Reproduction Strategies

Why it matters	Central in all living beings. Darwin -> complex beh exists because they evolve step by step through natural selection. Nonhuman primate reproductive strategies provide insight into evolution of human mating and parenting strategies because of shared reproductive physiological elements e.g. typical mammalian traits. Different mating systems will lead to different involvements, roles and costs from the mother, father and group.
Mating efforts v. parenting efforts	**Mating efforts:** All behaviours leading up to conception e.g. locating mates and competition for access. **Parenting efforts:** All activities related to offspring care post-conception. Efforts spent in both of these aspects is dependent on trade-offs of limited resources: investing energy in parenting takes energy away from mating efforts.

Female Strategies

Females tend to invest very heavily in their offsprings e.g. pregnancy and lactation alone are costly. Primates have much longer gestation and lactation periods than allometric scaling. Females must compromise effort invested: if they invest heavily in one offspring, they cannot invest as heavily in another. Investment is modified based on an offspring's needs.

In primates (human + nonhuman) must achieve a minimum nutritional level to ovulate and conceive.

Female reprod success	Based on length of reprod career. This varies wildly, even within a species (e.g. yellow baboons, with over half females never reproducing in their lives).

Ecology of female rships

Types of rships	Categorised based on competition (van Schaik): - Hierarchical rship if contest over essential resources. Leads to frequent conflict and affiliations. Advantages to higher ranking e.g. higher reproductive success. - Less hierarchal rship with more indirect competition where females scramble for resources. Leads to low interactions between females, neutrality or indifference. This means little affiliative behaviour e.g. hugging and grooming, and weak alliances overall. Across primates, rships defined by importance of contest and scramble competition between and w/in groups.

Ecology of female rships (cont)

W/in and b/w group competition	Female bonded v. nonfemale bonded groups based on relative strength of w/in v. b/w group contest competition. Female-bonded matrilines cooperating on resource defences for benefits in contest with other female groups. Competition w/in groups for highest quality resources maintains strong hierarchies. Adaptations of model included additional category of monkeys with minimal w/in group competition but that remain together because of a need for cooperation for defence of resources. So balance between cooperation and competition (like van Schaik's socioecological approach to group organisation, so with the weakness of the folivore paradox). If fitness of a female is higher in a group than it would be individually, she is liekly to stay no matter how badly she is treated.

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Ecology of female rships (cont)

Dominance rank and female reprod success	Competition for food = hierarchies, w/ high-ranking indivs gaining access to more high quality resources. This impacts reprod success e.g. daughters of high-ranking females chimpanzees mature earlier than lower-ranking females..
Social bonds	Quality of social bonds affect reprod success. Chacma baboons = higher offspring survivorship if females had stronger social relations. Social bonds also reduce stress

Intrasexual Selection

Competition among males for access to females favours large body size and canines -> sexual dimorphic traits.
Sexual dimorphism = greater in species forming one-male + multi-female groups > in pair-bonded species. Suggests intrasexual selection as cause for sexual dimorphism.
Multi-male + multi-female groups show selection for increased sperm production. Females = most receptive to mating advances during estrus (fertile period). Sperm production is less important in pair-bonded groups as females mainly mate with the resident male. Multi-male/female groups based on testes size.

Owl Monkeys

Male strategies

Pair-bonding species	Higher levels of paternal investment because of higher paternity certainty and lower distinction between mating and parenting efforts. This reduces the energetic strain on females and can also increase their fertility. **Example:** Pair-bonded male owl monkeys look after offsprings, groom and carry them and protect them from predators.
Cooperative breeding species	In cooperatively breeding species, infants can be sired by one or more males. Normally only one female breeding in these groups. Helpers (including fathers) contribute to offspring care - *e.g. marmosets and tamarins* - which leads to higher fertility rates.

Male strategies (cont)

Polygynous species	One male + muti-female groups where resident male ates with multiple females. Leads to intense conflict in males - e.g. coalitions between males to drive out resident male.
Sexual selection infanticide hypothesis *Hrdy*	Sexually selected male reprod strat. High-ranking males compete to monopolise access to females in multimale groups. Hrdy suggests that these circumstances lead to evolution of infanticide: a female giving birth to an infant must prioritise parenting efforts over mating efforts, so death of the infant makes female available for reproduction once again. Hypothesis also suggests (as backed up by evidence) that infanticide is associated with changes in male status, males kill infants whose death will hasten cycling in females again, males kill infants that are not their own and infanticidal males achieve reproductive benefits.

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Evolution of cooperation

Altruism Behaviours beneficial to others, but costly to themselves e.g. grooming. So how can it be selected for through evolution?

Evolution of cooperation (cont)

Why altruism is often not selected for Behaviours aren't always selected for just because they benefit the group as a whole.

Example:
One monkey gives an alarm when spotting a predator to alert others, even though that monkey is now more at risk (*group selection mechanism* as suggested by Wynne-Edwards). however, if all the monkeys emitted a call when spotting a predator, then they would all be more at risk than if they all stayed silent. All that matters is actually how the trait to call an alarm affects the caller. Calling reduces the risk of mortality overall in the group, but does not guarantee the survival of the caller over others so frequency of callers (and corresponding alleles) doesn't change.)

Kin selection

Hamilton's Rule: *A cooperative behaviour will be favoured if costs of beh are less than benefits by coeffi-cient of relatedness b/w actor and recipient.*
Siblings live together, so groups of callers are 50% likely to share calling genes with other members of the group. So kin selection favours altruistic alleles if animals selectively interact with genetic relatives.

So the idea is that altruism is limited to related kin and that closer kinship leads to more costly altruism (e.g. siblings over cousins).

Kin selection (cont)

Examples that align with Hamilton's rule:
- **Grooming** - more common among kin than non-kin. Beneficial for participant for hygienic + affiliative purposes. Examples of maternal grooming in rhesus macaques on island of Cayo Santiago, where females groomed close kins at higher rates than non-kin.
Research in France has shown that in mandrills infested with parasites, the monkeys stayed away from heavily infected indivs they were not closely related to but kept grooming close kin even if they were heavily infected.

Mutualism

Behaviours that benefit all parties involved. Continuing with the example of calling, emitting a call could create a state of confusion, both alarming others and protecting the caller.
Coalitions can also be mutualistic situations: in middle-ranking yellow and olive baboons, coalitions form to monopolise access over females guarded by higher-ranking males.

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