

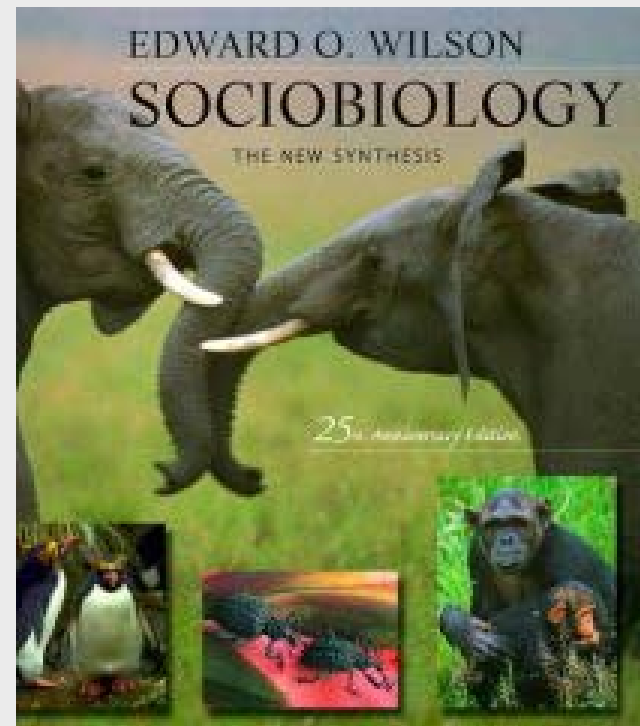
Evolução do comportamento humano



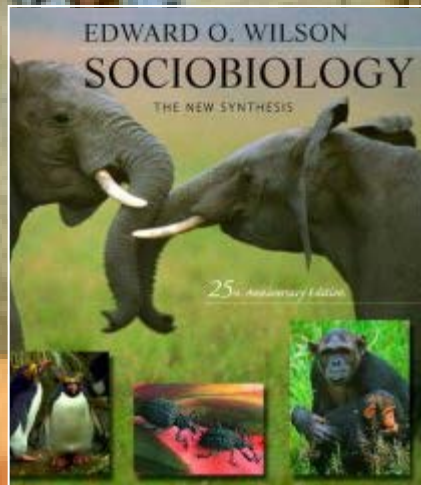
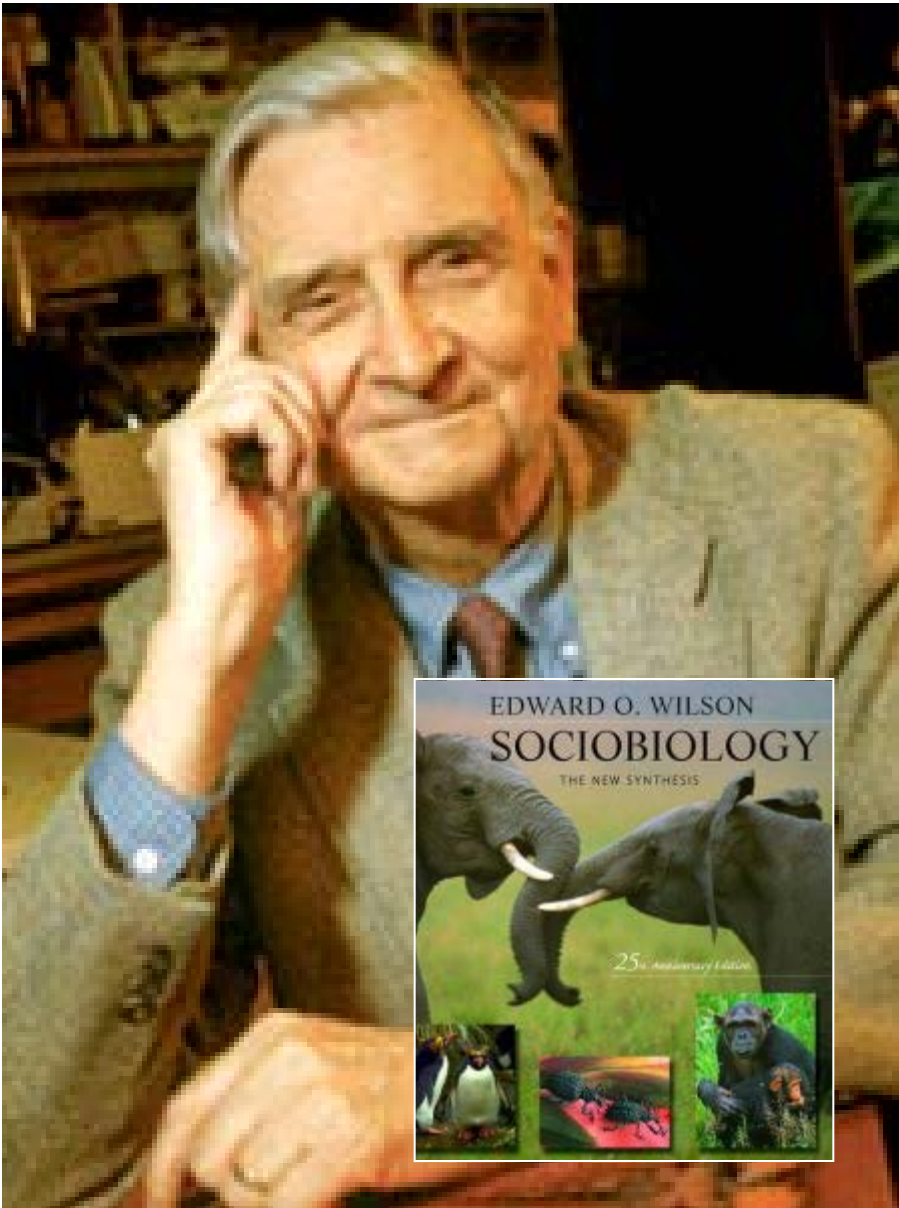
Topicos

- Controversia sobre Sociobiologia
- Testes da teoria
 - Adoção
 - Preferencias para acasalar
 - Sexo coercivo
 - Cuidados parentais

Controversia sobre Sociobiologia



Controversia sobre Sociobiologia



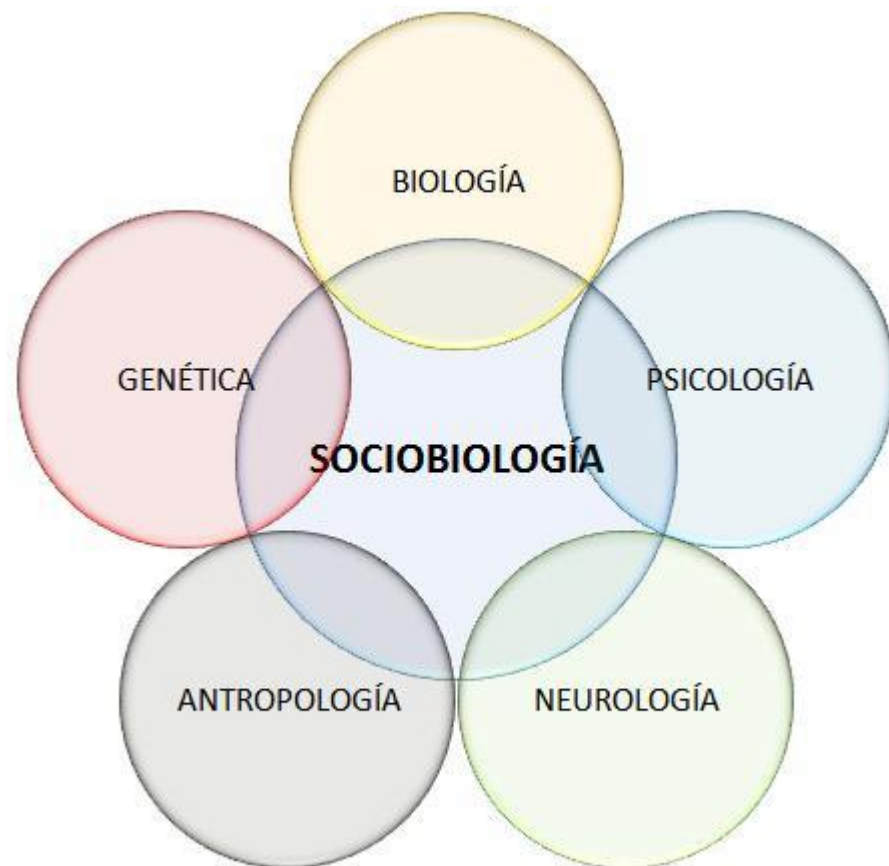
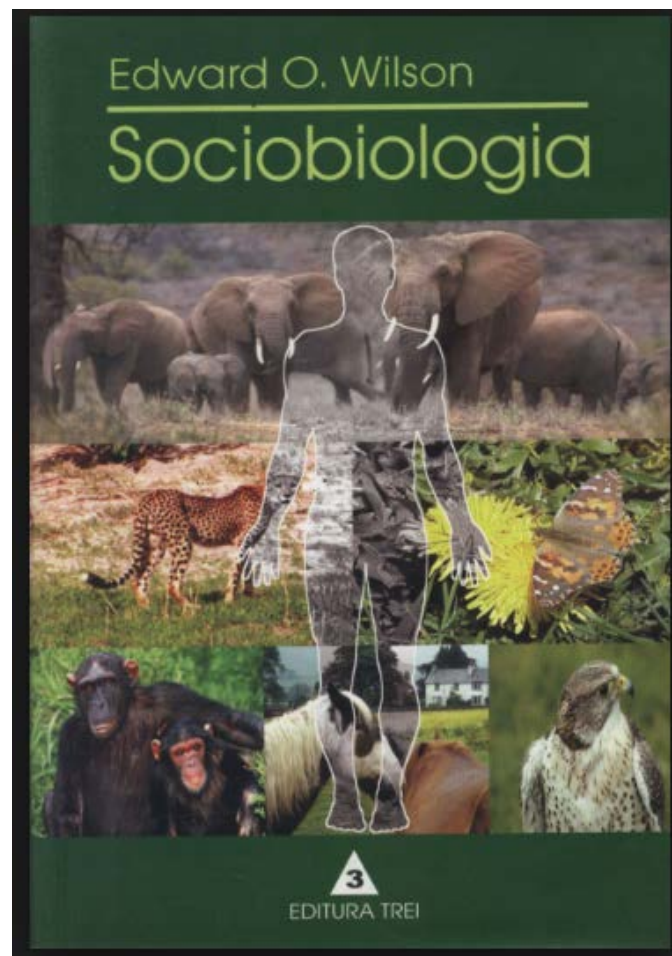
E.O. Wilson. 1975.

