is **synthetic.** Analytic statements are those where the truth follows from the meaning relations within the sentence, regardless of any relationship with the world, while a synthetically true statement is true because it accords with the facts of the world.

Thus we have three related distinctions of truth: between *a priori* and *a posteriori*^ necessary and contingent, and analytic and synthetic. These notions are closely linked, yet not quite identical. As noted by Kripke (1980), part of their difference comes from the concerns of the analyst: the *a priori! a posteriori* distinction is an epistemological one: it concerns what the speaker knows. Indeed when we use the term *a priori* we are not concerned with how the speaker knows that a statement must be true, except that it is not by experience. The necessary/contingent distinction on the other hand is really a metaphysical one, where we are philosophically questioning die nature of reality. We can hypothesize that it is the nature of reality tliat ensures that a sentence like *Two and two make four* is a necessary truth. Finally, the analytic/synthetic distinction is semantic in orientation. The traditional claim has been that analytic sentences are true because of the meaning of the words within them: for example, the meaning of the predicate might somehow be included in the meaning of the subject: it might not add anything new.[6] This certainly seems to be true of our tautology *My father is my father.*

Wc can see that the three notions are related because under the kind of definitions we have introduced so far, our example sentence *My father is my father* is an *a priori* truth, it is necessarily true and it is analytic. As we have mentioned, this classification of truth has been the subject of much debate in the philosophical literature and it has been argued by some philosophers, for example Kripke (1980), that the terms do not characterize exactly the same set of statements, for example that a statement might be a necessary

truth but not an *a priori* truth. To parallel a standard example, a statement of identity like *Mogadishu is Hamar* is necessarily true because these are two names for the same city, the capital of Somalia. Clearly, though, it is possible for a person not to know this and therefore for this person, our sentence is not an *a priori* truth. (The person might have to ask people or look it up in a book, making the knowledge *a posteriori.*[1]

This sketch is enough for our present purposes. In our discussion we will informally use necessary truth and analytic truth as synonymous terms to describe sentences which are true by virtue of their meaning, and which therefore are known to be true by a speaker of the language without any checking of the facts. See Grayling (1982) for further discussion of the relations of these notions.

We can provide further examples of sentences which are analytic or necessarily true in this sense if we imagine logically-minded sports fans looking forward to the World Cup Finals and saying the following:

4.42
a. Either Germany will win the World Cup or Germany won't win the World Cup.
b. If Germany are champions and Brazil are runners-up then Germany are champions.
c. All teams who win are teams.
d. If Germany beat Brazil then Brazil lose to Germany.

Sentences like 4.42 a-c above have been important in the development of logic. This is because their truth can be predicted from their logical form. Take 4.42a for example: if, as before, we replace each clause by an arbitrary letter, we produce a logical form, e.g.

4.43 Either p or not-p

This formula will be true for any clause, as long as each clause is the same, represented above by using the same letter. For example:

4.44 Either we'll make it on time, or we won't make it on time.

Similarly, sentence 4.42b above can be given the logical form:

4.45 If p and **q** then **p**

Once again whatever clauses we use for p and q the formula will be true, e.g.

4.46 If the house is sold and we aren't there, the house is sold.

Sentence 4.42c is also necessarily true because of its logical form, but in this case the truth behaviour is caused by the presence within the clause of the quantifier *all.* To find its logical form we have to go inside the clause and replace the subject and predicate by variables, e.g.:

4.47 All X's that *Y* are X's

Again, this form will be true whatever subject and predicate we insert for *X* and Y, e.g.:

4.48 All birds that fly are birds.[8]

The study of the truth behaviour of such sentences with quantifiers like *all, every, each, some, one* gave rise to a second type of logic usually called **predicate logic.** Once again, good introductions to this logic can be found in Allwood et al. (1977). We will come back to both propositional and predicate logic again in chapter 10.

The important point here is that, as we have seen, there are certain words like the connectors *and, or, if.. . then,* the negative word *not,* and quantifiers like *all, some, one* which influence the truth behaviour of sentences. For this reason these are sometimes called **logical words.** So the sentences 4.42a-c are necessarily true because of the presence of logical words, which means that their truth behaviour is predictable from their logical form.

The truth of sentence 4.42d *If Germany beat Brazil then Brazil lose to Germany,* however, depends on the meaning of individual words like *beat* and *lose,* and not any logical form we might give the sentence, like 4.49:

4.49 If *G X B* then *B Y G.*

We can see this, because if we replace the verbs with other verbs, we cannot predict that the resulting sentence will also be analytically true, e.g.

