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THE PARENTAL CHOICE BRANCH OF SEXUAL SELECTION: RE-EXAMINING THE EVOLUTION OF MATING BEHAVIOR

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Abstract

Conflicting interests over mating induce parents to control the mating decisions of their children. Females, being the scarce reproductive resource, are controlled more than males, and male parents are more influential in regulating mate choice. Parental control over mating gives rise to sexual selection under parental choice where men select other men for the purpose of reproduction. In effect, parental choice sets the stage where intrasexual and intersexual competitions take place. Accordingly, it is proposed that men compete with each other to gain resources that male parents desire, and they have evolved to signal their unobserved abilities to other men. Individual mate choice is still exercised, mainly within marriage, through the institution of divorce. On this basis, it is further proposed that mate preferences have evolved to guide choice within marriage, while individuals have evolved mating strategies such as extramarital relationships, in order to balance the costs of parental choice.

Keywords: Sexual selection, Parental choice, Female choice, Mate preferences, Honest signaling, Mating strategies, Intersexual selection, Intrasexual selection

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INTRODUCTION

In Classical Greece, women were strictly forbidden from entering the Olympic Games. The Greek woman Kalipatira, who was a daughter and a mother of Olympic champions, disguised herself as a man in order to gain access to the games and watch her son compete. When she was discovered, she was forcibly ejected from the Games. However, her successful intrusion resulted into the rules of the Games being changed; from that point on, the audiences, as well as the competitors, had to be naked (Pausanias, trans. 1918).

It is not uncommon for people to spend considerable amounts of energy and resources in attending, organizing and participating in athletic competitions. The energy and time devoted to these contests proves the benefits of the spectacle that qualifies the cost. An obvious benefit is entertainment. But why is it entertaining to compete against others in the presence of an audience? Or, why is it entertaining to watch people running to see who is going to finish first? And why are both the audience and those competing in the field typically men? From an evolutionary perspective, it has been proposed that men enjoy competing against each other to signal their otherwise unobserved physical abilities to women, who watch them in order to aid their decision in finding a mate (Miller, 2000; Zahavi & Zahavi, 1997).

This hypothesis is based on the evolutionary premise that female choice is the primary sexual selection force in our species. In Darwin's (1871) original formulation, certain male traits are selected because they appeal to women. To this hypothesis, Trivers (1972) gave a solid theoretical basis by arguing that female invest more in their offspring (i.e., larger gametes, nine months of gestation, breastfeeding etc.) and become in effect the scarce reproductive resource to which men seek access. As a result, women are in a position to exercise choice, and by doing so they determine who is going to be reproduced. Traits which enable men to be chosen by women are sexually selected and increase in frequency in the population. In the example above, men's willingness to sacrifice energy by engaging in sports has been sexually selected as women prefer to mate with those men who display superior physical abilities (Miller, 2000; Zahavi & Zahavi, 1997).

This model fits well with the mating patterns that we observe today in modern Western post-industrial societies, and has been widely accepted by most evolutionary theorists specializing in human mating. However, as the example from the Olympic Games in ancient Greece demonstrates, arguing that female choice is the primary sexual selection force in our species becomes problematic under close scrutiny: If men spent exorbitant amounts of energy to signal their abilities to women, why did they exclude women from the audience? Similarly, if men, and particularly older men, did not have much to gain from this demonstration of athletic abilities, why was the audience filled with them? This is not an isolated phenomenon of the distant past. Today, where entrance

to athletic events does not depend on sex, the field, as well as the audience, is still male-dominated (Lombardo, 2012).

The answer to these questions potentially lies in recent advancements in evolutionary psychology and in theoretical biology which indicate that female choice has not been as strong a sexual selection force as it was previously thought, while a different sexual selection force has been identified, namely parents (Apostolou, 2007b, 2010b). This paper aims to review these developments, and apply them in advancing our understanding of the evolution of human mating behavior.

The model of parental choice

Parent-offspring conflict over mating

Parents and offspring are not genetically identical, and as a result they do not share the same interests with respect to mate choice. Specific traits in a mating candidate give unequal benefits to each party, and consequently they are valued differently in an in-law and in a spouse (Apostolou, 2007a, Trivers, 1974). For instance, the coefficient of relatedness of parents to children is 0.5, but the coefficient of relatedness of grandparents to grandchildren is only 0.25. As a result, the odds of a particular gene of an individual being passed into the next generation by a spouse or an in-law is 50% or 25% respectively. Therefore, individuals reap more genetic benefits from a spouse than from an in-law of superior genetic quality, and as a result they have evolved to prefer this trait more in a spouse than in an in-law (Apostolou, 2008; Buunk, & Castro Solano, 2010; Buunk, Park, & Dubbs, 2008; Perilloux, Fleischman, & Buss, 2011).

