



SEXUAL SELECTION



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FEMALES versus MALES



STEREOTYPES

- FEMALES ARE CHOOSIER (MALES MORE ORNAMENTED)
- MALES COMPETE MORE (MALE MORE WEAPONRY)
 - FEMALES CARE MORE
- MALE-BIASED OSR (OPERATIONAL SEX RATIO) (many exceptions exists, but true 'on average')

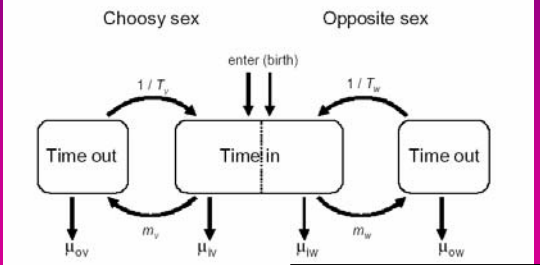
WHY DO FEMALES CARE MORE?



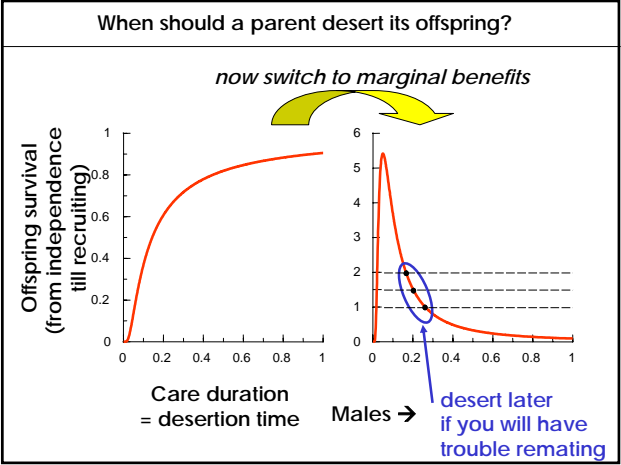
MAMMALS	90% female-only
INVERTS	female-only
REPTILES	female-only or both
BIRDS	biparental, but female-biased
FROGS	female only and male-only
FISH	male: biparental : female (9:3:1)

Model based on rates of changing states (2001, 2002)
OSR emerges rather than being assumed
Which sex benefits more from an

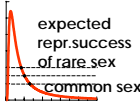
- increase in mating rate m ?
- increase in time spent caring, T ?



Kokko & Jennions (2008)



The Fisher condition predicts that the sex that is currently rare in the mating pool (usually female) benefits more from deserting than the more common sex



YOU

Hey! This reminds me a bit of Fisherian sex ratio theory ("make" the currently rare sex in the pop.)

Yes! Very similar - a numerical constraint on reproduction for each sex when all offspring have one parent of each sex

So why doesn't the Fisher condition equalize the OSR & sex roles when it so often equalizes primary sex ratios?

ME

SMART QUESTION!

Why do females care more than males?

David Queller's Solution

Either males have less to gain from care
or males benefit more from

REVERSES THE DIRECTION OF CAUSATION BETWEEN PARENTAL CARE AND SEXUAL SELECTION

ANISOGAMY GENERATES REPRODUCTIVE COMPETITION AMONG MALES

multiple mating! solution 2? solution 3?

Possible solution number 1:

Care benefits can be lower (for one sex) if there is multiple mating (uncertainty about parentage!)

(Queller 1997)

multiple mating! sexual selection! solution 3?

Possible solution number 2:

Success for **some** males (those thinking about deserting) can be higher if there is non-random sexual selection

(Queller 1997)

Mean offspring production might be the same for males and females, but the **variance** is often higher for males

and this is why it matters

multiple mating! sexual selection! ASR effects!

Possible solution number 3:

The starting point for the OSR may vary e.g. because the **adult sex ratio (ASR)** is biased

male success when OSR is **somewhat** biased towards them (competition effort kills males)

male success when OSR is **strongly** biased towards them (care effort kills females)

(Queller didn't comment on this)

multiple mating! sexual selection! ASR effects!

Integrative theory of sex roles:
put all these effects together and see where this thing stops

Indeed it stops in different places depending on feedbacks between what a sex does and its mortality!

Selection differentials look like this...

