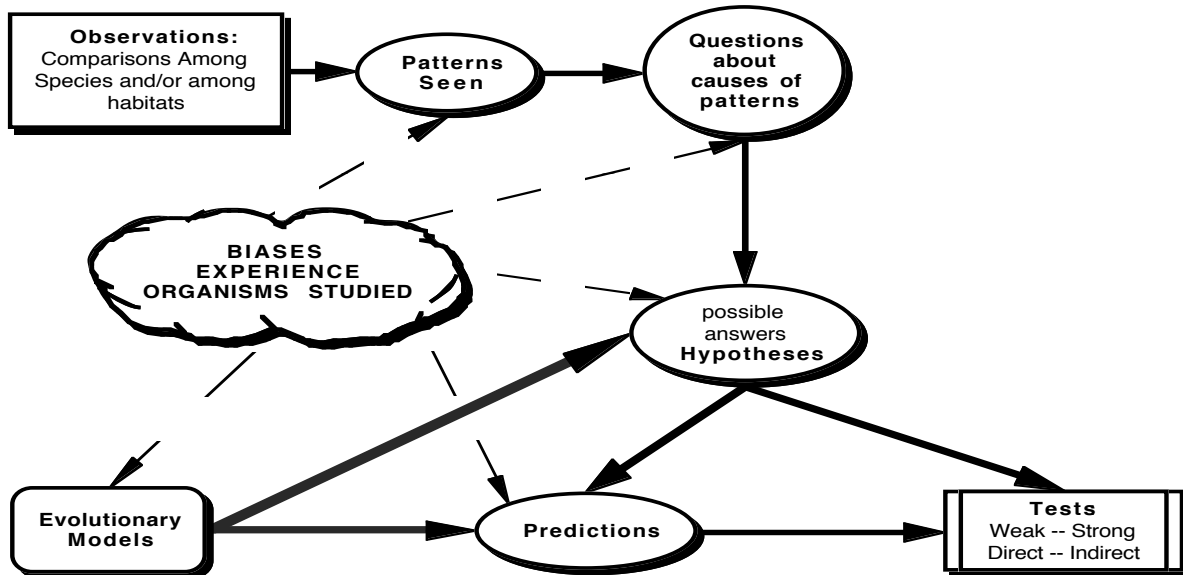


# Bio 45 – Lect. #1-5 - Creating & Testing Hypotheses about Behavior

## I. Where Hypotheses come from and where bias enters into the Process:



## II. Weak versus Strong Tests

A. The important distinction is between:

1. attempting to support or confirm a single hypothesis (**weak**)
2. attempting to distinguish among or eliminate one or more hypotheses (**strong**)

B. The strongest tests are **among alternative** (mutually exclusive) hypotheses

1. Hypotheses must be at the same level of causality -- can't test ultimate versus proximate hypotheses.
2. The tests can be of the hypotheses themselves or of predictions derived from them.

C. **Weak tests** generally:

1. Collect data in support of a single hypothesis
2. Use correlation analysis (X always occurs in the context of Y, so Y may be the cause of X). Correlations may suggest cause but can't directly demonstrate it. A series of independent correlations lends credence to the suggested cause (e.g., In species A, B, C, D, E and F behavior X occurs in the context Y and X never occurs in other contexts. This suggests that Y is the cause of X). See Alcock's analysis of infanticide.
3. Lack controls - When testing a hypothesis (or between hypotheses) one must control for the effects added by the experiment. For example, suppose we test the effect of testosterone on sparrow aggression by giving some birds testosterone shots and comparing their behavior with birds not given testosterone. A control is missing -- the effect of the shots themselves. We need a third group of birds that get shots but no testosterone. Why? What could go wrong with our test of cause without these controls?

D. **Weak tests** are not invalid or useless. They may often be the best we can do.

1. However, you should be wary of tests that just look for data consistent with the proposed causes. The weakness is that we do not know if the data are also consistent with another cause or if the consistency is a coincidence]
2. Tinbergen's gull experiments (red spot on bill) also had that weakness. His results were consistent with the idea of an image of the head with a red spot on the bill -- the obvious releaser. However, his results were also consistent with another hypothesis (Hailman's) that suggested it was the movement of the spot, not its location.

E. **Making weak tests strong** → using your imagination, using bias to your advantage