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Necessary and Sufficient Conditions

A characteristic aim of analytic philosophy is to break down or *analyze* the meaning of difficult concepts in an attempt to clarify them, analogously to the way chemical analysis yields the component parts of compound substances. For instance, Socrates says in *Theaetetus* that "mud is earth mixed with water." This could, perhaps, inspire us to analyze the *meaning* of the concept "mud" using the simpler concepts "earth" and "water." (Of course, things are much more difficult if one tries to analyze a concept like "good" or "minded"!)

To describe the relationship between the simpler and more complex concepts in a purported analysis, philosophers sometimes use the terminology of *necessary* and *sufficient conditions* (in a way, you will now be able to see, that is closely related to logicians' use of the material conditional):

P is a *necessary condition* for Q if and only if an instance of Q *must also be* an instance of P. [Q $\supset$ P]
P is a *sufficient condition* for Q if and only if an instance of P *must also be* an instance of Q. [P $\supset$ Q]

Pursuing the above example, "containing earth" and "being wet" might be presented as *necessary* conditions for "being mud," and "being mud" might be presented as a *sufficient* condition for both "being wet" and "containing earth."

Ideally, we should be able to provide a list of conditions that are jointly sufficient and jointly necessary for the concept we are analyzing. For example, an instance of something "containing earth" *and* "being wet" both guarantees, and is guaranteed by, an instance of something "being mud" [(P.Q)$\equiv$R]. Nevertheless, we make progress even if we can only give a *partial* analysis of some difficult concept. Moreover, articulating what one *takes* to be necessary and/or sufficient conditions for a concept is a way of clarifying one's view, since it enables one's interlocutors to precisely critique one's use of contested words.

Given any pair of concepts, we can ask whether the first is necessary, sufficient, both necessary and sufficient, or neither necessary nor sufficient for the second:

1) Having four sides is a *necessary condition* for being a square
2) Being born in Pittsburgh is a *sufficient condition* for being a US citizen
3) Being a bachelor is *both necessary and sufficient* for being an unmarried male
4) Liking apples is *neither necessary nor sufficient* for liking pears

In small groups, decide on the relationship holding between the following pairs of concepts. If you get into trouble (for example, if one concept could have multiple meanings), disambiguate the concept and decide on the relationship holding between each disambiguated case.

5) Being orange is_____for being an orange
6) Being an abused husband is_____for having a black eye
7) Being a parent is_____for being a child
8) Being water is_____for being H_2O
9) Being a philosopher is_____for having a good life

[Once students have completed this exercise, I ask them to analyze "game," and discuss the challenge posed to conceptual analysis in terms of necessary and sufficient conditions by Wittgenstein's notion of a "family resemblance" concept.]