

# FOUR CLASSES OF QUESTIONS/TYPES OF PROBLEMS REGARDING BEHAVIOR AND MENTAL PROCESSES

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Based on Niko Tinbergen, Ethologist

## Proximate Causal Mechanisms (How Questions)

How are behaviors and mental/processes (cognitions, emotions, and motivations) assembled, elicited, controlled, and executed in individuals?

1. Immediate Causation (Stimuli & Mechanisms):

What are (a) the *external environmental factors* (e.g., discriminative, sign, or releaser stimuli) and (b) the *internal psychological, physiological, anatomical factors* (e.g., goals, endocrine, and neural) involved in short-term regulation--elicitation, control, and execution--of the behavior or mental processes?

2. Development (Ontogeny):

What are (a) the *hereditary/genetic/innate factors* and (b) the *environmental/experiential/learning factors* (this is the Nature-versus-Nurture Problem) involved in assembling the behavior or mental process over longer time spans in the lives of individuals?

## Ultimate or Distal Causal Mechanisms (Why Questions)

Why have the proximate mechanisms evolved in the species?

3. Adaptive Significance (Function):

What is the current role of the behavior or mental process in *promoting survival and reproduction*: What are its advantages for gene replication?

4. Evolutionary History (Phylogeny):

What factors *influenced the evolution*--and what was the evolution--of the behavior or mental process during the species' history over geological time?

Note: Proximate and ultimate mechanisms represent *different levels of explanation*. They are *interrelated and complement one another*--they are not competing, mutually exclusive explanations. The distinction between proximate and ultimate questions helps *avoid confusion* about the mechanisms/causes of behaviors and mental processes (cognitions, emotions, and motivations) and helps to *organize and guide research*.

