

2.9. Main Form Phrase, Main Connective

1. Deceptively Similar Sentences. So far we've translated sentences no more complicated than a 'triple-barreled' English conjunction or disjunction, which repeats the same type of form phrase. That much form posed no challenge deeper than finding the phrases in a look-up list. But once different types of form phrases – negation, conjunction, and disjunction – are mixed together in the same sentence, we find ourselves in the deep end of the translation pool.

Consider, for instance, these two similar-looking sentences.

- (1) We won't have **both** tuna **and** uni.
- (2) We won't have tuna **but** we'll have uni.

Our catalogue of translation variations treated “but” as the equivalent of “both... and”; so both sentences contain a negation and a conjunction phrase. And since both sentences string together the same subject matter sentences – “We'll have tuna” and “We'll have uni” – (1) and (2) are built from all the same logical parts, (apparently) appearing in the same order.

Yet intuitively the sentences stake quite different claims. For example, they score very differently on the ‘tuna test’: does this sentence, if true, rule out our having tuna? Sentence (2) certainly rules out tuna. But (1) doesn't: consistent with Sentence (1), we might well be having tuna (though in that case we aren't also having uni). For fans of tuna the difference between (1) and (2) is clear enough.

But the point should be just as clear – and just as important – to anyone concerned with validity. For Sentence (2) validly entails that we won't have tuna, while Sentence (1) doesn't. That is: **Argument (B) is valid**, while **Argument (A) is invalid**.

Argument A

(1) We won't have both tuna and uni.

∴ We won't have tuna.

INVALID

Argument B

(2) We won't have tuna but we'll have uni.

∴ We won't have tuna.

VALID

Against the validity of Argument (A), consider again the situation where we're having tuna but not uni. There the premise (Sentence 1) is true while the conclusion is false – a validity counterexample for Argument (A). The difference between Sentences (1) and (2) **makes a difference to validity**.

2. The Main Form Phrase. Given that Sentences (1) and (2) are built from the same material, (apparently) in the same order – negation phrase, subject matter sentence, conjunction phrase, second subject matter sentence – we'd expect the two sentences to have the **same logical form**. Yet our guiding assumption in formal logic is that only logical form matters to validity. So since Sentences (1) and (2) differ in what follows validly from them, there must, be some **difference in logical form** between the two sentences.

Intuitively, the difference is that Sentences (1) and (2) are **different types of sentences**. (2) is a **conjunction**, asserting two smaller claims: (a) that we won't have tuna, and (b) that we'll have uni.

(1), by contrast, is a **denial**: (1) denies the claim that we'll have both tuna and uni. That makes Sentence (1) a **negation**. And what follows validly from each sentence depends crucially on **what kind of sentence** it is. In particular: one of our earliest examples of a valid logical form was a conjunction entailing its left part.¹

¹ In 2.1, and revisited in 2.4 §4.

$$\frac{\bullet \text{ and } \blacktriangle}{\therefore \bullet}$$

That explains why Sentence (2) validly entails the conclusion “We won’t have tuna”: (2) is a conjunction, and the conclusion is the left part of that conjunction.

$$\frac{(2) \text{ We won't have tuna, but we'll have uni.}}{\therefore \text{ We won't have tuna.}}$$

Yet while all that makes sense, it might seem we’ve only pushed the mystery back a step. For when told that (1) is a negation while (2) is a conjunction, it’s fair to ask: given that both sentences are built out of a conjunction phrase, a negation phrase, and the same two subject matter sentences, **why** do they wind up counting as different kinds of sentences?

Informally we resolve the mystery by saying that in each sentence one of the form phrases acts as the **main form phrase** of the sentence, determining **what kind of sentence** it is overall. In Sentence (2) the conjunction phrase “but” is the main form phrase of the sentence, making (2) a conjunction.

(2) We won’t have tuna, **but** we’ll have uni.

Whereas the main form phrase of Sentence (1) is instead the negation phrase “n’t,” making (1) a negation.

(1) We won’t have *both* tuna *and* uni.

