

6. Sexual Selection, Mate Choice

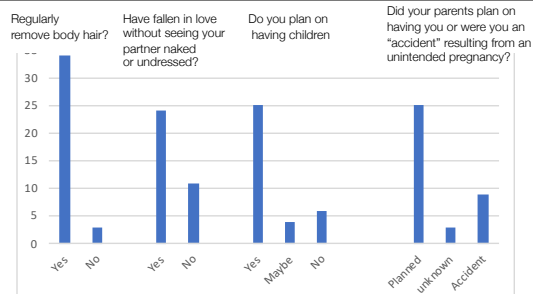


ANBI 116 Evolution of Sex
Pascal Gagneux

January 23, 2020

Auguste Rodin, “Le Baiser” 1889, considered as valuable art by some, seen as offensive by others.

Brief anonymous survey



The majority of us seem to regularly remove body hair, why? Many of us have fallen in love without prior exposure to our mates naked bodies (does this mean that sexual selection on aspects of the body is not really important?) More than two thirds of you say you want kids. Many of you were the result of unintended pregnancies (to be expected)

Criteria for Mate Choice

Suggestions from the class:

- Caring
- Accepting
- Similarities
- Challenging
- Confidence
- Communication
- Passion/Hobbies
- Tall
- Short
- Sexually Attractive
- Groomed/Hygiene
- Humility
- Parental
- Culture/Religion
- Employment/Work
- Beard/Facial Hair
- Humor
- Intelligence (what type?) Emotional Availability
- Common Sense
- Aspirations
- Social
- Honesty
- Motivation/Drive
- Odor

Looks and physical traits clearly play a role in human mate choice, but there are many other criteria about mates including their social entourage (fancy French for “surrounding”, family, peers, friends etc.) that seem important.

Practice question: What are some of the traits that humans value in their mates that are uniquely human?

Sense of humor, reputation.

Criteria for Mate Choice

David Buss 1989, 1994, studied 10,000 people in 37 cultures

good job (resources)	age	Suggestions from the 2018 class:
social status	empathy	
good family, kin group	self-confidence	
health	right ethnicity	
intelligence	skin color	
good peers/group	hygiene	
education	language	
beliefs	honesty	
world view (optimism/pessimism)	loyalty	
looks	kindness	
physical fitness	lifestyle	
	commonality	

Buss, D. 1989, *Behavioral and Brain Sciences*

Buss, D. 1994 *Behavioral and Brain Sciences*

Replicated by: Bech-Sørensen, J. & Pollet, T.V. 2016 *Evolutionary Psychol. Sci.*

Changes in mate choice between now and your grandparents' time



Times have changed for sure. For many of us, much more choice and much more additional information about others. Gender roles have seen change, polygamy is illegal in most countries, polyamory is en vogue in some places. The double standard of slut versus stud still very much exists. Social media are changing many things. Virginity in females has become almost as trivial as in males in many societies. There are much better mean of contraception and protection from STIs, there are new STI, e.g. HIV, ZIKA

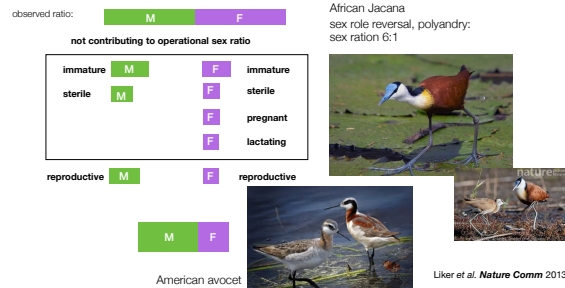
Changes in mate choice between now and your grandparents' time

arranged marriage	previous classes:	importance of cooking & providing by female
no online dating services		no choice
no texting/FB/Twitter etc		polygamy options
very limited options for LGBTQ people		less privacy/anonymity
divorce impossible/difficult		no openly same sex relationships possible
even stronger M/F double standard		single income possible
sanctions for rule breaking very harsh		looks as fitness indicators
		no plastic surgery
		endogamy
		close proximity
		no or limited child free choice
		timing of pregnancy
		infertility stigma
		no contraception

