UNIT 6. LIVING IN GROUPS

SOURCES (for powerpoint format: http://wfsc.tamu.edu/jpackard/behavior/wfsc622/powerpoints.zip)
required: Chapter 6 in Krebs & Davies (1993:120-146);
remedial: "Creating a Home" in Halliday 1994; "Homemaking "in the Trials of Life video series
supplement: Chapter 10 in Blumstein, D.T. and Fernandez-Juricic, E. "A Primer of Conservation Behavior"

PARTS OF THIS LECTURE OUTLINE
1. Avoiding predation
2. Getting food
3. Optimal group size

1. AVOIDING PREDATION: ALTERNATIVE HYPOTHESES (VDG)

1.1. H1: Vigilance increased
   1. Pigeons hunted by goshawks (Kenward 1978 cited in Krebs and Davies 1993: 122 Fig. 6.2)
   2. Ostriches hunted by lions (Bertram 1980 cited in Krebs and Davies 1993: 123 Fig. 6.3)

1.2. H2: Dilution and cover
   1. Guppies: streams in Trinidad (Seghers 1974 cited in Krebs and Davies 1993: 121 Fig. 6.1.a)
   2. Monarch butterflies hunted by birds (Calvert et al. 1979 cited in Krebs and Davies 1993: 121)
   3. Water skaters hunted by small fish (Krebs and Davies 1993: 124 Fig. 6.4)

1.3. H3: Group defense
   1. Gull nesting colony; mob crows that eat eggs (Kruuk 1964 cited in Krebs and Davies 1993: 126)
   2. Fieldfares (thrush); nests safer in colony (Haas 1985 cited in Krebs and Davies 1993: 122 Fig. 6.2)

1.4. Take-home message: avoiding predation (VDG)
   1. Alternative hypotheses: Vigilance; Dilution; Group defense
   2. E.g. pigeons, ostriches; guppies; gulls, fieldfares

Part 1 Study Questions for Chat & Quiz 6 "Living in Groups"

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Describe a study that tested the Vigilance Hypothesis of anti-predator behavior in groups? (TIP: e.g. pigeons or ostriches)</td>
</tr>
<tr>
<td>1.2</td>
<td>Describe a study that tested the Dilution Hypothesis of anti-predator behavior in groups? (TIP: guppies, or monarchs, or water skaters)</td>
</tr>
<tr>
<td>1.3</td>
<td>Describe a study that tested the Group Defense Hypothesis of anti-predator behavior? (TIP: gulls or fieldfares)</td>
</tr>
<tr>
<td>1.4</td>
<td>What are three alternative hypotheses re. the benefits of anti-predator behavior in groups? (TIP: VDG)</td>
</tr>
</tbody>
</table>

2. GETTING FOOD

2.1. H1: Search tactics: finding good sites
   1. Information Center Hypothesis (Ward & Zahavi 1973 cited in Krebs and Davies 1993: 128)

2.2. H2: Handling tactics: catching difficult prey
   1. Hyenas hunting zebra (Kruuk 1972 cited in Krebs and Davies 1993: 127 Fig. 6.5.b)
   2. Jack (marine fish) hunting anchovies (Krebs and Davies 1993: 131 Fig. 6.7)
2.3. H3: Return tactics: harvesting renewing food
   1. Brent geese grazing in salt marshes in Holland

2.4. Take-home message: getting food (SHR)
   1. Alternative hypotheses: Search; Handling; Return
   2. E.g. weaverbirds, rats; hyenas, jacks; geese, wagtails

<table>
<thead>
<tr>
<th>Part 2</th>
<th>Study Questions for Chat &amp; Quiz 1 &quot;Living in Groups&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Describe a Getting Food study that tested an hypothesis about Group Search tactics? (TIP: e.g. Information Center Hypothesis or weaverbirds, or rats)</td>
</tr>
<tr>
<td>2.2</td>
<td>Describe a study that tested an hypothesis about Group Handling tactics? (TIP: e.g. hyenas or jacks)</td>
</tr>
<tr>
<td>2.3</td>
<td>Describe a study that tested an hypothesis about Group Return tactics? (TIP: e.g. Brent geese or wagtails)</td>
</tr>
<tr>
<td>2.4</td>
<td>What are three alternative hypotheses re. the benefits of foraging in groups? (TIP: SHR)</td>
</tr>
</tbody>
</table>