And what determines which form phrase is the **main form phrase** of the sentence? Answering that question returns us to sentence construction.

3. Main Form Phrase Meets Main Connective. Despite their puzzling differences, Sentences (1) and (2) are simple enough to translate into the formal language. And their formal translation casts welcome light on the differences between them.

Consider the formal translation of Sentence (1). We're reading Sentence (1) as a denial – specifically, a denial of a “both... and” claim. So first translate that “both... and” claim, using the following translation key.

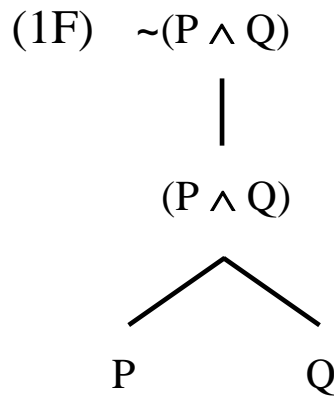
We'll have **both** tuna **and** uni $(P \wedge Q)$

(**P**: We'll have tuna; **Q**: We'll have uni)

For the **denial** of that formal sentence we just attach a tilde to the left.

(1) We won't have both tuna and uni. $(1F) \sim(P \wedge Q)$

The construction of Sentence (1F), from bottom to top, follows exactly those steps: first adding a wedge (with parentheses), then a tilde.



It's no mystery why the tilde is the **main connective** of (1F), making the whole sentence a negation: the tilde is **the last connective added** in construction.

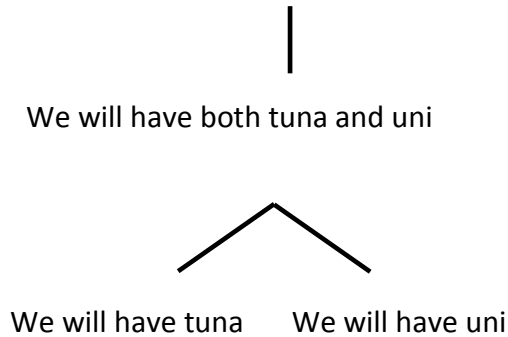
In fact that served as our definition of the “main connective” of a formal sentence.²

The **main connective** of a formal sentence is the last connective added in the construction of that sentence.

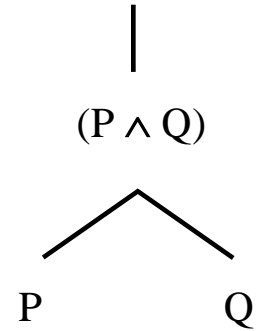
² In 2.8.

And reading Sentence (1) as parallel to its formal translation assigns “**n’t**” as **the main form phrase of (1)**.

(1) We won’t have both tuna and uni



$\sim(P \wedge Q)$



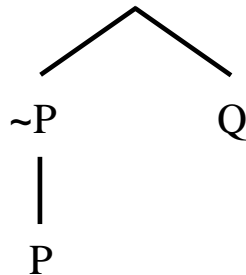
Using the same translation key, we translate Sentence (2) as a conjunction whose left part is a negation.

(2) We won’t have tuna, **but** we’ll have uni

(2F) $(\sim P \wedge Q)$

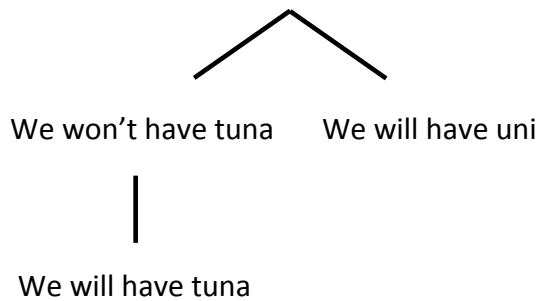
Construction of that formal sentence follows those steps: first constructing “ $\sim P$,” then ‘wedging’ it together with “ Q ”.