4.50 If Germany attack Brazil then Brazil outscore Germany.

This sentence might be true, or not: we cannot tell just from the sentence. It seems that sentence 4.42d is necessarily true because of the semantic relationship in English between the verbs *beat* and *lose.* This kind of necessary truth has not traditionally been a concern of logicians, because its effects cannot easily be reduced to general rules or schemas: it relies on the very varied and individual lexical relations we looked at in chapter 3. Thus such necessarily true sentences can derive from synonymy as in 4.51a below; from simple antonymy as in 4.51b; from converse pairs as in 4.51c; or hyponymy as in 4.5Id:[9]

4.51 a. My bachelor brother is an unmarried man.
b. If Elvis is dead then he is not alive.
c. If she's his sister then he's her brother.
d. A cat is an animal.

So our examples have shown us that sentences can be analytically true because of the behaviour of logical words (connectors, quantifiers) or because of the meaning of individual nouns and verbs. In each case we know that the sentences are true without having to check any facts about the world.

4.4 Entailment

Using this special meaning of 'truth' that we have been looking at, some semanticists have claimed that the meaning relations discussed in section 4.1 can be given a more rigorous definition. The claim is that there are fixed **truth relations** between sentences which hold regardless of the empirical truth of the sentences. We can examine this claim by looking at the semantic relation of **entailment.** Let's take as an example the relationship between sentences 4.52a and b below, where a is said to entail b:

4.52 a. The anarchist assassinated the emperor.
b. The emperor died.

Assuming as usual that the same individual is denoted by *the emperor* here, there are a number of ways of informally describing this relationship. We could say that if somebody tells us 4.52a and we believe it, then we know 4.52b without being told any more. Or we could say that it is impossible for somebody to assert 4.52a but deny b. What such definitions have to try to capture is that entailment is not an inference in the normal sense: we do not have to reason to get from 4.52a to b, we just know it instantaneously because of our knowledge of English. A truth-based definition of entailment might allow us to state the relationship more clearly and would be something like 4.53 below:

4.53 Entailment defined by truth:

A sentence **p** entails a sentence **q** when the truth of the first (**p**) guarantees the truth of the second (**q**), and the falsity of the second (q) guarantees the falsity of the first (**p**).

We can see how this would work for our examples:

4.54 Step 1: If **p** (The anarchist assassinated the emperor) is true, is **q** (The emperor died) automatically true? Yes.
Step 2: If **q** (The emperor died) is false, is **p** (The anarchist assassinated the emperor) also false? Yes.
Step 3: Then **p** entails **q**. Note if p is false then we can't say anything about **q**; it can be either true or false..

We can try to show this relation in an accessible form if we take the logician's truth tables, seen earlier, and adapt them somewhat. We can continue to use the symbols **p** and **q** for our two sentences, and T and F for true and

false, as in normal truth tables, but we will add arrows (⟶and⟵) to show the direction of a relation 'when. . . then'. So the first line of 4.55 below is to be read 'When p is true, q is true', and the last line is to be read 'when q is true, p can be either true or false? By taking these liberties with traditional truth tables, we can show the truth relations of entailment in 4.55, a composite truth table:

4.55 Composite truth table for entailment

p		**q**
T	⟶	T
F	⟶	T or F
F	⟵	F
T or F	⟵	T

When this set of relations hold between **p** and **q, p** entails **q.** From this table we can see that only the truth of the entailing sentence or the falsity of the entailed sentence have consequences for the other sentence. When **p** is false, q can be either true or false: if all we were told was that the anarchist didn't assassinate the emperor, we wouldn't know whether the emperor was dead or alive. When q is true, p can be either true of false: if we just know that the emperor is dead, that doesn't tell us anything about whether the anarchist assassinated him or not.[10]

We have said that an entailment relation is given to us by linguistic structure: we do not have to check any fact in the world to deduce the entailed sentence from the entailing sentence. The source may be lexical or syntactic. In our example above it is clearly lexical: the relationship of entailment between 4.52a and b derives from the lexical relationship between *assassinate* and *die.* In some sense the meaning of *assassinate* contains the meaning of *die.* In chapter 3 we called a similar relationship of meaning **hyponymy;** and indeed hyponymy between lexical items is a regular source for entailment between sentences. For example, the noun *dog* is a hyponym of *animal,* so it follows that sentence 4.56 below entails sentence 4.57:

4.56 I bought a dog today.

4.57 I bought an animal today.

Other sources for entailment are syntactic: for example, active and passive versions of the same sentence will entail one another. Sentence 4.58 below entails 4.59, and vice versa:

4.58 The Etruscans built this tomb.

4.59 This tomb was built by Etruscans.

In fact, the relationship of entailment allows us to define **paraphrase.** Paraphrases, like 4.58 and 4.59, are sentences which have the same set of entailments, or to put it another way, **mutually entail** each other.