Proximity
Family
IT
Marriage (heterosexual) as norm
Gender Roles
Pragmatic
Racial Norms
Needs of women considered more
Divorce (not possible or difficult)
Birth Control - access, acceptability

importance of social class
importance of virginity (for women)
"purity" religious and sexual
body modification
reproductive technology
stay at home fathers and more career options for women
less addiction to reputation now
STI different and without treatments

Operational sex ratio



Even with near to even male female ratios at birth, the operational sex ratios can be very skewed. Some birds have 6 times as many adult males as females....

Practice question: What is the operational sex ratio?

The number of fertile males to the number of fertile females in a population.

Evolutionary Strategies

- ESS: evolutionarily stable strategies:

Strategy which, if adopted by a population in a given environment, cannot be invaded by any alternative strategy that is initially rare.



John Maynard Smith
1920-2004

Maynard Smith was a famous evolutionary biologist who came up with the term “evolutionary stable strategy”.

For a behavior to evolve and to persist across generations, it must be “stable”, i.e. not subject to being exploited by a different, “cheating” strategy.

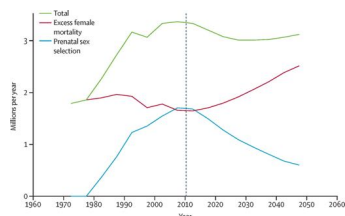
For example: generosity among humans will only persist if societies come up with some safe guards against free loaders, one such safe guard is that generous individuals refuse to help people who have the reputation of only taking and never giving..... Many traditional societies employ such safe guards. In addition, many societies have cultural norms that highly value generosity.

Beware of counter strategies though.....

As Groucho Marx put it: “The secret of life is honesty and fair dealing. If you can

Missing Women

Building on Sen's approach, we estimated that the number of missing women has steadily risen from 61 million to 126 million between 1970 and 2010.2 This increase is faster than that of the world population, with China and India accounting for most of the deficit in women.



Boongarts & Guilmoto. How many more missing women? *The Lancet* 2015

Several million girls are missing every year based on expectations of 1:1 birth ratios without intervention: Human culture: the preference for sons due to ancestor worship traditions China and the dowry traditions in India have led to the infanticide (direct or via neglect) of millions of girls. More recently, pre-implantation sexing in IVF or selective abortions have skewed the birth sex ratio toward males.

Practice question: How do you explain that millions of females seem to be missing from populations in Asia?

Infanticide, selective abortions, pre-implantation embryo selection.

The problem of measuring human sexuality

People do and say very different things

penile plethysmograph

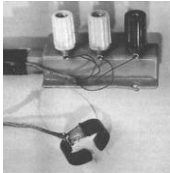


Table 2
Correlations Between Subjective Arousal and
Subjective Erection Ratings

Group	N	Video		
		Heterosexual	Lesbian	Male homosexual
Homophobic	35	.91	.95	.90
Nonhomophobic	29	.93	.94	.78

Adams, Henry E., Wright, Lester W., Lohr, Bethany A.
Is homophobia associated with homosexual arousal?
Journal of Abnormal Psychology, 1996

Adams and colleagues demonstrated using direct measurement of intensity of sexual arousal in males (measuring blood flow by change of penile diameter) in men watching various erotic movies, that just because a man says that he really despises gay men, does not mean that the same man will not be more aroused by gay sex than by hetero sex.

In an experiment, self declared homophobic men were more sexually aroused by male homosexual erotic video than non-homophobic men. True or false? (True)

Human Mate choice

Most everyone involved in choosing!