Asymmetrical preferences interact with the trade-off nature of mating (Gangestad & Simpson, 2000; Luo & Klohnen, 2005) to give rise to mating decisions that do not satisfy parents (Apostolou, 2011b). For instance, having a stronger preference for beauty (a proxy of genetic quality), children would be willing to make compromises on traits such as good social status, wealth, and good family background in order to gain a good looking spouse. This is costly to their parents as they lose the benefits from this trait and the cost is not balanced by the gain in genetic quality since this is not as valuable to them. Overall, parent-offspring conflict over mating mandates that mate choice left in the hands of children does not maximize the fitness of parents. In consequence, considerable evolutionary pressure is exercised on the latter to control the mating decisions of the former.

Sexual selection under parental choice

The theory of parent-offspring conflict over mating was employed in order to construct a model that advances the standard sexual selection theory as it accounts for certain unique aspects of human mating (Apostolou, 2007b, 2010b). More specifically, in this model conflicting interests over mating mandate that if offspring are left on their own

to exercise choice, they will choose spouses who are more beneficial for them than for their parents. As a consequence, evolutionary pressure is exercised on parents to control the mate choices of their children. To put it differently, those parents who have evolved mechanisms that enable them to impose their choices on their daughters and sons succeed in having individuals who maximize their fitness as in-laws, and have a selective advantage over those who leave their children alone to exercise their own choice.

Parents are able to bring their daughters' and sons' mating decisions under their control because they are physically stronger than their children, and because the latter depend on parental investment for survival and reproduction. Accordingly, by withholding resources and/or applying physical force, parents can manipulate the mate choices of their daughters and sons (Apostolou, 2007b). In effect, parental control over mating gives rise to sexual selection under parental choice: Traits that make an individual appealing to parents are likely to be selected and increase in frequency in the population (Apostolou, 2007b, 2010b).

Parental influence over mating is asymmetrical with parents exercising more control over the mating decisions of their daughters (Apostolou, 2007b, 2010b; Flinn, 1988; Perilloux, Fleischman, & Buss, 2008). There are numerous reasons that account for this asymmetry, the primary one being that the female invests more in her offspring and becomes the scarce reproductive resource to which males seek access (Trivers, 1972). Thus, by controlling their daughters, parents are placed in a position that enables them to exercise choice (i.e., to decide whether they will grant this access or not). In addition, allowing sexual freedom is more risky in the case of daughters as it may result into pregnancy. Finally, due to parental uncertainty, men value chastity in a potential wife (Buss, 2003); therefore, sexual adventures before marriage compromise parents' ability to attract a high quality son-in-law.

Furthermore, parental choice is male-dominated: By means of greater physical strength, exclusive use of weaponry and control of political institutions (Flinn & Low, 1986), male parents have more influence than female parents over their daughters' and sons' mating behavior (Apostolou, 2007b).

Despite parental control, individual mate choice can still be exercised. More specifically, where and when prevailing conditions allow parents to dominate mating decisions, individual mate choice exists in parallel to parental choice, working as a secondary sexual selection force. In particular, as they get older, children become more autonomous and less dependent upon parental investment. Also, when parents get older their physical strength declines and they become less effective in controlling their children's mating decisions. Additionally, in later marriages parents are likely to be absent due to death and no longer able to influence selection. Finally, daughters and sons are not pawns in the hands of their parents as they can psychologically manipulate them towards their own ends (Trivers, 1974).

On the other hand, when environmental constraints prevent parents from controlling the mate choices of their offspring, individual mate choice works as a primary sexual selection force, and parental choice as a secondary. That is, where and when the offspring at marriageable age are independent from parental investment, and where physical force cannot be used, parents will employ indirect means to influence mating: They may use psychological manipulation or their material resources in order to influence their children's mating decisions.

The mechanism of parental choice

The primary mechanism of parental choice is in-law preferences, which determine the course of sexual selection by directing parental choice: Traits that parents prefer in an in-law are selected and increase in frequency in the population.

Although not specifically designed for this purpose, a number of studies provide information on what parents prefer in an in-law. In particular, Hynie, Lalonde and Lee (2006) investigated in-law preferences of Chinese immigrants in North America and found good social status and understanding to be among the most preferred traits. Borgerhoff Mulder (1988) reported that, among the pastoral Kipsigies in Kenya, parents prefer as sons-in-law individuals who enjoy high social status, are wealthy, educated, have a good character and are industrious. Finally, Apostolou (2007b) found that among foragers, parents prefer sons-in-law who are good hunters and have a good family background, while they prefer daughters-in-law who are industrious and come from a good family background.

