

Translation from English to a Formal Language for Sentential Logic

The first part of translating English sentences into our formal language involves construction of a **translation scheme**, i.e. a pairing of *sentence letters* with sentences in the natural language. Make sure that the natural language sentences you pair with *sentence letters* are logically simple, i.e. they don't contain any of the words corresponding to any of our *sentential connectives* (\sim , $\&$, \vee , \rightarrow , \leftrightarrow).

Negations: If we let B translate the sentence "Bob is happy," then a few *stylistic variants* of the *logical form* $\sim B$ would include:

Bob is *not* happy.
Bob is *unhappy*.
It is not true that Bob is happy.
It is not the case that Bob is happy.
It is false that Bob is happy.
Bob *fails to be* happy.

Conjunctions: If we let D translate the sentence "Descartes was a rationalist," and L translate the sentence "Locke was an empiricist," then a few *stylistic variants* of the *logical form* (D & L) would include:

Descartes was a rationalist *and* Locke was an empiricist.
Descartes was a rationalist, *but* Locke was an empiricist.
Descartes was a rationalist; *however*, Locke was an empiricist.
While Descartes was a rationalist, Locke was an empiricist.
Although Descartes was a rationalist, Locke was an empiricist.
Descartes was a rationalist, *yet* Locke was an empiricist.
Descartes was a rationalist; *nevertheless*, Locke was an empiricist.
Descartes was a rationalist *even though* Locke was an empiricist.
Descartes was a rationalist *though* Locke was an empiricist.
Descartes was a rationalist; *also* Locke was an empiricist.

Disjunctions: Remember that the way we have defined the \vee is such that it's use is inclusive! So, if we were to let C translate the sentence "Carol attends college," and J translate the sentence "Carol gets a job," then the following are a few *stylistic variants* of the *logical form* (C \vee J):

Carol attends college *and/or* she gets a job.
Carol attends college *or* she gets a job.
Either Carol attends college *or* she gets a job.
Carol attends college *unless* she gets a job.*

*-"Unless" is usually translated as "if not." Thus, in the fourth example above, we could equally translate the compound sentence as : ($\sim J \rightarrow C$).

Conditionals: If we let R translate the sentence “It rains,” and C translate the sentence “there are clouds in the sky,” then some common *stylistic variants* of the *logical form* ($R \rightarrow C$) are:

- If* it rains, there are clouds in the sky.
- If* it rains, *then* there are clouds in the sky.
- There are clouds in the sky, *if* it rains.
- Given that* it rains, there are clouds in the sky.
- There are clouds in the sky, *given that* it rains.
- Assuming that* it rains, there are clouds in the sky.
- There are clouds in the sky, *provided that* it rains.
- On the condition that* it rains, there are clouds in the sky.
- It raining *is a sufficient condition that* there are clouds in the sky.
- Clouds in the sky are *a necessary condition for* it raining.

Biconditionals: If we let N translate the sentence “Norm is a bachelor,” and M translate the sentence “Norm is an unmarried male,” then some common *stylistic variants* of the *logical form* ($N \leftrightarrow M$) are:

- Norm is a bachelor *if and only if* he is an unmarried male.
- Norm is a bachelor *is equivalent to* Norm is an unmarried male.
- Norm is a bachelor *just in case* he is an unmarried male.
- Norm is an unmarried male, which is *both sufficient and necessary* to his being a bachelor.

Premise indicators: Terms which will often indicate the premise(s) of an argument include:

- | | | | | |
|----------------------|---------|---------------------|-----------------|-------------|
| since | in that | seeing that | as indicated by | inasmuch as |
| because | as | for | given that | owing to |
| may be inferred from | | for the reason that | | |

Conclusion indicators: Terms which will often indicate the conclusion of an argument include:

- | | | | | | | |
|--------------|-----------------|--------|-----------------|------|--------------|-------------|
| therefore | hence | whence | wherefore | thus | so | accordingly |
| consequently | it follows that | | we may conclude | | we may infer | |
| implies that | entails that | | it must be that | | as a result | |

Standard Form: Use the premise and conclusion indicators to help you place the argument into standard form so that you can then determine if the argument is *valid* or not:

Premise 1
.
.
Premise n

Conclusion