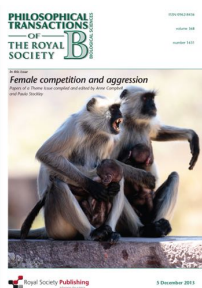
Reciprocal and third Party!

Competition for mates and mate retention by both sexes!

Humans are highly unusual by having lots of choosing by both sexes and often combined with third party (family, authorities) involvement. Humans can also poach mates from established pairs, and cryptic mate choice can be part of mixed mating strategies between long-term bonding and short term sex.

Practice question: What is unusual about human mate choice patterns, compared to many other animal species?
Both sexes chose partners and try to retain their partners.

Competition for mates: Females



Sarah Hardy. *The Woman that never evolved* 1981

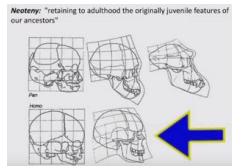
Women often compete over mates and over retention of mates. Clearly less violence is perpetrated by human females, but competition between females can turn very ugly.

Competition for mates: Males and Females



Different societies allow females to choose mates to very differing degrees. Choice by males can be strongly limited by class, caste, socio-economic status.

Neoteny



slow down and extension of many developmental phases:

- playfulness
- language
- lowered aggression

Evolutionary Hypotheses for Human Childhood, Bogin, B.,
Yearbook of Physical Anthropology Volume 40, p.63-89, (1997)

Neoteny is a common way that new features evolve by changes to the development including retention of juvenile traits in the adult. The human head and face shape is clearly neotenous compared to apes, where the face grows and protrudes far in front of the head.

Practice question: Explain the concept of neoteny.

It is an evolutionary process whereby juvenile traits are retained in the adult.

Humans as neotenous apes

Female humans more neotenous than males, despite their faster development?

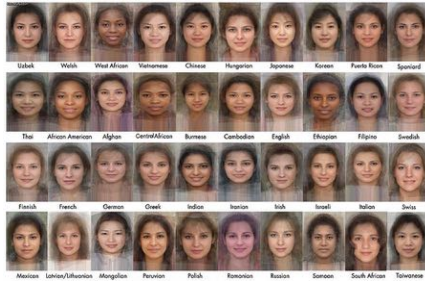


Female humans show many neotenous features: smaller facial features including nose, eye brows, chin etc.

Practice question: Which traits of the human face are more neotenous in females?

smaller noses, smaller chin, more delicate features (less secondary growth during puberty).

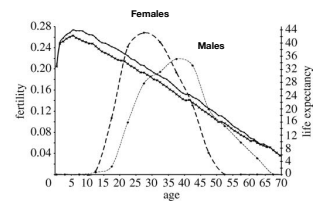
Human female beauty tied to neoteny



There seems to be a strong asymmetry in that youth (neoteny) is an important criterium for judging female beauty but less so for the assessment of male beauty. Symmetry and signs of health are important in both sexes. Studies of criteria of beauty in mates among non-heterosexuals are in their infancy.

Fertility and Age in Women and Men

Natural fertility populations (Ache, Paraguay and Hadza, Tanzania)



Female fertility is disproportionately affected by youth, males retain fertility later in life, but as discussed earlier, older males have more genetic mutations (de novo mutation) in each of their sperm.

Practice question: Is human fertility affected by age the same way in women and men?

No, female fertility is affected more strongly by age.

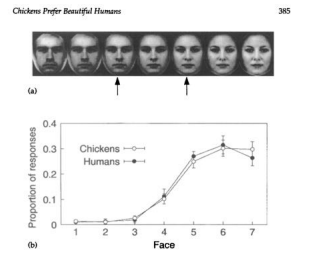
Female youth as indicator of fertility?

As Human males age, they start favoring younger females.

Gay men exhibit the same trend for male youth.

Trend favoring youth has not been reported for females.

In the eye of the beholder?