Sociobiology: the new synthesis

Sobre evolução de comportamento social no reino animal; ultimo capitulo sobre evolução de comportamento humano. Em linguagem comum explicou teorias desenvolvidos pelos cientistas de biologia evolutiva. W.D. Hamilton, R. Trivers and J.M. Smith

Muito criticado devido mal entendimentos sobre evolução, ou motivado politicamente (marxismo, R. Lewontin, S.J. Gould)

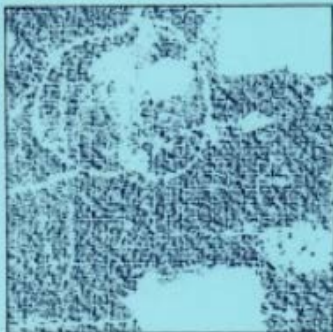
Acusaram Wilson de determinismo genética. Preferem pensar sobre o cérebro humano como uma folha em branco



O HOMEM E A CIÊNCIA 13

sociobiologia: senso ou contra-senso?

Michael Ruse



SOCIOBIOLOGIA O FATOR GENÉTICO

AS REALIDADES BIOLÓGICAS DA CONDIÇÃO HUMANA

O primeiro livro escrito em linguagem popular sobre sociobiologia – a revolucionária e provocadora teoria que diz ser aquilo que fazemos na vida real, influenciado por nossos genes do que somos imaginamos.

ROBERT A. WALLACE



ECKART VOLAND

ELEMENTOS DE SOCIOBIOLOGIA



EPIGÊNESE
E DESENVOLVIMENTO

Criticismos provocados por desentendimentos (i)

(i) *“nos humanos não fazem coisas porque queremos aumentar o nosso valor aptidão inclusivo.*

Não precisamos saber a motivo final do comportamento para que praticamos comportamentos adaptativos.

Mecanismos próximos podem nos motivar a fazer coisas que aumentam o nosso aptidão (por exemplo, comer coisas doces, fazer amor, cuidar de filhos ou netos)

Criticismos provocados por desentendimentos (ii)

(ii) “Nem todo o comportamento humano é adaptativo biologicamente, e se várias práticas culturais parecem não melhorar aptidão do indivíduo, pensamento sóciobiológico não é útil para entender o comportamento humano.”

Características podem não ser adaptativas atualmente.
Psicologia evolutiva indica que características podem ter sido adaptativas somente no nosso ambiente ancestral

Biologia evolutiva da ferramentas intelectuais que podem investigar questões interessantes sobre comportamento humano, gerando e testando hipóteses evolutivos

Criticismos provocados por desentendimentos (iii)

(iii) “Comportamento humano não é totalmente determinado pelos genes. Muitos comportamentos são aprendidos ou adquiridos via processos culturais.”

sociobiologia nunca alegou que comportamento humano é totalmente determinado geneticamente

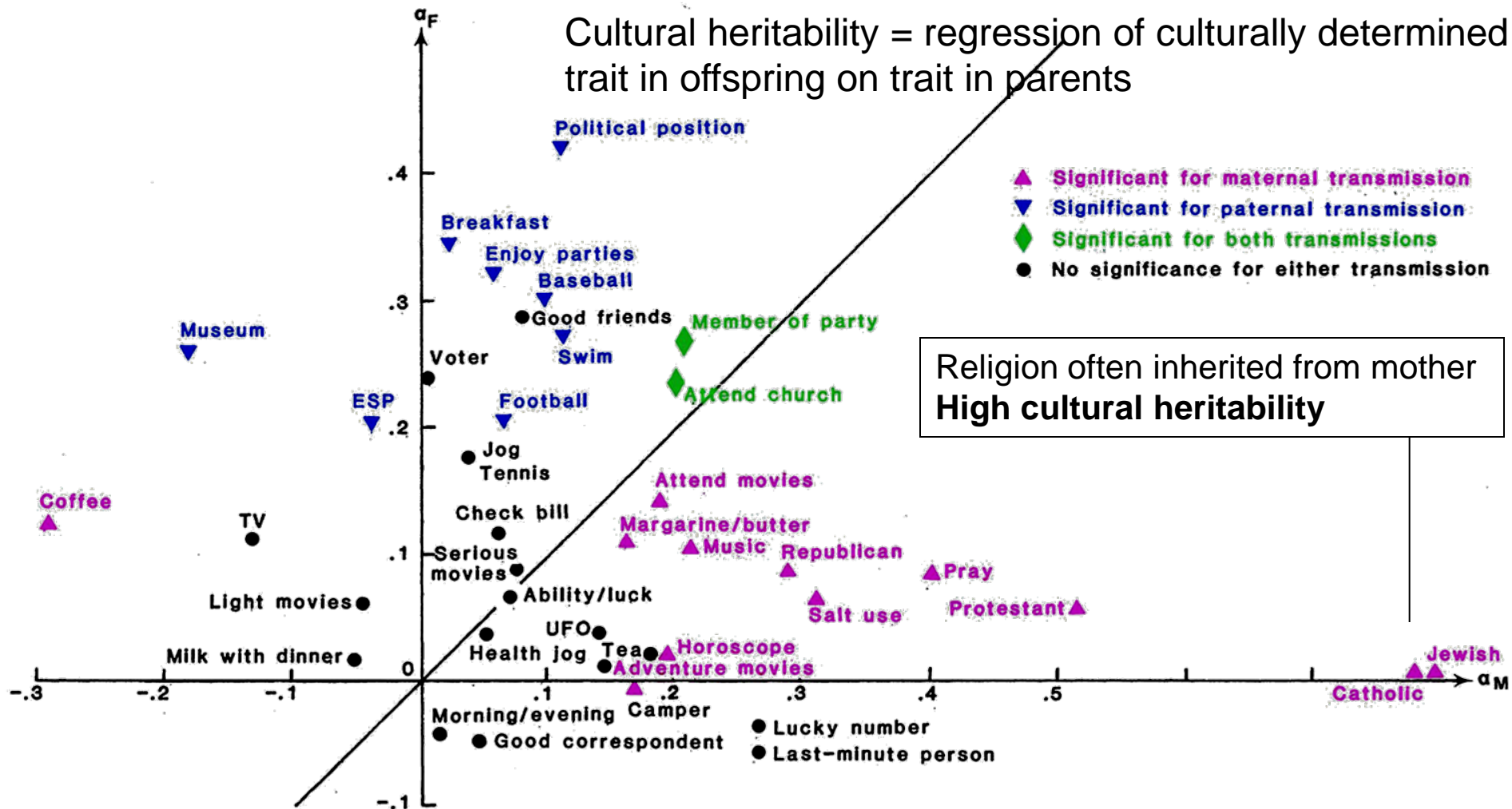
Teoria de dupla herança: especificamente examina coevolução gene-cultura

Herdabilidade de muitas características é alta. (Genética de comportamento)

Características culturais frequentemente são herdadas dos pais; neste caso um evolução também é envolvido.

Características culturais são comumente herdadas dos pais

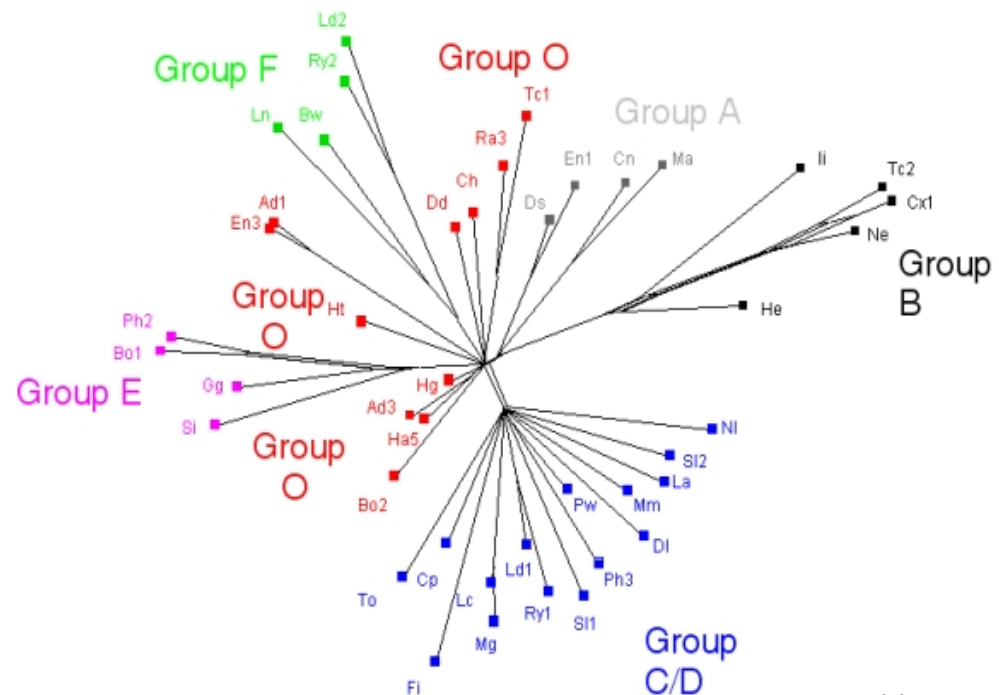
Cultural heritability = regression of culturally determined trait in offspring on trait in parents