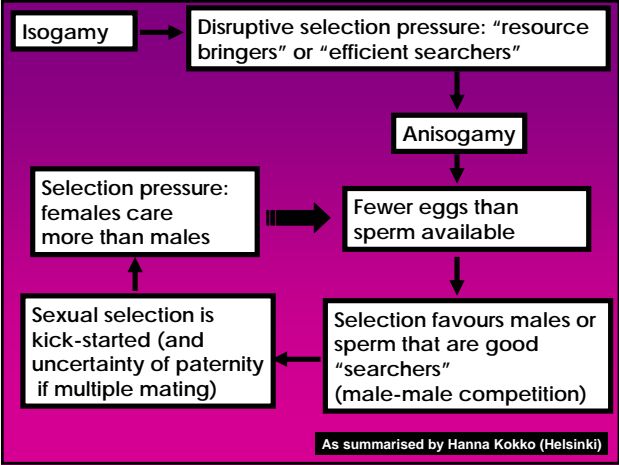
$$\frac{S'}{\bar{n}} - SM\tilde{K}_0^{1/2} + \tilde{\mu}_1 - \tilde{\mu}_0$$

The OSR - influences and is influenced by evolution

Kokko & Jennions (2008)

Example: no sex differences, but low level of polyandry




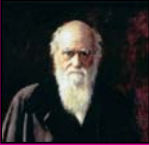
Equal mortalities, Competing for mates is more dangerous, or Care is more dangerous



WHY CHOOSE A MATE?

"To suppose that the females do not appreciate the beauty of the males, is to admit that their splendid decorations, all their pomp and display, are useless; and this is incredible" (Darwin 1872)



Darwin made the case that females choose certain males, but not why



Helena Cronin

WHY CHOOSE A MATE?

- For many years sexual selection was little studied.
 - That females had aesthetics was ridiculed.
- Male-male competition could explain sexual traits





Andersson (1982) Nature

WHY CHOOSE A MATE?

1. DIRECT MATERIAL BENEFITS = **MORE OFFSPRING**
(Increase longevity, fecundity)
2. GENETIC BENEFITS = **BETTER OFFSPRING**
(sons, daughters or both)
3. MINIMIZE COSTS ("Sexual conflict")

1. DIRECT MATERIAL BENEFITS

- A. RESOURCES THAT AFFECT FECUNDITY/FERTILITY
- B. PARENTAL CARE
- C. AVOID SEXUAL & OTHER DISEASES
(Partly discussed in the Multiple Mating Section)








Display rate predicts the level of parental care

Knapp & Kovach (1991) Behav Ecol


WHY CHOOSE A MATE?

What if no apparent direct benefits to choice?
LEKS (Swedish for 'Play')



2. GENETIC BENEFITS = FITTER OFFSPRING

A. FISHERIAN ("SEXY SONS")
B. VIABILITY GAINS ("GOOD GENES")
C. COMPATIBLE GENES

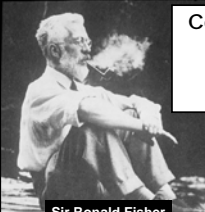


GENETIC REASONS MOST INTRIGUING
"PARADOX OF THE LEK"

WHY CHOOSE A MATE: THE FISHER PROCESS


Sir Ronald Fisher in 1930 stated that:

The two characteristics affected by such a process, namely plumage development in the male, and sexual preference for such developments in female, must thus advance together, and so long as the process is unchecked by severe counterselection, will advance with ever-increasing speed.




Could female prefer certain males just because other females do? If so can females that produce sexy sons increase their long-term fitness?

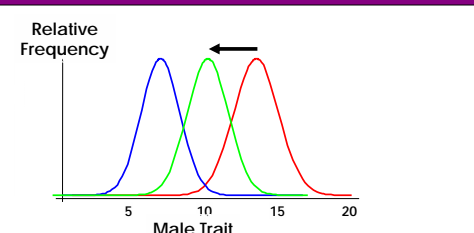
WHY CHOOSE A MATE: THE FISHER PROCESS



Preferences for "arbitrary" traits.
No reason why something is sexy or popular.
It is popular because it is popular.

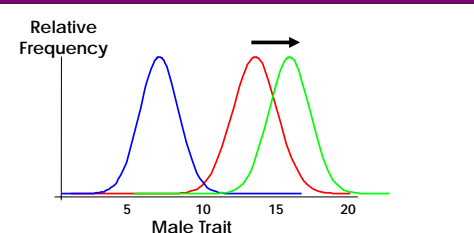


Lande's Model of Fisher's Idea



- **Zygotes**, have a mean 'potential' tail length (here = 13)
- Males with larger tails more likely to die (natural selection).
So **Adult males** have a lower mean (here = 7)
- Females mate preferentially with longer-tailed males.
- These males have sperm that code for longer tails.
- The mean for these **Gametes** is lower than the mean of zygotes, so benefit of mate choice is too small to compensate for lower viability

Lande's Model of Fisher's Idea



- **Zygotes**, have a mean 'potential' tail length (here = 15)
- Males with larger tails more likely to die (natural selection).
So **Adult males** have a lower mean (here = 7)
- Females strongly prefer males with long-tails.
- The mean for these **Gametes** is greater than original zygote mean so benefit of mate choice more than compensates for loss of viability

Lande's Model of Fisher's Idea

