2.6. Translation Philosophy: The X-Ray Method

To settle on our list of translation variations – to establish, e.g., that "but" and "though" should be translated the same as "and" – we appealed to facts about meaning (and related notions of truth and validity). But having now fixed that list, we'll proceed to apply it in a purely automatic way: replacing each English form phrase with its formal counterpart, without thinking twice (or even once) about what those English terms mean. So for every negation phrase we encounter ("not,""n't," "im-,"…), we **automatically** replace it with a tilde; and likewise with each conjunction and disjunction phrase.

We might call this the 'auto-pilot' approach to translating form phrases; but we'll use the label "the **x-ray translation method**". Since the logical form of a sentence acts as its underlying skeleton, each form phrase is like one bone in that skeleton. And an accurate x-ray is one that faithfully mirrors each bone being pictured – without bothering to consider whether all the bones are important, or what they're for. (Those latter questions might be raised by the doctor looking at the x-ray. But it's not the job of the x-ray itself to worry about such things – only to faithfully depict every detail of that skeleton.)

The point of the x-ray metaphor becomes clear when we translate sentences with **multiple form phrases**. The following sentence, for instance, contains two negation phrases – "not" and "im-" – and one subject matter sentence, "It's possible to pass Logic".

It's ~~not~~ ~~im~~possible to pass Logic.

(**P**: It's possible to pass Logic)

Automatically replacing each negation phrase with a tilde yields the following translation.

~~P

But here some find the x-ray approach unattractive. For many people will instinctively want to 'cancel out' the two negation phrases, and translate the English sentence simply as "**P**". And the justification of that move is

equally instinctive: after all, we're told, the sentence "It's not impossible to pass Logic" **means the same** as "It's possible to pass Logic".

I suppose it's true that that the two sentences are staking the same claim. But note what our critic does in resisting the x-ray approach: he introduces questions of *meaning* into the translation of multiple form phrases. On the critic's alternative approach, we need to ask of the original sentence if there's a simpler English sentence meaning the same thing; and if there is, we instead translate that simpler sentence into the formal language.

While that strategy might feel natural, the heavy cost it brings is hidden by the simplicity of the above example. It's easy enough to 'cancel out' a double negation in our heads, without pencil or paper. But we're pushing the limits of our mental juggling to simplify this next sentence.

> Neither Suki nor Neko failed to order sushi.
>
> (**P**: Suki ordered sushi; **Q**: Neko ordered sushi)
>
> **Correct Translation**: $\sim(\sim P \vee \sim Q)$
> **Simpler Equivalent**: $(P \wedge Q)$

And what are simpler versions of these English sentences?

> Either Barbie and Rex won't both fail to attend the meeting, or Kitty won't fail to attend.
>
> It is not the case that either Suki or Neko will fail to be irresponsible, but Jack will.

There are simpler versions; but we wrack our brains to come up with them.

Here we recognize a familiar problem: though English meanings are just the sort of things we can juggle in our heads intuitively, those intuitive powers are quickly overwhelmed by **complexity**. Of course that's exactly the problem that led us to develop the formal approach to logic (beginning with translation into formal language). But by dragging judgments about sameness-of-meaning into the translation procedure, and demanding that we settle complex questions of English meaning before we move to the formal

language, we inflict the problem of complexity on ourselves all over again – before the formal method ever has a chance to work its magic. Our attempt to overcome mind-boggling complexity will then have moved in a very vicious circle.

That’s why we resist the critic’s call to stop and think about the **meanings** of combinations of form phrases. Instead, with the list of translation variations in hand, we automatically replace each English form phrase with its formal counterpart – never stopping to think what it means, or whether there’s a simpler English way of combining it with its neighbors. If an x-ray encounters two bones (or four, or ten), it faithfully records each, without reflecting on the purpose of them, or whether a simpler skeleton is possible. And our x-ray translation approach proceeds likewise.

Therein lies the different translation approaches, mentioned earlier, for **subject matter sentences** and **form phrases**. With pairs of subject matter sentences we **do** need to stop and ask whether they mean the same thing. We can’t build a list in advance that will handle every possible subject matter sentence; so with them questions of meaning can’t be avoided. By contrast, our pre-established list of translation variations renders translation of form phrases quite brainless and automatic. And that automatic aspect is just what rescues the formal test of validity from overwhelming complexity.

Even with these strategic advantages in mind, however, the x-ray translation method might still seem to overlook important facts about meaning – that, for example, a double negation **means the same** as its ‘cancelled out’ cousin. But we’ll see that in fact it overlooks nothing: for all its automatic qualities, the x-ray approach does faithfully encode the logical meaning of the sentence. Our trick will be to assign the task of **recognizing** that meaning to another actor in our formal test (which we’ll soon meet). This division of labor allows translation into the formal language which neither boggles the mind nor loses information about the meaning of English sentences.