Human Reproduction Concepts

1. Life History Theory
   1. Life History tradeoff models are used to elucidate and predict strategies that optimize reproductive success (Williams 2009)
2. Different from NH primates and other mammals how?
   1. Paternal care
   2. Amount of parental investment
   3. Grandmother
   4. Human milk
      1. Human infants are weaned before nutritional independence
   5. IBIs
      1. Shorter among humans than apes because of CF and ability to resume ovulation earlier (Hawkes, 1997, Hawkes et al., 1998)
3. Reproductive decision making
   1. Costs (gestation and lactation, child care)
      1. Energy is the principal limiting resource in optimizing reproductive effort (Ellison 2001). But, must consider
         1. Energy status (stored, can be mobilized)
         2. Energy balance (intake minus expenditure, can be allocated)
         3. Energy flux (absolute level of energy turnover independent of balance (intake alone)
         4. Ovarian function may be more sensitive to energy balance and flux than status (weight, and probably other micronutrient stores) (Ellison 2003). Expected because you wouldn’t predict extended current or future reproductive effort ability from stores, but from current condition (i.e. losing weight). Net energy balance is the best predictor of potential to sustain ongoing investment (Ellison 2003)
   2. Biological/energetic trade-offs (quality quanity, sex ratio, somatic vs. extra-somatic, embodied capital, demographic transition)
      1. (Rev in Ellison 2003) For females, ovarian function not very sensitive to energetic balances; but generation and lactation fairly buffered in terms of nutrient delivery to offspring (Prentice et al., 1983; Prentice and Prentice 1990). However, duration of lactational amenorrhea sensitive to metabolic load of lactation.
         1. Suggests investment in current reproduction only favored when maternal condition at certain threshold, and there is probably an upper window on physiological investment in current investment given average nutrition (not depleted, which would affect ovarian function), but shift towards future can begin earlier with optimum nutrition. Access to resources and energy saving mechanisms (alloparenting) can also affect shift (see Flinn).
      2. For males, very little cost to gamete production (not environmentally sensitive), but testosterone production varies with age and energetic constraints
         1. Suggests that male mating effort is costly and variable. Testosterone can fluctuate within an individual in response to specifics of male reproductive effort—courtship and paternal care (higher during former) (Wingfield and More 1987)
   3. Fitness maximization (future vs. current)
      1. Is a sub-category of reproductive investment
   4. IBI and TFR
   5. BF and CF
      1. Cost of lactation around 700 kcal.day (Dewey 1997; Prentice and Whitehead 1987). Is amenhorrea a response that is favored to support current reproduction or simply a response of enormous negative energy flux engendered by lactation? Physiological decreases in breastmilk quality should favor infant behaviors that demand food after 6 months, and would allow mother to begin investing in future, suggesting evolved mechanism. But CF prior to 6 months or bmilk quality decline would also favor shift towards replenishing maternal stores and therefore future reproduction, at cost to current.
   6. Inter-generational conflict/alloparenting
      1. Alloparenting more frequent among kin and may be favored by kin selection (Krittenden and Marlowe, 2008)
4. Mate choice and sexual selection
   1. Mate preference is a means toward sexual reproduction and is expected to be non-random, evolve via sexual selection (Darwin, Fisher), and be different for sexes given reproductive differences (Trivers
      1. *Current* pressures: who is excluded or included on basis of some desired characteristic(s) (Darwin 1871)
      2. *Prior* pressures: influence current pool and reflect species reproductive histories, successful past strategies
      3. Intrasexual pressures: competition among one sex for mates strongly influenced by the preferences of opposite sex (Buss 1998)
      4. Sexual selection is driven by (3 outlined by Buss 1989):
         1. *Levels of parental investment* (Trivers); expect large asymmetries where cost of investment is unequal, as in humans and most other mammals (Fisher 1930, Trivers 1972, Williams 1975). Although, increased paternal care beyond insemination lessens the disparity (Trivers 1972), the sex investing more (female) is expected to be more picky and thus exert stronger pressure on opposite sex.
         2. *Reproductive value/potential.* Rx a signal of future reproductive potential (Fisher 1930), fertility a measure of current reproduction. Rx peaks in mid-teens, fertility later (Thornhill, early 20s, but Anderson 1986 and Short 1976 say mid-20s)
         3. *Paternal probability.* Males should show mate guarding behaviors (Daly et al. 1982, Daly and Wilson 1988) and prefer chaste females to protect their paternity (Dickemann 1981). Females should also value chastity to the extent that it ensures resources not directed away from her (Buss 1988)
   2. **Male vs. Female preferences**
      1. Focus of evolutionary perspectives (Buss 1989, Symons, 1979, Townsend 1989), men and women seek out partners that promote their own reproductive fitness, and so look for mate traits that indicate higher genetic fitness or willingness/ability to invest in offspring (Kenrick et al. 1993)
      2. Women should look for resources and men for fertility ( ). Women should look for males who are able to provide and defend resources, and should be choosier when variance in resource acquisition is low (Trivers 1972, Emlen and Oring 1977). Women have been found to be more selective on basis of dominance and social status (Kenrick et al. 1990)
   3. **Human vs. no-human primate, mammals**
      1. Female preference for higher-ranking and/or better resource/territory holding confirmed for many nonhuman species (Calder 1967, Lack 1940, Trivers 1985)
      2. Resources in humans can be equated with earning capacity (Buss 1989). Females may thus value traits that indicate earning potential, such as industriousness or earnestness (Buss 1989). Both males and females may choose mates via a processes of *social exchange*, whereby individuals are looking for optimal market value (looks, intelligence, wealth, social status). People should find mates of similar value or higher, and values vary with culture (see Kenrick et al. 1993)