This truth-based definition does seem to capture our basic intuitions about entailment and semanticists have gone on to characterize other semantic relations in terms of truth relations. For example, we could very simply characterize synonymy with the following table:

4.60 Composite Truth Table for Synonymy

p		**q**
T	⟶	T
F	⟶	F
T	⟵	T
F	⟵	F

This table simply says, of course, that p and q always have the same truth-value, i.e. if p describes a situation so will q, and vice versa; while if either incorrectly describes a situation so will the other. We can see this is true for examples like:

4.61 Alice owns this book.

4.62 This book belongs to Alice.

where again we observe the convention that it is the same Alice and the same book in the two sentences.[11]

The opposite of this relation of synonymy would be contradiction, with the truth table below:

4.63 Contradiction

p		**q**
T	⟶	F
F	⟶	T
T	⟵	F
F	⟵	T

where the simplest examples involve negation, as below:

4.64 Mr Jones stole my car.

4.65 Mr Jones did not steal my car.

but other examples might also include the lexical relation of simple or binary antonymy, as in our earlier examples with *beatHose to.*

So thus far it seems that recasting semantic relations as truth relations allows us to describe neatly the relations we listed in section 4.1 as being the focus of our investigations. In the next section, however, we look at one of these relations, **presupposition,** which seems to lend itself less well to a truth-based description.

4.5 Presupposition

4.5.1 Introduction

In ordinary language, of course, to presuppose something means to assume it, and the narrower technical use in semantics is related to this. In the following examples the a sentence is said to **presuppose** the b sentence:

4.66 a. He's stopped turning into a werewolf every full moon.
b. He used to turn into a werewolf every full moon.

4.67 a. Her husband is a fool.
b. She has a husband.

4.68 a. I don't regret leaving London.
b. I left London.

4.69 a. The Prime Minister of Malaysia is in Dublin this week.
b. Malaysia has a prime minister.

4.70 a. I do regret leaving London.
b. I left London.

Presupposition has been an important topic in semantics: the 1970s in particular saw lively debates in the literature. Books devoted largely to the subject include Kempson (1975), D. Wilson (1975), Boer and Lycan (1976), Gazdar (1979) and Oh and Dinneen (1979); and important papers include J. D. Fodor (1979) and Wilson and Sperber (1979). In retrospect this interest in presupposition can be seen as coinciding with the development of pragmatics as a sub-discipline. The basic idea, mentioned in chapter 1, is that semantics would deal with conventional meaning, those aspects which do not seem to vary too much from context to context, while pragmatics would deal with aspects of individual usage and context-dependent meaning.

The importance of presupposition to the pragmatics debate is that, as we shall see, it seems to lie at the borderline of such a division. In some respects presupposition seems like entailment: a fairly automatic relationship, involving no reasoning, which seems free of contextual effects. In other respects though, presupposition seems sensitive to facts about the context of utterance. We will look at this sensitivity to context in section 4.5.5.

For now we can begin by identifying two possible types of approach to presupposition, arising from different ways of viewing language.

4.5.2 Two approaches to presupposition

In the first approach, rather in the philosophical tradition, sentences are viewed as external objects: we don't worry too much about the process of producing them, or the individuality of the speaker or writer and their audience. Meaning is seen as an attribute of sentences rather than something constructed by the participants. Semantics then consists of relating a sentence-object to other sentence-objects and to the world. When in the last section we characterized sentence relations in terms of truth relations we adopted this perspective. The second approach views sentences as the utterances of individuals engaged in a communication act. The aim here is about modelling the strategies that speakers and hearers use to communicate with one another. So we might look at communication from the speaker's viewpoint and talk about presupposition as part of the task of packaging an utterance; or adopt the listener's viewpoint and see presupposition as one of a number of inferences that the listener might make on the basis of what the speaker has just said. The first approach is essentially semantic and the second pragmatic.

Let's use 4.71 below and its presupposition 4.72 as an example to show these different views.

4.71 John's brother has just got back from Texas.

4.72 John has a brother.

We can adopt the sentences-as-external-objects approach and try to identify a semantic relationship between these two sentences. One obvious way is to cast this as a truth relation, as we did for entailment and other relations in the last section. To do this we might reason as in 4.73, to set up the partial truth table in 4.74:

4.73 Presupposition as a truth relation.
Step 1: If **p** (the presupposing sentence) is true then **q** (the presupposed sentence) is true.
Step 2: If **p** is false, then **q** is still true.
Step 3: If **q** is true, **p** could be either true or false.