Two studies have been completed so far which aim to identify the qualities that parents desire in an in-law. The first study asked British parents to rate the desirability of a number of traits in a son-in-law and a daughter-in-law (Apostolou, 2007a). The results indicate that certain traits such as industry and good character rank high in the hierarchy of parental preferences. In the second study, Apostolou (2010a) analyzed the anthropological record and collected data on parental preferences from 67 pre-industrial societies. It was found that parents desire traits such as industry, high social status, good family background, and wealth in an in-law, while other traits, such as beauty, rarely appear to matter.

Overall, parents are interested in having as in-laws individuals who have a good character, are industrious and able workers, enjoy a high social status and have a good family background. These preferences direct the course of sexual selection when parents dominate mate choice, which is typical of what happens in most human societies (Apostolou, 2010b).

Sexual selection under parental choice in human societies

Means of control

The model of parental choice predicts that parents employ their physical strength, the resources they control and psychological manipulation in order to influence the mate choices of their children. In particular, parents use direct physical force to keep their children in line. In pre-Victorian England, for example, one daughter insisted on choosing her own husband, which met with a fierce reaction from her parents: 'she hath since Easter the most part been beaten [by her mother] once in the week or twice, and sometimes twice on a day, and her head broken in two or three places' (Stone, 1990, p.130). Moreover, parents use their physical strength to impair their children's ability to exercise mate choice. In particular, mainly in sub-Saharan Africa, but also in other areas across the globe, parents subject their young daughters to a surgical procedure that results in the full or partial removal of the clitoris and a consequent reduction in the ability to experience sexual pleasure (Gruenbaum, 2001).

In addition, parents employ their physical strength to chaperone their children and prevent them from forming undesirable relationships before marriage. Among the Sacree foragers of Canada: 'Sacree mothers kept the strictest watch over their unmarried daughters, and never allowed them to sleep or to wander away alone' (Diamond, 1938, p.22). Furthermore, because older children are physically stronger than younger ones and thus more difficult to manipulate, parents attempt to enforce early marriage. Among the Tuareg pastoralists of Africa: 'A small girl stands little chance of successfully protesting against her parents' arrangements for her early marriage. It is much more difficult for parents to go against the wishes of an adult daughter' (Nicolaisen, 1963, p.523).

Furthermore, across different cultures parents manipulate inheritance rights in order to influence their children's mate choices (Apostolou, 2011a). Parents also use psychological manipulation including presenting certain behaviors as immoral. Among the Kutenai foragers of North America: 'Parents did not restrict their daughters' choices but relied on the efficiency of their moral teaching to lead their children to make wise choices' (Turney-High, 1941, p.131).

These means of manipulation are effective in placing mate choice under parental control, particularly in pre-industrial societies where children depend on their parents and close kin for food, support and protection.

Sexual selection under parental choice in pre-industrial societies

To examine the prevalence of parental control over mating, one study coded the mating patterns of a large sample of foraging societies (N = 190) spread across the globe (Apostolou, 2007b). In these societies parents exercise substantial control over the mating behavior of their offspring with arranged marriage being the most frequent type of marriage found in 70% of the societies in the sample. Marriage as the result of free

courtship is found only in a small number of cases (i.e., 4.3%). In arranged marriage, men, usually fathers, dominate the selection process, but it is not uncommon for women to be influential. Finally, there is space for daughters and sons to exercise choice by eloping, divorcing or forming extramarital relationships.

Similarly, another study analyzed data from the Standard Cross Cultural Sample and found that in agropastoral societies the most common marriage type is arranged marriage, with marriage arrangements being dominated by men (Apostolou, 2010b, see also Broude & Greene, 1983; Stephens, 1963). Additionally, in agropastoral societies women are more likely than men to have their marriage arranged, and they are also married younger than men. Daughters and sons can exercise choice through various means, such as divorce and extramarital relationships. Moreover, comparisons between agropastoral and foraging societies revealed that parents exercise more control over the mating decisions of their offspring in the former than in the latter societies. Also, male parents are more frequently reported to dominate marriage arrangements in agropastoral societies than in hunting and gathering ones.