Cultural phylogenies: literature



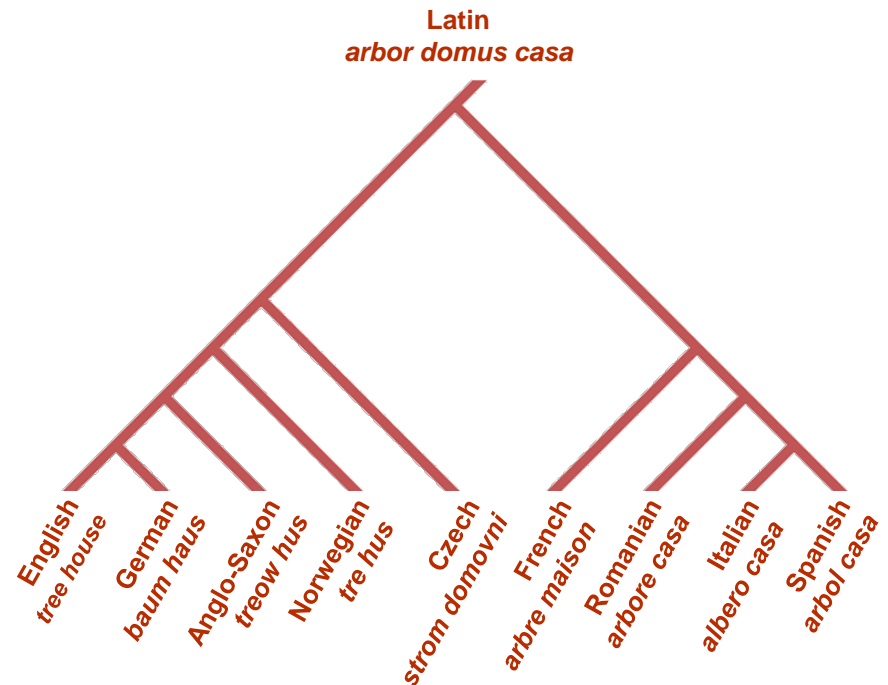
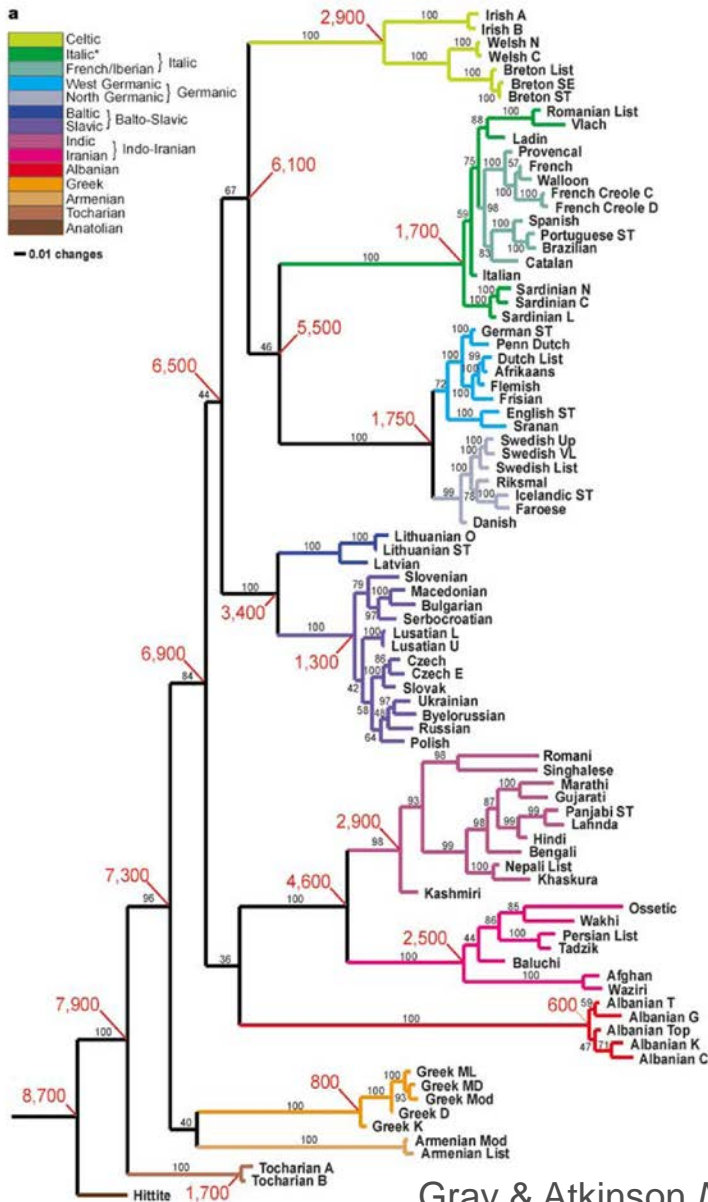
Relationship among various versions of historical **manuscripts**, such as *The Canterbury Tales*, can be determined using phylogenetic methods from biology



Barbrook *et al.* (1998) The phylogeny of the Canterbury Tales. *Nature* 394: 839

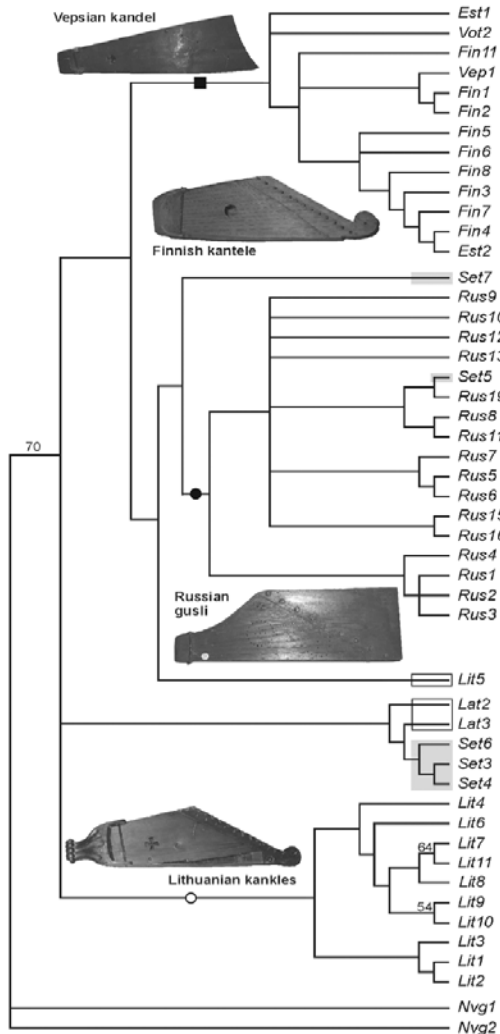
Cultural phylogenies: linguistics

Similarity in vocabulary across languages also allows the construction of **language phylogenies**, shedding light on their historical relationship.

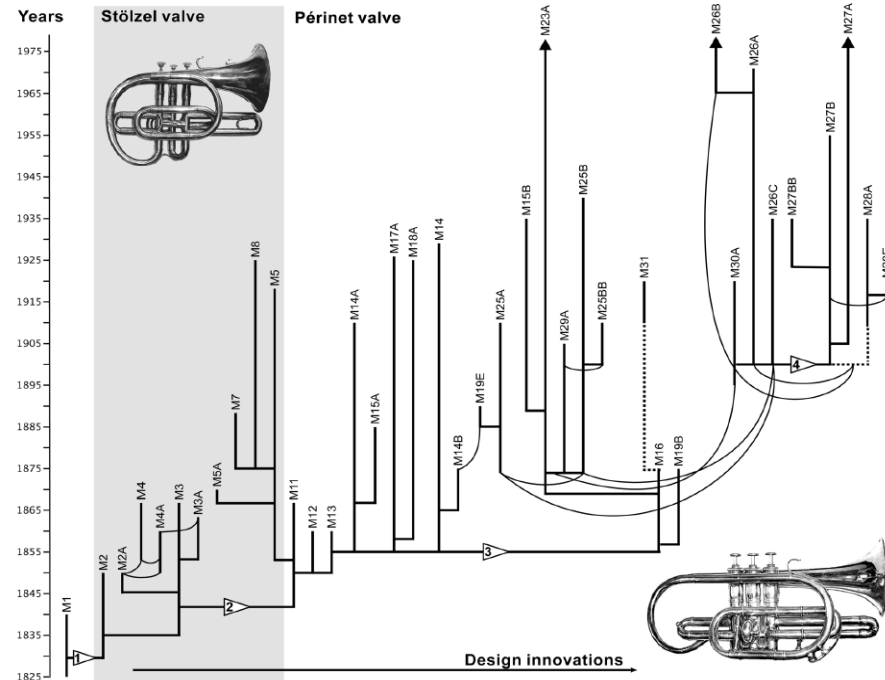


Cultural phylogenies: artefacts

Evolutionary trees can also be constructed for cultural artefacts such as textiles, pottery, music instruments, arrow points, etc...., shedding light on their historical relationship and on innovation in design over time.



Baltic psaltery



cornet

Criticismos provocados por desentendimentos (iv)

(iv) “Explicações evolutivos sobre comportamento humano tem base em uma doutrina politica que apoia injustiça social.”

Tem base no medo que a sociobiologia pode ser usado como um argumento científico para legitimar desigualdade social, por exemplo entre raças ou sexos.

Ciência já foi usado para justificar praticas odiosos (por exemplo o movimento eugênico, Darwinismo social no século 19, - Francis Galton aplicou o lei da sobrevivência do mais apto para a sociedade, acreditando que impulso humanitários tinha que ser superados para não interferir com a luta social para existir, produzindo assim ganhadores e perdedores.

Entretanto, biólogos evolutivos tentam explicar porque um comportamento existe, não justificando-o.

A falácia naturalística

Justificando desigualdades em base a teorias evolutivas é um erro porque não pode presumir que o que é natural é sempre bom. Este é a **falácia naturalística**

Infelizmente, por causa destas criticismos malentendidos, o termo **sociobiologia** adquiriu uma conotação negativa durante um tempo



George Edward Moore (1903)
Principia Ethica

Alternativa para o pensamento evolutivo: Teoria de cultura arbitraria

- Alternativa principal é que comportamento humano é resultado de cultura, cujo desenvolvimento pode vir de acidentes históricos ou processo arbitrárias.
- Podemos comparar o que cada um vai prever. Exemplo: adoção

