# INDUCTION WITHOUT FALLIBILITY, DEDUCTION WITHOUT CERTAINTY

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The conventional understanding on deduction and induction can be summarized as follows: in deductive inferences, the evidential strength provided to the conclusion is such that the truth of the premises guarantees the truth of the conclusion. In inductive inferences the evidential support provides a weaker guarantee because the truth of the premises only makes the conclusion more likely, not certain. This creates the impression that deductive reasoning is tied to certainty and inductive reasoning to fallibility, but this view is overly simplistic and misleading. It can be argued that induction can lead to certainty, just as deduction can lead to fallibility.

The textbook examples of induction were introduced as a cautionary tale about the fallibility of empirical generalizations (such as from observing only white swans and concluding that 'All swans are white', only to be confronted by the counterexample of a black swan). This lesson is often contrasted with the supposed infallibility of deductive reasoning. Yet, failed mathematical proofs show that deductive reasoning is also subject to fallibility. If we were to apply the same logic that governs our understanding of induction, then every failed proof in mathematics would suggest that deductions should be classified as inductive. However, this conclusion is unreasonable. The fallibility of deductive reasoning does not justify reclassifying it as inductive.

In a deduction, the conclusion is necessitated by the premises, meaning the conclusion cannot be false if the premises are true. This conceptual requirement is often conflated with a different thesis —namely, that the conclusion must be certain given the premises. However, even if this conflation were accepted, it doesn't follow that the inference that the conclusion is certain given the premises must itself be certain. This is a fallacy. Conversely, in an induction, the fact that an inference leads to an uncertain conclusion does not imply that the inference itself is uncertain. The nature of the conclusion—such as a 50 percent probability of being true—reflects the content of the inference, not its reliability. For instance, using probability calculus, I may confidently infer that an event has a 50 percent chance of occurring; the inference remains valid and certain even though the event itself is uncertain.

While inductive reasoning is often linked to uncertainty, it can lead to certain conclusions. For example, the generalization that the sum of two even numbers is even, based on a few observations, is definitive because all even numbers share the same properties. Shouldn't this still be considered inductive, despite its certainty? If we deny this, induction becomes merely uncertain reasoning, and even a highly probable mathematical proof would count as inductive. This view reduces induction to uncertainty, rather than a distinct form of inference. Instead, we should see induction as generalization, independent of its epistemic status, thus decoupling it from fallibility.

It's also entirely reasonable to state that there are good, yet fallible, grounds to accept an inference even though the truth of the premises should ensure the truth of the conclusion. If the textbook characterization of deduction were to be believed, this statement would have to be an inconsistency, even though it sounds consistent. We don't assume that mathematicians should be charged with incoherence for not ascribing certainty to their proofs. To demand complete certainty as a basic requirement for reasoning in any given domain is both excessive and unrealistic. Deduction without certainty is just as plausible as induction without fallibility.