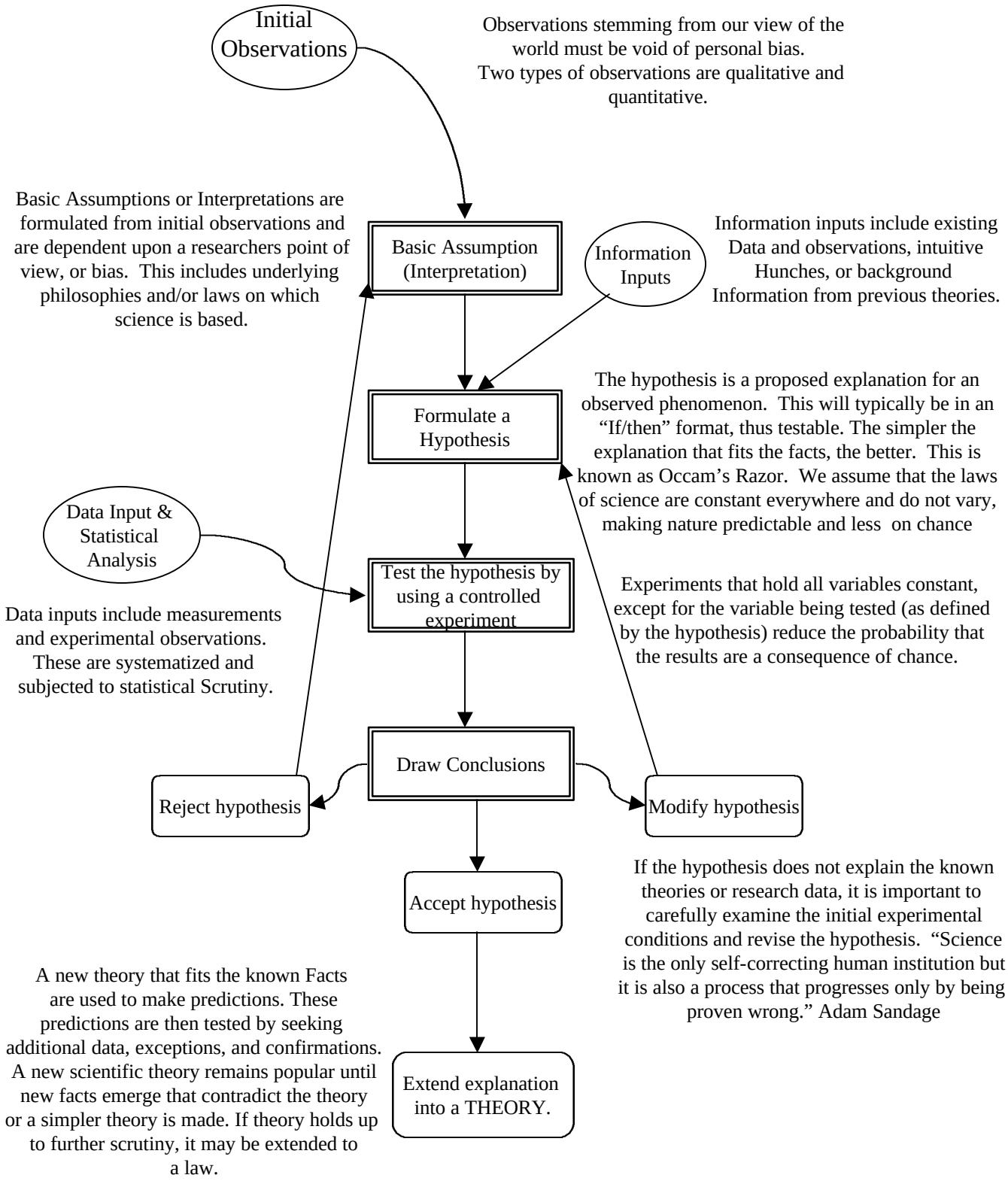
Initial Observations
Observations stemming from our view of the world must be void of personal bias. Two types of observations are qualitative and quantitative.
Basic Assumptions or Interpretations are formulated from initial observations and are dependent upon a researchers point of view, or bias. This includes underlying philosophies and/or laws on which science is based.
Basic Assumption (Interpretation)
Information Inputs
Information inputs include existing Data and observations, intuitive Hunches, or background Information from previous theories.
Formulate a Hypothesis
The hypothesis is a proposed explanation for an observed phenomenon. This will typically be in an "If/then" format, thus testable. The simpler the explanation that fits the facts, the better. This is known as Occam's Razor. We assume that the laws of science are constant everywhere and do not vary, making nature predictable and less on chance
Data Input & Statistical Analysis
Test the hypothesis by using a controlled experiment
Experiments that hold all variables constant, except for the variable being tested (as defined by the hypothesis) reduce the probability that the results are a consequence of chance.
Data inputs include measurements and experimental observations. These are systematized and subjected to statistical Scrutiny.
Draw Conclusions
Reject hypothesis
Modify hypothesis
Accept hypothesis
If the hypothesis does not explain the known theories or research data, it is important to carefully examine the initial experimental conditions and revise the hypothesis. "Science is the only self-correcting human institution but it is also a process that progresses only by being proven wrong." Adam Sandage
A new theory that fits the known Facts are used to make predictions. These predictions are then tested by seeking additional data, exceptions, and confirmations. A new scientific theory remains popular until new facts emerge that contradict the theory or a simpler theory is made. If theory holds up to further scrutiny, it may be extended to a law.
Extend explanation into a THEORY.