

## CHAPTER 2

# Economics, Sex, and the Emergence of Society

## A Dynamic Life History Model of Cultural Variation

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### Abstract

Cultural variations in social norms have sometimes been taken as evidence against evolved universal predispositions. This chapter discusses several cultural variations—including male competitiveness, ages of marriage partners preferred by men and women, prevalence of bride price versus dowry, and polygyny versus polyandry. The chapter reviews these cultural variations in light of relevant principles from evolutionary life history theory. An evolutionary life history model considers behavioral variation through the lens of evolutionary economics—asking how any given pattern of behavior might be a manifestation of universal tradeoffs that all organisms must make as they attempt to optimally allocate their inherently limited resources. Discussion considers how cultural norms can emerge dynamically from interactions between individuals making selfish choices based on underlying evolved decision-biases.

**Keywords:** evolutionary life history, behavioral ecology, dynamical systems theory, dynamical evolutionary psychology, cultural variation

### I. INTRODUCTION

When psychologists, anthropologists, and other social scientists have considered human cultures, they have often focused on the different societal norms found across human groups. Consider a few such differences. As reported in a

classic ethnography of the Tiwi of North Australia, nearly all Tiwi men in their 30s were married to elderly widows, and very few had a resident young wife (Hart & Pillig, 1960). This contrasts sharply with data the two of us have collected in Spain and the United States: In both of these modern Western societies, the typical man in his 30s is married to a woman 3 or 4 years younger than himself (Gomez-Jacinto & Hombrados-Mendieta, 2011; Kenrick & Keefe, 1992). Consider also a very different domain of social behavior—aggression—where there are again noticeable differences between cultures (Cohen & Nisbett, 1994). Among poor Hispanic males in East Los Angeles, for example, a willingness to respond to insults with violence is associated with norms of “machismo,” whereas this is not the case for white college students from the Midwestern United States, for whom it may be more appropriate to respond to insults with humor (e.g. Cohen, Nisbett, Bowdle, & Schwarz, 1996). Cultural variations such as these have sometimes been taken as evidence against assumptions that humans have evolved universal predispositions (e.g. Eagly & Wood, 1999).

In addition to often glaring differences between human societies, there are also large variations in social norms within a society, some of which can be linked to regional and historical fluctuations in external conditions. For example, the tendency to engage in risky and violent (machismo-like) behaviors is higher among poor compared with middle-class or wealthy Spanish men, and that tendency tends to wax and wane with local and temporal variations in economic resources. As a result, more poor Spanish men die from violent crime and accidents when unemployment or poverty increases (Gomez-Jacinto, 2011). Again, regional and historical fluctuations in normatively appropriate behavior seem, at first blush, to be evidence against the operation of evolved and universal predispositions (aka “human nature”).

Of course, astute cultural psychologists have noted that a “universal” psychological mechanism might not manifest itself as rigid invariance across societies (Norenzayan & Heine, 2005). Researchers who incorporate ideas from evolutionary biology have repeatedly pointed out that evolved mechanisms linked to behavior are unlikely to be fixed but are instead apt to vary in response to environmental inputs, and to do so in flexible and adaptive ways (e.g. Gangestad, Haselton, & Buss, 2006; Janicki & Krebs, 1998; Kenrick, Nieuweboer, & Buunk, 2010; Schaller & Murray, 2010; Tooby & Cosmides, 1992). For example, several researchers have found that local variations in prevalence of disease are associated, in adaptively functional ways, with locally normative mating behaviors, with the local prevalence of different personality traits, and with local attitudes toward members of other groups. These findings

suggest that people living in areas with high levels of disease prevalence tend to (a) adopt norms, and generally act in ways, that discourage contact with members of other groups, who might be carriers of new, and potentially fatal, infectious diseases, and (b) choose mates with physical features connoting disease resistance (Gangestad, Haselton, & Buss, 2006; Fincher & Thornhill, 2008; Schaller & Murray, 2008).

In this chapter, we will consider the biology of cultural variation more generally. The two authors of this chapter come from rather different cultural and educational backgrounds. One of us spent the early part of his life in a lower-class neighborhood in New York City, before moving to the middle-class suburbs of Long Island, studying biology, anthropology, and psychology in college, later migrating to the Western United States to study in a behaviorally oriented clinical psychology program, and finally switching to study the social psychology of social influence and relationships. The other split his childhood between a middle-class neighborhood in Salamanca, Spain, and a rural agricultural region of Western Spain called the *Extramadura*, then studied social psychology in the European tradition before migrating to Malaga in the Southern Mediterranean region of Spain.

Despite our different backgrounds, we have independently come to the conclusion that cultural variations in social behavior can be better understood within a framework that biologists call an *evolutionary life history* model. This model considers variations in human behavior through the lens of evolutionary economics—asking how any given pattern of behavior might be a manifestation of universal tradeoffs that all organisms must make as they attempt to optimally allocate their inherently limited resources. The evolutionary life history view has implications for understanding which areas of social life are most likely to have norms in the first place, why norms and roles vary in predictable ways as a function of age, sex, and parenting status, and how those variations are linked systematically to factors in the local physical and social environment.

On the model we propose, the human mind does not contain one general mechanism for reckoning economic self-interest, but several sets of decision-biases, designed to deal with different recurring problems faced by humans throughout history (Kenrick & Griskevicius, 2013; Kenrick, Li, White, & Neuberg, 2012). Because different life history tasks are solved most efficiently with very different solutions, humans everywhere apply different decision-rules for interactions involving friendship, self-protection, status, mate acquisition, mate retention, and kin care (Kenrick, Griskevicius, Neuberg, &

Schaller, 2010). Most critically, this model presumes that social norms emerge from a set of universal human preferences and biases inside individual human heads, which interact in dynamic and flexible ways with local ecological factors, and with similar biases inside other people's heads (Kenrick, Li, & Butner, 2003; Kenrick & Sundie, 2005, 2006). The result is cultural variation in norms, roles, and social institutions. On this view, the appropriate model for understanding the emergence of human cultures is neither a Blank Slate (in which variations are arbitrary and uninfluenced by human nature) or a Blueprint (in which genetic mechanisms in the human brain fix the outcomes), but instead a Coloring Book (in which there are some fairly clear guidelines, but much room for local color) (Kenrick et al., 2010).

In what follows, we first provide an introduction to the basic tenets of life history, with a focus on how ecological variations can alter the ways in which animals allocate their resources to different tasks over the life span. We next describe the fundamental motives perspective, which is derived from life history theory and connects human motives to these biological tradeoffs. We provide some examples linking life history theory with variations in normative behavior across cultures (such as bride price versus dowry, and polygyny versus polyandry), and then discuss some non-obvious links between different aspects of cultural variation. We finally consider how norms emerge from flexible evolved decision-biases.

## II. LIFE HISTORY THEORY AND ECOLOGICAL VARIATION

Life history theory is an approach that considers how each animal's life cycle—from conception to death—has been shaped by natural selection in ways designed to enhance reproductive success (Stearns et al., 2008). Life history theorists conceptualize an animal's life span as a genetically organized developmental plan, which encompasses a set of strategies and tactics for allocating energy to survival, growth, and reproduction at different times in its life (Crawford & Anderson, 1989; Partridge & Harvey, 1988; Stearns, 1976). Those strategies are presumed to be attuned to an animal's "expected" environment, in the sense that they commonly include contingency plans for responding to the usual ecological variations encountered by a particular species.

From a life history perspective, all living organisms, whether they are human beings living in a small village in Ecuador, chimpanzees living in the jungles of Tanzania, or rainbow lorikeets living along a stream in Wollongong,

Australia, make economic tradeoffs at every phase of their life spans. The left column in Table 2.1 summarizes some of the central tradeoffs considered life history theorists (which we discuss in detail later). Exactly how an organism makes those tradeoffs depends on individual differences (the animal's age, sex, position in the local dominance hierarchy, and mating strategy, for example), in interaction with features of the physical and social environment (availability and distribution of resources, mortality rates, and local sex ratio, for example).

One of the most critical tradeoffs involves whether to allocate scarce energetic resources to what biologists call *somatic effort* versus *reproductive effort*. Somatic effort is the energy an animal invests in building and maintaining its own body (growing muscles and storing fat, fighting off infections, and so on). Reproductive effort involves investment of resources in *mating*, *parental care*, and *support for other relatives* (Alexander, 1987).

To the extent that an organism invests more resources in its own growth and maintenance that means fewer resources to invest in reproductive effort, and vice versa. In humans and other animals, bearing offspring reduces a mother's life span, for example (Lummaa, 2007). Different animals trade off somatic and reproductive effort very differently. Some animals mature quickly, and begin mating early. The streaked tenrec, for example, is a small shrew-like mammal from Madagascar that may reach sexual maturity in less than 2 months. Other animals spend a considerably longer time developing their bodies before reproducing. African forest elephant females, for example, take 11 years before they begin reproducing, whereas male elephants take 20 years.

TABLE 2.1: Variables Related to Evolutionary Life History Theory

Key tradeoffs	Individual Differences	Relevant Ecological Factors
Somatic (growth/survival) vs. reproductive effort Current vs. future reproduction Quantity versus quality of offspring Grandparenting vs. continued reproduction	Age Sex Size Reproductive strategy <i>Fast vs. slow</i> <i>Monogamous vs. polygamous</i> Parity (number of current offspring) Position in dominance hierarchy	Food supply Distribution of resources Harshness/mortality Unpredictability Sex ratios Steepness of social hierarchy
As described in the text, these variables, initially derived from research with other animal species, have implications for the emergence of cultural norms, and their variation across societies.		

For animals that invest in their offspring, as do humans, chimpanzees, lorikeets, and all other birds and mammals, there are also critical tradeoffs involving the number of offspring to have, and the amount of effort to invest in those offspring. Tailless tenrecs may give birth to as many as 32 offspring, after a gestation period of less than 2 months. Female elephants, on the other hand, give birth to a single calf, after a gestation period of 2 years. The elephant mother also makes high investments after birth, nursing her single calf for 2 to 5 years, and continuing to have a close relationship with the offspring for several additional years.