Ghirlanda S, Jansson L, Enquist M. Chickens prefer beautiful humans. *Hum Nat.* 2002

Even chickens seem to prefer the same faces preferred by most humans. (a) Faces used in the experiment (see text). (b) Average proportions of pecks by chickens in response to the test faces, and human ratings of the same faces. Bars denote SE. Animal data are aligned so that face 3 is the unrewarded face and face 5 the rewarded one. For humans, face 3 is the same-sex average and face 5 the opposite-sex one.

Parental or Mating Effort?

Males can focus on either or.

Females likely select for the latter.

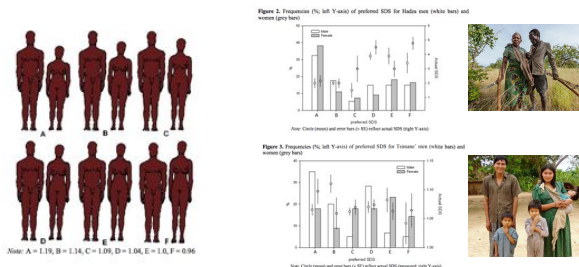
Both, female short term strategies and upbringing of their sons, might favor male mating effort.

How important is it to be a good parent, or at least project the impression that one is “good parent material”? Given the huge asymmetry in parental investment between men and women, due to internal insemination, internal gestation, difficult child birth, and prolonged lactation, the criterion of parental capacity, at the very least in the form of provisioning and resources appears more important in women. Men can neglect parenting effort in favor of mating effort.

Practice Question: How can mothers contribute to the mating effort of their sons?

By tolerating or even promoting their sons machismo.

Cultural preferences for body height dimorphism



Sorokowski et al. Body Height Preferences and Actual Dimorphism in Stature between Partners in Two Non-Western Societies (Hadza and Tsimane'). *Evol. Psychology* 2015

Testing preferences for degrees of sexual dimorphism in stature reveals much variation between cultures.

People across societies prefer sexual dimorphism with the man larger than the woman. True or false? (False)

Cultural differences in preferred dimorphism

Table 1. Actual and preferred SDP among indigenous societies					
Study site	Subsistence strategy	Mating pattern	General outline	Preferred / Actual SDP	Data source
Hadza (Tanzania)	Hunter-gathering	Monogamy	Majority of men and women preferred and realized a sexual dimorphism in stature (SDP) with the men being taller than the women, in approximately 10% of all marriages, the wife was taller than the husband. No evidence for the male-taller norm. In approximately 8% of all marriages, the wife was taller than the husband.	Preferred + Actual	This study
Tsimane' (Bosnia)	Farming-fishing	Monogamy	Majority of men preferred an SDP with the men being taller than the women, but women did not show a specific preference for their partner's height. In less than 4% of all marriages, the wife was taller than the husband.	Preferred + Actual	Sear and Marlowe, 2008 This study
Dahalo (Tanzania)	Pastoralism	Polygyny	Majority of men and women preferred extreme sexual dimorphism in stature (SDP) with men (i.e. men and women chose partners much taller or much shorter than themselves).	Preferred	Sorokowski and Buss, 2012
Himba (Namibia)	Semi-sedentary pastoralism	Polygyny	Majority of men and women preferred an SDP with the men being taller than the women, but a significant percentage of participants (over 10%) preferred partners' body height to be similar to their own, since Himba men preferred women taller than themselves.	Preferred	Sorokowski et al., 2012
Yali (Indonesia/Hig Mendi of New Guinea)	Farming-fishing	Polygyny	Men and women did not show any specific preference for their partner's height.	Preferred	Sorokowski and Sorokowski, 2012
Gnau (Namibia)	Polygyny		No evidence for the male-taller norm. In approximately 10% of all marriages, the wife was taller than the husband.	Actual	Sear, Allal, and Marlowe, 2008; Sear, 2008
Hadza (Tanzania)	Hunter-gathering	Monogamy	Partial evidence for the male-taller norm, women's concerning height and mate choice suggested that the male-taller norm matches mating preferences.	Preferred + Actual	Becker et al., 2012

Sorokowski et al. Body Height Preferences and Actual Psychromorphism in Stature between Partners in Two Non-Western Societies (Hadza and Tsimane'). *Evol. Psychol.* 2015

Sorokowski et al. Body Height Preferences and Actual Dimorphism in Stature between Partners in Two Non-Western Societies (Hadza and Tsimane'). *Evol. Psychology* 2015

Sexual dimorphism in stature preferences across foraging societies.