(2F) $(\sim P \wedge Q)$

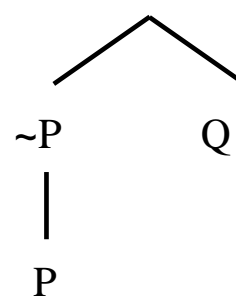


And once again, reading the English original (Sentence 2) as having a parallel structure resolves any mystery about its main form phrase. Just as wedge is the **main connective** of “ $(\sim P \wedge Q)$ ” because the wedge is added last in construction, “**but**” is the **main form phrase** of (2).

We won't have tuna **but** we will have uni



$(\sim P \wedge Q)$



Construction, far from being a mere formal amusement, is central to which connective is the **main connective** of the sentence; and that can make all the difference with argument validity. Just as with their English counterparts, **Formal Argument A is invalid** while **Formal Argument B is valid**.

Formal Argument A

$$\begin{array}{l} \text{(F1)} \quad \sim(P \wedge Q) \\ \hline \therefore \sim P \end{array}$$

INVALID

Formal Argument B

$$\begin{array}{l} \text{(F2)} \quad (\sim P \wedge Q) \\ \hline \therefore \sim P \end{array}$$

VALID

And note: the only formal difference between the two arguments is the **placement of the left parenthesis** in the premise. Our earlier insistence on parentheses proves to be more than a grammatical obsession; for now we see that shifting a parenthesis just one click to the left or right can spell the difference between validity and invalidity.

(That's why the formal language counts the following as a bogus piece of gibberish.

$$(3) \sim P \wedge Q$$

Without parentheses it's not clear whether (3) is a conjunction or a negation. And as we've seen, that can make all the difference in the world to validity.)

These observations add **another dimension** to the translation procedure. We’ve so far treated English-to-formal translation as a simple **left-to-right** sweep in search of form phrases, replacing each English form phrase, x-ray style, with its matching connective(s). But we see now that that alone overlooks an essential ingredient for proper translation. It’s not enough just to properly translate each English form phrase. We also need to figure out which of those form phrases is the **main form phrase** of the whole English sentence, and translate into a formal sentence whose **main connective** matches that main form phrase. For getting this point wrong – having a mismatch between main English form phrase and main connective – results in a mistaken translation.

The main connective of the formal sentence must match the main form phrase of the English sentence it’s translating.

For example, suppose we mistranslate Sentence (1) as a conjunction.

💀 Bad Translation of Sentence (1) 💀

(1) We won’t have both tuna and uni

(2F) $(\sim P \wedge Q)$

Then an **invalid** English argument (with Sentence 1 as premise) would get translated into a **valid** formal argument (with conjunction 2F as premise).

💀 Bad Translation of Argument A 💀

Argument A

(1) We won’t have both tuna and uni.

\therefore We won’t have tuna.

INVALID

Formal Argument B

(2F) $(\sim P \wedge Q)$

$\therefore \sim P$

VALID

A mismatch between main form phrase and main connective leads a form-based test of validity to give the **wrong verdict** on an English argument.

4. English Clues. Appreciating the importance of finding the main form phrase, we list here some English clues to that end.

First, in a duel for dominance between two form phrases – especially a conjunction and a disjunction phrase – the **comma** is very often the tie-breaker. For the main form phrase of the sentence marks the **biggest break** in the sentence (the gap coming between sentences getting glued together). And the comma is a natural way of marking that break in English.

Note that the following two sentences are word-for-word identical, differing only in where the comma falls.

- (4) Either we'll have truffles, or we'll have grog and we'll have grappa.
- (5) Either we'll have truffles or we'll have grog, and we'll have grappa.

Yet (4) and (5) make very different promises – for example, grappa is a sure thing with Sentence (5), but not with (4). The placement of a single comma makes all the difference.

In (4) the comma falls beside “**or**” – marking “or” as the **main form phrase**, and so making (4) **a disjunction**. The left half of this disjunction is the subject matter sentence “We'll have truffles,” while the right half is a conjunction: “We'll have grog and we'll have grappa”. Sentence (4) thus translates as formal sentence (4F).