Other critical life-history issues involve the social arrangements within which mating and parenting occur. In most mammalian species, there is no bond between parents, and females choose males based on their physical characteristics or position in local dominance hierarchies. In this arrangement, a few males have high levels of mating success, while most other males have no offspring at all (Daly & Wilson, 1983). In many birds, and a few mammals, such as human beings, the male contributes resources to the offspring, and the parents form bonds that may last for one mating season, or for a lifetime. Not all of those parental bonds are monogamous, and polygynous bonds are fairly common among birds, especially if one male controls a higher quality territory that yields abundant resources (Orians, 1969).

Besides the differences in life history strategies found across different species, there are often differences in life history strategies *within* a species. Most commonly, males and females of the same species play a different life history strategy. This is linked to the fact that the minimum investment made by a female is typically higher than that made by a male (Geary, 1998; Trivers, 1972). Consider the case of mammalian females, who must carry the young inside their bodies, then nurse them after they are born. Males in over 90% of mammalian species, by contrast, invest only sperm in their offspring. As a consequence of this higher *minimum obligatory parental investment* by females, females tend to be more selective in choosing mates, selecting males whose physical characteristics or social status indicate good genetic potential for the offspring (Gangestad & Simpson, 2000; Sadalla, Kenrick, & Vershure, 1987). A further consequence of this enhanced selectivity by the higher investing sex is that the sex making lower investment tends to compete among themselves for opportunities to mate.

Because all the usual mammalian constraints on gestation and nursing apply to humans, several broad sex differences—regarding greater female mating selectivity and greater male intra-sexual competition—apply to humans as to other mammals (e.g. Clark & Hatfield, 1989; Kenrick, Groth, Trost, &

Sadalla, 1993; Wilson & Daly, 1985, 2004). For example, males are, in general, relatively more indiscriminate about accepting opportunities for casual sex (Clark & Hatfield, 1989; Kenrick et al., 1990), and this difference holds across different societies (Schmitt, et al., 2003, Schmitt, 2005).

An indirect consequence of greater female selectivity is slower maturity for males (Geary, 1998). The reason for the maturational delay among males in dimorphic species is that it takes longer for males to reach a size when they are likely to successfully compete for females. Similar differences in size and maturity rates are found in other species in which females exercise selection pressure by choosing more dominant males (Geary, 1998). Recall that male elephants begin reproducing 9 years later than do female elephants, for example. In line with this general rule, human males typically reach sexual maturity much later than females, and males also attain a somewhat larger size than do females.

In line with the above reasoning, males across species tend to engage in more competitive and aggressive intrasexual competition (Geary, 1998). Consistent with the pattern in other mammals, human males across societies are also more likely to engage in intrasexual competition in the form of male-to-male assaults and homicides as well as other risky behaviors (Daly & Wilson, 1988; Griskevicius et al., 2009; Wilson & Daly, 1985). The general mammalian pattern is somewhat (but not completely) qualified in humans, because human males frequently do contribute resources directly to the offspring, which reduces the size of sex differences in parental investment typically found in other mammals (Geary, 2000; Kenrick, Sadalla, Groth, & Trost, 1990; Kenrick, Groth, Trost, & Sadalla, 1993). In one series of studies, we asked college students about their minimum standards for romantic partners at varying levels of involvement. For example, we asked students about the minimum percentile of intelligence (or agreeableness, or physical attractiveness, or social status) they would find acceptable for a date, a one-night sexual encounter, a steady partner, or a marriage partner (Kenrick et al., 1990, 1993). For sexual relationships, in which females stand to pay a cost that may not be shared by the male (pregnancy and child care), men had substantially lower standards than did women. For long-term relationships, on the other hand, in which both sexes expect to invest a great deal of time, energy, and resources, both sexes had similarly high standards. We discuss the implications of this qualification below.

There are many species in which females make virtually all the investment in the offspring, and the males do all the competing to get chosen. But the tradeoff between parenting and mate-choice is not always so sex-differentiated

(Gould & Gould, 1989). Males in some species make investments in the offspring (as in helping build and defend a nest). In a few species, such as phalaropes (sandpiper-like birds) and seahorses, the males contribute relatively more resources to the offspring than to females. The same pattern of associations between high parental investment and sexual selection is also found in species where the males make higher investments; but in these cases, the males who make more investments in the offspring become more selective about choosing mates, and the females consequently become more competitive, as they try to attract those high-investing males. In species like seahorses and phalaropes, the females are often larger, more colorful, and/or more competitive than the (higher investing) males.

Because humans are mammals, women must make a high investment in the offspring (via gestation and nursing). However, because we belong to one of the few mammalian species in which males commonly invest resources in the offspring, males are also selective in choosing mates. Although human males are selective, however, their selectivity criteria are not identical to those used by females. Instead, males often choose females based on different features than those used by females to choose males. For example, mate-seeking females pay more attention to status and resources in a male, whereas, mate-seeking males pay more attention to features connoting fertility, such as a female's youth and health (Kenrick et al., 1990, 1993; Li & Kenrick, 2006). These sex differences vary in magnitude across human societies, but all around the world, females are more likely to emphasize status and resources as necessities in a mate (Buss, 1989; Turke & Betzig, 1985). Males across human societies are also more likely to engage in costly competitive behaviors, especially when they are young and unmated (Daly & Wilson, 1988; Wilson & Daly, 1985). Males are also, compared with females, more likely to display their wealth, status, independence, and creativity when mating motives are activated (Griskevicius, Cialdini, & Kenrick, 2006; Sundie et al., 2011). For example, in one series of studies, men and women were asked to imagine that they had \$5000 in their bank account, and were considering buying a few things. They were asked how much money they might spend in several categories (a new watch, a new cell phone, or a vacation, for example). Some of the participants (in the romantic motivation condition) had previously been asked to imagine going on a first date with a person whose photograph they had selected as highly attractive to them; others (in the control condition) were asked to imagine walking down an ordinary street they had seen in a photograph. Women's consumption patterns were not affected by the

mating manipulation, but men in a mating frame of mind indicated that they would purchase relatively more expensive items (Griskevicius, et al., 2007). In another series of studies, participants were asked to tell a story about an abstract painting or write a caption for a joke, after being exposed to the same mating prime (imagining being on a date with a person whose photo they had selected as highly attractive). Compared with those in the control condition, men in a mating frame of mind wrote stories or captions that were rated as more creative by an independent set of judges. Women's creativity was not affected by the mating prime (Griskevicius, Cialdini, & Kenrick, 2006).

Even within the same sex of a given species, different individuals may play different mating strategies. Among several fish species, for example, there are different male mating strategies, with different developmental trajectories. One common type of male grows very large and colorful and defends a territory to which he attracts females. Another type looks and acts more like a female, but actually sneaks in to release sperm when a true female releases her eggs in response to the large male's courtship efforts (Gross, 1984; Warner, 1984).

Human beings also show within-sex variations in mating strategies, and both males and females vary their courtship strategies and degree of parental effort, in ways that are linked to different developmental trajectories (Belsky, Steinberg, & Draper, 1991; Ellis et al., 2009, 2012; Gangestad & Simpson, 2000). Men who adopt an *unrestricted* (nonmonogamous) mating strategy, for example, are on average larger, more physically attractive, and more competitive, as compared with those who adopt a *restricted* strategy characterized by high investment and greater monogamy. Men who adopt an unrestricted mating strategy are also especially likely to conspicuously display resources when mating motives are active (Sundie et al., 2011).

In one study, for example, participants were told, "Imagine you have just won \$2000 worth of products and services because a friend entered you into a drawing without your knowledge. You have only today to spend the entire \$2000 and... If you don't spend all the money today, you will lose it." They were then given a menu of items they could buy, which had been previously rated on the extent to which they were associated with conspicuous consumption (e.g. a pair of designer sunglasses versus a similarly priced toaster oven). As in the experiments described earlier, they made these decisions after either imagining either walking down a street, or going on a date with someone they had chosen as especially attractive. In addition, participants filled out a measure of the extent to which they adopted a restricted versus unrestricted

mating strategy (Simpson & Gangestad, 1991). The scale asks participants to express their agreement or disagreement with items such as "Sex without love is OK." The mating manipulation again had no effect on female participants, but was especially likely to trigger conspicuous purchases in men who adopted an unrestricted mating strategy (Sundie et al., 2011).

Within-sex differences in mating strategies are often linked to ecological factors. Male lark buntings with poor territories may attract no females as mates; males with good territories will mate monogamously; and those with very rich territories may mate with multiple females (Pleszczyńska & Hansell, 1980). Similarly, most indigo bunting males have a single mate, for example, but 10% of them (those with better territories) have two mates (Carey & Nolan, 1975). This ecology-triggered variation is a critical point to keep in mind when applying life history to human beings: Humans vary their life history strategies within and between cultures. From a life history perspective, one would expect that this variation is not completely arbitrary, but instead systematically linked to variations in ecological factors, particularly factors that affect the distribution and abundance of resources.

At first blush, one might expect all animals to start reproducing as soon as possible, and have as many offspring as possible. However, the central evolutionary goal is the production of *viable* offspring, and producing as many offspring as possible as quickly as possible may not result in the most surviving offspring. An animal's optimal investment of reproductive effort depends on the particular physical features of its species and the ecological constraints typically faced by that species. For large mammals like elephants, females do not become physically capable of having offspring until they are several years old. Having offspring too soon, or having too many, decreases the odds that those offspring will survive (Lack, Gibb, & Owen, 1957; Lummaa, 2007). Whether it is adaptive to allocate one's limited energy budget in one way as opposed to another depends on a dynamic interaction of environmental pressures (current threats and opportunities), inherited predispositions (useful traits and constraints the animal inherited), and the animal's current stage of development.

For social animals, such as humans, chimps, and lorikeets, decisions about life strategies are not simply automatic responses to external ecological factors like climate, vegetation, and the availability of food resources. For group-living species, the local social environment is also critically important, and individual strategies are influenced by the composition of one's group, as well as one's position in that group (Kenrick et al., 2003). One animal's life-history

decisions affect the other animals in his or her group, and vice versa (if you a socially dominant individual with three mates, for example, that may mean that two other members of your group will consequently have none).