These patterns of mating have further evolutionary implications. In particular, the division between agropastoral and foraging pre-industrial societies reflects the two major stages of human evolution: Humans lived as hunters and gatherers for most of human evolution, then over the last 10,000 years there was a transition to a mode of subsistence based on agriculture and animal husbandry (Lee & DeVore, 1968). Accordingly, by studying contemporary pre-industrial societies, we can make valid inferences about mating patterns in ancestral human ones (Ember, 1978; Lee & DeVore, 1968). Thus, as parental choice is dominant in modern foraging societies, we can infer that it was also dominant in ancestral foraging societies (Apostolou, 2007b). Evidence from comparative phylogenetic analysis provides also support for this argument (Walker et al., 2011). Moreover, it can be further inferred that the agricultural revolution at the onset of the Holocene (10,000 years ago) resulted in a subsequent increase in the influence of parents, and in particular male parents, over the mating decisions of their offspring (Apostolou, 2010b).

As a matter of fact we do not need to make speculations for pre-modern agropastoral societies, as data for the mating patterns in these societies is already available from historical sources. This evidence indicates that parents, primarily male ones, had been arranging the marriages of their children, and especially of their daughters, in ancient Greece (Vrissimtzis, 1997), ancient Rome (Balsdon, 1962), Imperial China (Gernet, 1970) and in pre-Victorian England (Stone, 1990). In Athens during the Classical Period:

> The young Athenian woman wasn't allowed to socialize with the opposite sex and she accordingly couldn't choose the man that she would marry. It was her legal master [the father] who would choose her future husband, even in spite of the wishes of the girl, whose consent wasn't necessary (Vrissimtzis, 1997, p. 26).

Sexual selection under parental choice in post-industrial societies

Unlike in pre-industrial societies, the extensive educational needs of technology-based societies require marriage to be postponed until the conclusion of one's training. As a result, individuals are married later in life, when they are relatively independent from their families. Moreover, social protection systems, such as the welfare state, police, human rights etc., reduce individuals' dependence on their family. Similarly, the legal system prevents the use of physical force, so parents are constrained from imposing their will by means of physical punishment. Since parents cannot use their children's dependence on their investment and their physical strength as means of coercion, they cannot directly control their mating decisions. Consequently, individuals in post-industrial societies enjoy freedom over mate choice.

However, parental behavior has been shaped by evolution so as to attempt to control the mating behavior of offspring, which means that even if parents cannot do so directly, they will attempt to do so indirectly. To begin with, parents control substantial resources, to which their children are not indifferent, that can be used to influence mate choice. For instance, manipulation of inheritance rights can give parents, especially wealthy ones, leverage for effective manipulation (Apostolou, 2011a). Moreover, parents employ means such as 'cajolery, persuasion, appeals to loyalty, and threats' (Sussman, 1953, p.80) to manipulate the mating behavior of their children. Modern Chinese parents cannot impose their choices on their children, but they do continue to exercise the role of facilitator through their own social networks (Ikels, 1985). Chinese parents in the USA try to create environments in which their children can meet other Chinese children of desirable background. For example, they may stage a barbecue when an eligible relative from out of state comes to visit (Ikels, 1985).

Although the actual strength of parental choice in post-industrial societies remains to be estimated, the limited evidence currently available points towards the direction that parents are influential over mating decisions.

Intersexual and intrasexual selection under parental choice

By dominating mate choice, parents set the stage for intersexual and intrasexual selection to take place. Starting from the former, when parental choice is dominant, male parents control the scarce reproductive resource, the female, and decide who is going to have access to her. Accordingly, evolutionary pressure is exercised on men to appeal to other men as spouses for their daughters. To put it differently, traits that make men more appealing to other men as sons-in-law will spread in the population as they give their owners reproductive benefits.

In more detail, traits associated with resource acquisition capacity such as industry and working ability are highly valued in a son-in-law. Therefore, since men who

are endowed with such traits are more likely to be selected as in-laws, direct selection should increase the frequency of these traits in the population. Moreover, given that these traits are unobserved, there should be evolutionary pressure on male mate-seekers to find reliable ways to signal their abilities on the one hand, and on male parents to be sensitive to this signaling on the other.

In foraging societies parents are looking for sons-in-law who are good hunters and good providers (Apostolou, 2007b). Men can signal these abilities by engaging in costly behaviors, such as risky forms of hunting (Hawkes, 1991). Among the Blackfeet in North America: 'adventurous young men hunted the powerful grizzly bear for its claws, which they proudly displayed in the form of necklaces.' However, 'the most highly prized bird of the Blackfoot country was the golden eagle … Eagle catching was a dangerous feat performed only by men who claimed to possess secret power' (Ewers, 1958, p. 85). By engaging in this kind of hunting a man signals to other men who are looking for spouses for their daughters and sisters that he is a good hunter; by being sensitive to this signal, men are likely to select good hunters as spouses for their daughters.

