UNIT 15. CONCLUSION: THE BABY AND THE BATHWATER IN BEHAVIORAL ECOLOGY
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SOURCES *(for powerpoint format: http://wfsc.tamu.edu/jpackard/behavior/wfsc622/powerpoints.zip)*

required: Chapter 15 in Krebs & Davies (1993:375-386)

supplement: Chapter 12 in Blumstein, D.T. and Fernandez-Juricic, E. (2010) "A Primer of Conservation Behavior"

PARTS OF THIS LECTURE OUTLINE
1.   The muddy bathwater- selfish genes, optimality, group selection
2.   The 2-handed baby- integrate How & Why questions (causation and function)
3.   Testable hypotheses- the science behind natural history
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1. THE BATHWATER- SELFISH GENES, OPTIMALITY, GROUP SELECTION

1.1 **Selfish genes** *(Krebs and Davies 1993:375)*
1.   is natural selection a struggle between selfish genes rather than individuals?
      a.   gap between theory (genetic basis of behavior) and field work (individuals)
      b.   phrasing questions in terms of genes may open the mind of fieldworker
2.   value of thinking in terms of inclusive fitness in addition to direct fitness
      a.   testable predictions about recognition of kin and direction of behavior
      b.   stimulates more careful genetic studies of relatedness and paternity

1.2 **Optimality** *(Krebs and Davies 1993:378-382)*
1.   two types of optimality models (assume no change in environment; perfect heritability)
      a.   optimality model- tradeoffs between relative benefits and costs
      b.   ESS- apply game theory model when the payoffs are frequency dependent
2.   critical thinking
      a.   the idea that animals are optimal cannot be tested (goal is testable predictions)
      b.   hard to tell why animal's behavior does not fit the optimality model (assumptions)
      c.   animals not well enough adapted to optimize (natural selection in progress)

1.3 **Group selection** *(Krebs and Davies 1993:376)*
1.   it was an uncritical explanation left over from the '60's before modern genetics
      a.   rejected for several reasons: groups not isolated; no differential extinction of groups
2.   sophisticated model by Wilson (1980) does have merit
      a.   an altruistic genotype may spread if the group out-reproduces other groups
      b.   assumes a highly subdivided population structure; not clear if this occurs in nature

1.4. **Take-home message: the bathwater may be muddy**
1.   "selfish-gene thinking" tossed out "group selection" view in favor of "optimality"
2.   there are pros and cons for each of these views (beware of assumptions)

Part1	Study Questions for Chat & Quiz 15 "Conclusion: the Baby and the Bathwater in Behavioral Ecology"
1.1.1	In your opinion, is natural selection better represented informally as a struggle between selfish genes or selfish individuals? (TIP: see pg. 375)
1.1.2	What are some of the advantages for field biologists, thinking in terms of inclusive as well as direct fitness? (TIP: see pg. 375)
1.2.1	How would you describe the benefits of optimality and game-theory models to a field biologist? (TIP: see pg. 378-382)
1.2.2	What are the disadvantages (limitations) of applying optimality and game-theory models in behavioral ecology? (TIP: see pp. 378)
1.3.1	What was the former concept of "group selection" (from the 1960's) and why was it rejected by behavioral ecologists? (TIP: see pp. 376)

1.3.2	What is the current working hypothesis about "group selection" formulated by Wilson (1980), and what are the assumptions about populations to which it might apply? (TIP: see Fig. 15.1)
1.4.1	What are the pro's and con's of thinking in terms of (a) group selection, (b) selfish genes, and (c) optimality (including game theory)? (TIP: take home message)
1.4.2	In your opinion, how "muddy" is the conceptual framework used by behavioral ecologists? (TIP: you may use the analogy of the "bathwater")

2. THE 2-HANDED BABY *(Krebs and Davies 1993: 382-384)*

2.1 **How (causation)- right hand**
    1.   remember the first two premises of the logic of natural selection
        a.   IF there is variation in a population (e.g. if platyfish genes for tails exist)
        b.   IF the variation is heritable (e.g. developmental anomalies don't count)
    2.   very few studies of behavioral ecology examine these two premises

2.2. **Why (function)- left hand**
    1.   remember the last premise and conclusion of the logic of natural selection
        a.   IF differential fitness of genotypes results from the heritable variation
        b.   THEN the proportion of genotypes will change in the population, over generations
    2.   models in behavioral ecology are elaborate hypotheses about differential fitness
        a.   comparative method (qualitative similarities & differences in species or populations)
        b.   optimality method (if certain assumptions are met, test quantitative predictions)
    3.   hypotheses are often inferred from comparative studies, tested by optimality methods

