

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

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. Weaverbirds in aviary (*de Groot 1980 cited in Krebs and Davies 1993: 128*)
3. Rats: maze in lab (*Galef & Wigmore 1983 cited in Krebs and Davies 1993: 129*)

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. Wagtail shorebirds on riverbank (*Davies & Houston 1981 cited in Krebs and Davies 1993: 116*)

2.4. Take-home message: getting food (SHR)

1. Alternative hypotheses: Search; Handling; Return
2. E.g. weaverbirds, rats; hyenas, jacks; geese, wagtails

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

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. klepto-parasitism: 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

3.2. Colonial nesting: cliff swallows (*Brown & Brown 1986, 1988 cited in Krebs and Davies 1993:136*)

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

3.4. **Schooling in guppies** (*Magurran et al. 1992 cited in Krebs and Davies 1993:145*)

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

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"
4.1	What were three take-home messages from these notes on the functions of group size?
4.2	How has group size been investigated in terms of costs and benefits? (TIP: mention avoiding predation and getting food)

SOURCES

Pulliam, and Caraco. 1984. In: J.R. Krebs & N.B. Davies (eds.) Behavioural Ecology