The life history approach has been a powerful tool for understanding variation within and between other animal species, but in recent years it has been increasingly applied to human beings (e.g. Ellis et al., 2009; Kaplan & Gangestad, 2005; Kenrick & Keefe, 1992; Kenrick & Luce, 2000; Lummaa, 2007; Stearns, Allal, & Mace, 2008). This perspective leads to the central assumption of this chapter: *many facets of human culture, include variations as well as commonalities across societies, may eventually be understood as emergent properties arising from biologically significant life-history tradeoffs.*

### III. FUNDAMENTAL MOTIVES AND HUMAN LIFE HISTORY

By dividing the tasks of life history into somatic effort and reproductive effort, biologists have made great strides in understanding common patterns of behavior across a wide range of species. To understand a particular species, of course, it is helpful to make finer and more specific distinctions. We have elsewhere argued that the tasks of human life history are linked to a set of fundamental motives—organized systems of affect, cognition, and behavior designed to deal flexibly with the recurrent problems and opportunities of human living, which arise at different phases of development (Kenrick, Griskevicius, Neuberg, & Schaller, 2010; see Figure 2.1).

Some problems and opportunities—such as acquiring food, water, and remaining warm and dry—arise early in life, and are only indirectly social. Once a child becomes mobile, however, it confronts the problem of self-protection from strangers who may be potentially dangerous. Another set of problems arises slightly later, and it involves getting along with other members of one's group. Once children have established a group of friends and associates, they then must develop skills to win respect and/or avoid scorn from their group-mates. All of these processes continue during adolescence, but after puberty problems of acquiring mates become salient. Later, when a person has acquired a mate, a (very different) set of problem involved in maintaining a long-term relationship emerge. Then, if a long-term relationship results in children, as it has throughout most of our evolutionary past, a new set of problems emerges—taking care of the children. Later still, a final set of problems arises, involving the amount of resources to be invested in

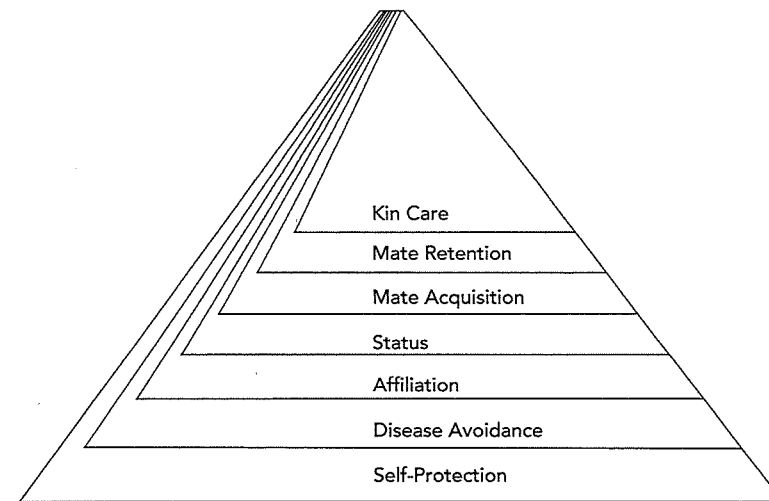


FIGURE 2.1: A hierarchical model of fundamental human motives. Different motivational systems initially become active at different phases of life (although once activated, they remain available during future phases, subject to activation by environmental threats and opportunities).

Original figure based on Kenrick, Griskevicius, Neuberg, & Schaller, 2010.

one's grandchildren, which investment has traditionally provided an important factor in human reproductive success (Lummaa, 2007). Again, all of these issues trigger questions about tradeoffs. Energy invested in gaining additional status cannot be directed toward taking care of one's children, for example, and energy invested in one child reduces the amount of effort and resources that could be directed to finding new mates.

The decision rules involved in these tradeoffs can be conceptualized in economic terms, as is often done by life history theorists. Consider the standard economic choice called the prisoner's dilemma. Game theorists have traditionally made the assumption that people approach a given payoff matrix with the goal of maximizing their personal rewards, and minimizing their personal losses. The traditional model may have applied to interactions between anonymous Wall Street traders, but is not necessarily applicable for most everyday exchanges (e.g. Fiske, 1992; Frank, Gilovich, & Regan, 1993). From an evolutionary perspective, some of these differences can be quantified. For example, the exact same set of rewards for cooperation versus competition nevertheless results in very different payoffs if the other player is your brother, or your potential mate, or your child. To take the simplest example,

brothers share half of their genes, hence, from one's gene's perspectives, a gain of \$100 for one's brother is a gain of \$50 for oneself, and conversely for a loss to your brother. Because you share 100% of your genes with yourself, you are still inclined to favor yourself, but because of the genetic overlap, many situations that pose potential dilemmas between strangers are not dilemmas for two siblings (Kenrick, Sundie, & Kurzban, 2008).

We have argued that different social networks emerge dynamically from the decision rules individuals use in dealing with people in different relationships; with very different patterns of interaction naturally emerging from the different intrinsic biases involved in getting along with friends, getting along with romantic partners, getting along with superiors, and getting along with family members (Kenrick & Griskevicius, 2013; Kenrick, Li, & Butner, 2003). To give a simple example, having a group of five or ten friends can provide benefits over a smaller group. For our ancestors, larger groups can more effectively build a hut, hunt large game, and provide a larger "risk pool" for sharing the results of hunts (Hill & Hurtado, 1996). For intergroup conflicts, which were common for our hunter-gather ancestors, larger groups are critical to whether lives or dies (Wrangham & Peterson, 1996). Among friends, if you are a friend of one my relatives or friends, you are also more likely to be a friend of mine. With mating arrangements, on the other hand, there is an inherent conflict of interest between different people mated to the same individual. For a man in a polyandrous group, there is a lower likelihood that his mates' children are his own. For a woman in a polygynous group, she will get a lower share of her husband's resources for her own children (Pollet & Nettle, 2009). As a consequence, monogamous pair bonds are the most common human mating arrangement, even in societies where norms allow polygamy (Daly & Wilson, 1983). From an evolutionary life history perspective predictable patterns of social norms arise from these different individual biases interacting with the biases in other individuals, and with existing social structures, as well as resource availability and distribution, to yield predictable patterns of social norms and roles in these different domains of social life.

#### IV. SOME EXAMPLES LINKING LIFE HISTORY AND VARYING CULTURAL NORMS

In the next section, we briefly review several examples of research, including work done by ourselves and our colleagues, in which cultural variations have been studied through the lens of life history theory. As we noted in Table 2.1, life history theorists are interested in how ecological variables such as resource

distribution, mortality threats, and sex ratios might interact with individual differences such as sex, age, and social position to influence the allocation of resources to different aspects of reproduction (such as competition for mates or investment in offspring). We describe six examples of such interactions here, examining links between economic inequality and male competition, variations in men's and women's mate choice across the life span, variations in values of brides versus husbands as a function of sex ratios and economic distribution, willingness to enter polygamous relationships as a function of economic resources, the influence of economic threats on early versus late reproduction, and the effect of sex ratios on intrasexual competition.

#### A. Economic Inequality and the Young Male Syndrome

Wilson and Daly (1985) reviewed a number of findings suggesting what they called a "young male syndrome"—a proclivity to competitiveness, risk-taking, and violence among unmarried, unemployed, youthful males. In examining the causes of homicides, Wilson and Daly (1985) noted that a large percentage of homicides among young males had been categorized by police and criminologists as due to "trivial altercations." Their own analysis of homicides in Detroit led Wilson and Daly to conclude that something very non-trivial was at stake in such homicides—a young man's "face," or dominance status in the eyes of his peers. A man's position in the local status hierarchy is an important determinant of his attractiveness as a mate (Sadalla, Kenrick, & Vershure, 1987; Turke & Betzig, 1985). Hence, an unwillingness to defend his status could limit a man's reproductive prospects.

As Wilson and Daly (1985) note, aggressive competitions between males are common in other species as well, and often increase during the mating season. As noted earlier, a number of findings have recently indicated that activating mating motives triggers various forms of competitive displays, including economic risk, nonconformity, as well as overt aggressiveness among males (Griskevicius, Goldstein, Mortensen, Cialdini, & Kenrick, 2006; Griskevicius, Tybur, Sundie, Cialdini, Miller, & Kenrick, 2007; Li, Kenrick, Griskevicius, & Neuberg, 2012; Sundie et al., 2011). Violence is a high-cost means of establishing one's status, but for poor young males, it is sometimes their only alternative. In a related line of research, Dabbs and Morris (1990) reviewed evidence of the link between testosterone levels and antisocial behavior. They found that this link is strong, but only among lower class men. Men who come from middle and upper-class backgrounds have other avenues for establishing their social position *vis a vis* other men.



In a study of broad population trends, Gomez-Jacinto (2011) examined how economic threats influence internal versus external causes of mortality in men and women. Internal causes of death are those that stem from infection, injury, stress, physical challenge, or degenerative diseases. External causes are those that stem directly from behaviors, including accidents, homicides, and drug-induced deaths. Except among older people, external causes generally lead to more deaths than do internal causes. There is a large sex difference in the ratio of external to internal deaths, with males being much more likely to die of external causes than are females. This difference is more pronounced during certain life phases than others, and the sex-differentiated pattern is not limited to Western society. In a sample of World Health Organization statistics from 82 countries, the ratio of external to internal deaths is especially pronounced for males between 25 and 34, during which period fully five times as many young men die from external versus internal causes. By comparison, the ratio for men under 15 and over 65 is 2:1. Women's ratios, on the other hand, never get much above 1.5:1.

Those data were reanalyzed including a measure of each country's economic inequality (Figure 2.2). The GINI-coefficient calculates the discrepancy between a country's wealthiest and poorest classes, where a value of 0 would indicate total equality, whereas a value of 1 would indicate maximal inequality. Gini coefficients for income range from approximately 0.23 (in Sweden) to 0.70 (in Namibia). The spike in deaths from external causes is higher in countries with more inequality, and this discrepancy is especially pronounced among young men. A similar analysis of different Spanish provinces yielded the same conclusion: The provinces with the most economic inequality were also the provinces in which young men were especially likely to die of external causes (Gomez-Jacinto, 2011).