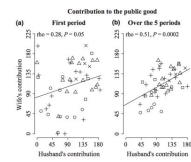
Among the Himba of Namibia, where women famously keep many boyfriends in different camps, many (20%) of males prefer dimorphism where women are taller.

Assortative Mating



Socioeconomic status
Education
Height, BMI
Skin Color
Religion

Generosity



Tognetti, A. et al. Assortative mating based on cooperativeness and generosity. *J. Evol Biol* 2014

Humans across cultures seem to mate with partners that resemble them in several aspects. This is called assortative mating. A study in Senegal showed that generosity is one of these aspects, as couples shared very similar levels of generosity.

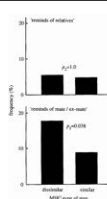
Practice question: Give some examples of assortative mating in humans.

Mate choice based on socioeconomic status, education, height, skin color, religion.

Disassortative Mating



Setchell, J.M., Vaglio, S., Abbott, K.M., Moggi-Cecchi, J., Boscaro, F., Pieraccini, G. & Knapp, L.A. (2011). Odour signals major histocompatibility complex genotype in an Old World monkey. *Proceedings of the Royal Society B* 278(1703): 274-280.



Claus Wedekind; Thomas Seebeck; Florence Bettens; Alexander J. Pasipam. MHC-Dependent Mate Preferences in Humans. *Proceedings: Biological Sciences* (1995)

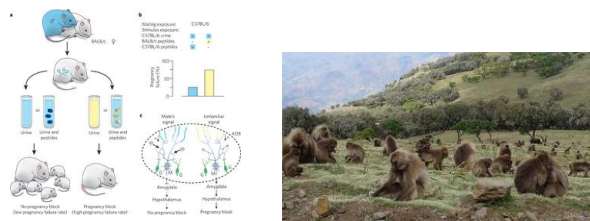
Frequency of women's memory associations by sniffing the odors of MHC-dissimilar men and of MHC similar men with relatives, and with current or previous mates, respectively (Fisher exact tests, two-tailed). Most of the memory associations in the lower graph were by women who stated that they were sure they had not taken the contraceptive pill when they chose the particular mate they were remembered during the experiment. MHC stand for major histocompatibility Complex, its is a large stretch of DNA on chromosome 6, that is involved in immune responses, i.e. molecular self-non-self detection. The MHC is by far the most diverse part of the human genome.

Practice question: What could be the advantage of choosing mates with different MHC variants?

The offspring would inherit a richer immune toolkit to detect infections.

Bruce Effect

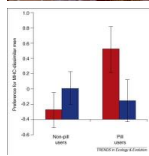
preempting infanticide cost in mice and gelada baboons



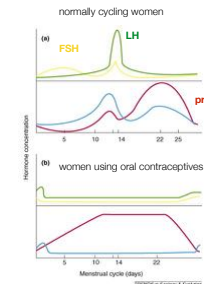
Female mice that are pregnant with pups from one male, will spontaneously abort if they smell the urine from a new male. A similar phenomenon has been demonstrated for Gelada baboons in the highlands of Ethiopia, where the takeover of a group of pregnant females by a new males induced spontaneous pregnancy loss.

Practice question: What is the Bruce effect on pregnancy of female mammals?
Pregnant females in some mammal species can lose their pregnancy when exposed to novel males.

