What is The Role of Induction and Deduction in Reasoning and Scientific Inquiry?

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Abstract: A long standing and continuing controversy exists regarding the role of induction and deduction in reasoning and in scientific inquiry. Given the inherent difficulty in reconstructing reasoning patterns based on personal and historical accounts, evidence about the nature of human reasoning in scientific inquiry has been sought from a controlled experiment designed to identify the role played by enumerative induction and deduction in cognition as well as from the relatively new field of neural modeling. Both experimental results and the neurological models imply that induction across a limited set of observations plays no role in task performance and in reasoning. Therefore, support has been obtained for Popper’s hypothesis that enumerative induction does not exist as a psychological process. Instead, people appear to process information in terms of increasingly abstract cycles of hypothetico-deductive reasoning. Consequently, science instruction should provide students with opportunities to generate and test increasingly complex and abstract hypotheses and theories in a hypothetico-deductive manner. In this way they can be expected to become increasingly conscious of their underlying hypothetico-deductive thought processes, increasingly skilled in their application, hence increasingly scientifically literate.