4.74 A first composite truth table for presupposition

p		**q**
T	→	T
F	→	T
T or F	←	T

At the risk of being longwinded, we can work through 4.73. If it is true that John's brother has come back from Texas, it must be true that John has a brother. Similarly, if it is false that John's brother has come back from Texas (if he is still there, for example), the presupposition that John has a brother still survives. Finally, if is true that John has a brother, it doesn't tell us anything about whether he has come back from Texas or not: we just don't know.

So viewing presupposition as a truth relation allows us to set up a truth table like 4.74, and allows us to capture an important difference between entailment and presupposition. If we negate an entailing sentence, then the entailment fails; but negating a presupposing sentence allows the presupposition to survive. Take for example the entailment pair in 4.75:

4.75 a. I saw my father today.
b. I saw someone today.

If we negate 4.75a to form 4.76a then it no longer entails 4.75b, repeated as 4.76b:

4.76 a. I didn't see my father today.
b. I saw someone today.

Now 4.76b no longer automatically follows from the preceding sentence: again it might be true, we just don't know. Compare this with the presupposition pair:

4.77 a. The mayor of Liverpool is in town.
b. There is a mayor of Liverpool.

If we negate 4.77a to form 4.78a the resulting sentence still has the presupposition, shown as 4.78b:

4.78 a. The mayor of Liverpool isn't in town today.
b. There is a mayor of Liverpool.

So negating the presupposing sentence does not affect the presupposition, whereas, as we saw, negating an entailing sentence destroys the entailment. So it seems that viewing presupposition as a truth relation allows us to capture one interesting difference between the behaviour of presupposition and entailment under negation.

By comparison, we can sketch an idea of how an alternative, interactional view of presupposition might work for our original example; *John's brother has just got back from Texas.* This approach views presupposition as one aspect of a speaker's strategy of organizing information for maximum clarity for the listener. Let us say roughly that the speaker wants to inform the

listener that a particular individual has returned from Texas. The way she does this will depend on what she estimates about her listener's knowledge. If she thinks he knows John but not his brother, we can see in her use of 4.64 an ordering of the assertions in 4.79-80:

4.79 Assertion 1: John has a brother X.

4.80 Assertion 2: X has come back from Texas.

In our example 4.71 the first assertion is downgraded or backgrounded by being placed in a noun phrase *[John's brother]* while the second assertion is highlighted or foregrounded by being given the main verb. Why foreground one assertion rather than another? The answer must depend on the speaker's intentions and her guesses about the knowledge held by the participants. For example the speaker might judge that the listener knows 4.79 but that 4.80 is new information, and therefore needs to be foregrounded. Here we could speculate that the speaker decides to include the old information 4.79 to help the listener to identify the individual that the new information is about. Note too that a speaker can use 4.71 even if the listener does not know John has a brother. In such a case both assertions are new but the speaker has decided to rank them in a particular order.

4.5.3 Presupposition failure

One phenomenon which has traditionally caused problems for a truth relations approach but may be less problematic in an interactional approach is **presupposition failure.** It has been observed that using a name or a definite description to refer presupposes the existence of the named or described entity:[12] so the a sentences below presuppose the b sentences:

4.81 a. Ronald is a vegetarian.
b. Ronald exists.

4.82 a. The King of France is bald.
b. There is a King of France.

Example 4.82 is of course the subject of Bertrand Russell's discussion of the problem (Russell 1905), and is by now one of the most discussed examples in this literature. The problem arises when there exists no referent for the nominal. If there's no Ronald or King of France, i.e. if the b sentences above are false, what is the status of the a sentences? Are they false, or are they in a grey area, neither true nor false? In a truth-based approach, on a grey-area analysis, we need to add a line to our truth table, but what does the line look like?

4.83 A second truth table for presupposition

p		**q**
T	→	T
F	→	T
T or F	←	T
?(T v F)	←	F

What this table tries to show is that if q is false, the status of p is dubious, possibly neither true nor false. This is a problem for truth-based theories, known as a **truth-value gap.** If a statement can b.e neither true nor false, it opens a nasty can of worms. How many degrees in between are possible? A good deal of the attractive simplicity of the truth-based approach seems in danger of being lost. It is a problem that has generated a number of solutions in the philosophical literature; see McCulloch (1989) for discussion and for a solution in the linguistics literature, J. D. Fodor (1979). Russell's famous solution was to analyse definite descriptions as complex expressions roughly equivalent to 4.84 (adapted from McCulloch 1989: 47):

4.84 The King of France is bald is true if and only if:
- a. at least one thing is the king
- b. at most one thing is the king
- c. whatever is the king is bald.

