

Testing For Entailments

Understanding the meanings of sentences in terms of their truth conditions allows us to investigate certain semantic relations that hold between sentences.

- | | | | |
|-----|----------------------------------|---|---|
| (1) | a. Sally tried to leave on time. | T | T |
| | b. Sally left on time. | T | F |

- can you imagine a situation in which (1a) and (1b) are both true? **YES**
- can you imagine a situation in which (1a) is true and (1b) is false? **YES**

- | | | | |
|-----|------------------------------------|---|--------------|
| (2) | a. Sally managed to leave on time. | T | T |
| | b. Sally left on time. | T | F |

- can you imagine a situation in which (2a) and (2b) are both true? **YES**
- can you imagine a situation in which (2a) is true, but (2b) is false? **NO**

- | | | | |
|-----|--------------------------------|---|---|
| (3) | a. Kim allegedly kissed Sandy. | T | T |
| | b. Kim kissed Sandy. | T | F |

- can you imagine a situation in which (3a) and (3b) are both true? **YES**
- can you imagine a situation in which (3a) is true and (3b) is false? **YES**

- | | | | |
|-----|-----------------------------------|---|--------------|
| (4) | a. Kim passionately kissed Sandy. | T | T |
| | b. Kim kissed Sandy. | T | F |

- can you imagine a situation in which (4a) and (4b) are both true? **YES**
- can you imagine a situation in which (4a) is true, but (4b) is false? **NO**

What we see:

- in (1) & (3), the truth of the (a)-sentence tells us nothing about whether the (b)-sentence is true or false
- in (2) & (4), the truth of the (a)-sentence requires that the (b)-sentence be true
- in other words, it's impossible for (2a)/(4a) to be true while (2b)/(4b) is false

Special term for the relationship that holds between (2a)/(4a) and (2b)/(4b):

A sentence *A* **entails** a sentence *B* just in case whenever *A* is true, *B* is also true. (In other words, the truth of *A* guarantees the truth of *B*.) If *A* entails *B*, then *B* is an **entailment** of *A*.

Entailment is usually a one-way relation between sentences:

(4)	a. Kim passionately kissed Sandy.	T	T	T	F
	b. Kim kissed Sandy.	T	F	T	T

But occasionally, two sentences will mutually entail each other:

(5)	a. Kim lied to Sandy.	T	T	T	F
	b. Kim said something untrue to Sandy.	T	F	T	T

How can we tell whether a sentence *A* entails another sentence *B*?

Can you imagine a situation in which *A* is true but *B* is false?

⇒ if “yes”, then *A* does not entail *B*

⇒ if “no”, then *A* does entail *B*

Two linguistic tests for entailment:

- (A) If *A* entails *B*, then a speaker cannot assert *A* and deny *B* without contradicting himself. (Non-deniability of entailments)
- (6) Sally tried to leave on time. But, she didn't leave on time.
(not contradictory)
- (7) #Sally managed to leave on time. {But, In fact}, she didn't leave on time.
(contradictory)

When using Test A, *but* gives the best results, so try it first. If the resulting sentence doesn't sound "weird" and contradictory, you can immediately conclude that the first sentence does not entail the second sentence (as in (6) above). If using *but* yields something that sounds "weird" and possibly contradictory, then try using *in fact*. If *in fact* still yields a "weird" result, then you can safely conclude that there is a contradiction, so the first sentence entails the second sentence (as in (7) above). On the other hand, if *in fact* yields an acceptable, non-contradictory result, then you should conclude that the first sentence does not entail the second sentence. Here's an example:

- (8) a. I have to arrive at work by 7am.
b. I don't have to arrive at work before 7am.

Let's first try our test with *but*:

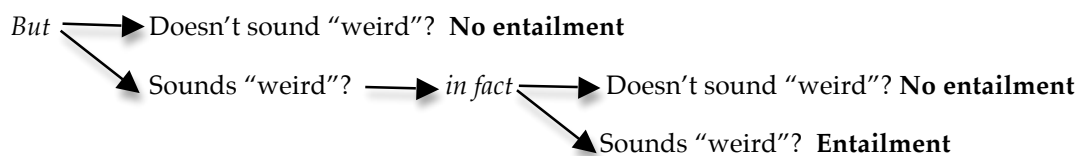
- (9) #I have to arrive at work by 7am. But I have to arrive at work before 7am.

Sounds pretty weird, right? So let's try using *in fact* instead:

- (10) I have to arrive at work by 7am. In fact, I have to arrive at work before 7am.

Now, (10) sounds perfectly acceptable. So we should conclude that (8a) does not entail (8b).

Here's a "decision tree" for Test A:



In the vast majority of cases, using *but* and *in fact* will yield the same results.

- (B) If *A* entails *B*, then a speaker who first asserts *A* and then *B* will sound redundant. (Non-reinforcement of entailments)
- (11) Kim allegedly kissed Sandy. In fact, she did kiss Sandy.
(not redundant)
- (12) #Kim passionately kissed Sandy. {In fact, But}, she did kiss Sandy.
(redundant)

When using Test B, *in fact* gives the best results, so try it first. If the resulting sentence doesn't sound "weird" and redundant, you can immediately conclude that the first sentence does not entail the second sentence (as in (11) above). The phrase *not only that* also works well:

- (11') Kim allegedly kissed Sandy. Not only that, she did kiss Sandy.
(not redundant)

If using *in fact* or *not only that* yields something that sounds "weird" and possibly redundant, then try using *but*. If *but* still yields a "weird" result, then you can safely conclude that there is a redundancy, and so the first sentence entails the second sentence (as in (12) above). On the other hand, if *but* yields an acceptable, non-redundant result, then you should conclude that the first sentence does not entail the second sentence. Here's an example:

- (13) a. I don't always go to class.
b. I sometimes go to class.

Let's first try our test with *in fact* (or *not only that*):

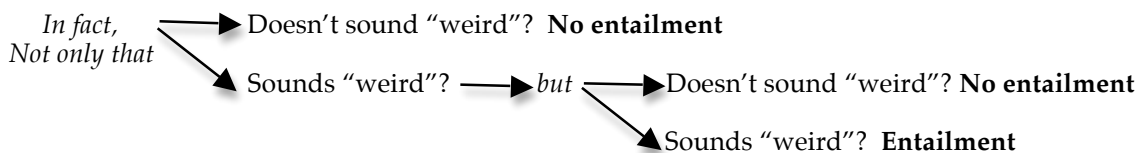
- (14) #I don't always go to class. In fact, I sometimes go to class.

Sounds pretty weird, right? So let's try using *but* instead:

- (15) I don't always go to class. But, I sometimes go to class.

Now, (15) sounds perfectly acceptable. So, we should conclude that (13a) does not entail (13b).

Here's a "decision tree" for Test B:



In the vast majority of cases, using *in fact*/*not only that* and *but* will yield the same results.

Note that the “decision trees” for Test A and Test B differ only in whether we should start with *but* or *in fact* / *not only that*.

Why does the choice between *but* or *in fact* even matter? Perhaps somewhat surprisingly, *but* and *in fact* convey certain meanings of their own, which are concerned with the amount of “contrast” that exists between the two sentences that they join together. It’s these extra bits of meaning that sometimes interfere with our (otherwise quite nifty) tests. (It’s also these extra bits of meaning that make *but* the initial choice for Test A, and *in fact* the initial choice for Test B.) As the course proceeds, we’ll actually read more about the meaningful contributions of *but* (though unfortunately, not *in fact*).