Rating smelly T-shirts



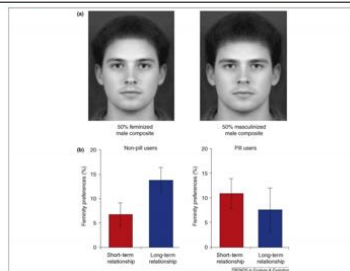
MHC-correlated odour preferences in humans and the use of oral contraceptives.
Roberts, S.C. et al. *Proc. R. Soc. Lond. B*. 2008



Alvergne, A. & Lummaa, V. *Trends in Ecology & Evolution* 2010

Hormonal regulation of the menstrual cycle in (a) normally cycling women and (b) pill users. By providing a steady daily level of both progestin (a substitute for progesterone; red lines) and oestrogen (blue lines), oral contraceptives prevent gonatropin-releasing hormone (GnRH) secretion from the hypothalamus, blocking a signal to the pituitary gland to produce FSH (yellow lines) and LH (green lines). Because FSH stimulates the ovaries to grow egg follicles and LH triggers ovulation, their absence causes the ovary to be relatively dormant, and no egg is produced to a point where it could be released. Hormonal contraception thus maintains the menstrual cycle at the same late phase of the natural cycle on a continuous basis. Adapted, with permission, from <http://www.pbs.org>.

Pheromones?



Alvergne, A. & Lummaa, V. *Trends in Ecology & Evolution* 2010

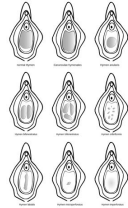
Alvergne, A. & Lummaa, V. *Trends in Ecology & Evolution* 2010

Effect of oral contraceptive pill use on women's facial preferences for short- and long-term relationships (short-term versus long-term preferences are proxy for, e.g. relationship during fertile versus infertile menstrual cycle phase, respectively). (a) Each composite image tested for female preferences was formed of 20 male and 20 female facial images of young adults in a neutral pose. Five different images were presented in random order to participants (158 women aged between 16 and 39 years) recording their preferences for short- and long-term contexts. (b) Normally cycling women (non-pill users) preferred less masculine faces in a long-term context compared with a short-term context. Masculinity-related physical traits in men are related to high levels of testosterone, which, because of its associated immunosuppressive effects, is thought to be an indicator of genetic quality because it is sustainable only by an individual having high genetic resistance against pathogens. Context dependent preferences are adaptive if they maximize: (i) non-genetic material benefits (i.e. parental investment and cooperation) in long-term relationships, and (ii) genetic benefits (e.g. immunocompetence) from short-term or extra-pair partners. Such context-dependent preferences were not displayed by pill users, who consistently preferred feminine features in men.

Importance of Virginity



Very big differences in the importance of virginity for mate choice across cultures.
M/F Double standards in cultural norms.



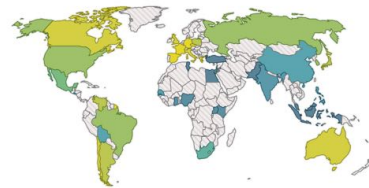
The Ain Sakhri lovers figurine. This is the oldest known representation of sexual intercourse in the world, dated c10,000 BCE. Photo courtesy of the Trustees of the British Museum Natufians in Middle East, Hunter-Gatherers whose lifestyle gradually led to farming/herding

Practice question: What feature of the female genital tract is not known from any other primate but humans?

The hymen.

Premarital Sex?

Views on premarital sex by country



Percent saying premarital sex is "unacceptable"

10 20 30 40 50 60 70 80 90

Created with Datawrapper

Source: Pew Research Center

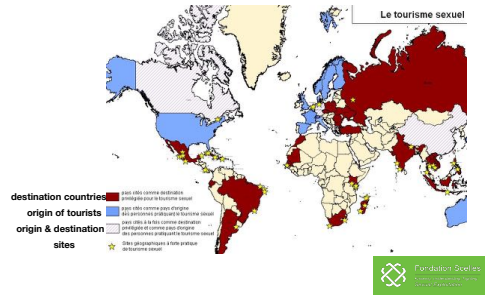
In many hunter-gatherers (foragers) without villages, priests, laws, institutions and many possessions, premarital sex is tolerated or even encouraged. Since the beginning of agriculture, the establishment of settlements, private property, taxes and social/political/resligious power structures, premarital sex has become strictly regulated.

