

Agonistic Behavior: Descriptive, Aggression

Aggressive Resource Defense: Functional Significance

“Resource Defensibility”

Resource sufficiently predictable/localized in space or time

Benefits aggressive defense > costs

Territoriality: defense of *resources* in bounded area

Individuals: food, mating opportunities

Breeding pairs: food, safety for offspring

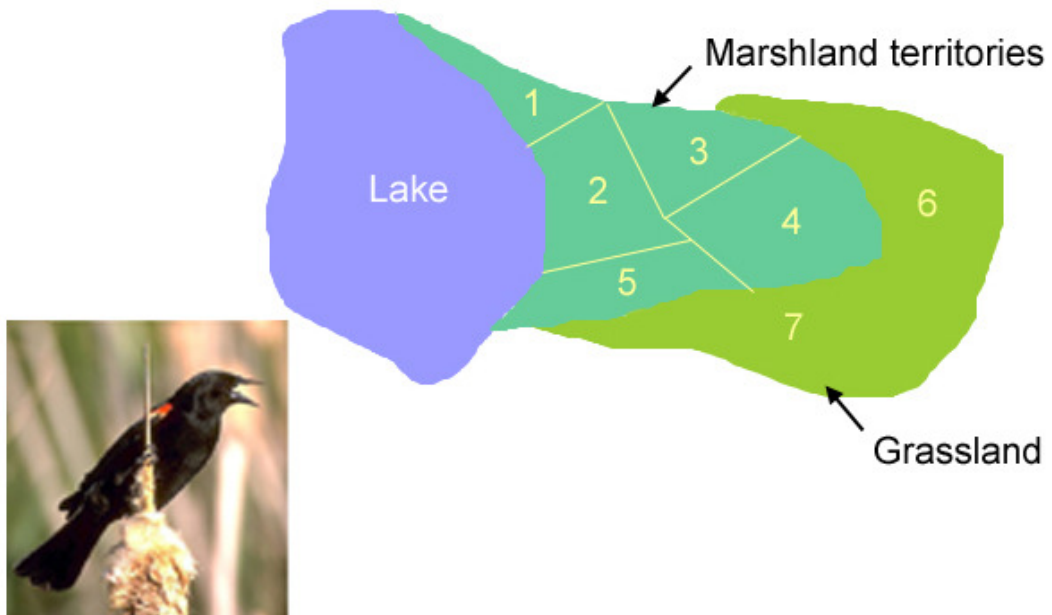
Groups: food, habitat manipulation

Individuals

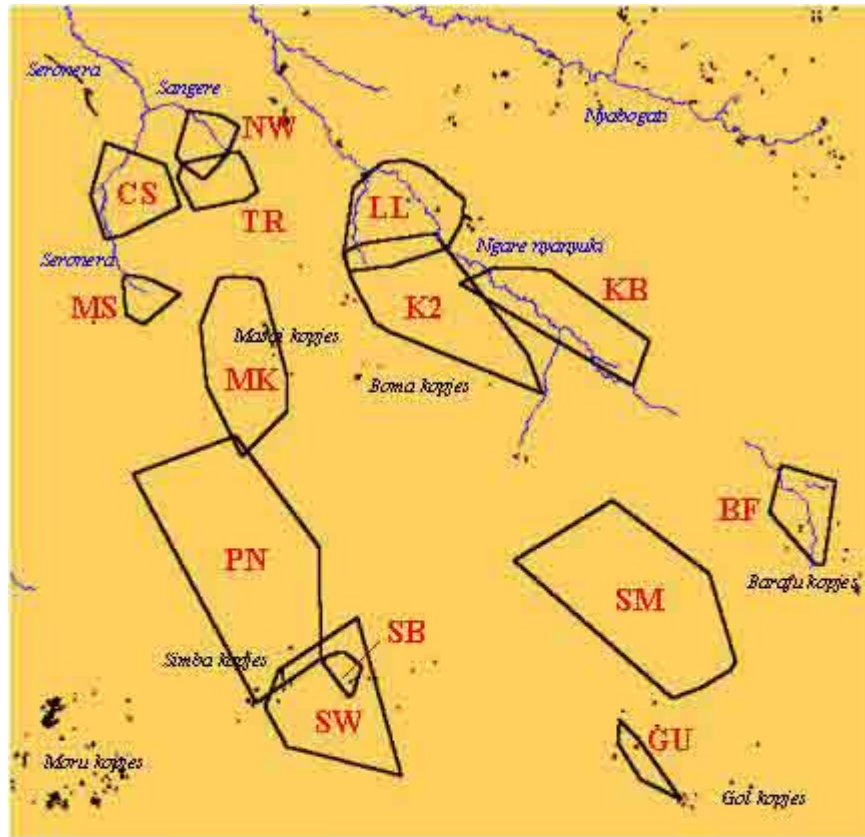


Breeding Pairs

Territoriality in the Red-winged Blackbird



Group Territory



0 9 18 Kilometers

- River
- Kopje
- Territory boundary
- BF** Pride name abbreviation

Study prides:

- | | |
|-----------------|-------------------|
| BF - Barafu | MK - Masai kopjes |
| CS - Campsite | NW - Sangere |
| GU - Gol united | PN - Plains |
| K2 - K2 pride | SB - Simba |
| KB - Kibumbu | SM - Same tu |
| LL - Loliondo | SW - Simba west |
| MS - Masai | TR - Transect |

Within group?