From 4.84, it follows that sentence 4.82a is false if there is no king of France, and that there is no grey area between true and false, no truth-value gap. The cost however is a large discrepancy between the surface language and the semantic representation. Do we really want to say that a name is underlyingly a cluster of three statements?

For an interactional approach, there is less of a problem. Such an approach would claim that a speaker's use of definite NPs like names and definite descriptions to refer is governed by conventions about the accessibility of the referents to the listener. In some obvious way, I have made a communication error if I say to you:

4.85 Heronymous is bringing us a crate of champagne.

if you don't know any person called Heronymous. Your most likely response would be to ask 'Who's Heronymous?', thus signalling the failure. So we can hypothesize that there is an interactional condition on referring: a speaker's use of a name or definite description to refer usually carries a guarantee that the listener can identify the referent.[13]

So in an interactional approach the issue of presuppositional failure shifts attention from the narrow question of the truth-value of statements about non-existent entities to the more general question of what conventions license a speaker's referring use of definite nominals.

4.5.4 Presupposition triggers

We have seen that the use of a name or definite description gives rise to a presupposition of existence. Other types of presupposition are produced by particular words or constructions, which together are sometimes called **presupposition triggers.** Some of these triggers derive from syntactic structure, for example the cleft construction in 4.86 and the pseudo-cleft in 4.87 share the presupposition in 4.88:

4.86 It was his behaviour with frogs that disgusted me.

4.87 What disgusted me was his behaviour with frogs.

4.88 Something disgusted me.

Other forms of subordinate clauses may produce presuppositions, for example, time adverbial clauses and comparative clauses. In the following sentences, the a sentence has the presupposition in b:

4.89 a. I was riding motorcycles before you learned to walk.
b. You learned to walk.

4.90 a. He's even more gullible than you are.
b. You are gullible.

Many presuppositions are produced by the presence of certain words. Many of these **lexical triggers** are verbs. For example, there is a class of verbs like *regret* and *realize* that are called **factive** verbs because they presuppose the truth of their complement clause. Compare sentences 4.91 and 4.92 below: only the sentence with the factive *realize* presupposes 4.93. There is no such presupposition with the non-factive verb *think.*

4.91 Sean realized that Miranda had dandruff.

4.92 Sean thought that Miranda had dandruff.

4.93 Miranda had dandruff.

Similarly compare 4.94-6:

4.94 Sheila regretted eating the banana.

4.95 Sheila considered eating the banana.

4.96 Sheila ate the banana.

Some verbs of judgement produce presuppositions. Compare 4.97-9 below:

4.97 John accused me of telling her.

4.98 John blamed me for telling her.

4.99 I told her.

Once again one verb, *blame*, produces the presupposition in 4.99, while another, *accuse*, does not.

For a final example of lexical triggers, consider change of state verbs, like *start, begin, stop*. These verbs have a kind of switch presupposition: the new state is both described and is presupposed not to have held prior to the change; see for example 4.100-1 below, where again the a sentences presuppose the b sentences:

4.100 a. Judy started smoking cigars.
b. Judy used not to smoke cigars.

4.101 a. Michelle stopped seeing werewolves.
b. Michelle used to see werewolves.

4.5.5 Presuppositions and context

As mentioned earlier, one problem for a simple truth-based account of presupposition is that often the presuppositional behaviour seems sensitive to context. While a given sentence always produces the same set of entailments, it seems that this is not true of presuppositions. Levinson (1983) gives as an example, the type of presupposition usually triggered by time adverbial clauses, e.g. 4.102a presupposing 4.102b below:

4.102 a. She cried before she finished her thesis.
b. She finished her thesis.

However if we change the verb, as in 4.103a below, the presupposition 4.103b is no longer produced:

4.103 a. She died before she finished her thesis.
b. She finished her thesis.

Why is this? It is argued that in 4.103 the presupposition is blocked or cancelled by our general knowledge of the world: quite simply we know that dead people do not normally complete unfinished theses. This characteristic is sometimes known as **defeasibility,** i.e. the cancelling of presuppositions. If presuppositions arise or not depending on the context of knowledge, this suggests that we need an account of them that can make reference to what the participants know, as in an interactional approach, rather than an account limited to formal relations between sentences.