Caso teste: adoção

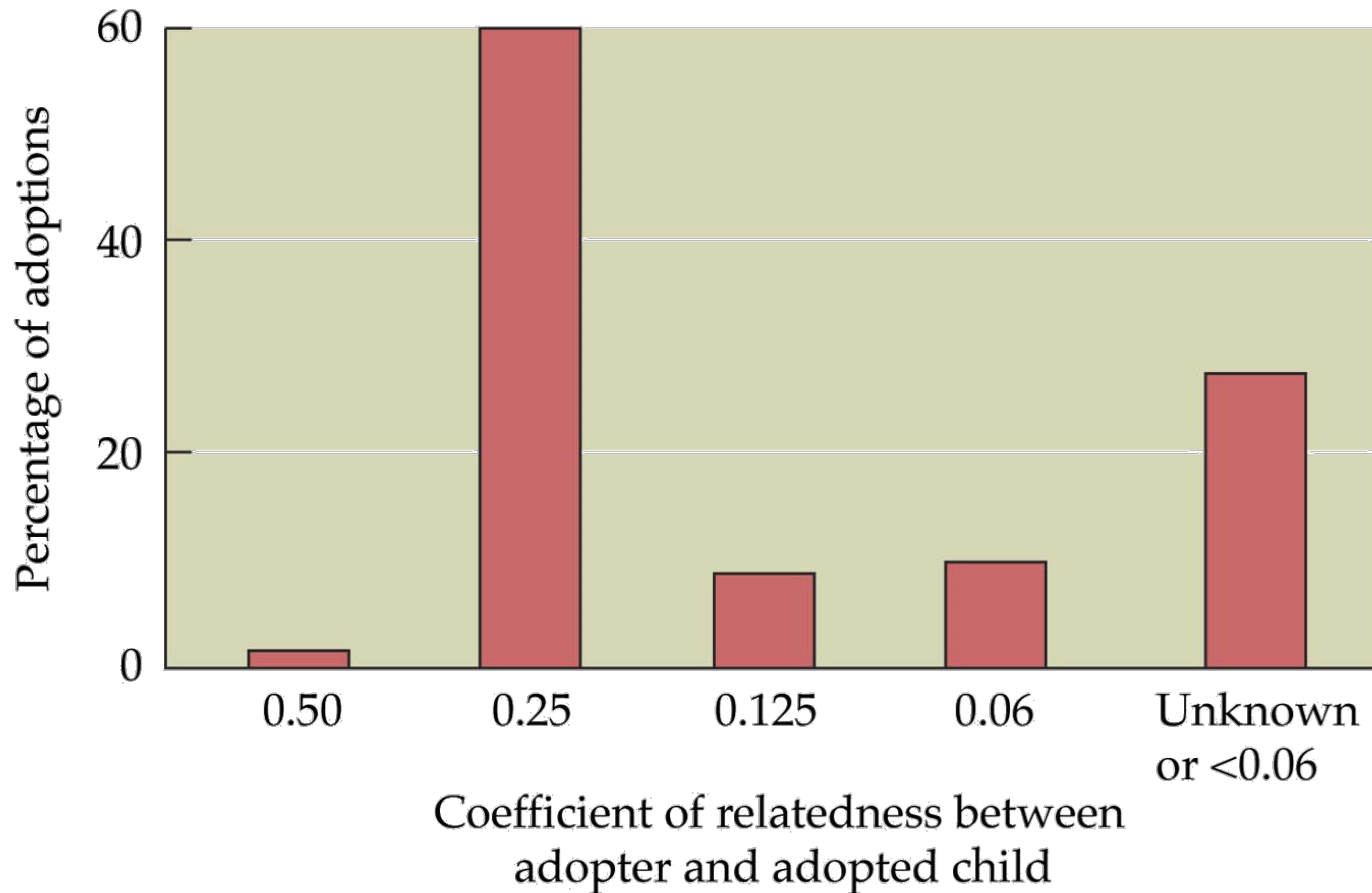


Teste: adoção

Marshall Sahlins (1976) diz que adoção é bastante frequente em muitas ilhas no meio de Pacífico (Oceania). Até 30% das crianças são adotados. Ele entendeu adoção como uma tradição cultural arbitrária e viu sociobiologia irrelevante para entender comportamento humano.

Antropólogo Joan Silk (1980): examinou o grau de parentesco entre crianças adotados e seus novos pais em 11 culturas na Oceania.

Adoção e parentesco



Normalmente sobrinhos ($r=0.25$)

Adoção de parentes confere vantagens inclusivas

J. Silk (1980) Adoption and kinship in Oceania. *American Anthropologist* 82: 799-820.¹⁹

Evolução de comportamento humano: Teoria de cultura arbitraria

- As vezes adotam com grau de parentesco baixo ou inexistente.
- Como explicar?
- Adotando quem não é parente parece ser benéfica para sociedade agrícolas, onde mais mao de obra pode incrementar a produtividade da fazenda e ajudar a sobrevivência dos filhos próprios.
- Coerente com este hipótese, famílias pequenas adotam com bem mais frequência do que famílias grandes.

Evolução de comportamento humano: Teoria de cultura arbitraria

- Explicação alternativa é que algumas decisões podem ser subprodutos não adaptativas de mecanismos que normalmente seriam adaptativas. Adotar indivíduos sem parentesco pode ser não adaptativa, mas cuidar de criança normalmente é.
- Desejos (por exemplo de ter uma família) fortemente afetam o nosso comportamento, sendo que para satisfazer estes desejos podemos não necessariamente maximizar o nosso aptidão inclusivo.
- Espécies não-humanos tem comportamentos similares – pinguim que perdem o seu próprio filhote, adotam um órfã (sem pressão cultural para o fazer)



3. Test case: mate preferences



Adaptive mate preferences

- Human cultural rules concerning sexual behavior and mate selection are very diverse.
- Despite large cultural differences certain basic aspects of human reproduction are consistent across societies and parallel those found in other mammals.

Adaptive mate preferences

- Female humans invest very heavily in individual offspring and their life time reproductive success is limited by how well they can care for offspring rather than how many they can give birth to.
- Males, also invest heavily in their offspring, but in contrast to women, have the potential to produce many offspring (and perhaps have them reared by other males).

Adaptive mate preferences of men

- Given that females often require considerable investment by males, it would be expected that males should be keenly interested in a female's potential fertility.

Adaptive mate preferences of men

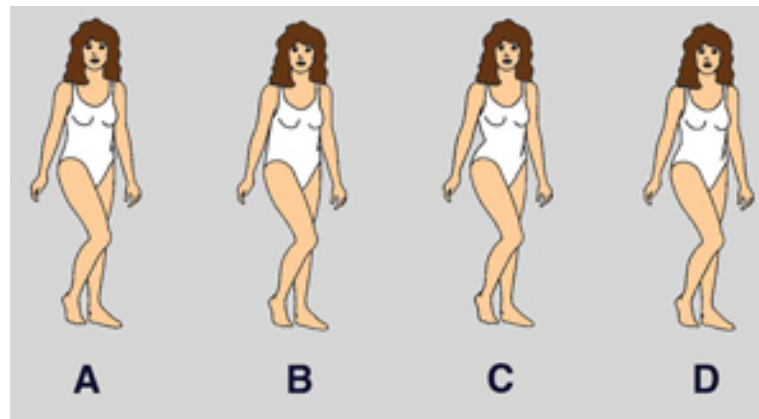
- Women differ in their likelihood of conception.
- Healthy and/or younger women are more likely to conceive than older and/or sick women.
Similarly, overweight or underweight women are less likely to become pregnant than women of average weight.
- Given that females differ in fertility, evolutionary biologists would expect that males have been selected to evaluate female fertility.
- Is there a relationship between what males consider “good looks” and fertility?

Adaptive mate preferences of men

- A cultural alternative is that males and females have been culturally indoctrinated to perceive “beauty” in relation to a nearly impossible standard designed to maintain female insecurity.
- So are standards of beauty arbitrary?

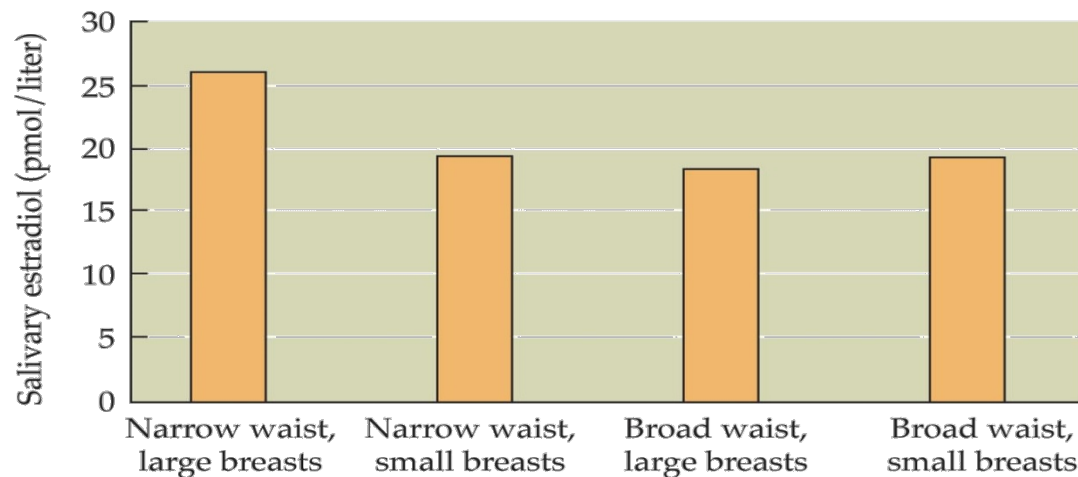
Adaptive mate preferences of men

- Males in western society generally prefer females who possess: full lips, thin noses, large breasts, a waist that is narrower than the hips, and an intermediate weight.



Adaptive mate preferences of men

- The listed traits are associated with developmental homeostasis, a strong immune system, good health, high estrogen levels and youth.
- Circulating levels of estrogen, for example, is related to body shape in Polish women.



Adaptive mate preferences of men

- Many physical features in women that men find attractive are linked to fertility.
- Women can only become pregnant at the time of ovulation. Thus, we would expect males to be attuned to cues that signal ovulation.

Adaptive mate preferences of men

- Males do exhibit these traits.
- Men find the scent of a T-shirt worn by an ovulating women sexier than that worn by a non-ovulating woman.
- Similarly, men rate as more attractive, facial photos of women taken during their period of ovulation than pictures taken when the same woman was not ovulating.

Singh & Bronstad (2001) Female body odour is a potential cue to ovulation. *Proc. Roy. Soc. Lond. B* 268: 797-801.

Roberts et al. (2004) Female facial attractiveness increases during the fertile phase of the menstrual cycle. *Biology Letters* 271: 270-272.

(a) (i)



(ii)



(b) (i)



(ii)



Roberts et al. (2004) Female facial attractiveness increases during the fertile phase of the menstrual cycle.
Biology Letters 271: 270-272.

**judged
most attractive**

follicular phase
(day 12,
highest prob.
of conception)

(a) (i)



(b) (i)



luteal phase
(day 19,
lowest prob.
of conception)

(ii)



(ii)



Roberts et al. (2004) Female facial attractiveness increases during the fertile phase of the menstrual cycle.
Biology Letters 271: 270-272.

Adaptive mate preferences of men

- Conclusion: cues males use in assessing attractiveness of partners appear to have a significant selective advantage associated with them, which is not consistent with the cultural explanation.

Adaptive mate preferences of women

- Women also exhibit adaptive mate preferences.
- Human females appear to rate capacity of males to supply good genes and to provide resources highly when evaluating potential mates.

Adaptive mate preferences of women

- Numerous studies have reported that females express a preference for men with “masculine” features: a prominent chin and strong cheekbones, athletic and muscular upper body and facial symmetry.
- These features have been linked to high testosterone levels, good health and developmental homeostasis.
- Evolutionary basis for these preferences may be that males can pass their genes for attractiveness to their children or that these traits are correlated with ability to secure resources.

Adaptive mate preferences of women

- Studies have documented females have preferences for male physical appearance but most researchers have concluded that looks are much less important for single men than single women.
- Instead, the difficult task of rearing offspring to maturity has selected females to focus on securing a mate willing and able to assist with child rearing.