These findings make sense in terms of Wilson and Daly's (1985) "young male syndrome"—when young men find their legitimate pathways to social status blocked, they increase their tendency to engage in risky and antisocial behaviors, hence the increase in external mortality. These results also fit within the broader context of Life History Theory, which, as just described, considers behavioral strategies as functional adaptations to environmental conditions, which reflect adaptive tradeoffs made throughout the life span (Kruger, 2008). In evolutionary terms, male mortality is the product of an interaction between ultimate biological causes (sexual selection acting on male competitiveness) and proximal behavioral causes (local conditions that exacerbate the need to compete). Peaks of sexual difference are found precisely when males reach reproductive maturity, and most intensely compete for resources, social status and mates.

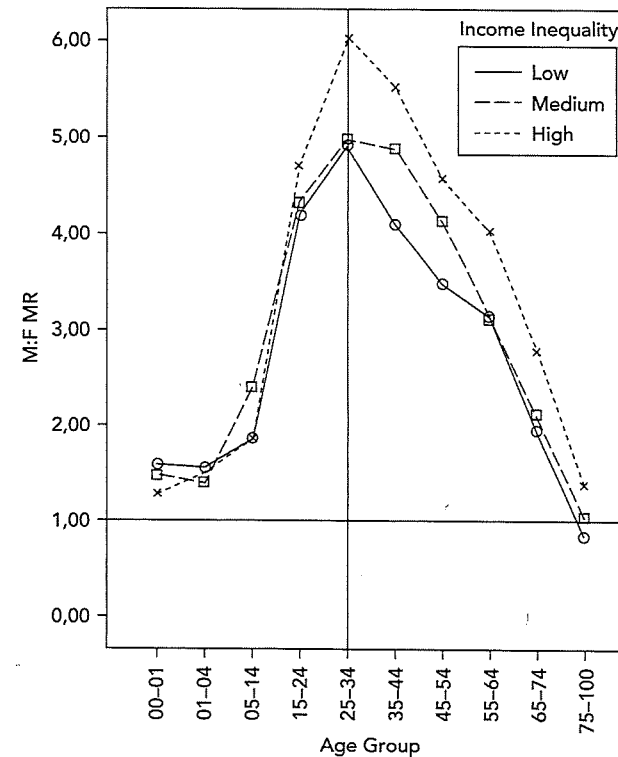


FIGURE 2.2: Ratios of male to female deaths by external (e.g. homicide, accident) versus internal (e.g. disease) causes. Positive values indicate that males are much more likely to die of external causes, especially when they are young men. The discrepancy between men and women becomes more pronounced in areas with greater income inequality. (From Gomez-Jacinto, 2011.)

The broader implication of these findings is that economic factors can affect sociological trends, in ways that are nonobvious, but that fit with evolutionary life-history models of behavior. It is indeed the case that "machismo" behaviors are associated with being from a poorer social class. That link, however, is not an arbitrary historical accident. Instead, it is found across different countries, and its emergence follows from broader biological considerations.

## B. Age and Mate Preferences across Human Societies

Along most dimensions studied, North Americans have been found to prefer romantic partners as similar to themselves as possible. People prefer mates who share their political attitudes, religious beliefs, recreational interests,



eating and drinking preferences, and so on (e.g. Byrne, 1971; Critelli & Waid, 1980; Hendrick, 1981). There is a notable exception to the similarity-attraction principle: Men seeking mates tend to prefer relatively younger women, and women seeking mates tend to prefer relatively older men (Kenrick & Keefe, 1992). The discrepancy was originally explained in terms of seemingly obvious sex-role norms of North American society. One team of researchers, for example, explained the difference in terms of “traditional sex-role specifications . . . frequently valued as sex appropriate in American Society,” which specify that women should “look up to” their partners (Cameron, Oskamp, & Sparks, 1977, p. 29). In discussing this difference, Deutsch, Zalenski, and Clark (1986) suggested there was a “double standard of aging” in our society.

But a closer examination led us to doubt the explanation of age differences in terms of American norms (Kenrick & Keefe, 1992; Kenrick et al., 2010). One bit of problematic evidence came from young men’s preferences. Although young men are generally highly sex-typed in their behaviors, they violate the supposed age preference norm. Instead, teenage males indicate strong attraction towards relatively older females. A boy of age 14 or 15 asked to imagine an ideally attractive date tends to think of a woman several years older than himself (Kenrick, Gabrielidis, Keefe, & Cornelius, 1996). When interviewed, teenage male participants revealed clear awareness that their attraction for older women was not reciprocated. Slightly older men, in their mid-20s, also express some interest in slightly older women—up to age 30 (Kenrick & Keefe, 1992). Men over 30, however, begin to express a clear preferential bias toward younger partners, and in men over 40 the bias to prefer younger partners becomes quite pronounced.

Kenrick and Keefe (1992) suggested that the difference in age preferences could be understood in terms of the different evolutionary life history constraints on females and males. Females reach initial sexual maturity several years before males do, then reach peak fertility around their early 20s, and later terminate their reproductive capacity completely, at menopause. After their 20s, men decline slightly in reproductive capacity with advancing age, but are still capable of fathering children well beyond age 60, even into their 80s.

An evolutionary perspective leads to the expectation that men will be drawn to women who have features that were associated with fertility in the ancestral past. Before they reach their teenage years, females have not fully matured, and on the other end of the age spectrum, women over 40 decrease in fertility. Women during their 20s and early 30s, on the other hand, manifest features such as relatively low waist-to-hip ratio and other features that

are associated with fertility (Singh, 1993). According to an evolutionary life history account, our male ancestors would have been selected for any inclinations to prefer females who manifested those features. Thus, rather than being attracted to women who are relatively “younger” than themselves, men of all ages should be maximally attracted to women of a more or less constant age range (with women between 20 and 30 being prototypically most attractive).

On the other side of the equation, to say that women are generally attracted to “older” men is more descriptively accurate but may also obscure the causal mechanism. According to an evolutionary life history perspective, women are attracted to men who have status and material wealth, which tends to be positively correlated with a man’s age across societies. The female attraction to status and wealth is presumed to stem from an intrinsic sex difference in the types of resources each sex provides for the offspring (Geary, 1998). Males across human societies do not contribute physiological resources directly from their bodies to offspring, as females do, but instead contribute indirect resources, such as food and shelter. The ability to provide such resources is correlated with a man’s status and material wealth. Furthermore, because males do not undergo menopause and continue to accumulate resources and status beyond their years of peak physical fitness, our female ancestors would not have been selected for strong inclinations to prefer young males.

If men’s attraction toward women of a certain age is linked to evolved mechanisms, then males the world over ought to become more attracted to relatively younger women as the males themselves age. This would follow because age-linked changes in fertility are universal—delayed puberty and menopause form lower and upper limits on the years of peak fertility for women in all societies, and men do not go through menopause. Consistent with this reasoning, data from mating advertisements and marriage ages collected across a number of societies indicates a clear change in males’ relative preferences as they age. The same sex-differentiated pattern was found in singles ads from various U.S. cities, and in ads from Netherlands and Germany, as well as in marital ads from India (Kenrick & Keefe, 1992).

Gomez-Jacinto and Hombrados-Mendieta (2011) examined the data from Spain’s marriage records over a 30-year period (1976 to 2006). This very large sample (of 13,292,902 people) replicated the exact same pattern Kenrick and Keefe (1992) had found in North America: As Spanish men got older, they choose increasingly younger partners for marriage, just as American men do, whereas females in Spain, as in America, generally prefer older partners throughout their life span (see Figure 2.3).

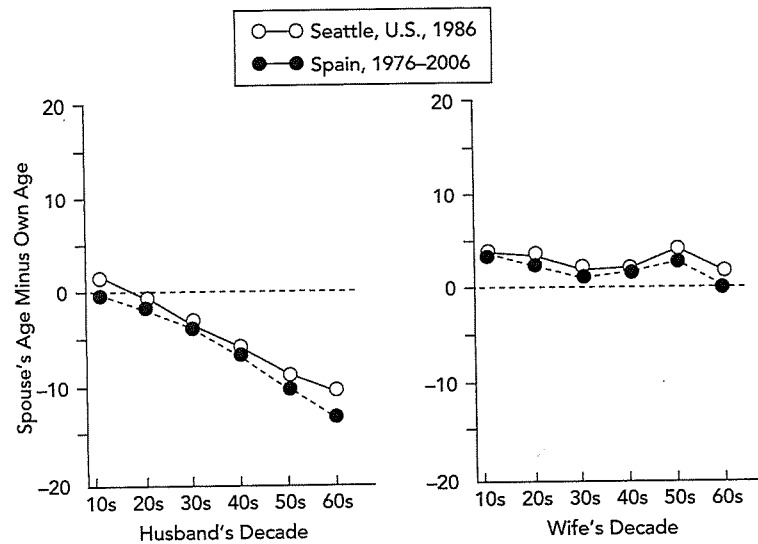


FIGURE 2.3: Age differences at marriage in Spain and the United States. Lines on the left depict the difference between a man and his wife. Lines on the right depict the difference between a wife and her husband.

Original figure based on Kenrick & Keefe, 1992, and Gomez-Jacinto & Hombrados-Mendieta, 2011.

This large sample also allowed us to consider a number of possible factors that might have moderated the relationship. As it turned out, the pattern was robust across variations in religion, profession, place of birth, and were not dependent on whether the subject had been married before. Gomez-Jacinto and Hombrados-Mendieta (2011) concluded that the results supported the evolutionary model of age preferences, and the associated assumption of universality in the attraction mechanisms linked to age preference.

The same sex-differentiated pattern was also found in studies examining marriage records from several American cities, as well as from a range of other locations around the world, including Brazil, Africa, and a remote island in the Philippines (Harpending, 1992; Kenrick & Keefe, 1992; Otta, Queiroz, Campos, daSilva, & Silveira, 1998).