Marriage freedom



In a map published by Hiddush, Israel can be seen among other countries that impose 'severe restrictions' on marriage. (photo credit: hiddush.org)

Global Mating Place Power and Resource gradients



With increased mobility and ease of international air travel, the world has become a global mating place. Differences in power and mobility, often favoring men, but in some countries also women, has led to the development of sex tourism. The phenomenon of mail-order brides is relatively new.

The Prevalence of Non-Reproductive Sex

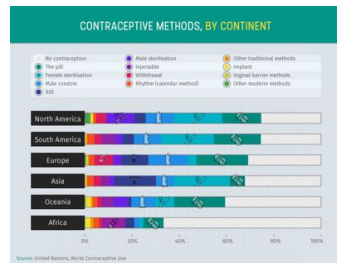
Most Human Sex is non-reproductive!



Contraceptive theoretical allow for evermore non-reproductive sex. their availability is not the same around the world. Japan for example, only finally allowed oral contraceptives, after its male majority government rushed through the approval for the erection enhancing drug Viagra!

The Prevalence of Non-Reproductive Sex

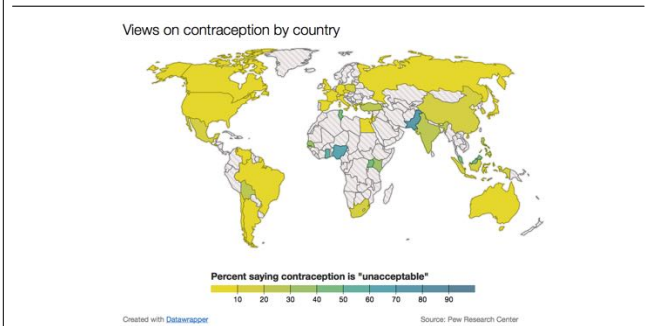
Most Human Sex is non-reproductive!



Different regions use different types of contraception. Large fraction of people in each region still use no contraception.

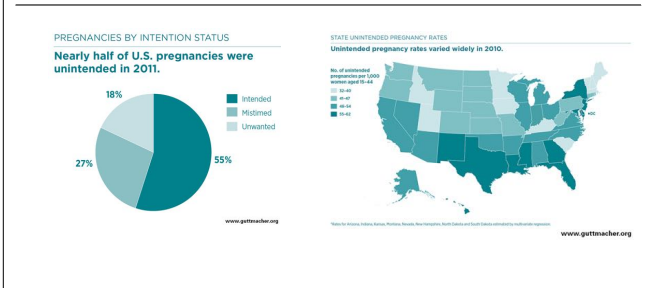
Practice question: Which method of contraception is used much more widely in Europe than in the USA?
Intra-Uterine Devices (IUD).

Game changer contraception?



The acceptance of contraception has increased around the world, even in places with strongly nativist religions (S-America), Egypt.

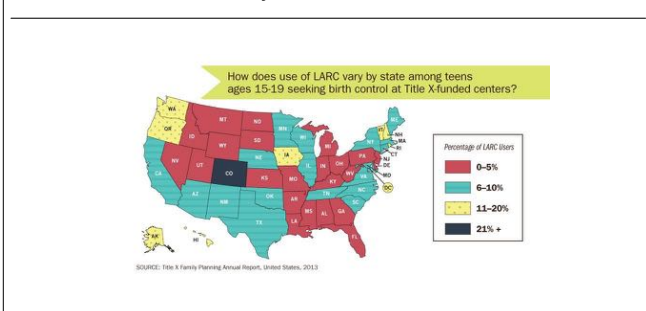
Half of US births unintended despite availability of birth control....