Adaptive mate preferences of women

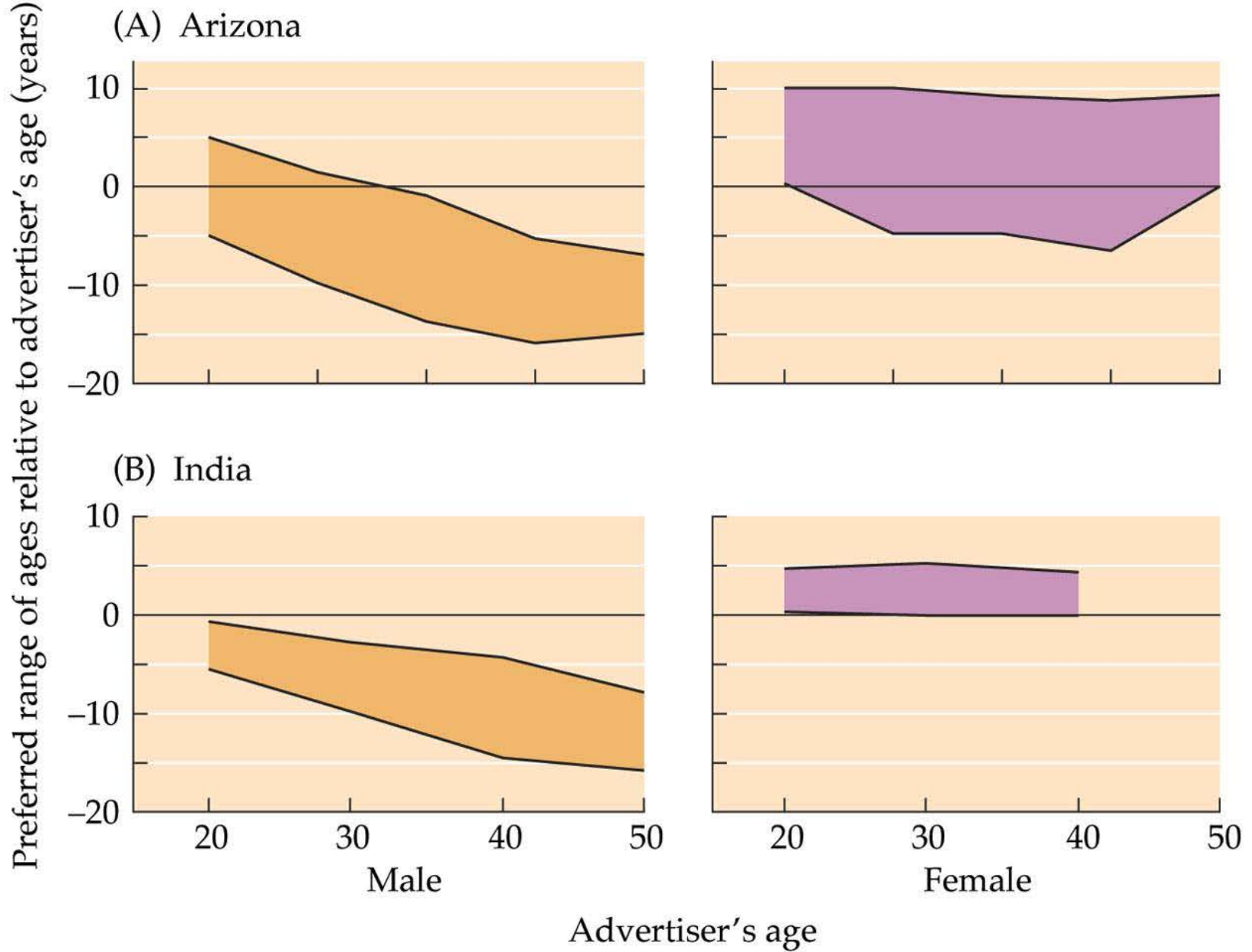
- Consistent with this idea many studies have shown that women prefer males who can supply resources and that this preference enhances fitness.
- E.g. women with wealthier husbands in societies where there is no birth control have higher lifetime fitness than women with poorer husbands.

Adaptive mate preferences of women

- Women whose husbands are good hunters produce more surviving offspring among the Ache of Paraguay.
- Studies of women in Africa and Iran show that a woman's reproductive success is related to her husband's wealth.
- Even in modern western societies income is correlated with children's health and chronic illness in childhood can reduce earning power in adulthood, perpetuating the cycle of poverty.

Adaptive mate preferences of women

- Given the importance of resources to women's prospects of enhanced reproductive success it would make evolutionary sense for females to favor wealth, status and power over good looks in a partner.
- Data from personal ads (where costs limits word use) provide relevant evidence of the features most valued in a mate: males across cultures consistently seek younger (presumably more fertile) partners and females seek older (wealthier) partners.

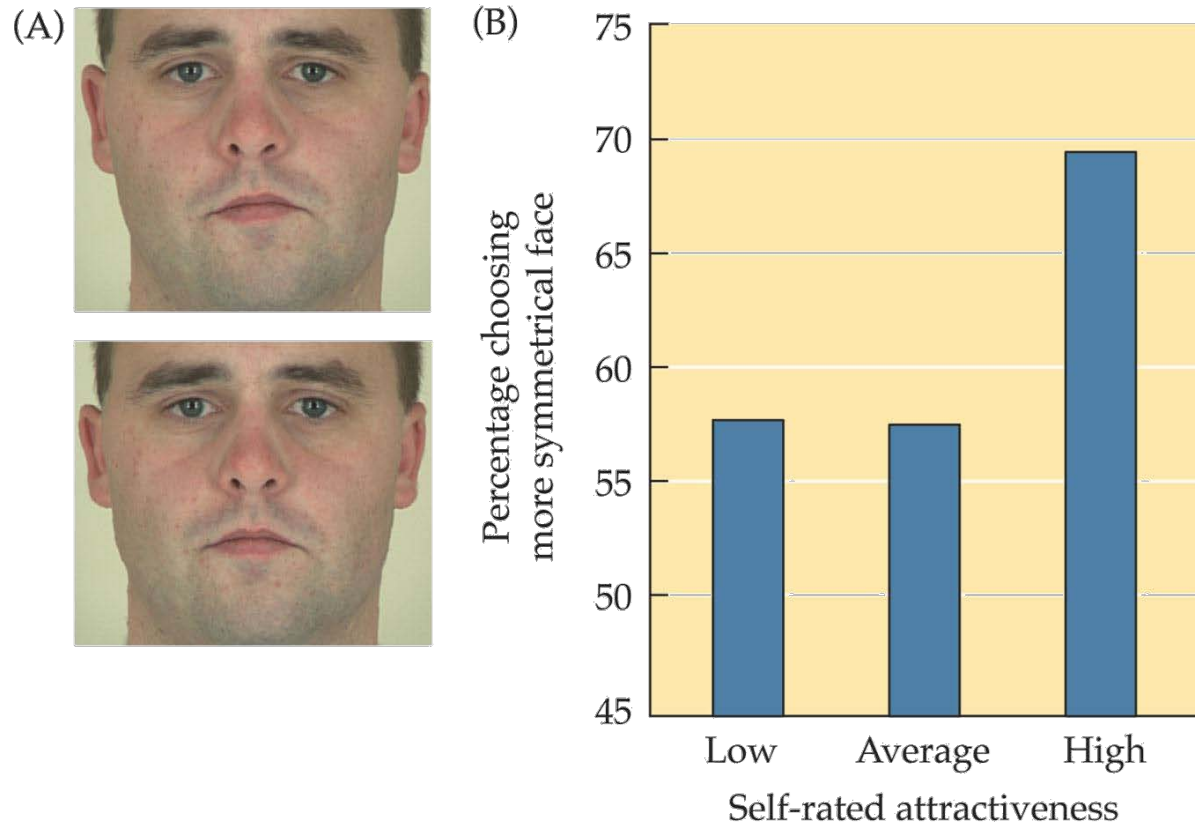


Males generally seek younger (presumably more fertile) partners and females seek older (wealthier) partners.

Conditional mate preferences

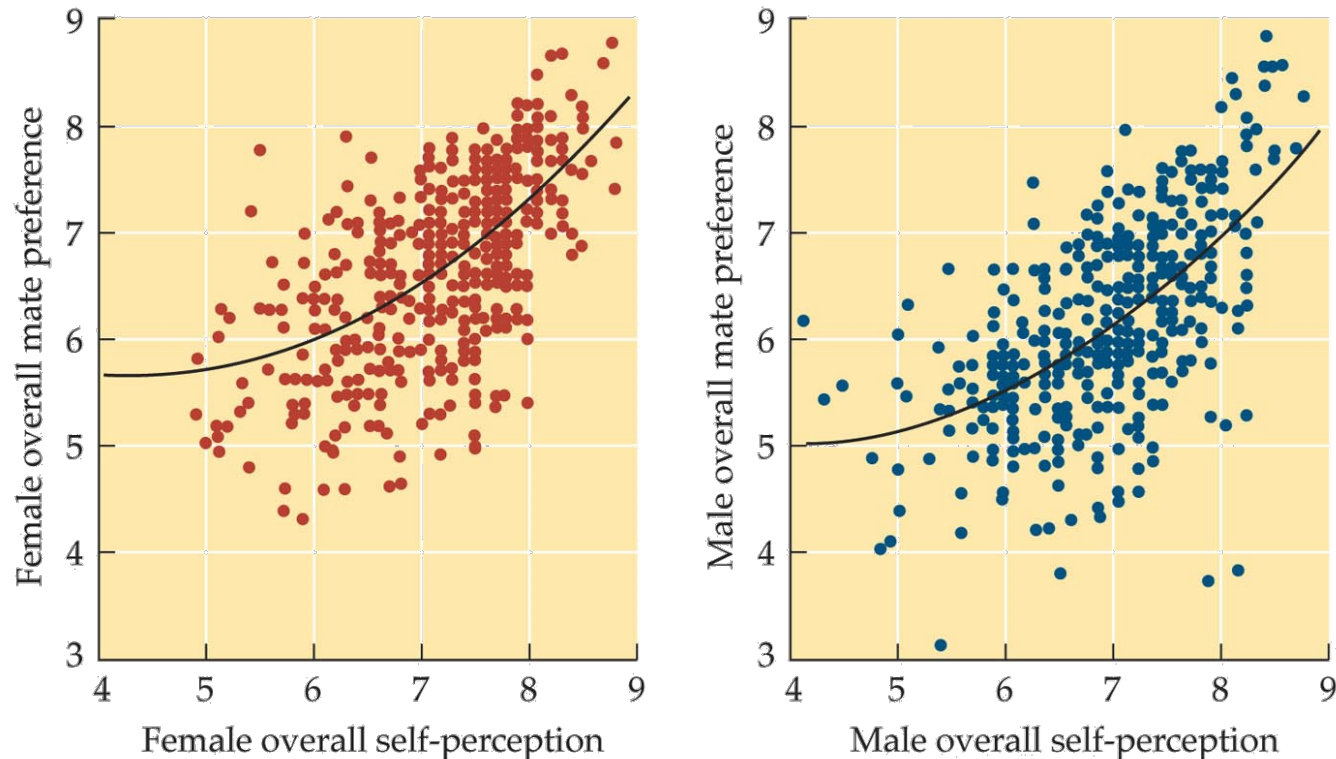
- What people want in an ideal mate and what they can obtain are not always the same.
- The supply of the most desirable mates is limited and people employ conditional strategies in mate selection that reflect their own attractiveness as mates.