One implication of these sex-differentiated age preferences is that there are substantially more young women than young men getting married. At the other end of the age spectrum, there are substantially more older men than younger women getting married. Figure 2.4 depicts the changes in ratios of women to men getting married at different ages in Seattle, Washington, in the 1980s. Likewise, analyses of U.N. data from various locations around the

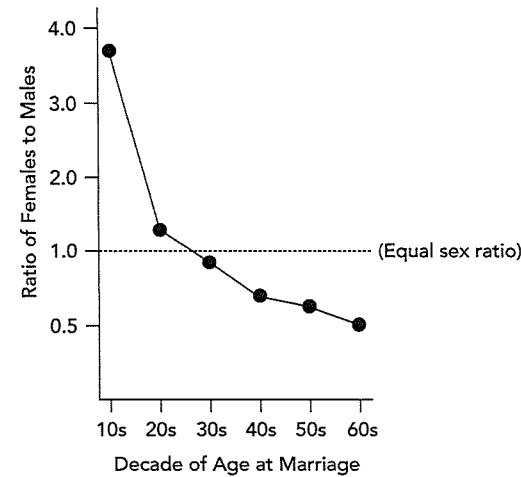


FIGURE 2.4: Sex ratios at marriage for people of different ages (from Seattle sample). Ratios above 1 indicate that relatively more females are marrying, ratios below 1 indicate that relatively more males are getting married (e.g. a 0.5 ratio indicates that males of a given age are twice as likely to marry as females; a ratio of 2 indicates the reverse). As discussed in the text, the same change over the life span is found around the world. (From Kenrick & Keefe, 1992.)

world indicated that teenage women were several times more likely to marry than were teenage men, whereas the reverse was true for people over age 50 (Kenrick & Keefe, 1992). For that analysis, we used data from five different islands from around the world, with the only criterion being that they were geographically as diverse as possible. On Mauritius, an island nation in the Indian Ocean east of Africa, the ratios were highly skewed for young people, with women under 20 years of age being 25 times more likely to marry than were men under 20. Men over age 50, on the other hand, were 3 times more likely to marry than were women over 50. The age-related reversals in ratios varied in magnitude in different places but were universal. In Cuba, Singapore, Malta, and Fiji, there were roughly 4 or 5 times as many women as men marrying under the age of 20, whereas there were between 2 and 4 times as men as women marrying after the age of 50 (Kenrick & Keefe, 1992).

All of those findings are consistent with the presumption of a universal tendency for males to be attracted to women in the years of peak fertility and for women to be attracted to relatively older men who have attained some degree of social status. However, one of us later came across an old anthropological case study of the Australian Tiwi that seemed to challenge the conclusion that the pattern was universal.

Hart and Pillig (1960) reported that:

According to a nearly complete genealogical census carried out in 1928–1929, nearly every man in the tribe in the age group from thirty-two to thirty-seven was married to an elderly widow... But very few of them had a resident *young* wife (p. 25, emphasis in the original).

At first glance, this blatant exception seems to overturn the assumption of a universal male attraction toward younger fertile partners. When Tiwi mating patterns are viewed in their entirety, though, they are the exception that proves the rule. Tiwi men actually place very high value on young women as mates, but several features of Tiwi society allow older men to completely monopolize the market in desirable young wives. For one, the society is polygynous, and older Tiwi men control marriage decisions. Powerful older men are most likely to betroth their young daughters to other patriarchs, who are in a position to reciprocate the favor. One consequence is that young men, who have no daughters to offer, are completely excluded from obtaining young wives, while the older men keep them all to themselves.

Other features of the society encourage marriages between younger men and older widows. All Tiwi females (but not all males) are required to be married. An infant girl is betrothed at birth to an older man, and a widow remarries at her husband's gravesite. Older widows are not desirable to powerful older men, who frequently have numerous young wives. On the other side, a man below age 30 has insufficient social power and influence to induce an older man to bestow a young daughter on him. According to the anthropologists who studied the culture, this is a key factor leading young men to marry older women:

To get a start in life as a household head and thus to get his foot on the first rung of the prestige ladder, a Tiwi man in his thirties had first of all to get himself married to an elderly widow, preferably one with married daughters... The widow did several things for him. She became his food provider and housekeeper. She served as a link to ally him with her sons. As her husband, he acquired some rights in the future remarriages of her daughters when they became widowed (Hart & Pillig, 1960, p. 25).

Thus, instead of overturning the life history model, the Tiwi pattern suggests a dynamic interaction between evolved psychological mechanisms (men's attraction to women in the years of peak fertility, women's attraction to men with higher status) and local social ecology (a geriatric patriarchy that allows

older men to monopolize younger women for themselves, in combination with a rule that all women must be married).

### C. Bride Price Versus Dowry

Marriages in Western societies have often involved a dowry (payment made by the bride's family at the time of marriage). Most societies throughout history, however, have been more likely to have a custom of bride price (payment made by the groom's family to the bride's). *Murdock's World Ethnographic Atlas* of 1167 pre-industrial societies shows that dowry is found in less than 4%, whereas bride price is found in two-thirds of the world's societies (Anderson, 2007). Bride price is often quite high, amounting to more than 1 year's income in many areas of Africa, for example.

Why is bride price so prevalent, and so high? Anderson (2007) analyzed the cultural and economic circumstances surrounding bride price as well as dowry. She notes that the price of a bride has historically been linked to virginity, with young healthy virgins bringing the highest prices, and women who already have children bringing lower bride prices. The reason that a woman's virginity is generally more valuable across cultures can again be linked to the principle of *minimum parental investment*. As we noted earlier, for any mammalian species, humans included, reproduction has required females to carry an energetically hungry fetus for several months and then nurse it afterward. The minimum male investment is much lower, in most mammalian species involving only a donation of sperm.

From the perspective of differential parental investment, then, it makes sense that most of the world's societies have had bride price, with men paying for a young and fertile wife. But given the intrinsically higher value of females as parents, why is that any societies have the custom of dowry—a payment made by the bride's family at the time of a wedding?

As we noted earlier, although human beings are like other mammals in that the female makes a much higher obligatory investment, our species differs from most other mammals in that men typically make some investment in their offspring. Because human babies are born helpless, those babies' chances of survival, and of later success in life, increase dramatically if the father provides resources for the infant and the mother (Geary, 2000). The resources provided by males and females differ in quality as well as quantity, however. That is, even when males contribute resources to the offspring, they are very different than those contributed by females. Females contribute their bodily

resources directly (the fetus extracts calories from the mother, and continues extracting calories after birth via nursing). Males provide indirect resources, in the form of food, shelter, protection, and the like.

The evolutionary economics surrounding differential parental investment can help us understand a critical difference in the societies that have bride price versus those that have dowry. By paying a bride price (or in modern Western societies, by purchasing an expensive engagement ring), a man may be providing some evidence of his a commitment to the relationship, and his willingness and ability to provide resources over the long haul. Bride price is found in the majority of traditional societies, which tend to be poor. On the other hand, dowry only arose more recently with the emergence of large nation-states, such as in China, India, and Europe. In these societies, citizens for the first time were able to accumulate substantial wealth, and families were able to pass their accumulated wealth, and thereby their status, on to their children.

It is critically important to realize that the payments associated with dowry are not simply a mirror image of bride price. Instead, they are qualitatively very different. Whereas one key function of bride price is as a payment for access to a fertile partner, dowry is better conceptualized as a woman's family making an investment to ensure that their daughter's future husband is a good long-term financial prospect (Anderson, 2007). Randeria and Visaria (1984) noted another key difference: whereas brideprice is paid by the groom's family to the bride's family, "dowry is property given to *the bride* by her kin, to take with her to her husband's family." Randeria and Visaria (1984) note further that dowry is "property which belongs to the woman, and which may be controlled jointly by her husband, who does not have the right to dispose of it." If the couple were to divorce, the dowry goes back to the woman. Dowries can thus be seen as advances on inheritance, which a bride receives from her kin to start a new family. In societies with dowry, the man is required to bring his own resources as well. By paying a dowry, a woman's family allows her to secure a husband from a wealthy high status family. Thus, the differences between brideprice and dowry parallel the different resources that males and females contribute to their offspring.

#### D. Polygyny Versus Polyandry

Exclusive monogamy is the official and legally sanctioned marital arrangement in Europe and North America. But this is not universally true. For example, one comparison of 238 cultures reported that exclusive monogamy was

the preferred arrangement in less than 20% of those cultures (Broude, 1994). Polygyny (more than one woman sharing the same husband) is practiced in most of the remainder (over 80%), and polyandry (more than one man sharing the same wife), although rare, was nevertheless found in four of those societies.

The general cross-cultural prevalence of polygyny has also been linked to differential parental investment and sexual selection. Again, because of the difference in obligatory minimal investment, mammalian females are indispensable for their offspring's survival; males are not (beyond the initial contribution of gametes). Hence, mammalian females choose males whose contributions to the offspring are indirect, providing "good genes" in most species, as well as resources in a few species (like ours). Males are capable of contributing genes, and resources, to multiple females, but females are not capable of simultaneously carrying offspring from more than one male. As a consequence, most females get to mate, but some males do not. Males at the top of local status hierarchies, or males with abundant resources, are better able to attract multiple mates.

Consistent with the above reasoning, powerful male rulers across various cultures throughout history, including emperors and sultans in Rome, China, and the Middle East, have frequently had hundreds of wives and concubines. Rajinder Singh, the sixth maharajah of the state of Patiala in India, had 365 wives. Consistent with our earlier discussion of age preferences, these powerful men typically choose young women, even as the men themselves age (Betzig, 1992). As a consequence, high-status males typically have more children. Ismael Ibn Sharif, who ruled Morocco at the turn of the eighteenth century and had hundreds of wives, had over a thousand recorded children.

Traditional Tibetans are one of the world's few polyandrous societies. The harsh conditions of life in the high Himalayan desert have made it difficult for a single man and a woman to survive alone. Tibetan families in which one man marries one woman have fewer surviving children than do families in which brothers pool their resources (Crook & Crook, 1988). However, polygynous arrangements do not mirror polyandrous arrangements; they do not involve powerful women choosing a succession of young men, for example. Instead, they fit with known biological constraints. Women in Tibet typically marry a group of brothers, for example. Because brothers share genetic interests with one another, this reduces the jealousy that would ensue between unrelated men sharing the same mating partner (universally, male jealousy is a common cause of homicide, Daly & Wilson, 1988). In addition, by sharing one wife,

brothers can preserve the family estate, which, under the severe resource limitations of the high Himalayas, would not even support one family if it were subdivided each generation. There is another difference between polygynous and polyandrous societies: polyandrous societies are also polygynous, but not the reverse. If all the children in a Tibetan family are girls, for example, the polyandrous pattern will switch to a polygynous one, and several sisters may marry one man, passing the family estate on to the sons of that marriage. Hence, Tibetan polyandry appears to be an economically based strategy by which a limited pool of resources must be channeled into a very focused family line. Furthermore, if the brothers in a polyandrous marriage accumulate sufficient additional resources, they will take additional wives.