3. OPTIMAL GROUPS SIZE: TRADE-OFFS BETWEEN COSTS AND BENEFITS

3.1. Costs of living in groups *(Krebs and Davies 1993:133 Table 6.1)*
   1. Increased conspicuousness: fieldfare nesting colonies
   2. Competition for food
      a. disadvantage to followers: schooling jacks *(Krebs and Davies 1993:131 Fig. 6.7)*
      b. interference competition: redshanks feeding on shrimp
      c. kleptoparasitism: gulls steal food *(Krebs and Davies 1993:145 Fig. 6.13)*
   3. Transmission of parasites: cliff swallows, prairie dogs
   4. Sexual competition: same-sex rivalry
      a. cuckoldry (neighbor inseminates female): cliff swallows
      b. cannibalism (competing female eats pups): prairie dogs

   1. Benefits (B): information center foraging
      a. chicks grow faster in larger colonies
      b. fumigated parasites to measure this effect
   2. Costs (C): reduces the large-colony advantage
      a. more ecto-parasites on chicks in large colonies
      b. nest parasitism by neighbors: eggs laid in other nests

3.3. Tactics of juncos: scan, feed & fight *(Caraco et al. 1980 cited in Krebs and Davies 1993:140)*
   1. Benefits (B): reduced scanning (S) in large flocks
   2. Costs (C): increased fighting (F) in large flocks
   3. Optimal B:C ratio (winter flocks in Arizona; *(Krebs and Davies 1993:141 Fig. 6.11)*
      a. warm=> less foraging=> more F=> decrease group size
      b. more food=> less foraging=> more F=> decrease group size
      c. hawk present=> more S=> less F => increase group size
      d. more cover=> less S=> more F=>decrease group size
   1. Benefits of schooling (B): reduced predation risk
   2. Costs of schooling (C): less effective at competition
   3. Natural selection influenced schooling behavior (30 yr)
      a. predator-stream to non-predator stream => smaller schools
      b. non-predator stream to predator streams => larger schools
   4. Differences appeared in naive lab-reared fish stocks

3.5. Take-home message: optimal group size (benefits/costs of switching between "join tactic" and "unjoin tactic")
   1. optimality model: conditional strategy predicts switching as conditions change in the environment
   2. E.g. cliff swallows; juncos; guppies

### Part 3 | Study Questions for Chat & Quiz 1 "Living in Groups"

<table>
<thead>
<tr>
<th>3.1</th>
<th>What are 4 hypotheses about the costs of living in groups? (TIP: CIST)</th>
</tr>
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<tbody>
<tr>
<td>3.2</td>
<td>How were the costs and benefits of colonial nesting tested in a study of your choice? (TIP: e.g. cliff swallows)</td>
</tr>
<tr>
<td>3.3</td>
<td>How were costs and benefits of group foraging tested in a study of your choice? (TIP: e.g. juncos)</td>
</tr>
<tr>
<td>3.4</td>
<td>For group anti-predator behavior, how were costs and benefits tested in a species of your choice? (TIP: e.g. guppies)</td>
</tr>
<tr>
<td>3.5</td>
<td>How has the optimality approach been used to test models of group size?</td>
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### SUMMARY

1. Avoiding Predation
   a. alternative hypotheses: Vigilance; Dilution; Group defense
   b. e.g. pigeons, ostriches; antelope, wild horses; gulls
2. Getting Food
   a. alternative hypotheses: Search; Handling; Return
   b. e.g. weaverbirds, rats; hyenas, jacks; geese, wagtails
3. Optimal Group Size (decision of when to use the "join" vs. "unjoin" tactics in this conditional strategy)
   a. optimality model: based on benefit/cost ratio predicts switching re. habitat conditions
   b. e.g. cliff swallows; juncos; guppies

### Summary | Study Questions for Chat & Quiz 1 "Living in Groups"

<table>
<thead>
<tr>
<th>4.1</th>
<th>What were three take-home messages from these notes on the functions of group size?</th>
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<tbody>
<tr>
<td>4.2</td>
<td>How has group size been investigated in terms of costs and benefits? (TIP: mention avoiding predation and getting food)</td>
</tr>
</tbody>
</table>

### SOURCES