Conditional mate preferences



For example, females who rate their own attractiveness highly show a stronger preference for both relatively masculine and symmetrical faces

Conditional mate preferences



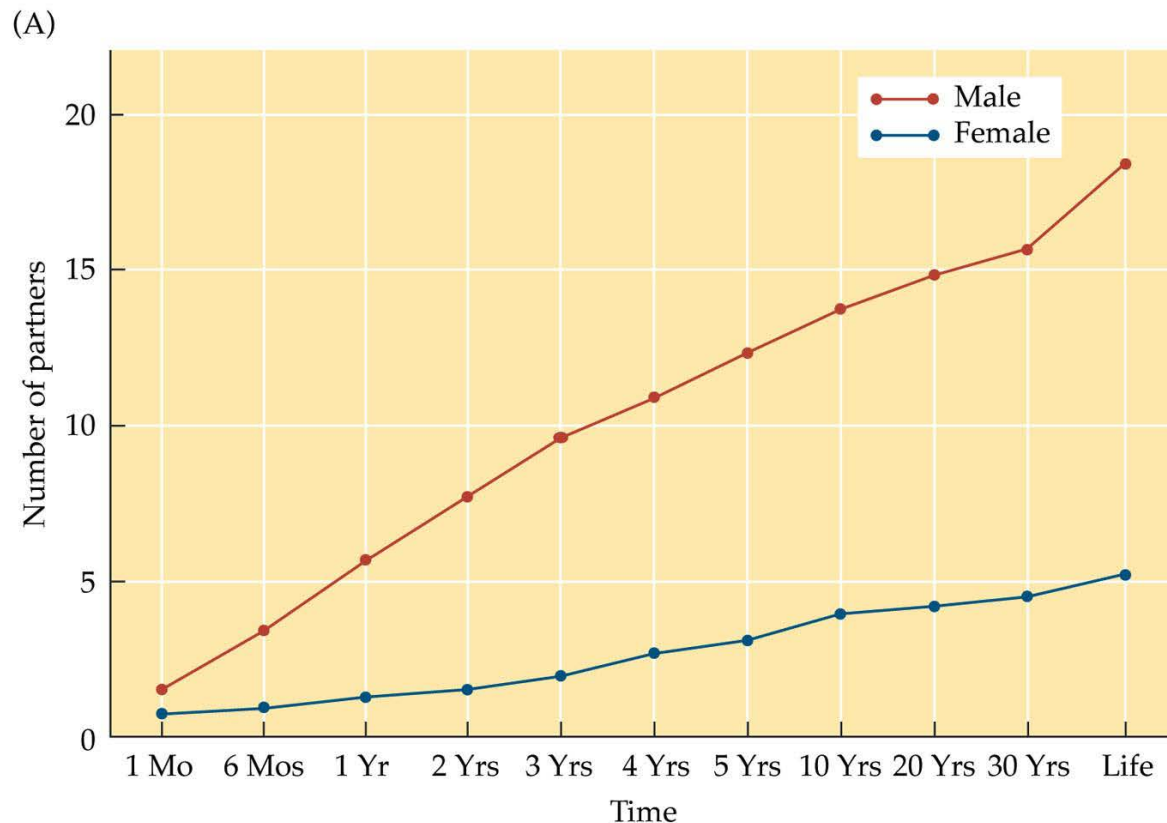
Similarly, both males and females who consider themselves high ranking mate prospects express a preference for similarly highly ranked mates.

Sexual conflict

- Because male and female fitness interests do not necessarily coincide sexual conflict is likely.
- One significant area of conflict is male's on average greater interest in multiple sexual partners.

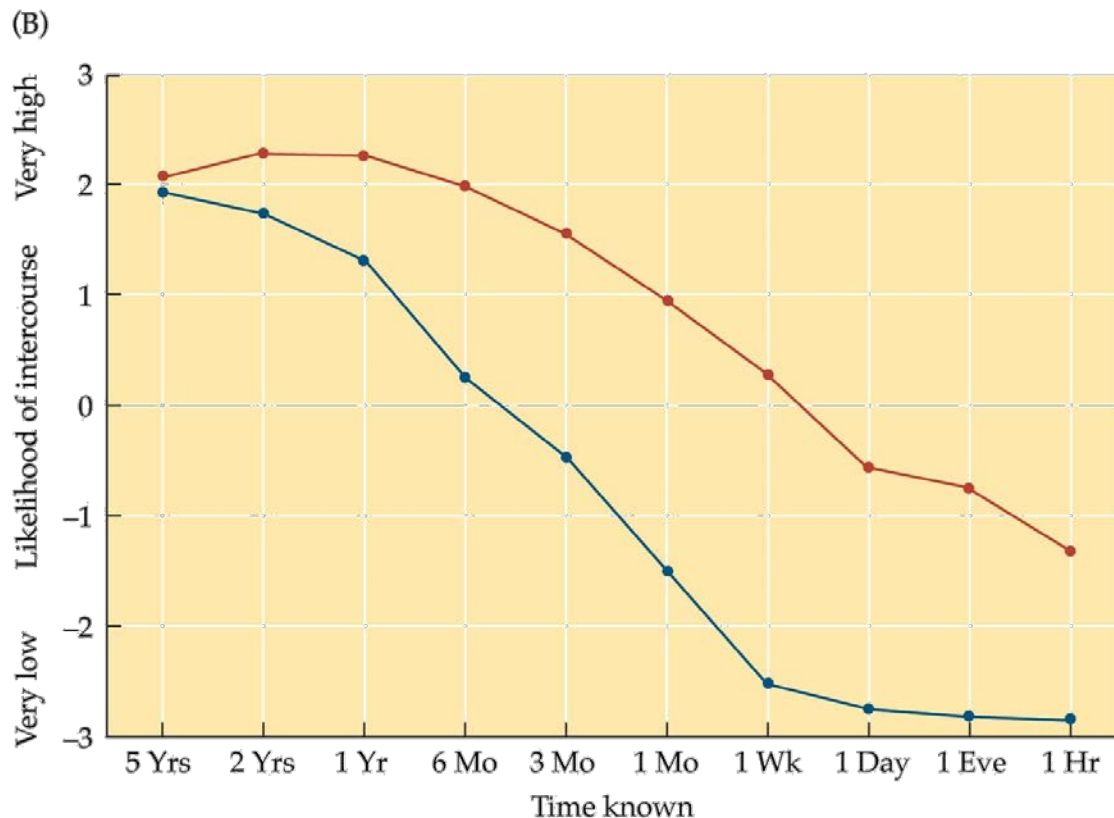
Sexual conflict

Men consistently express a greater interest in having multiple sexual partners over a given time period than women.



Sexual conflict

Men and women also differ in how likely they would be to have sex with a partner after knowing the individual for different lengths of time.



Sexual conflict

Men are less selective in the choice of a partner

Clark & Hatfield *J. Psych. Hum. Sex.* 1989

Males

Females

“Would you go out with me tonight?”

“Would you come to my apartment?”

“Would you go to bed with me tonight?”

Sexual conflict

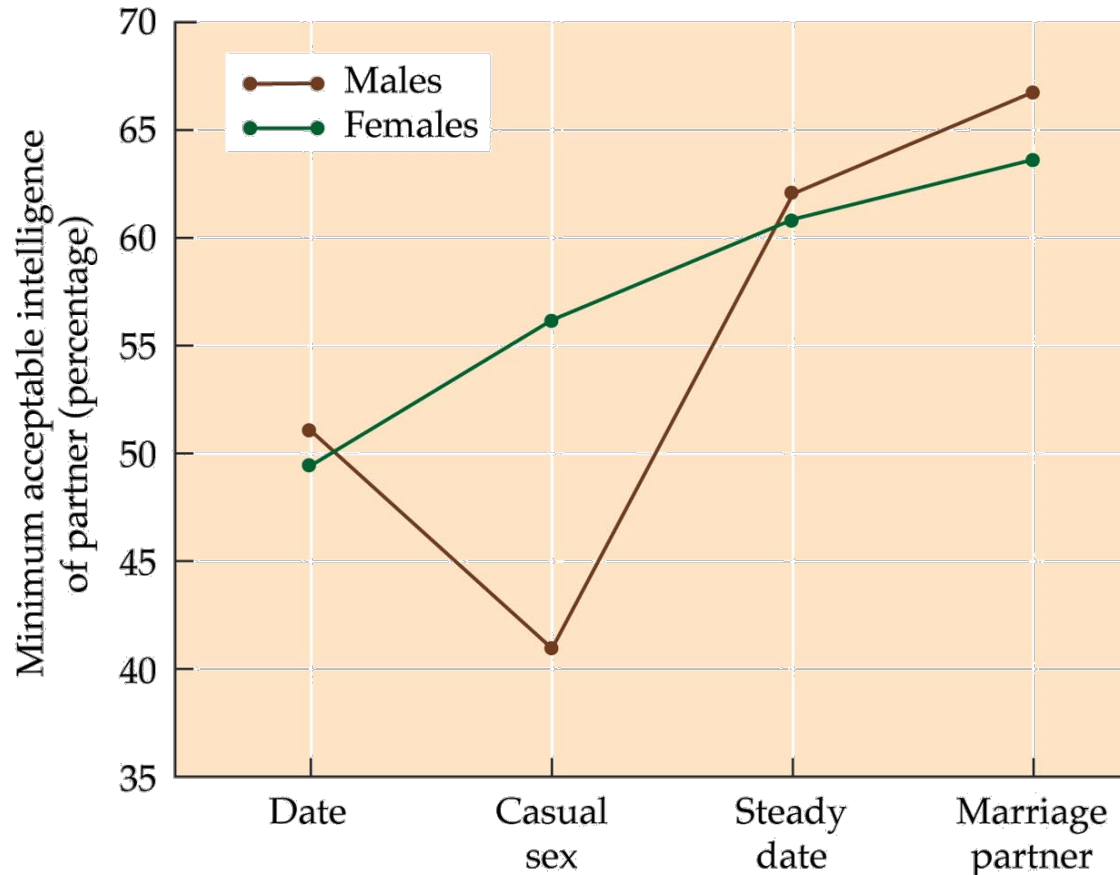
Men are less selective in the choice of a partner

Clark & Hatfield *J. Psych. Hum. Sex.* 1989

	Males	Females
“Would you go out with me tonight?”	50%	56%
“Would you come to my apartment?”	69%	6%
“Would you go to bed with me tonight?”	75%	0%

Sexual conflict

Men are less selective in the choice of a partner, particularly in the context of short-term relationships



Sexual conflict

- Polygynous men can potentially achieve substantially higher reproductive success than monogamous men and polygyny has been widespread in human history.
- Women, however, are likely to do worse in a polygynous system.
- For example, in 19th century Utah monogamous Mormon women married to relatively poor men had more surviving children on average (6.9) than women married to rich polygynous men (5.5).
- The polygynous men, of course, did much better than the monogamous men.