Economic factors are critically important in polygynous marriages. Across cultures, polygyny is more likely to be found when several conditions converge: (a) a steep social hierarchy, (b) a generally rich environment, which enables one family to accumulate wealth, and (c) occasional famines, which raise the possibility that children in poor families will starve (Crook & Crook, 1988). Under these circumstances, a woman who marries a wealthy man gains benefits in the form of resources for her and her offspring, even if that means she will have to share her husband. In contrast to a woman who marries a poor man with no additional wives, a woman who marries into a wealthy family buffers herself and her children against famine, and her children also gain access to the various other benefits of wealth whether economic conditions are favorable or unfavorable.

The conditions surrounding polyandry and polygyny in humans have parallels in the animal kingdom. In other species, arrangements in which one female mates with multiple males are found when resources are scarce, and as in humans, the males in polyandrous bonds are often brothers (Daly & Wilson, 1983). Also paralleling the human pattern, when other animals have arrangements in which one male mates with several females, it very frequently involves females choosing males with relatively high status or abundant resources, in comparison to other local males (Gould & Gould, 1989). For example, in birds like the indigo bunting, males who attract more than one female are those who control especially resource-rich territories (Orians, 1969).

### E. Socioeconomic Background, Economic Threats, and Family Values

Several of our colleagues have recently uncovered an interesting pattern of interactions between early childhood socioeconomic status (SES) and current

environmental threats (Griskevicius, Delton, Robertson, & Tybur, 2011a; Griskevicius, Tybur, Delton, & Robertson, 2011b; White, Li, Griskevicius, Neuberg, & Kenrick, 2013). In general, these findings indicate that people who grew up under conditions of economic adversity respond to current harsh environments by adopting what life history researchers call a “fast” life history, whereas those who grew up under conditions of economic plenty respond to current harsh environments by adopting an increasingly “slow” life history. The difference between “fast” and “slow” life histories is derived from comparisons across different species; those animals adopting a fast life history reach sexual maturity earlier, have more offspring, and invest fewer resources in each offspring (Ellis et al., 2009).

Other research with humans had suggested that people who grow up in environments characterized by high levels of unpredictability and harshness (e.g. dangerous ecologies) are more likely to reach sexual maturity at an earlier age and to generally engage in a “faster” life history strategy (Ellis et al., 2009; Nettle, 2010). For example, factors such as having had a low birth weight, being separated from their mothers during childhood, having low involvement with their fathers, or moving frequently during childhood were all more associated with earlier pregnancy in British women (Nettle, Coall, & Dickens, 2010). This link between environmental harshness and early reproduction parallels findings with other animal species and makes sense to the extent that harsh and unpredictable ecologies involve some uncertainty about whether an individual will live long enough to reproduce in the future. On the other hand, people whose early experiences lead them to expect a predictable and benign environment can benefit from delaying reproduction and gathering additional resources, thereby enabling their offspring to outcompete others in the local environment (Ellis et al., 2009).

Although early-life experience can shunt individuals down different life history trajectories, more recent research suggests that early-life experience can also sensitize *contingent expression* of different life history strategies (Griskevicius et al., 2011a, 2011b; White et al., in press). Griskevicius and colleagues (2011a, 2011b) have demonstrated this interaction in a series of experiments in which participants are randomly assigned to read either an article (supposedly taken from a recent edition of the *New York Times*) that discussed the increasingly unpredictable nature of rising violence in the United States. Participants who were raised in low-SES environments respond to these threats by becoming more impulsive, risk-seeking, and reporting an inclination to start a family sooner—a pattern consistent with a faster life history strategy (Griskevicius et al., 2011a, 2011b). In contrast, people raised

in higher-SES environments respond to those same threats by becoming less impulsive, risk-averse, and wanting to delay starting a family—a pattern consistent with a slower life history strategy.

## F. Sex Ratios, Marriage Patterns, and Intrasexual Competition

Across a wide range of species, imbalances in sex ratios have linked to a number of behavioral changes. When there are relatively fewer two-spotted gobies in an area, for example, male gobies become more competitive (Forsgren, Amundsen, Borg, & Bjelvenmark, 2004). The same has been found in many other species of mammals, birds, and fish (Kvarnemo & Ahnesjö, 1996; Mills & Reynolds, 2003).

The effects of sex ratios make more of a difference for males than for females, and this is another consequence of differential parental investment. Although females also become more competitive with other females when there is a shortage of males, this is buffered to the extent that polygyny is more common than polyandry in the animal kingdom, and because male investment typically does not extend beyond a contribution of sperm. Hence, a fertile female among many other females can still find a mate, whereas a male among many other males may not. Again, this sex difference is slightly reduced in humans to the extent that human males, unlike most other mammals, do pair up with females to help raise the offspring. Hence, human females are also affected by shortages of males, and women have to compete with one another to find and keep a man when the population is female-biased.

In the classic book *Too Many Women*, Marcia Guttentag and Paul Secord (1983) argued that fluctuations in sex ratios—the ratio of adult men to women in a particular location such as a city or country—have a wide range of effects on human reproductive behaviors. When there are more women, as happens during and after major wars, there is more promiscuity, people get married later, and more children are born out-of-wedlock. When there are more men, on the other hand, men are more inclined to get involved in committed relationships, and to invest more in their families. Guttentag and Secord argued that the sexual revolution of the 1960s and 1970s in the United States was related to the relatively high ratio of mating age women.

Research with humans has found that male violence also increases with male-biased sex ratios (Barber, 2003; Dreze & Keher, 2000; Hudson & Den Boer, 2005; Kruger & Nesse, 2005). In India, for example, where there is a great

deal of variation in sex ratios between different regions, a 1% change in sex ratio is associated with a 5% change in the murder rate, with homicide numbers increasing dramatically as women become scarce (Dreze & Keher, 2000).

Griskevicius and his colleagues (2011) have found that imbalanced sex ratios influence economic behaviors in ways that fit with life history theory. They calculated sex ratios in 134 cities across America and found that cities with relatively higher numbers of men had higher amounts of credit card debt. Those results were consistent with the authors' hypothesis that men went into debt in order to spend conspicuously. However, analyses of aggregate credit card debt left it unclear whether it was men or women who were spending more. So the researchers conducted several laboratory studies in which they varied perceived sex ratios. Subjects in one experiment, for example, saw photographs of crowds of students. Some saw photographs in which the majority of people were men; others saw photographs in which the majority were women. Then, subjects were presented with various economic decisions (e.g. an opportunity to get \$20 tomorrow OR to get \$35 in a month). Men who had seen a lone woman surrounded by other men became more economically impulsive and chose immediate payoffs. As expected, sex ratio had no effect on women's choices (recall that men tend not to choose women based on the woman's financial standing).

In another study, people read a news article which described the local population as either having many more single men or many more single women. After reading the article, people indicated how much money they would save each month from a paycheck, as well as how much money they would borrow on a credit card for immediate expenditures. When women were scarce, men indicated that they would save less, and be willing to increase their credit card debt by 84%. When women were scarce, men were also more inclined to spend more on Valentine's Day gifts and engagement rings. On the other side of the equation, women who felt they were scarcer expected men to spend more money on them.

Earlier, we discussed the cultural variation in the prevalence of bride price versus dowry. Sex ratios also have direct influences on these practices (Francis, 2011). China, for example, currently has a surplus of 40 million extra single men (an imbalance often attributed to selective abortion of fetuses made possible by sonogram technology in the last century; Chan, Blyth, & Chan, 2006). As a consequence, the practice of bride price has been increasing in China. Some areas have seen a fourfold increase in bride price in the last decade, and half of the men in the countryside can no longer afford a bride. Men from

countries with shortages of women are now paying large sums of money for wives from other countries such as Vietnam. In turn, men in Vietnam are finding it more difficult to find wives (Belanger & Linh, 2011).

Several of the findings we have discussed can be integrated using the concepts of “biological markets” (Noe & Hammerstein, 1995; Pollet & Nettle, 2007, 2009). This idea applies to exchanges between individuals who are offering different commodities, as in the case of human mating, in which females offer fertility whereas males offer resources. As in other marketplaces, the value of a commodity depends not only on its quality but also on how scarce it is, and how many other individuals are offering it. At a farmer’s market, blueberries, apricots, and avocados are all cheaper when they are in season, and lots of vendors are competing for buyers. Likewise, the marriage value of a man depends not only on his resources, but also on how many other men are available as potential husbands. For example, one study of marriages in Uganda found that polyandry is more common in areas with more women, and that as the number of men increases, their resources become increasingly important, with the consequence that poor men do especially badly (Pollet & Nettle, 2009).

## V. LIFE HISTORY RESEARCH CAN REVEAL LINKS BETWEEN DIFFERENT ASPECTS OF HUMAN CULTURE

Here is a brief summary of the findings we just reviewed:

- Males across a number of countries are more likely to die from engaging in risky and violent competitions, and that tendency is pronounced among young males, especially young males whose economic resources are limited.
- Whereas males universally seek to mate with women in the years of peak fertility, women across societies tend to mate with men who are relatively older, and who consequently have accumulated power and resources.
- Whereas many societies throughout history have required a bride price, which is higher for fertile young women without children, some more hierarchical modern societies have required a dowry, which a woman’s family pays to underwrite their daughter’s marriage to a man with resources and status. Brideprice increases as the relative ratio of males in the population increases. Dowry is

more likely in modern societies in which some families can accumulate wealth and status, which can be passed on to offspring.