1. Individual distance: tolerance, less aggressive

Increased competition within group

Fight over every resource item? Too expensive?

2. Dominance relationships

Dominance: *priority of access to resources*

Despotism: individual dominates all others

Hierarchy: Dyadic relationships

Linearity, transitivity of dominance (?)

Tree-like

Dominance

Age sex size
Experience parent's dominance
“resource holding potential,” RHP

Despotism: mating, small groups

dominant male evicts males at maturity

zebra, many primates

single dominant male has most matings

wolves, wild dogs, mongoose, turkeys (brothers?)

only single, dominant female reproduces

wolves, wild dogs

Despotic mating: offspring relatedness can be high

Dominance *hierarchy*: mating opportunities by rank

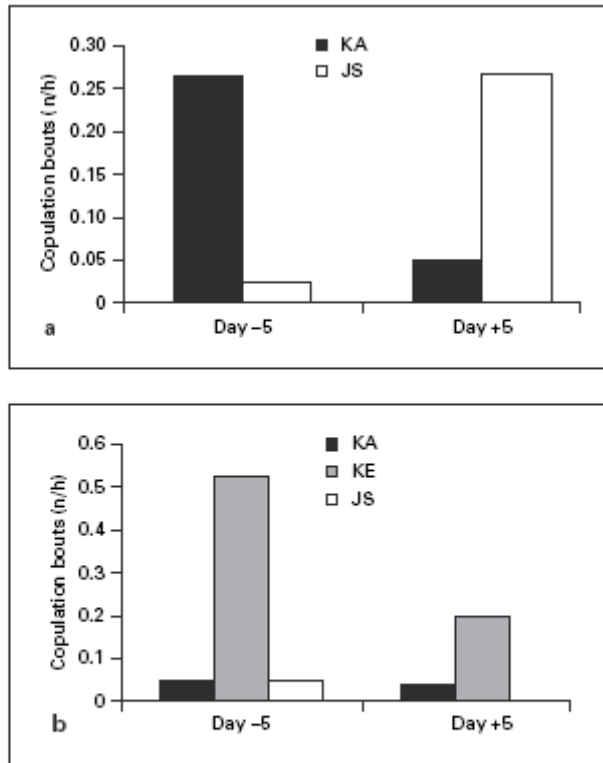


Fig. 2. Male mating frequencies with the females DT and BY, respectively, in the period of 5 days before including detumescence and in the period of 5 days after detumescence, corrected for the number of hours observed in each period. **a** The mating frequency of the males KA and JS with the female DT. **b** The mating frequency of the males KA, KE and JS with the female BY.

Certain dragonflies: “temporal lek”

Female arrival pattern fixed

Males: territorial dominant, subordinate males

Male dominance: strongly age-dependent

Transitivity

Given: A dominates B, B dominates C

Transitive if A dominates C

Larger social groups, more pairwise (dyadic) interactions

Economy of learned transitivity

Paz-y-Mino et al. (2004) *Nature* 430:778.

Pinyon jays (*Gymnorhinus cyanocephalus*)

Corvids (jays and crows: social, intelligent)

Large, permanent flocks of ~500 individuals

Linear dominance hierarchies, transitive

How arrive at dominance ranks?

Number of pairwise interactions enormous =

$$N(N - 1)/2$$

Permit observer (C) to monitor dominance interactions

Interaction: 1 bird familiar (B),
1 unfamiliar to observer (A)

B dominates C in aviary flock: known to C

C observes A dominate B in experiment

When exposed to A, C submissive without fighting

Linearity & transitivity: learned thru observation

Economy: avoid injury, energy expenditure

Dominance and physiology

Burmeister et al. (2005) PLoS Biol 3:e363.

Cichlid fish *Astatotilapia burtoni*



Groups: dominant male, several females, subordinate males

Dominance: male mating success, defends

Subordinate males: reduced gonadotropins

Less aggressive, less colorful, lower metabolism (?)

Regulation of status-dependent physiology, behavior

Fish: visual recognition, hierarchy rank

Dawn: removed dominant male, monitored next dominant

Bright colors developed, aggressive defense of females

Measured change expression in brain (preoptic region)

immediate-early genes

As color & dominance behavior appears,

Expression of *egr-1* increased

Brain region links nervous system to hormonal system

Expression genes regulating hormone

Prompts gonadotropin-releasing hormone 1

System conserved in vertebrates (?)

Economic Perspective on Dominance

Subordinate behavior: “best of a bad job,” given dominant

Dominant acquires greater benefits

Subordinate individual may attain dominance

Same benefits, alternative strategies

Recall Hawk-dove game