Another example of context sensitivity, pointed out by Strawson (1950), occurs with sentences like 4.104 and 4.105 below:

4.104 It was Harry who Alice loved.

4.105 It was Alice who loved Harry.

These sentences seem to describe the same essential situation of Alice loving Harry; or to put it another way, we might say that they embody the same proposition. The difference between them is that they belong to different conversational contexts: whether the participants have been discussing Harry or Alice. As Strawson points out, they seem to give rise to different presuppositions, with 4.104 producing 4.106 and 4.105 producing 4.107:

4.106 Alice loved someone.

4.107 Someone loved Harry.

The same phenomenon is found with **intonation** in English, where stressing different parts of the sentence can produce different presupposi tions. Using capitals to show the position of this stress, we can produce the presupposition in 4.106 above with 4.108 below, and 4.107 above with 4.109 below:

4.108 Alice loved HARRY.

4.109 ALICE loved Harry.

Such phenomena are discussed by Jackendoff (1972) and Allan (1986) amongst others. So these examples seem to provide another case where presuppositional behaviour is related to context: in this case the context of the discourse.

Another, narrower, contextual feature is traditionally called the **projection problem,** and is discussed by a number of writers, including Gazdar (1979), Karttunen and Peters (1979), Levinson (1983), Soames (1989) and Heim (1992). Sometimes the presupposition produced by a simple clause does not survive when the clause is incorporated into a complex sentence. Levinson (1983: 191ff.) gives the example of conditional clauses. Sentence 4.110a contains the factive verb *regret* and would normally produce the presupposition in 4.110b:

4.110 a. John will regret doing linguistics.
b. John is doing/'will do linguistics.

However in the context of a conditional clause like 4.111 below, the presupposition 4.110b disappears:

4.111 If John does linguistics, he'll regret it.

The context here is the syntactic one provided by the adjoining clause.

So we can see that different levels of context can cause fluctuations in presuppositional behaviour. At the most general level, the context provided by background knowledge; then, the context provided by the topic of conversation; and finally, the narrower linguistic context of the surrounding syntactic structures - all can affect the production of presuppositions. Simply giving a truth table of fixed relations between presupposing and presupposed sentences cannot adequately describe this complicated behaviour. Some more sophisticated account is required which takes account of how what participants know forms a background to the uttering of a sentence.

4.5.6 Pragmatic theories of presupposition

There have been a number of responses in the semantics literature to the features of presupposition we have outlined. Some writers (for example Leech 1981) have divided presuppositions into two types: one, **semantic presupposition,** amenable to a truth-relations approach; another, **pragmatic presupposition,** which requires an interactional description. In contrast, Stalnaker (1974) argued that presupposition is essentially a pragmatic phenomenon: part of the set of assumptions made by participants in a conversation, which he termed the **common ground.** This set of assumptions shifts as new sentences are uttered. In this view a speaker's next sentence builds on this common ground and it is pragmatically odd to assert something which does not fit it. Presumably cases of presuppositional failure like *The king of France is bald* would be explained in terms of the speaker assuming something *(There is a king of France)* that is not in the common ground.

This type of approach can cope with cases where presuppositions are not necessarily already known to the hearer, as when a speaker says *My sister just got married* (with its presupposition *I have a sister)* to someone who didn't know she had a sister. To capture this ability Lewis (1979: 127) proposes a principle of **accommodation,** where: 'if at time *t* something is said that requires presupposition *p* to be acceptable, and if *p* is not presupposed just before *t* then - ceteris paribus - presupposition *p* comes into existence.' In other words presuppositions can be introduced as new information.[14]

A pragmatic view of presupposition is also proposed by Sperber and Wilson (1995) who argue that presupposition is not an independent phenomenon but one of a series of effects produced when the speaker employs syntactic structure and intonation to show the hearer how the current sentence fits into the previous background. These writers integrate presupposition with other traditional discourse notions like **given** and **new** information, and **focus.** They propose (1995: 215) that the same principle of relevance to contextual assumptions covers both presupposition and the choice, of the different word orders and intonations in 4.112 below:

4.112 a It rained on MONDAY.
b. On Monday it RAINED.
c. On MONDAY it rained.

These sentences belong to different contexts of use in a similar way to our presupposition examples in 4.104-9, that is, the preceding context will naturally lead a speaker to choose one of the sentences in 4.112 over another. In Sperber and Wilson's view a general theory of conversational cooperation will explain all such cases. We will look at further examples of this in chapter 7.

4.6 Summary

In this chapter we have identified a number of semantic relations that hold between sentences: **synonymy, entailment** and **presupposition;** and the sentential qualities of **tautology** and **contradiction.** We have reviewed an approach which characterizes these in terms of truth relations, using a notion of linguistic or analytic **truth.** We have seen that while this approach provides an attractive account of entailment, for example, it fails to account for the full range of presuppositional behaviour, in particular presupposition's sensitivity to contextual features. We contrasted this purely semantic approach with accounts which assume a pragmatic approach: describing presupposition in terms of a speaker's strategies to package her message against her estimate of what her audience knows. We will come back to this idea of processes of packaging information again in chapter 7.