   4. Mating systems: monogamy, polygyny, polyandry, polygamy, cooperative breeding.
      1. Variation in humans: Humans cannot be characterized as solely monogamous, promiscuous, polygynous, or polyandrous (Buss 2008)
      2. Comparisons with other monogamous mammals/birds
      3. Adaptations for monogamy
   5. Mating Strategies
      1. Like systems, vary, and include: long/short-term, extra-pair, mate poaching/guarding. Cannot be characterized by single strategy, may be mixed, and are expected to vary with sex ratio, cultural norms, and an individual’s mate value (Buss2008)
      2. **Short-term vs. long-term (s**ee Kenrick 1993, Altman and Taylor 1973, Duck 1978, Murstein 1981
         1. Costs and benefits differ depending on level of involvement
         2. Given asymmetry in costs of raising offspring, men should be less choosy than women in casual relationships, but approach women’s discrimination when looking for long-term partner (Kenrick et al., 1993). Women are expected to be more selective than men in both short- and long-term relationships, and sex differences should be more apparent in short-term, casual preferences (Kenrick et al. 1993)
         3. Parental investment asymmetry should favor desire for casual sex in men (Buss 2008). Costs of short-term mating for females potentially high, but benefits may be accrued by way of resources, genetically diverse offspring, using new mate to transition out of poor mateship, acquiring skills at mating and mate acquisition, and.or deterring a partner’s future infidelity. Of these, resource acquisition and mate switching received the most support (Greiling and Buss 2000). Gangested and Thornhill (1997) found support for good genes as a motivator
      3. Mate-poaching is extremely common in U.S., likely an evolved strategy (Buss 2009)
5. Variation in reproductive outcomes
6. Biological variation
   1. Fecundity vs. fertility
   2. Across lifetime
   3. Across races
7. Ecological variation (Ellison)
   1. Effects of environment on physiology
   2. Nutritional constraints
   3. Fecundability changes with diet, health, age
8. Cultural/Historical variation
   1. Mating Systems
      1. Marriage and Inheritance
         1. Levi-Straus 1949 (Complex marriage system); most traditional societies have some marriage system (Levi-Strauss, universal)
         2. Malthus concluded that marriage, for any sector, is a conscious choice, a deliberate weighing of the costs and benefits; however the trade-off between material affluence and mating occurs only in modern societies (MacFarlane 1988)
         3. Illusion of monogamy (Malthus) and equality (Godwin): most societies outside of modern context were polygamous, male dominated and patriarchal, permitted easy “divorce,” may have forbade remarriage in the case of spousal death, determine marriage through parental/kin rather than individual choice. In contrast, wealth was normally measured by wife or wives and many children The individual choice and deliberative pattern we recognize today in marriage and fertility behavior did not begin until England in the mid-18th century and then spread (Macfarlane 1988).
         4. Anecdotally, constraints placed on marriage choice, which *deny* individual preferences, are manifest in our obsession with unrequited love, expressed from Chaucer to Tennyson (MacFarlane 1988)
         5. Modern mating and marital systems are characterized by free contract, possession, and self-control, and accord more with capitalism than equality (MacFarlane paraphrasing Engels and Weber)
   2. Mate preferences
      1. Buss (1989), looking at 37 different countries, found evidence for predicted sex differences in valorization of resources, age, and attractiveness (the latter in most countries) but NOT chastity
      2. Ultimately depend on outcome of mating pair as well as preferences; more stable partnerships should involve mates who are equally self-assessed and matched to avoid risk of one partner “trading up” (Waynorth and Dunbar 1995, Noe and Hammerstein 1995, Palowski and Dunbar 1999)
   3. Child care/parental investment
   4. Diet
      1. Dietary practices may confound or aid reproductive effort. Taboos may restrict caloric intake or intake of high-quality foods, although individual women may compensate for or ignore taboos to obtain needed energy (Bentley et al. 1999)
   5. Population effects
      1. Fecundity or natural fertility is kept in check by cultural traditions and norms governing age at marriage, non-marriage, and the use of contraceptives and induced abortions (Macfarlane 1988)
      2. Demographic transition
         1. Fertility, not mortality, is the key variable in demographic transition (Wrigley and Schofield )
            1. England: wealth accumulation between 1620 and 1750, which formed basal structure for industrialization, did not lead to population growth; population grew rapidly after 1750s. England had lowest population growth in 17th but fastest in 18th century—without that population explosion, industrialization *could not* have occurred (Macfarlane 1988)
            2. In England in 18th century, marriage age dropped 26-23, illegitimacy rates rose, and rates of non-marrying dropped. So marriage and fertility behavior caused population increase, not mortality decrease
            3. U.S. Baby Boom: Friedan—women actually left workplace, abandoned higher education, and began marrying earlier than in 1940s