

2.3. Translation Keys

Expanding on our loose survey of English-to-Formalese translation, we turn first to the simplest sentences: the subject matter sentences. These are linked to their formal counterparts, the sentence letters, via a **translation key**. And since translation keys serve as the initial bridge between English and the formal language, setting up a translation key is the first step in translating.

1. Sentence Letters and Subject Matter. For logical purposes we divide English into two, mutually exclusive vocabularies: the **subject matter** words and the **form phrases**. That division shows up in our techniques of formal translation: while we'll later devote lots of attention to how to properly translate English form phrases into the formal language, with translation keys our focus is instead entirely on subject matter. For a translation key assigns a sentence letter to each purely subject matter sentence of English; and what makes an English sentence 'purely subject matter' is simply its lack of form phrases. For example, "It's raining" is a (purely) subject matter sentence of English, but "It's not raining" isn't – because "It's not raining" contains the form phrase "not".

To isolate the subject matter sentences of English we thus simply strip away all the form phrases. That's why building a translation key begins by whittling away all the form phrases. The following sentence has two form phrases: "either... or" and "not".

(1) It's sunny and it's not warm

Setting these aside leaves two 'form-free' sentences stating the subject matter: "It's sunny" and "It's warm".

(1) It's sunny ~~and~~ it's ~~not~~ warm

Since these **mean different things**, a translation key assigns them **different sentence letters**.

P: It's sunny

Q: It's warm

We then replace each subject matter sentence with its matching sentence letter (following the translation key).

(1) **It's sunny and it's not warm**

P and not **Q**

The form phrases are then the only English words remaining. “Not” is translated by the tilde.

P and $\sim Q$

“And” is translated by the wedge (with matching outer parentheses).

$(P \wedge \sim Q)$

Another example highlights the importance of sameness of meaning.

(2) **Either Rex likes rodeos or Rex does not like rodeos.**

Here the form phrases are “either... or” and “not”. Setting these aside leaves the ‘form-free’ sentences “Rex likes rodeos” and “Rex does like rodeos”.

(2) ~~Either~~ Rex likes rodeos ~~or~~ Rex does ~~not~~ like rodeos.

While the sentences are not word-for-word identical, they do **mean the same thing** – just phrasing the same point in slightly different ways. So we count them as the same subject matter twice over, not two different bits of subject matter. Meaning the same thing, the two sentences **take the same sentence letter**.

P: Rex likes rodeos

(2) Either **Rex likes rodeos** or **Rex does not like rodeos**.

Either **P** or not **P**.

Then the form phrase “not” is translated by tilde, “either... or” by the vel (with accompanying parentheses).

Either **P** or not **P**.

$(P \vee \sim P)$

2. Avoiding Repetition: Pronouns and Proverbs. Variation in English phrasing also comes from our tendency to **avoid repeating material**. The following sentence, for instance, sounds awkward.

(3) **Either Jake is at home, or Jake is at the game.**

P: Jake is at home

Q: Jake is at the game

$(P \vee Q)$

A more natural phrasing avoids repeating “Jake” in the second subject matter sentence.

(4) Either Jake is home, or **he** is at the game.

The **pronoun** “he” stands in for “Jake,” satisfying our stylistic aversion to repeated phrases. Still, Sentence (4) translates just like Sentence (3) – “ $(P \vee Q)$ ” – and calls for the **same translation key** in doing so. Specifically: “Q” stands **not** for “He is at the game,” but “Jake is at the game”. Because a pronoun rides on the coattails of another phrase for its meaning – typically one appearing earlier in the discussion – **in a translation key, pronouns are replaced by the phrases they stand in for**.

To see why that's important, note that the pronoun "he" appears twice in the following sentence – but with **two different meanings**.¹

(5) Either Jake won the prize and **he's happy**,
or Rex won the prize and **he's happy**.

Certainly "He's happy" means "Jake is happy" the first time, but "Rex is happy" the second. That's because the pronoun "he" borrows its meaning from different earlier phrases in the two cases ("Jake" the first time, "Rex" the second).

It would be a disaster to use the following translation key to translate (5).

(5) Either Jake won the prize and he's happy,
or Rex won the prize and he's happy.

💀 A Bad Translation Key 💀

P: Jake won the prize
Q: He's happy
R: Rex won the prize

Since the two instances of "He's happy" have **different meanings** in Sentence (5), they must be assigned different sentence letters. A proper translation key for (5) – with pronouns replaced – is as follows.

P: Jake won the prize
Q: Jake is happy
R: Rex won the prize
S: Rex is happy

A similar 'stand-in' phrase is "**one**," which allows us to avoid the repetitious "Neko has a red thermos and Jack has a blue thermos," in favor of the more natural "Neko has a red thermos and Jack has a blue **one**."

¹ Following an observation from (Quine 1959: 53).

And just as pronouns stand in for noun phrases, **proverbs** such as “do,” “do so,” and “so do” stand in for verb phrases (or predicate phrases) of sentences. The following conjunction sounds unnaturally repetitive.

(6) Kitty **likes chili peppers** and Dr. Slim **likes chili peppers**.

Using “so do” to avoid repetition leaves the following sounding more natural.

(7) Kitty likes chili peppers and **so does** Dr. Slim.

Like pronouns, proverbs are replaced in a translation key.

P: Kitty likes chili peppers

Q: Dr. Slim likes chili peppers

Naturally, both (6) and (7) then translate into the same formal sentence.

(6) Kitty **likes chili peppers** and Dr. Slim **likes chili peppers**.

(7) Kitty likes chili peppers and **so does** Dr. Slim.

$(P \wedge Q)$

3. Avoiding Repetition: Deletion. An even simpler way of avoiding repeated words in English is to **delete** them outright. With “be at the meeting” appearing twice, Sentence (8) sounds awkward.

(8) Nick will **be at the meeting**, and Nora will **be at the meeting** too.

With the second copy of these words deleted, the sentence reads more naturally.²

(9) Nick will be at the meeting, and Nora will _____ too.

² In many cases pronouns and deleted repetition yield equivalent sentences – e.g., “Jack baked a casserole and he washed the dishes” and “Jack baked a casserole and washed the dishes”. But in more complex cases they can yield significantly different sentences; see 2.9 §4.

But here again **the original material must be restored in the translation key.**

P: Nick will be at the meeting
Q: Nora will be at the meeting

And the reason is the same: the words deleted are repeated from earlier sentences, so with different previous sentences the same string of words can mean different things – as in the following example.

(10) Either Letitia is skipping class and **Lucretia is** too,
or Letitia is sick and **Lucretia is** too.

Translating (10) via the following translation key certainly gets things wrong.

💀 Another Bad Translation Key 💀

P: Letitia is skipping class
Q: Lucretia is
R: Letitia is sick

“Lucretia is” means “Lucretia is skipping class” in the first instance but “Lucretia is sick” in the second; so the sentences must take different sentence letters.

Restoring the deleted repetition in each case yields a proper translation key.

P: Letitia is skipping class
Q: Lucretia is skipping class
R: Letitia is sick
S: Lucretia is sick

Of course this is all quite natural to an English speaker. The main point in reviewing these cases was to stress the role **sameness of meaning** plays in assigning sentence letters to **subject matter** sentences: different sentence letters are called for just when subject matter sentences have different meanings. As we will see, the appeal to meaning applied to subject matter sentences stands in stark contrast to the mechanical “x-ray” policy we will follow when translating **form phrases** of English.