2.3. **Integration- juggling takes two hands**
    1.   not all behavioral variation is adaptive (evolution occurs only if the 3 premises are true)
    2.   both cause and function should be integrated in seeking explanations for adaptation
    3.   use the logic of natural selection (VHDP) to catch the correct ball with the correct hand

2.4. **Take-home message**
    1.   the baby has two hands (causal and functional perspectives)
    2.   the most satisfying explanations are those that integrate cause and function
    3.   in developing hypotheses about cause, think in terms of function (and vice-versa)

Part 2	Study Questions for Chat & Quiz 15 "Conclusion: the Baby and the Bathwater in Behavioral Ecology"
2.1.1	What are "causal explanations" in behavioral ecology? (TIP: see p. 382)
2.1.2	In your opinion, are hypotheses about causal mechanisms adequately addressed in this textbook on behavioral ecology? (TIP: points for backing up your opinion; there is no right or wrong opinion)
2.2.1	What are "functional explanations" in behavioral ecology? (TIP: see p. 382)
2.2.2	In your opinion, are hypotheses about functional mechanisms adequately addressed in this textbook on behavioral ecology? (TIP: points for backing up your opinion; there is no right or wrong opinion)
2.3	What are the advantages of integrating "how" and "why" questions in behavioral ecology? (TIP: see p. 382)
2.4	In your own research, how would you integrate "how" and "why" questions? (TIP: make this hypothetical if you are still searching for a research focus)

3. TESTABLE HYPOTHESIS *(Krebs and Davies 1993: 384-385)*

3.1 **behavioral ecology is natural history (descriptive studies of how organisms relate to the environment and each other)**
1. similarities
   a. most of the studies used as examples are based on qualitative results
   b. both generate more questions than they resolve
2. differences
   a. the emphasis on testing alternative working hypotheses in behavioral ecology
   b. behavioral ecology is a distinctive school of thought promoted by British academics
   c. many ecological studies looking at similar questions are not cited in these publications

3.2 **spiced with critical thinking**
1. formulate alternative hypotheses based on the literature
   a. similar questions examined in other taxonomic groups
   b. comparisons within one taxonomic group (convergent, divergent, phylogenetic inertia)
2. seek to reject one or more hypotheses via testable predictions
3. those studies that try to prove one hypothesis are considered "weak science"
4. the accepted working hypothesis may be disproved if assumptions are not met

3.3. **Take-home message: testable hypotheses re. behavioral ecology**
1. avoid throwing out the baby (understanding of behavioral adaptation) with the bathwater
2. the science behind the myths is based on accurate natural history spiced with critical thinking

Part 3	Study Questions for Chat & Quiz 15 "Conclusion: the Baby and the Bathwater in Behavioral Ecology"
3.1	In your opinion, what are the similarities and differences between behavioral ecology and natural history approaches? (TIP: popular videos, magazines and field experiences often offer a natural history perspective)
3.2	How can natural history approaches benefit from the critical thinking approach voiced by behavioral ecologists? (TIP: see pg. 384)
3.3.1	Using informal language, what have you learned about avoiding "throwing out the baby with the bathwater"? (TIP: refer to critical thinking about natural history)
3.3.2	Using formal language, how can critical thinking be applied to behavioral adaptations to help in understanding the "science behind the myths" of popular culture? (TIP: the "myths" would be uncritical thinking about behavioral adaptations)

4. SUMMARY
4.1 The bathwater may be muddy (the concepts and theory about behavioral adaptations)
1. "selfish-gene thinking" tossed out"group selection" view in favor of "optimality"
2. there are pros and cons for each of these views (be aware of assumptions)
4.2 The baby has two hands (causal and functional perspectives)
1. the most satisfying explanations are those that integrate cause and function
2. in developing hypotheses about cause, think in terms of function (and vice-versa)
4.3 Testable hypotheses re. behavioral ecology
1. avoid throwing out the baby (understanding of behavioral adaptation) with the bathwater (theory)
2. the science behind the myths is based on "accurate natural history spiced with critical thinking"

Summary	Study Questions for Chat & Quiz 15 "Conclusion: the Baby and the Bathwater in Behavioral Ecology"
4.1	What are the take-home messages of these notes concluding our course on behavioral ecology? (TIP: see summary)