Sexual conflict

- Potential benefits of polygyny to males increase potential for conflict between mates.
- However, females may also opt for extra-pair matings if these offer better genes, more resources or the possibility of trading-up to a better partner.

Sexual conflict

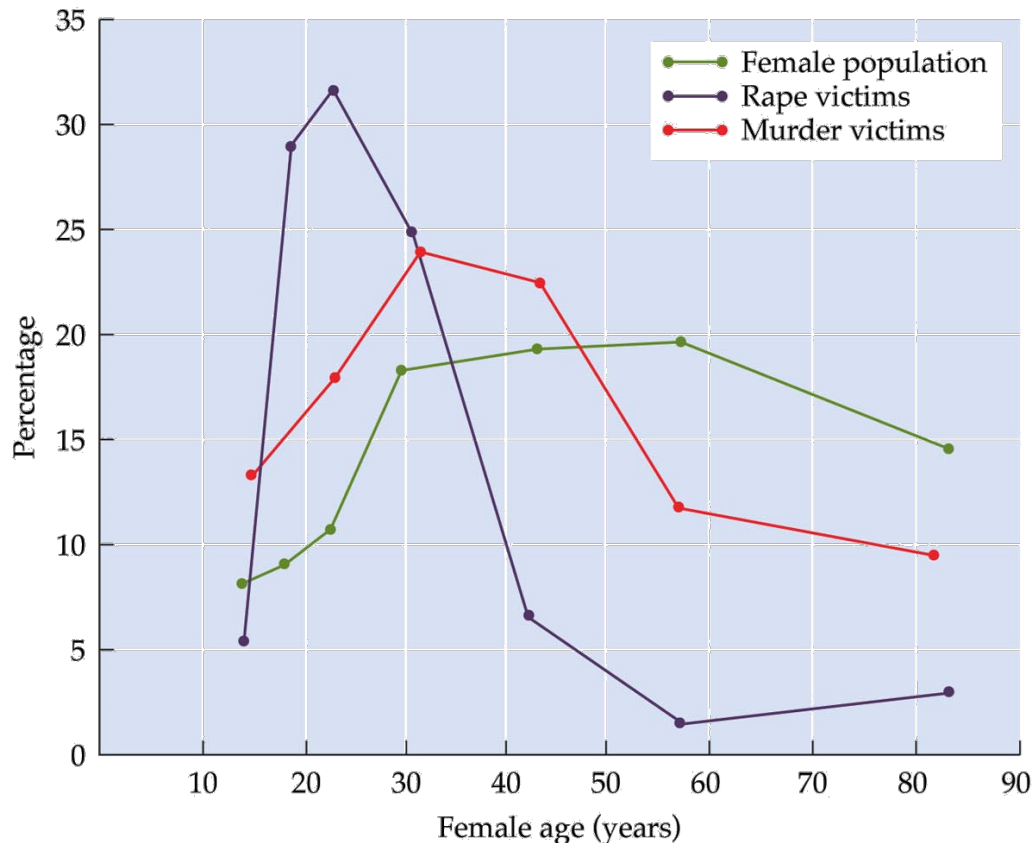
- Sexual jealousy is likely an evolutionary consequence of the conflict between the sexes.
- The conditions that cause the most intense expression of jealousy appear to differ between the sexes.
- Males respond most to a potential loss of paternity and sexual infidelity whereas females express greater concern when their mates develop deep emotional relationships with other women, which threaten the long-term partnership.

4. Test case: coercive sex

Coercive sex

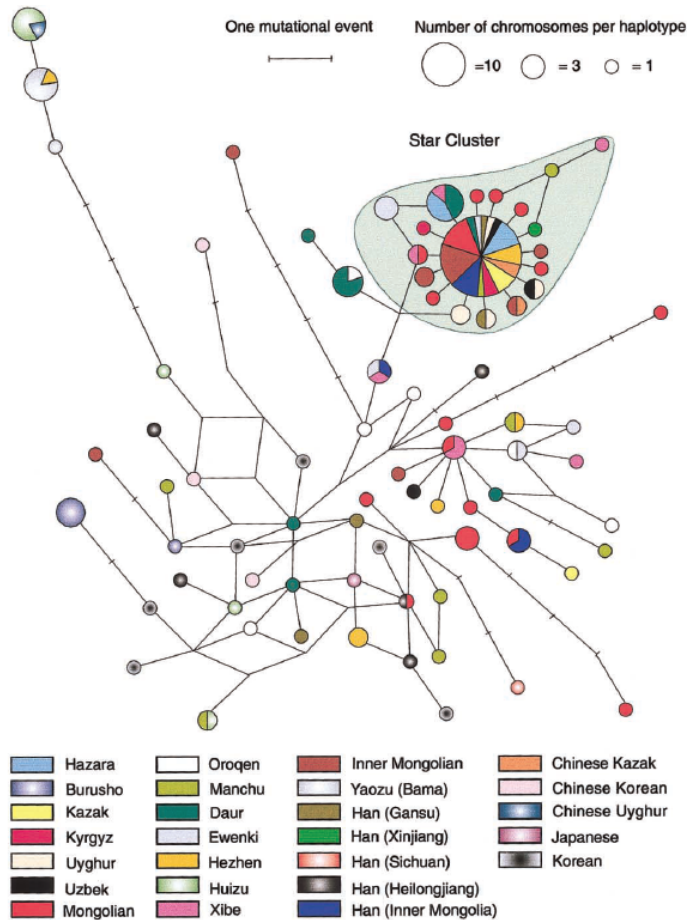
- Thornhill & Palmer: evolutionary biologists who wrote a book on the natural history of rape (coercive sex)
- Suggested that rape could be an adaptive male strategy particularly for men with a low reproductive value. Was heavily criticised. E.g. children abuse or homosexual rape clearly can't have any fitness benefits.
- Test: do rape victims belong more often than random to the age category of maximum fertility?

Coercive sex



Yes, raped woman are most often in their early 20s, when they are maximally fertile. Murder victims, by contrast are usually well into their 30s.

Coercive sex



Median-joining network of Y-chromosomal variation.



Frequency of star cluster Y chromosome haplotype. Shaded area=extent of Genghis Khan's empire at the time of his death.

Ca. 8% of all men in Asia (or 0.5% of the world's population) carry a Y chromosome haplotype that originates from male-line descendants of Genghis Khan (1162-1227).

Probably linked to the slaughter, pillage and rape exercised during the many conquests of Genghis Khan and his male-line descendants (who ended up ruling large areas of Asia up until the 17th century).

Coercive sex



Coercive sex also occurs in the animal kingdom, e.g. in the Iron cross blister beetle.

Left: normal courtship pattern

Right: coercive sex

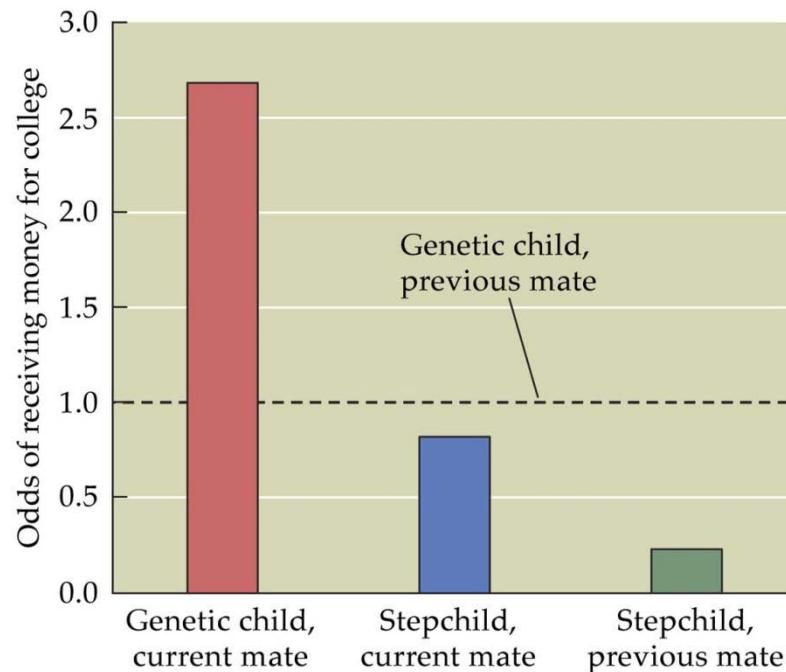
5. Test case: parental care

Adaptive parental care

- Making decisions that increase the likelihood that genetic offspring will reproduce successfully and directing resources so as to maximize the number of grandchildren produced by offspring are strategies likely to be favored by selection.

Adaptive parental care

- Humans appear to apply such strategies.
- It is well established that parents of genetically related and stepchildren discriminate in resource allocation.
- For example, the odds that a man will give a child money for college is much higher if he is the genetic father rather than the stepfather.



Adaptive parental care

- Similarly, stepmothers are less likely to care for stepchildren than their own offspring.
- Households in which a woman cares for stepchildren, foster children or adopted children spend less on food than households in which the mother cares for genetic offspring.

Adaptive parental care

- Stepchildren are also more likely to suffer abuse than genetic children.
- In one Canadian study the relative risk of abuse was much higher for stepchildren than for genetic children.

	Type of father	
	Genetic father	Stepfather
# murders per million / yr	2.6	322
<i>N</i>	1,665,000	10,000

Daly, M & Wilson, M. 2001. An assessment of some proposed exceptions to the phenomenon of nepotistic discrimination against stepchildren. *Annales Zoologici Fennici* 38: 287-296.