FURTHER READING

A very clear introduction to logic for linguists is given by Allwood et al. (1977). Grayling (1982) contains a very readable discussion of the different notions of truth used in logic and the philosophy of language. Chierchia and McConnell-Ginet (2000) propose a truth-based account of entailment and other sentential relations which is probably best approached after reading chapter 10 below. Levinson (1983) has an accessible discussion of approaches to presupposition, and Allan (1986) has as its basic principle the kind of interactional approach we have discussed in this chapter. Beaver (2001) discusses the role of presupposition in the dynamic updating of context.

EXERCISES

4.1 Take three sentences, **p, q** and **r** as follows:

p: The sun is shining.
q: The day is warm.
r: The sun is shining and the day is warm.

Let's make the working assumption that we can represent sentence **r** by the logical formula **p** |^ **q.** Use the truth table for A given in 4.23 in this chapter to show the truth-value of r in the three situations (SI-3) below:

51. **p** is true; **q** is false
52. **p** is true; **q** is true
53. **p** is false; **q** is true.
54. **p** is false; **q** is false.

4.2 In propositional logic is it assumed that **p** ^ **q** and **q** ^**p** are logically equivalent i.e. that the order of the elements is irrelev- ant Discuss how the following examples show that this is not true for the way that speakers use English *and.*

a. He woke up and saw on TV that he had won the lottery.
b. Combine the egg yolks with water in a bowl and whisk the mixture until foamy.
c. He made two false starts and was disqualified from the race.
d. Move and I'll shoot!

4.3 Take three sentences, **p, q** and **r** as follows:

p: Peter is drinking.
q: Aideen is driving home.
r: It .is not the case that Peter is drinking or Aideen is driving home.

Let's make the working assumption that sentence **r** is ambiguous: in one reading the whole sentence is negated; in the other, just . the first disjunct is negated. Thus the sentence may be given the two logical forms in a and b below:

a. **->(p** v **q)**
b. **-p** v **q**

Use the truth tables for -i given in 4.21 and v in 4.24 in this chapter to show the truth-values of a and b above in the three situations (SI-3) below:

51. **p** is true; q is false
52. **p** is true; **q** is true
53. **p** is false; **q** is true
54. **p** is false; **q** is false.

4.4. To begin with, assume a general rule of **disjunction reduction,** by which any phrasal or clausal disjunction is derived from the disjunction of full sentences, i.e. assume that a sentence like *You can say yes or no* is equivalent to *You can say yes or you can say no.* For each of the sentences below, decide whether the use of *or* corresponds to inclusive (v) or exclusive (v_e) disjunction. Discuss your reasoning. Do any of these sentences have meanings that you feel are not captured by assuming disjunction reduction; or by the truth table characterization of the two logic connectors in 4.24 and 4.26 earlier?

a. We spend the afternoons swimming or sunbathing.
b. They can resuscitate him or allow him to die.
c. If the site is in a particularly sensitive area, or there are safety considerations, we can refuse planning permission.
d. You can take this bus or wait till the next one.
e. Beffni is a man's name or a woman's name.
f. The base camp is five or six days' walk from here.
g. He doesn't smoke or drink.
h. She suffers from agoraphobia, or fear of open places.
i. Stop or I'll shoot!

4.4 Decide which of the following sentences are **analytically true.** Discuss the reasons for your decision.

a. If it rains, we'll get wet.
b. The train will either arrive or it won't arrive.
c. Every doctor is a doctor.
d. If Albert killed a deer, then Albert killed an animal.
e. Madrid is the capital of Spain.
F Every city has pollution problems.

4.5 Below are some paired sentences. Use the composite truth table for **entailment** given in 4.55 in this chapter to decide whether the a sentence **entails** its b partner. Note any cases of mutual entailment and the difference in truth relations this involves. (As usual, assume that repeated nouns, names and pronouns refer

to the same entity twice, and that the b sentences are uttered immediately after the a sentences.)

1 a. Olivia passed her driving test.
b. Olivia didn't fail her driving test.

2 a. Cassidy inherited a farm.
b. Cassidy owned a farm.

3 a. Cassidy inherited a farm.
b. Cassidy owns a farm.

4 a. Arnold poisoned his wife.
b. Arnold killed his wife.

5 a. We brought this champagne.
b. This champagne was brought by us.