(**P**: We'll have truffles; **Q**: We'll have grog; **R**: We'll have grappa)

(4) Either we'll have truffles,[|] **or** we'll have grog and we'll have grappa.[|]

(4F) ($P \vee (Q \wedge R)$)

In Sentence (5) the comma falls instead beside **“and”** – marking “and” as the **main form phrase**, and making (5) a **conjunction**.

(5) Either we’ll have truffles or we’ll have grog,[|]**and** we’ll have grappa.

Its left part is the disjunction “Either we’ll have truffles or we’ll have grog,” while its right part is “We’ll have grappa”.

Using the same translation key as in (4), Sentence (5) translates as (5F).

(5) Either we’ll have truffles or we’ll have grog, **and** we’ll have grappa.

(5F) $((P \vee Q) \wedge R)$

Second, **“either”** in “either... or” and **“both”** in “both... and” function the way the **left parenthesis** does in the formal language: marking the **left border** of that disjunction or conjunction. While “either” and “both” are optional, their presence can settle matters when different form phrases are competing to be main form phrase of the whole sentence.

So in Sentence (6), “either” is outside (to the left) of “not,” just as the left parenthesis outflanks the tilde in formal Sentence (6F) – making both sentences **disjunctions**.

(6) **Either** we’re **not** having truffles or we’re having grog (6F) $(\sim P \vee Q)$

But in Sentence (7) “not” attaches to the left (outside) of “either,” just as the tilde’s to the left of the left parenthesis in (7F) – making both sentences **negations**.

(7) We’re **not** having **either** truffles or grog (7F) $\sim(P \vee Q)$

In fact the same English clue was at work in Sentence (1): since “n’t” is attached outside (to the left of) “both” – and hence is added onto the completed “both... and” sentence – that “n’t” serves as the main form phrase of (1). That’s what made it clear to us that (1) is a negation.

(1) We won’t have **both** tuna and uni (1F) $\sim(P \wedge Q)$

Note that when **inversion** moves a form phrase to the left in an English sentence, this moved phrase likewise acts as a left parenthesis.

So in Sentence (8) the negation phrase applies to the entire “unless” sentence that follows; while in (9) the negation phrase is tucked into the left half of the larger “unless” sentence.

(P: Neko’s asleep; Q: Neko’s tired)

(8) It’s not the case that [**unless** Neko’s asleep she’s tired].

(8F) $\sim(P \vee Q)$

(9) It’s not the case that Neko’s asleep, unless she’s tired.

(9F) $(\sim P \vee Q)$

The same effect found in (8) is found generally when an inverted sentence is embedded inside a larger sentence – as in the following.

(R: We can buy stock in Dr. Slim’s new business; S: We act now; T: We will get the special price)

(10) We can buy stock in Dr. Slim’s new business, but **unless** we act now we won’t get the special price].

(10F) $(R \wedge (S \vee \sim T))$

And that points out a **third** clue: if **inversion** moves a left-right form phrase (such as “though” or “unless”) to the front of the sentence, that moved phrase is typically the **main form phrase** of the sentence.

(U: Neko’s tired; V: Neko will eat fish; W: Neko will work on her inventions)

(11) **Unless** she’s tired Neko will eat fish and work on her inventions.

(11F) $(U \vee (V \wedge W))$

While there are two form phrases jockeying for position in (11) – “unless” and “and” – the sentence translates as a **disjunction** overall.

And inversion conspires with our earlier comma clue: when we find no left-right form phrase at the comma break, we suspect inversion – as in the following sentence.

(P: Lucretia fixes the wireless network; Q: Letitia can watch *Kittens Playing Foosball*)

(12) **Unless** Lucretia fixes the wireless network,[|] Letitia can't watch *Kittens Playing Foosball*.[|]

Unless P,[|] n't Q[|]

(12F) $(P \vee \sim Q)$

Finally, a somewhat subtler clue comes from **repetition** (or **lack** of it) **with negation** – as in the following two sentences.³

(R: Suki's going to law school; S: Suki's writing a novel)

(13) Suki's not going to law school and writing a novel. (13F) $\sim(R \wedge S)$

(14) Suki's not going to law school and she's writing a novel. (14F) $(\sim R \wedge S)$

Think of (13) as the denial of the rumor that Suki's going-to-law-school-and-writing-a-novel.