- Most societies throughout history have allowed polygynous marriage, with the consequence that some (relatively higher status) men acquired multiple wives, whereas other (relatively lower status) men went without wives. Polygyny is more pronounced when there is a steep hierarchy such that some men have much more status and resources than others, and when there is occasional famine, so that children in poorer families might not survive.
- Polyandrous marriage is rare, but found under conditions of extreme resources scarcity, and the arrangement typically involves brothers pooling their resources to acquire shared wives.
- People from poor backgrounds facing harsh conditions (and a highly uncertain future) are more likely to adopt a “fast” life history strategy (early mating and less investment in a larger number of children). People from wealthy backgrounds are more likely to adopt a “slow” life history strategy (later mating and greater investment in a smaller number of children).
- When there is a relative abundance of men and a relative shortage of women in an area, men are more likely to invest highly in relationships with women, marry earlier, and stray less. On the other hand, when there is a relative abundance of women and a shortage of men, men commit fewer resources to attracting mates, and there is more promiscuity and less marital stability.

There are several obvious linkages between these diverse findings, suggesting that variations across societies in mating practices, social status, and violence are all linked to evolutionary economics and life history. The overall pattern makes sense in terms of the different resources men and women invest in their offspring, which leads women to choose men with resources and status, and men to compete for such resources, especially when women and/or resources are relatively scarce.

As one example highlighting the interconnections between the findings we have just discussed, and their implications for cultural variations, consider a study of changes in male versus female mortality rates following China’s 1979 “single child” law (Kruger & Polanski, 2011). According to this law, parents living in urban areas are only allowed one child, whereas those living in rural areas may be permitted to have a second child after a wait of at least 5 years (especially if the first child was a girl). Various features of Chinese



culture lead to a higher value on male offspring (men are, for instance, responsible for providing resources and care for their elderly parents). One consequence has been an increase in abortions of female fetuses (Chan, Blyth, & Chan, 2006). Over the years, this has led in turn to an increasingly large population of unmarried men with each passing year. And an additional indirect consequence is that, with each passing decade since the one-child law, higher and higher proportions of men have been dying of external causes, such as accidents and homicides (Kruger & Polanski, 2011). As noted earlier, these are precisely the kinds of deaths that follow from increases in male competition, suggesting that Chinese men are migrating toward more “machismo” norms as their mating market becomes more unfavorable.

Thus, at least some of seemingly arbitrary variations in social behavior between cultures, subcultures, and social classes, turn out on closer examination to map nicely onto similar patterns of variation found across animal species, and within particular species that flexibly shift strategies with ecological factors. These connections suggest that at least some important cultural variations are not arbitrary. These patterns are beginning to reveal a rich set of interconnections between economics, psychology, biology, and anthropology. This perspective also suggests that the study of the interactions between biology and culture can also contribute to a richer understanding of the psychology of economic decision-making. For several decades, psychologists have been pointing out that economic decision-making does not follow the strict assumption of traditional views of economic rationality, but is instead highly limited and subject to apparently irrational biases (e.g. Simon, 1956; Tversky & Kahneman, 1981). But an examination in terms of evolutionary economics suggests that, although human decision making is indeed biased, those biases may incline people to make decisions that are rational at a deeper level, in the sense of motivating decisions that would have made adaptive sense for our ancestors (Kenrick & Griskevicius, 2013).

## VI. FLEXIBLE DECISION BIASES AND THE DYNAMICAL EMERGENCE OF NORMS

There is another key point to take away from the findings we just discussed: Human beings may well have evolved psychological mechanisms that influence their patterns of social behavior, but those mechanisms are not fixed. Instead, they are flexibly attuned to environmental variations (Kenrick et al., 2003). The amount of competition within a sex and relationships between the two sexes vary with economic and social opportunities, for example.

The Tiwi case demonstrates a dynamic interaction between multiple evolved mechanisms, including female attraction to dominant males, intramale status competitions, and male attraction to fertile females. Tiwi men who have successfully won social status and power use that power to monopolize all the younger fertile females. Although younger Tiwi men are also attracted to younger fertile females, they marry an older widow as an indirect pathway to acquiring social status, and eventual access to younger wives.

Of course, any inherited psychological mechanisms must be instantiated inside individual's heads. How do these individual preferences and decision biases get translated into societal norms? The insights of dynamical systems theory provide a means to bridge the gap between psychologists, who focus on individual behavior, and sociologists, who focus on the level of groups (e.g. Latane & L'Herrou, 1996; Nowak & Vallacher, 1998). Research and theory on dynamical systems has demonstrated how initially random interactions between interconnected units (such as neurons in a brain, or people in a group) tend to move toward self-organized patterns. This insight becomes especially powerfully when it is integrated with ideas from the interface of evolutionary psychology and cognitive science (Kenrick et al., 2003; Kenrick, Maner, Butner, Li, Becker, & Schaller, 2002). Evolutionary cognitive scientists have studied how contingency-sensitive mechanisms are designed to serve fundamental motivations associated with key problems regularly confronted by human ancestors (Bugental, 2000; Buss, 2004; Cosmides & Tooby, 1992).

In Figure 2.1, we depicted a set of fundamental human motivational systems. We presume that each of those systems includes a qualitatively different set of cognitive decision-rules (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). We further presume that both adaptive and random variation lead to individual differences in those decision-rules (Kenrick et al., 2003). Because human beings are social organisms, decision mechanisms within any given individual unfold in dynamic interplay with decision mechanisms of others in the social network. In one paper, we used dynamic simulations to illustrate how a whole neighborhood can be altered from peacefulness to aggressiveness by the presence of a few aggressive individuals, and how small local variations in the numbers of sexually unrestricted men and women can dramatically change the mating strategies of other men and women in their communities (Kenrick et al., 2003).

Figure 2.5 illustrates a simple example of such self-organization. It depicts a neighborhood in which individuals gauge their levels of peacefulness or hostility to the majority of their neighbors, with the simple decision rule: Observe your neighbors on a given day, and change to hostility if the majority of your immediate neighbors are playing a strategy different from your own. Dark

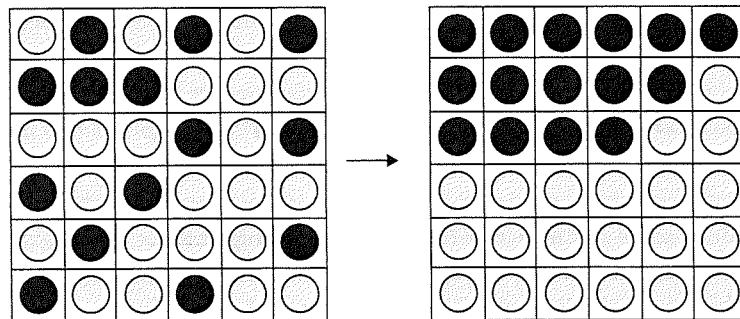


FIGURE 2.5: Self-organization leads to the emergence of local norms. If every person in a neighborhood attempts to conform to the majority of his or her immediate neighbors, organized and self-maintaining pockets of opinion will emerge, even if initial opinions were random.

circles indicate individuals who are hostile, light circles indicate individuals who are peaceful. The left side of the figure shows a random distribution on Day 1, the right side illustrates the organization that will emerge after several days of interaction. Figure 2.6 illustrates another example. In most cases, the result will be fairly stable neighborhoods where people are hostile and others where they are peaceful. Depending on the initial configuration and number of hostile and peaceful, the whole simulated village often ends up either stably peaceful or hostile (Kenrick et al., 2003).

Dynamic simulations begin with initial values based on theory, logical analysis, or existing data. When combined with data on people's actual decision-biases and preferences, simulations can contribute to one's understanding about how particular decision-rules might play out dynamically in social groups, and can clarify the range of conditions under which different outcomes are likely

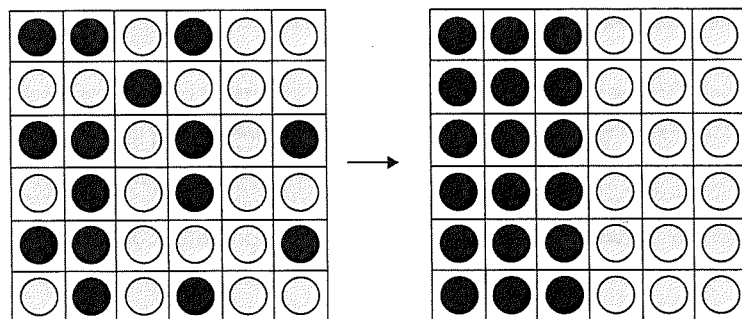


FIGURE 2.6: Another example of self-organization leading to the emergence of local norms. This follows the same majority principle illustrated in Figure 2.5 but for a different random initial arrangement.

to occur. For another series of simulations on the dynamics of mating pools, we began with survey data regarding men's and women's initial probabilities of engaging in sexually restricted (monogamous) versus unrestricted (promiscuous) strategies, as well as survey data regarding college students' estimates regarding the likelihood that a member of their sex would change strategies if the majority of the opposite sex were adopting a different strategy. We then entered those values into simulations of neighborhoods in which men's strategies were gauged to their immediate female neighbors, and women's to their male neighbors. Figure 2.7 illustrates one such simulation. In that figure, dark circles indicate individuals who are initially unrestricted (note that more males began as unrestricted, in line with survey data). Again, survey data were used to set different change rules for females and for males (females, compared with males, required a higher majority of locally unrestricted individuals to switch to an unrestricted strategy, for example). Figure 2.8 depicts the results when those values played out for the simulated neighborhood in Figure 2.7.

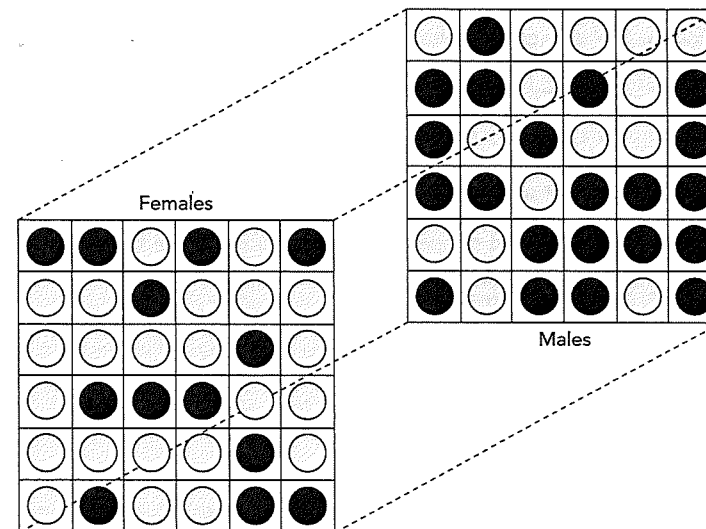


FIGURE 2.7: Different mating strategies in a neighborhood (Day 1). This figure depicts a neighborhood in which the males and females calibrate their mating strategies to match the members of the opposite sex. The male in the uppermost left location will check with the females in adjacent locations, for example (imagine the square for the females spatially superimposed on the square for males). Dark circles indicate individuals adopting an unrestricted strategy; light circles indicate a restricted (monogamous) strategy. Males and females have slightly different change rules, as described in the text, and more fully in Kenrick, Li, and Butner (2003).