& 6 a. Not everyone will like the show.
b. Someone will like the show.

4.6 We noted that factive predicates, like English *regret,* presuppose the truth of their clausal complements, as in *He regretted that he didn't move to Melbourne.* Using your own examples, identify the factive predicates from the following list: *announce, assume, be aware, believe, be fearful, be glad, realize, be sorry, be worried, know, reason, report.*

4.7 Using the different behaviour of entailment and presupposition under negation as a test, decide whether the a sentences below **entail** or **presuppose** their b counterparts. (Again, assume that repeated nouns, names and pronouns refer to the same entity twice, and that the b sentences are uttered immediately after the a sentences.)

1 a. Dave knows that Jim crashed the car.
b. Jim crashed the car.

2 a. Zaire is bigger than Alaska.
b. Alaska is smaller than Zaire.

3 a. The minister blames her secretary for leaking the memo to the press.

b. The memo was leaked to the press.

4 a. Everyone passed the examination.
b. No one failed the examination.

5 a. Mr Singleton has resumed his habit of drinking stout.
b. Mr Singleton had a habit of drinking stout.

NOTES

1 In 4.1-4 we assume, as in other examples, that pairs of sentences are uttered by the same speaker, in sequence and that repeated nominals identify the same individual.

2 We assume here a simple **correspondence** theory of truth; see Grayling (1982) for a discussion of this and other theories of truth.

3 Logicians sometimes distinguish between two types of what we are here calling counterfactuals: **subjunctive conditionals,** which set up a hypothetical situation in the antecedent, as in *If Liverpool were to win the championship, hed be a happy man',* and **counterfactual conditionals** where the antecedent is implied to be false, as in *If Liverpool had won the championship, he would have been a happy man.* For the rest of this book, we will use the term **counterfactual** as a cover term for both types. See Lewis (1973) and Haack (1978) for discussion.

4 Including for example Leibniz (1981), Kant (1993), Quine (1953), Carnap (1956), and Kripke (1980).

5 Another definition of necessary truth uses the notion of **possible worlds,** due originally to Liebniz. Possible worlds in the work of, for example, Lewis (1973, 1986) is a notion used to reflect the way speakers use language to do more than describe the world as it is. Speakers can, for example, hypothesize situations different from reality, as in **counterfactuals** like *If Ireland was a Caribbean island, we'd all be drinking rum.* Such situations that are not asserted as real are called possible worlds, the idea being that the world where Ireland is a Caribbean island is linguistically set up as a possible world, not the actual world. One definition of necessary truth uses this notion as follows: A statement is necessarily true if it is true in all possible worlds. However, since the constraints on setting up hypothetical worlds and their possibilities of difference from the real world are far from easy to ascertain, such a definition needs some work to establish. See Grayling (1982: 43-95) for introductory discussion and Kripke (1971), Lewis (1973) and the papers in Loux (1979) for more detailed discussion. We come back to this idea of possible worlds again in chapters 5 and 10.

6 This idea, often known as **concept containment,** derives from Leibniz. See the papers in Jolley (1995) for discussion.

7 An anonymous reviewer has suggested that an example like *Whales are mammals* brings out the difference between necessary and *a priori* truth. Following Kripke, this sentence is a necessary truth, but it is not an *a priori* truth for our hypothetical speaker who thinks that whales are fish.

8 This assumes that we rule out self-reference to avoid paradoxes. For example by choosing to instantiate Y as 'are not Xs', we would get the necessarily false statement *All Xs that are not Xs are Xs.*

. 9 We discuss a formal approach to these lexical relations, **meaning postulates,** in chapter 10.

10 Another, more strictly logical way of describing this entailment relation is to say that **p** entails **q** when an argument that takes **p** as a premise and **q** as a conclusion must be valid, for example the argument:

The anarchist assassinated the emperor.
∴ The emperor died.

is valid.

11 Since this relation is clearly similar to the biconditional connective described earlier, we could give a logical definition of synonymy as in: p and q are synonymous when the expression p = q is always true.

12 Of course not all definite nominals are used to refer: so, for example, the definite NP in bold in the following sentence is traditionally described as being predicative and not referential: *Stuart is **the answer to our prayers.***

13 As we will note later, in chapter 8, Austin (1975) suggested that this condition is a **felicity condition** on the making of statements.

14 See Heim (1983) for a development of this idea of presuppositions as a set of assumptions forming part of the context for a sentence being uttered. A dynamic account of how participants update the context of assumptions is also given by Discourse Representation Theory (DRT), which we discuss in chapter 10. See Beaver (2002) for a DRT account of presupposition.