Reproductive Behavior 3

- Evolution of Differences in Sex Roles
- Sexual Selection & Competition for Mates

- Sexual Selection & Mate Choice
  - Mate choice with “material benefits”
    - Nuptial gift
    - Male parental care
  - Mate choice without “material benefits”
    - No nuptial gift and no male parental care

- Sexual Conflict
Mate choice when there is no material benefit

• In satin bowerbirds…

• No nuptial gift

• No male parental care

• Females choose mates based on bower quality, male displays, male plumage

• E.g., males that build high-quality bowers have fewer ectoparasites (mites)
Long-tailed widowbird
Female choice selects for extreme tail length in a widowbird

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- Polygynous
- Females build their nests on the territories of the males
- No male parental care

- Malte Andersson
- Randomly assigned males (in 9 areas) to one of 4 groups
- Shortened the tail of some males (n=9)
- Lengthened the tail of other males (n=9)
- Control groups?
- Measured number of nests with eggs or chicks

Nature 1992
Long-tailed widowbird

- Tail-lengthened males were most attractive to females
- Tail-shortened males were least attractive to females
- Elongated tails are a “supernormal” stimulus
Why do females care about these things?

• In long-tailed widowbird, no nuptial gift and no male parental care...so tail length does **not** indicate parental ability.

• Several theories exist to explain female choice in these situations. These theories focus on the male’s health, his genes, and his ability to produce “sexy sons”...
These theories are not mutually exclusive. A healthy male can also have "good genes." Selection for traits related to health or good genes may have preceded "runaway selection," where the trait is currently selected just because it is sexy.

**TABLE 10.3** Four theories on why extreme male ornamentation and striking courtship displays have evolved in species in which males provide no material benefits to their mates

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<th>Theory</th>
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Healthy Mate Theory

- Mates can transmit *ectoparasites* and *endoparasites*. This is a major route of parasite transmission.

- Female preferences might focus on indicators of current or recent male health and parasite load.

- Females need an *honest signal* of health. E.g., brightly colored feathers are hard to produce when parasitized.
Signal

Bower

- Bower quality
  - Ectoparasite load

Number of decorations

- Blood parasites

Rump UV-brightness

- Body size

Wing coverts UV-brightness

Overall plumage color

- Feather growth

Male appearance
Good Genes Theory

• “Good genes” will benefit female’s offspring

• Female preferences might focus on indicators of genetic viability

• “Good genes” could mean, for example, genes that confer resistance to parasites and disease

• “Good genes” could also mean genes that are different from the female’s genes…why?
Runaway Selection Theory

• How could “runaway selection” produce extreme behaviors or ornaments?
• Selection may have originally favored females that chose traits related to male health or good genes, but as these females experience greater success, and as the males with these traits experience greater success, there will be directional selection (more, larger, brighter, etc.) and the preference and trait can become somewhat arbitrary.
• But by mating with a male with a preferred heritable trait, she ensures that her sons will be found sexy too!
• Sexy traits can have substantial costs. Until selection against the trait (costs) exceeds the selection for the trait (benefits), the trait will persist.
Testing the theories in peacocks

- No nuptial gift or male parental care

- Females prefer males with more eyespots on their tail (number of eyespots)

- Experimental removal of eyespots causes a drop in male mating success. Controls?

http://www.pbs.org/wgbh/evolution/library/01/6/l_016_09.html
Testing the theories in peacocks

• **Good Genes Theory.** Predictions in *peacocks*: 1) the male trait should be heritable and relate to male survival, 2) females should use the trait to select mates, and 3) offspring should benefit from the choice.

• Results: 1) Males predated by foxes in an English park had **shorter** tails. 2) In choice tests, females preferred more ornamented males. 3) Removal of eyespots reduced male attractiveness. 4) Young raised in **uniform environment** grew more rapidly and survived better if sired by more ornamented males.
During the winter of 1989-1990 we caught full-trained males, removed eye-spots from them and then released them. We removed 20 eye-spots from each of the experimental males, cutting the eye spot from the end of the feather shaft with a pair of scissors. Each time we cut a feather we chose the longest shaft and therefore removed the 20 outermost eye-spots. This manipulation did not affect the overall length of the train which is determined by feathers which end in a "V" rather than an eye-spot."

“...the control group were males who were caught in the winter but whose trains were left intact (n = 3) in addition to males who were not caught (n = 12).”
Fig. 3 Change in number of copulations between seasons for those males who had 20 eye-spots removed ($n = 6$, mean $= -2.5$, SE $= 1.6$) in comparison with those males whose trains were not manipulated ($n = 15$, mean $= 0.4$, SE $= 0.7$), $t = 1.923$, $P = 0.035$, one-tailed test. The control group includes 3 males who were caught overwinter but whose trains were not manipulated.
“Since the control group mainly consists of males that were not caught (12 out of 15) it is possible that the difference in the change in mating success between the experimental and control groups is a result of capture rather than the manipulation of the trains. Although we cannot completely rule out this possibility we feel that it is unlikely....”
“When we removed the eye-spots we only ‘nipped’ out the eye at the end of the feather. The overall length of the train is determined by those feathers that end in a "V" and not an eye-spot, so we were not altering the overall length of the train by this manipulation. However, it is possible that we altered other aspects of the train by our manipulation, such as its overall symmetry and consequently its aesthetic appearance to peahens. A recent theory suggests that females are attracted not merely by the degree of development of a male character, but also by its symmetry.”
“It could also be predicted that an increase in the number of eye-spots in a male's train would result in an increase in mating success. However, it proved impossible to effectively increase the number of eye-spots in the train for two reasons. First, we found it difficult to catch a sufficient number of displaying males and, second, the number of feathers in the train (approx. 230) and their complex arrangement precluded crude manipulation.”
Testing the theories in peacocks

• Has been difficult because the theories aren’t mutually exclusive.

• Good Genes Theory. Predictions in peacocks: 1) heritable male traits should relate to survival, 2) ornamentation should provide accurate info on his genes’ survival value, 3) females should use the traits to select mates, and 4) offspring should benefit from the choice.

• Results: 1) Males predated by foxes in an English park had shorter tails. 2) In choice tests, females preferred more ornamented males. 3) Removal of eyespots reduced male attractiveness. 4) Young raised in uniform environment grew more rapidly and survived better if sired by more ornamented males
Outline

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Chase-away selection theory

- Sensory exploitation
- Male trait provides NO benefit to female!
- Harmful to female
- Females become less sensitive to the male trait over generations
- Males respond by increasing the trait over generations
- Would lead to costly exaggerated male ornaments...of no real value to female