

**SECTION 8: PROBABILITY, INDUCTION AND DECISION THEORY**  
**ON PLAUSIBLE REASONING AND ITS IMPORT IN REASONING ABOUT SCIENCE**

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This paper has an aim that can be quite simply expressed: to make precise the notion of plausibility, as it occurs in contexts such as plausible reasoning or plausible conclusion, by proposing a logical formalization to it. It will also be demonstrated that this concept may play a very key role in a general theory of reasoning, not only concerning practical reasoning, but also in reasoning about science. It will be shown that its logical account is also adequate to express some related concepts such as *approximation to truth*, as long as our current ignorance allows, *resemblance to truth*, or *likeness to be true*. It could also being soundly taken as an expression for the more elaborated concept of *pragmatical truth*. On the other hand, it should be emphatically distinguished from notions such as probability in the sense of “being probable to be true” and should not be confused with mere possibility, not even in the sense of “being possible to be true, in relation to which is already known”. This would be too weak for the notion we are trying to capture here. In order to be taken as plausible, an assumption should cope with two kinds of criteria:

1st) It should be sound in the sense of being consistent with what we agree to take as knowledge. This provides a kind of negative criterion – a conjecture should not shock with the established theory it tries to extend.

2nd) It should be supported by some kind of positive indication, coming from observation, intuition, analogy, lawlikeness, simplicity or something in the like. In other words, a plausible assumption, or a conjecture, to use the popperian term, is

something to be filtered by means of the creative exercise of science among those alternative possibilities allowed by the theory under development and the current observations.

Those considerations on demarcating the notion of plausibility have been reflected in the formalization here proposed. For instance, the avoidance of the assimilation, or confusion, of plausibility with probability, a very common, although unsound, practice, plays a definite role here. In all acceptable mathematical expression of probability, the sum of the probability of a fact and its negation, expressed as its complement, should be 1. This means that, if plausibility is defined as something having a probability somewhat close to one, which could seem a plausible possibility, one statement and its negation could never be both plausible at the same time. From that, if two opposites are equally probable, no one of them is really plausible.

On the other hand, by making the kind of distinction we have done, it can happen two, or more, mutually exclusive alternatives being all of them plausible, provided they are possible additions to the theory, and that each of them are positively supported by evidences. This reflects the situation where alternative hypothesis, in spite of being mutually contradicting, match the available knowledge and experience, being all of them plausible candidates for extending the accepted theory. Another strong point here is the distinction from possibility. Logically, within the epistemic setting we deal with, a plausible statement is strictly stronger than a just possible one, in the sense that possibility can be derived from plausibility, but not the other way around. By its turn, from a fact of the established theory a plausibility can be derived and not vice versa.

The logic of plausibility is here presented as part of an extended framework where all those relations can be demonstrated. It includes the usual modalities of possibility and necessity, besides the novel ones: the weak and strong plausibilities.