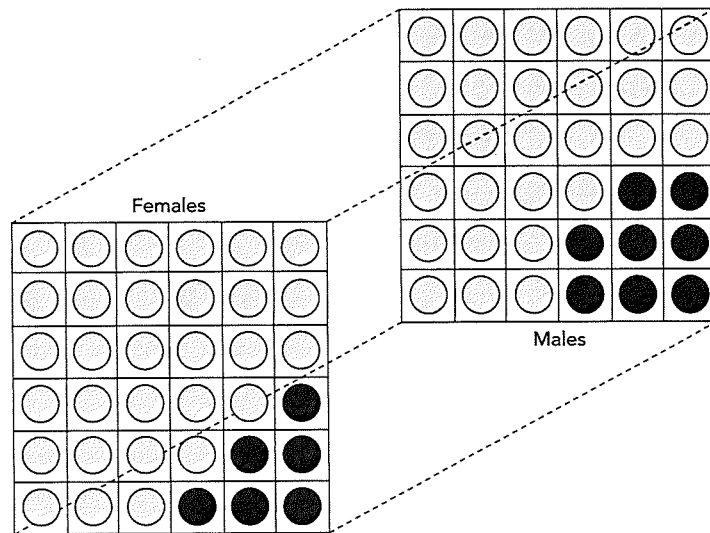


FIGURE 2.8: Different mating strategies in a neighborhood (Day 14). Using the change rules specified in survey data from college students, most neighborhoods stabilized into an arrangement of mostly restricted individuals, with small pockets of unrestricted females, surrounded by (slightly larger) pockets of unrestricted males.

Across many such randomly simulated neighborhoods, the result was most commonly a majority of restricted individuals, with an occasional small local minority of unrestricted individuals. We also simulated what would happen if there were small changes in the strategies played by the members of the opposite sex, as would happen when sex ratios changed, and the results suggested that small initial changes could in fact have broad system-wide results for emergent norms (see Kenrick et al., 2003, for more discussion of these issues). The bottom line of such work is to illustrate how decision biases inside individual heads can lead to the emergence of social norms. Such norms emerge in a bottom-up fashion, and require no central decision-making body to enforce norms from the outside.

## VII. CULTURE THROUGH THE LENS OF LIFE HISTORY THEORY

We have been arguing that cultural norms emerge naturally and systematically in response to recurrent variations in the local social and physical ecology. This idea is similar to the idea of “evoked culture”—which is the presumption that human brains are programmed with alternative strategies calibrated to

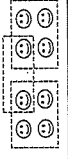


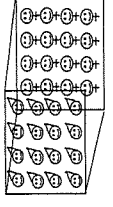
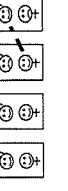

variations in the environment that have occurred throughout human ancestral history (Tooby & Cosmides, 1992). Tooby and Cosmides offered an engaging metaphor for understanding how human minds come predisigned to respond in flexible ways to environmental inputs—a jukebox. We would offer a slightly different metaphor for thinking about these issues—of the mind as a Coloring Book. As we have discussed elsewhere, the coloring book model acknowledges that the human mind is not a blank slate, but comes with some predispositions (Kenrick et al., 2010). In contrast to a jukebox (in which the response options are preset), though, a coloring book allows somewhat more flexibility in the eventual product. Furthermore, a coloring book encourages the use of certain colors in response to certain patterns of input, but does completely determine the eventual outcome.

We suspect that the degree of flexibility with which inherited predispositions respond to different environmental challenges and opportunities varies depending on the particular challenge or opportunity in question. Exactly how all of that works remains for future empirical work, but recent advances connecting genes to environmental inputs raise the possibility that it is now possible to begin mapping out the full set of connections between ongoing biological processes, developmental experiences, genes, and their evolved functions (e.g. Carroll, 2006; Cole, 2009; Robinson, Fernald, & Clayton, 2008).

On the view we are proposing here, cultural variations and cultural universals can be better understood by assuming that human beings everywhere need to solve a recurring set of life history problems—establishing an affiliative network, gaining and maintaining status, protecting themselves from other people who pose dangers to them, finding mates, keeping mates, and caring for kin. Successful survival and reproduction involve a set of tradeoffs. People, like all organisms, need to allocate limited resources to solve these problems (even wealthy people in modern Western societies face limited budgets of time and energy). Each of these problem domains involves a different set of desirable outcomes, so that what a person regards as a cost and a benefit depends on which goal is currently salient. Table 2.2 depicts a sampling of different domain-specific biases that have been investigated by evolutionary researchers, and depicts the different social geometries likely to emerge from the decision-rules operating in each domain (see Kenrick et al., 2003).

Besides responding to local ecological factors, the different social goals also vary predictably across the life span. For example, children below puberty are not concerned with finding or keeping mates, people with children are generally investing more energy in kin care than in finding mates. These goal

TABLE 2.2: Domains of Social Life

Social Domain	Fundamental Goal	Decision Bias	Underlying Principle(s)	Emergent spatial Geometry
Coalition Formation	Form and maintain cooperative alliances	Cooperate with others who (a) share your genes and/ or (b) have cooperated with you in the past	Inclusive fitness Reciprocal altruism	
Status seeking	Gain and maintain respect from, and power over, other group members	Both sexes desire resources attendant on status, but males will be inclined to take more risks to gain and maintain status, because females use male status as a cue to choosing mates.	Sexual selection	
Self-protection	Protect oneself and important others from threats to survival and reproduction	Potential threats or costs will lead to reciprocal aggressive behavior, particularly among non-kin	Inclusive fitness	
Mate choice	Obtain a desirable mate or mates	Because additional mates yield more genetic benefits to males than to females, males will be more inclined to seek multiple mates.	Differential parental investment	
Mating relationship maintenance	Maintain mating bonds	Breaking a bond is likely for: (a) males when a mate is sexually unfaithful or when physically attractive alternatives are available (b) females when a mate compromises resources or when high status alternatives are available	Differential parental investment	
Parental care	Promote the survival and reproduction of one's offspring and other kin	Familial provision of resources and care will follow the order: (a) self > siblings; (b) own offspring > stepchildren	Inclusive fitness	

Each domain is associated with a goal. The table gives examples of evolved decision biases in each domain and the underlying general principle which generates those biases. Those biases lead to the emergence of unique social spatial geometries.

systems are also slightly different for males and for females, who have different reproductive life histories.

These assumptions have important implications for understanding culture. They suggest that which cultural norms are most salient, and even whether a cultural norm is applicable at all, will vary systematically for men and for women, for unmated people versus married people, for people with children versus those without, and so on. Life history theory further suggests a number of salient variables that should influence how norms emerge. For other animals, life history strategies vary systematically with sex ratios, with resource scarcity and distribution (spotty versus evenly distributed, for example), and population density.

Our view of cultural norms focuses on norms as emergent properties of individual decisions, and less on transmitted culture. Researchers who study culture often presume that cultural norms are, to a large extent, actively transmitted—that children learn how the locals behave as a result of being taught rules (or “injunctive norms”) by parents, relatives, and peers, for example. There is no doubt that transmitted culture can be a powerful influence on behavior. However, it is possible to mistakenly jump from the observation of a descriptive norm to the conclusion that an injunctive norm is at work. As we noted earlier, researchers who observed that women often married older men presumed that this was due to the operation of an injunctive norm in American society, when a closer examination of cross-cultural research and developmental findings suggested instead that the difference emerged from universal preferences in women and men (Kenrick & Keefe, 1992). Of course, there are numerous interactions between transmitted culture and evolved mechanisms, most yet to be empirically explored (Janicki & Krebs, 1998).

### VIII. CONCLUSION

We noted earlier that cultural variations in social norms have sometimes been taken as evidence against assumptions that humans have evolved universal predispositions. Evolutionary theorists and cultural theorists have frequently pointed out the theoretical problems with the assumption that evolution and culture are “alternative” influences on behavior (e.g. Buss, 2004; Janicki & Krebs, 1998; Kenrick et al., 2010; Norenzayan & Heine, 2005). With increasing frequency, empirical research is demonstrating that cultural variations do not operate outside the realm of biology (Gangestad et al., 2006; Schaller & Murray, 2010). In this chapter, we have shown how several cultural variations

that were once taken to be arbitrary can be understood within the framework of an evolutionary life history model.

There have been some preliminary investigations applying life history theory to human beings, but thus far there has been very little work on how the theory's various principles apply to cultural variations and similarities. Given the power of life history theory in understanding the behaviors of other animal species, we would expect that they similarly apply to human beings. We would further expect predictable variations in how social norms differently regulate behavior in the key social domains in predictable ways, manifesting universal but flexible psychological mechanisms. In this paper, we have talked mainly about the domains of mating and status competition, and how they are linked to sex differences in parental investment. Very different biases exist in the domains of self-protection, affiliation, and kin care, and those biases are linked to other powerful evolutionary principles, such as inclusive fitness and reciprocal altruism (Kenrick & Griskevicius, 2013; Kenrick & Sundie, 2006; Kenrick, Sundie, & Kurzban, 2008). To take one example, we would guess that the powerful motivational influence of kinship could shed new light on previously explored aspects of culture. For example, we would expect collectivist norms to emerge spontaneously in places where people expect to deal mostly with kin and/or to have life-long reciprocal relationships, whereas individualist norms will emerge to the extent that people expect to deal predominantly with unrelated individuals and/or strangers. There are no doubt numerous other hypotheses that would arise from a serious consideration of the links between evolutionary life-history, fundamental human motives, and human culture. At this point, most of those hypotheses remain to be tested, thus making this a potentially fertile field to be tilled by the next generation of researchers.

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