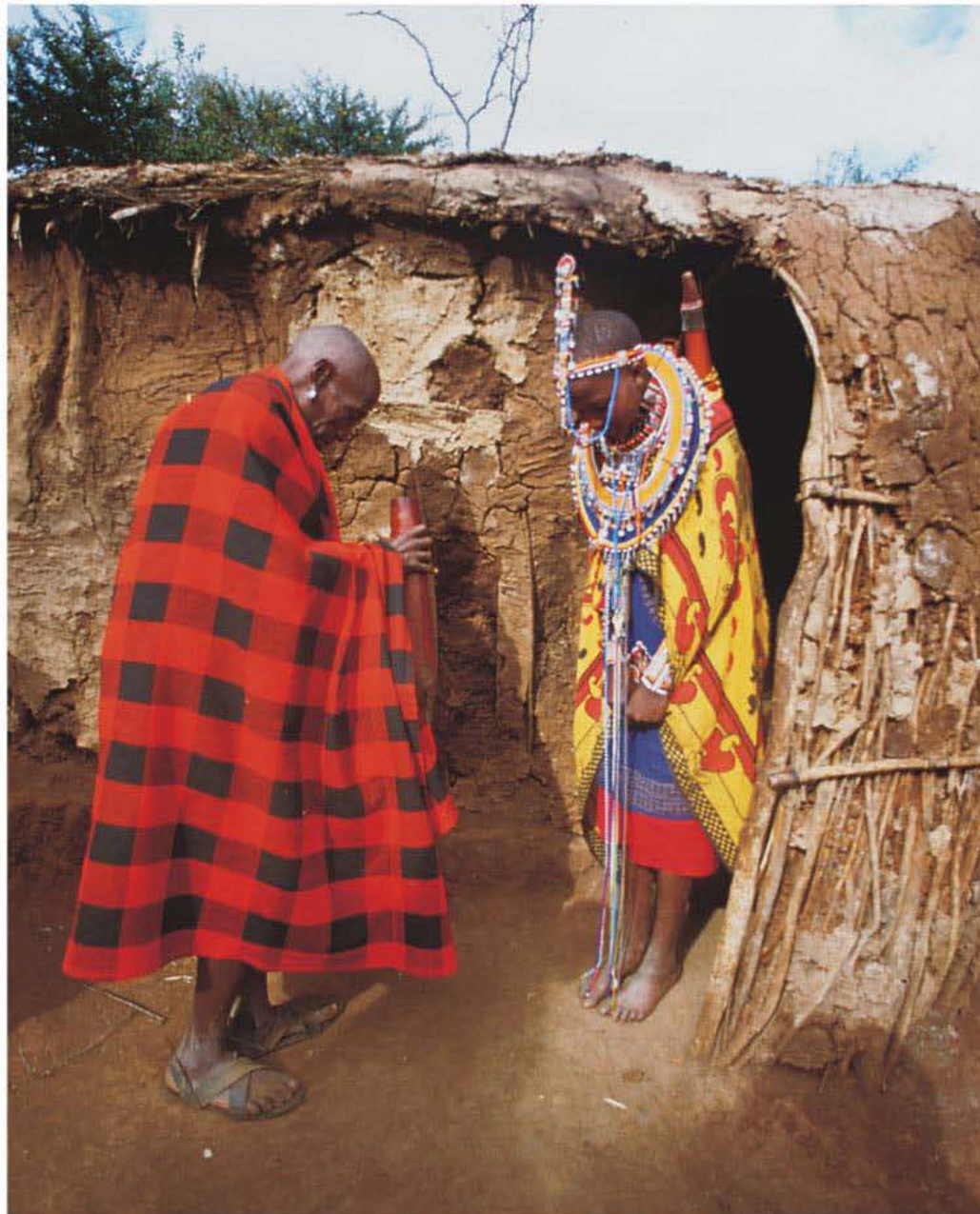
Adaptive parental care: assisting children's reproduction

- Parents not only discriminate between genetically related children and step children, but also discriminate among genetically related children.
- In many societies parent commit resources to enable their offspring to marry.

Adaptive parental care: assisting children's reproduction

- In some societies the grooms family must contribute resources (a bridewealth) to the bride's family, whereas in others the bride's family contributes a dowry.
- If these payments are purely cultural we would expect the two forms to be equally common. However, they are not.
- Sexual selection theory suggests that because males usually compete for females that bridewealth payments should be more common than dowries.
- In 66% of societies studied bridewealth payments occur, but dowries in only 3%. Bridewealth payments are especially common in cultures where men can have more than one wife. In these societies marriageable females are in demand and so demand a price.

Masai father
and his soon-to-be
-married daughter.
The father will have
received a
bridewealth
payment before
giving permission
for the marriage.



Adaptive parental care: assisting children's reproduction

- Even in supposedly monogamous western societies rich men may have greater opportunities for reproductive success.
- Parents in modern societies appear to retain an ancestrally selected bias that favors investing more in the offspring with the highest reproductive potential.
- This shows in inheritance decisions. Wealthy Canadians bias their legacies towards sons.

TABLE 14.1 *The relationship between the mating systems of human cultures, bridewealth payments, and inheritance systems that favor sons*

Mating system	Bridewealth payment		Sons favored	
	No	Yes	No	Yes
Monogamy	62%	38%	42%	58%
Limited polygyny	46%	54%	20%	80%
General polygyny	9%	91%	3%	97%

marriageable females in demand and so demand a price

sons have much greater reproductive potential

Source: Hartung [516]

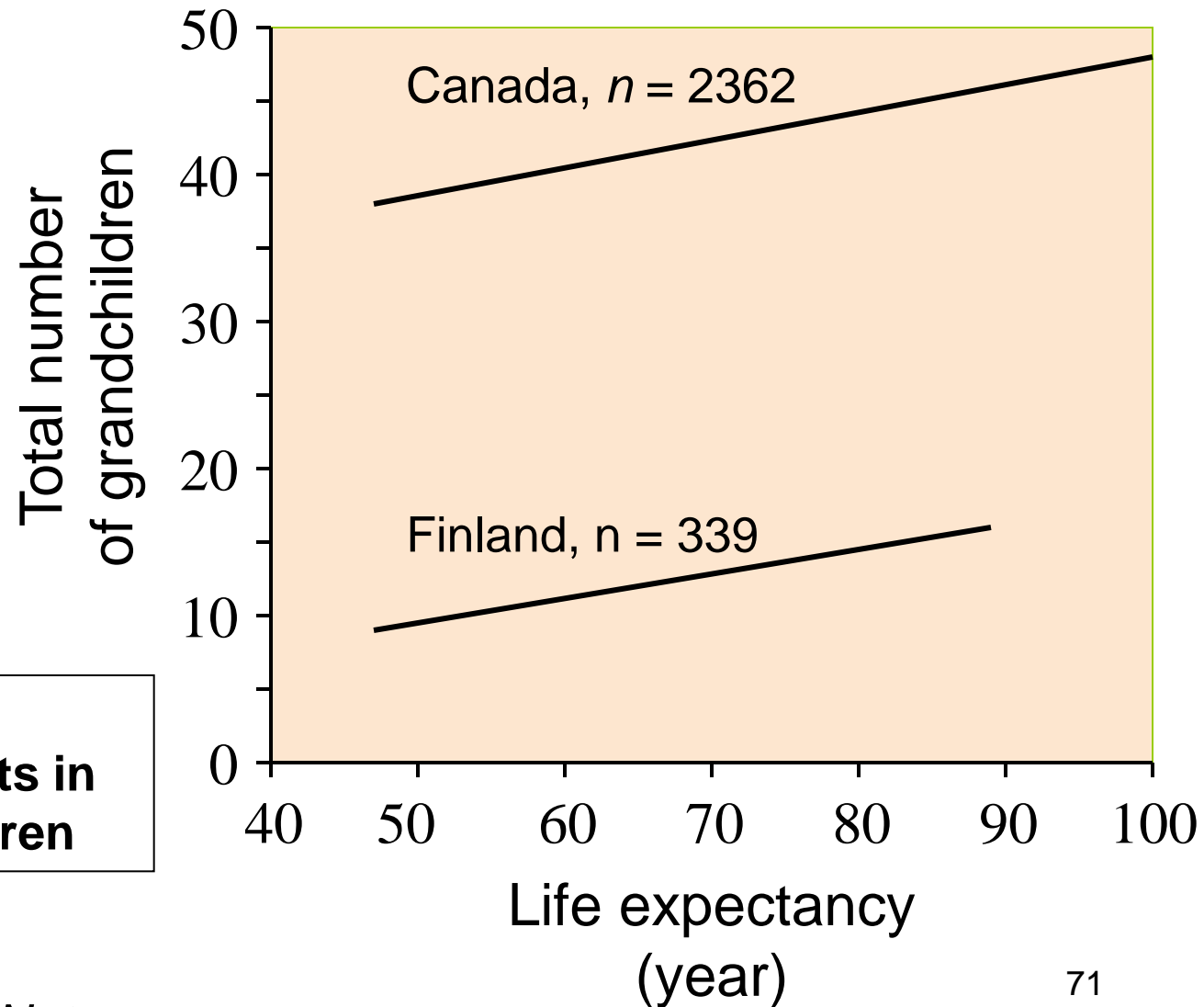
Note: The data are from Murdock's *Ethnographic Atlas* [863] for 112 monogamous cultures, 290 cultures that practice limited polygyny (less than 20 percent of men are polygynous), and 448 that practice general polygyny (more than 20 percent of men are polygynous). When sons are favored, they receive all or almost all of the parental inheritance.

Adaptive advantage of menopause

Why stay alive past menopause given that women are no longer fertile then?
Theory: help rear grandchildren (grandmother effect).

	18th-19th century	
	Finland	Canada
Age of having 1st child (years)	25.4	22.8
Age of having last child	39.3	38.7
Number of children	6.8	9.1
Number of children that survive to 15 years	3.8	5.1
Number of grandchildren	11.3	38.2
Life expectancy for women aged 50	67.5	74.0

Adaptive advantage of menopause



10 years of post-menopausal life results in ca. 2 extra grandchildren

Economic game theory

- **Economic game theory:** aimed at determining what people should do in conflict situations if they behaved rationally (developed by Oskar Morgenstern, John Von Neuman & John Nash in 1950s)

- Example: **ultimatum game**

You have to divide up a sum of money with another anonymous person. The other can reject the proposed share, but if he does this neither of them gets any money.

- **Rational behaviour:** first person gives very little to the second person, and the other always accepts

- In practise people do not usually act so rationally. E.g. proposed share often rejected.

- Probably because we are not adapted to act optimally in one-shot anonymous situations.

The future

- E.O. Wilson proposed in 1975 in his book Sociobiology: The New Synthesis that evolutionary theory would transform the social sciences
- Was he right??
- Only the future will tell