Despite the availability of contraceptives, over half of all pregnancies in the USA are unintended. Tisanes problem for many reason, not least because it can expose the early embryo to drugs such as alcohol, cannabinoids and pharmaceuticals consumed by the unsuspecting mother.

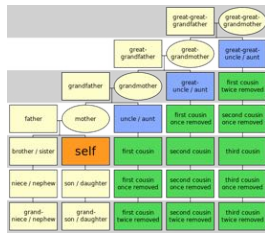
Practice question: With widely available contraceptives, most pregnancies in the USA are intended. True or false? (false)

Differences in availability of birth control....



The US has huge differences in access to and use of longterm contraception.

Inbreeding and incest avoidance



Most language have specialized terminology for kinship terms.

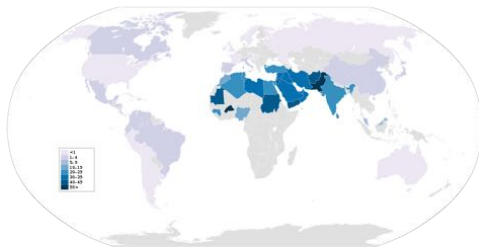
Inbreeding and incest avoidance

Breaking up nepotism and other favors within the family:
Impact of Christianity on distribution of wealth and power?

Joseph Henrich, Harvard University

The spread of christianity and derived moral systems did much to spread monogamous norms.
One result is the interruption of large nepotistic clans, where the wealthy and powerful limited their support mostly to their immediate (very large) family.

Frequency of Inbreeding (e.g. 1st cousin unions)



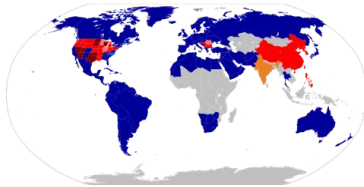
Societies around the world show very different frequencies of close inbreeding. There are strong religious, cultural and even economical reasons for such inbreeding. The practices clearly associated with genetic and health costs. Slightly over 10% of all marriages worldwide are estimated to be between second cousins or closer. The overall rate appears to be declining.

Practice question: Which regions of the world have relatively high inbreeding?

North Africa, Middle East, Arabia and Indian subcontinent.

Illegal status of 1st cousin unions

example of "eugenic law"



Some countries have laws banning 1st cousin unions. Most countries forbid parent-offspring marriages, an example of eugenic laws..... Charles and Emma Darwin were first cousins.

Practice question: After the terrible experiences with 19th century eugenics, all eugenic laws have been abolished. True or false? (false, it is still against the law to have offspring with ones' offspring.)

Westermarck Effect

Tongyangxi 童養媳
SIMPLUA: 媳婦阿
adopted daughter in law

Tradition of arranged marriage dating back to pre-modern China, in which a family would adopt a pre-adolescent daughter as a future bride for one of their pre-adolescent, usually infant, sons, and the children would be raised together.

Kibbutz "siblings"



Edvard Westermarck
The History of Human Marriage (1891)

There is evidence that marriages between people who grew up together as children suffer from poor outcome and lack sexual attraction. Evidence comes from the Chinese tradition of adopted daughter in laws, that would work as a maid in the future husband's family and cohorts of kids from Kibbutz groups.

Summary Mate Choice



Our species shows bidirectional mate choice, but culture can pre-empt choice.

Human sexual behavior is very hard to observe and relies on often unreliable reports.

A number of features are used for choosing mates, these can differ between males and females and include looks and behavior.

Humans are neotenous apes, females more so than males. Youthfulness is often a component of perceived female beauty.

Both Males and females compete over mates.

For many traits, humans prefer similarity in their mates, but there are exceptions (MHC variation).

Most sex is non-reproductive, but pregnancies happen!