(13) Suki's **not** going to law school and writing a novel. (13F) $\sim(R \wedge S)$

Because “Suki's” doesn't appear in the sentence “[Suki's] writing a novel,” (13) treats the sentence “Suki's going to law school and writing a novel” as a unified ‘chunk’. Think of the unrepeated part “Suki's” as to the left of a list.

(15) **Suki's** [(i) going to law school and (ii) writing a novel.

That **unrepeated part**, “Suki's,” then **acts like a left parenthesis**. So when “not” is added to “Suki's” to yield Sentence (13), “not” likewise hangs out on the left border of the sentence.

³ Following an observation in (Quine 1959: 18).

That means “not” falls outside (to the left) of this whole conjunction.

(13) **Suki’s not** [(i) going to law school and (ii) writing a novel.

Hence “**not**” beats “and” in the competition to be **main form phrase**.

(13F) $\sim(R \wedge S)$

If (13) is true, Suki may be going to law school or writing a novel, but not both.⁴

By contrast, (14) can’t be read as the denial of a conjunction.

(14) Suki’s not going to law school **and** she’s writing a novel.

Because “Suki’s” is repeated in the right sentence (as “**she’s**,” with a pronoun in place of “Suki”), we don’t interpret “Suki’s not” as hanging on the edge of Sentence (14) like a tilde and left parenthesis.

Instead “Suki’s not” is only in the left part of the conjunction, “Suki’s not going to law school”. Shunted off to the left part, “not” doesn’t act as main form phrase of (14) – that role falling to “**and**”.⁵

(14F) $(\sim R \wedge S)$

⁴ Other constructions that create such a sealed ‘chunk,’ locking the negation outside, are “without” sentences and sentences with relative clauses – both discussed in 2.10 §3.

⁵ The difference a repeated phrase makes to translation returns in 5.6 §2, where we find a clear difference in meaning between the unremarkable sentence “Something is a cat and something isn’t a cat” and the far more dubious “Something is a cat and isn’t a cat”. Lacking repetition, the second sentence is interpreted as having one item hanging off the left edge and applying to both the parts that follow – though in this case that item is the quantifier phrase “something”.

Summary: Clues for Finding the Main Form Phrase In an English Sentence

1. The **comma** marks the main break between two parts of a sentence; and a left-right form phrase (a conjunction or disjunction phrase) will fall at that main break.

Example:

(4) Either we'll have truffles,[|] **or** we'll have grog and we'll have grappa._|

(4F) $(P \vee (Q \wedge R))$

(5) Either we'll have truffles or we'll have grog,[|] **and** we'll have grappa._|

(5F) $((P \vee Q) \wedge R)$

2. “Either” and “both” act as left parentheses, marking the left edge of an “either... or” or “both... and”.

Example:

(6) **Either** we're **not** having truffles or we're having grog (6F) $(\sim P \vee Q)$

(7) We're **not** having **either** truffles or grog (7F) $\sim(P \vee Q)$

3. If **inversion** moves a left-right form phrase to the front of the sentence, that moved phrase is typically the **main form phrase** of the sentence.

Example:

(11) **Unless** she's tired Neko will eat fish and work on her inventions.

(11F) $(U \vee (V \wedge W))$

4. In cases of **deleted repetition**, if the repeated word(s) appear on the left they act as a left parenthesis; so a negation phrase added to those repeated word(s) acts as if it's outside those parentheses.

Example:

(13) **Suki's not** [going to law school and ~~Suki's~~ writing a novel.

(13F) $\sim(R \wedge S)$

(14) **Suki's not** going to law school and **she's** writing a novel.

(14F) $(\sim R \wedge S)$