Logical possibility

In distinguishing the properties of logical consistency and validity we make tacit use of the notion of **possibility**. This is because when we consider the validity of an argument we are assessing truth-conditions and this consists in asking ourselves what could or could not be the case: were it such that P, then it would be the case that Q. It is important to understand what possibility means in the context of logic and how it differs from what we might mean ordinarily when we use the term.

It is evident from the case of arguments that are valid but not sound that logic operates with a specialised notion of possibility. For example it has to be the case that the proposition *Every woman can levitate* is logically possible since the following argument is valid:

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1.  P: Janice is a woman.
2.  P: Every woman can levitate.
3.  C: Janice can levitate.
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But we know of course that women cannot levitate. When we assert that this is impossible we are relying on a stronger notion of possibility than logical possibility. It follows that the concept of possibility can have different degrees. The scope of the concept of possibility has been the concern of logicians and philosophers since at least the time of Plato and numerous different formulations exist. The notion that we mostly work with unreflectively in everyday life is nomological possibility. This means 'governed by the application of laws' where these laws pertain to our current understanding of the natural world as determined by physics. Levitation is therefore nomologically impossible but logically possible.

If logical possibility is not constrained by the laws of physics does it place any restrictions on what is possible? Logic applies a single restriction, the law of non-contradiction: a proposition cannot both be true and false at once. The following propositions are examples of a contradictory propositions.

Some examples of contradictions:

- There is a dog that is not a dog
- Today is Tuesday and today is not Tuesday
- The cat that is dead is alive

From this we can derive the following property of logical possibility:

> A proposition is logically possible just if it does not imply a contradiction.

Logical necessity

A sentence is *logically necessary* if it is true in every logically possible circumstance which is to say: true on every possible truth functional assignment. Necessity

and logical truth are therefore synonyms: anything that is logically true (a tautology) is true by necessity (could not be otherwise.)

Further, every logical truth is logically possible but not everything that is logically possible is logically true. It is possible that it is raining but this is not logically necessary - it could be otherwise, i.e not raining. However it is not possible that it could be both raining and not raining.