Numerous studies indicate that costly or risky behaviors observed in men are directed towards impressing other men: Farthing (2005) concluded that certain aspects of male risk-taking behaviors are directed towards other men rather than women. And men are responsive to such behaviors: Kelly and Dunbar (2001) found that men prefer to form friendships with risk-prone, brave men. It is no surprise then that men make riskier decisions while driving when they have male passengers than when they have female ones (Jackson & Gray, 1976). Additionally, Fischer and Rodriguez Mosquera (2001) in a meta-analysis study concluded that men evoke anger and aggression not because they want to attract the attention of women, but because they are afraid of losing status and respect in the eyes of other men.

It is reasonable to assume that athletic prowess correlates with a number of desirable traits including hunting ability, working ability, fighting ability, and so on. Thus, in athletic competitions like the Olympic Games in ancient Greece, it makes sense for men to demonstrate, in a standardized fashion, their abilities to other men who are looking or will be looking for husbands for their daughters. It also makes sense to exclude females from watching the games since they have no power over marriage arrangements; in an athletic competition where men aim at displaying their abilities to other men, allowing women to attend inevitably reduces the size of the male audience and thus, the effect of the signaling produced by the competing men.

It can be argued of course that women do not need to be present in athletic competitions, simply because the winners can present themselves to them after the completion of the competition. However, in ancient times, women never initiated the presentation of themselves to men. Instead, they were confined to their houses and had little, if any, opportunity to interact with men. Meanwhile, prospective suitors needed to

impress the women's fathers and other male relatives who were predominantly responsible for finding spouses for them (Vrissimtzis, 1997).

Last but not least, in modern pre-industrial societies and most probably in ancestral societies, capable men who successfully communicate their abilities to other men receive from them women as wives (the Tiwi foragers in Oceania serve a good example, see Hart, Pilling & Goodale, 1988). However, in post-industrial societies where women's marriages are not controlled by men, appealing to other men has limited reproductive benefits. Such adaptations can even be dysfunctional, as they absorb substantial amounts of energy and resources that could be directed to courting women.

Parental choice also sets the stage for intrasexual competition by determining which resources men compete for. In particular, when parental choice is dominant, the female's ability to exercise choice is limited, and consequently intrasexual competition becomes competition between males to acquire resources which are desired by male parents who control females. In other words, in-law preferences influence the resources over which intra-sexual competition takes place.

For instance, parents are interested in material resources and males are expected to compete between them on who is going to become wealthier. Parents are also interested in social status, which proxies the ability to acquire resources. Accordingly, men should compete with each other to climb up the status hierarchy. Moreover, as parents are interested in the family background of their prospective in-laws, individuals are also expected to care about their family's status: They should attempt to enhance it and take measures against anything that threatens to compromise it.

Finally, men can use force to gain access to women who are controlled by other men. For instance, the Yannomamo in South America organize raids of nearby settlements, fighting other men to get their daughters, sisters and wives (Chagnon, 1992). Accordingly, traits such as aggression, physical power and stamina, which make men more effective in this endeavor of force, should have increased in frequency in the population.

Mate preferences and mating strategies under parental choice

Given that parental control over mating is not (and cannot be) absolute, there is space for children to exercise choice. In particular, individual mate choice is exercised indirectly when parents ask the consent of their daughters and sons to arrange their marriage. However, it is usually the case that the offspring's consent is not necessary for the marriage to proceed (Apostolou, 2010b). Elopement is another way for individual mate choice to be exercised, but this is rare. Furthermore, parental control wanes as parents grow older, thus, offspring become more independent to exercise choice in later marriages.

Individual mate choice is stronger in the institution of divorce. Divorce is as universal as marriage and the decision to break up rests predominantly with children and not with their parents (Apostolou, 2010b). Sexual selection under individual mate choice operates when offspring are able to exercise mate choice, and the institution of divorce gives them this opportunity. For instance, among the !Kung in Africa:

In a population so small that only a few young women arrive at the age of first marriage in each year, and in which the rate of divorce and remarriage is high one has the impression that more of the testing of the qualities of the spouses takes place after marriage than before (Howell, 2000, p. 231).

Parents therefore have substantial control over whom their offspring are going to marry, but limited control with regard to whom they will stay married. Under conditions where parental choice is strong, divorce, present in almost all recorded societies (Murdock, 1949), is perhaps the most effective way for offspring to exercise choice. Consequently, when mating is regulated by parents, intersexual selection takes place within marriage, primarily through the institution of divorce. Since parental control over mating was most probably strong throughout human evolution, mate preferences should have predominantly evolved to guide selection within marriage. And there are several benefits associated with choice within marriage.

To begin with, in cases where marriages are arranged, the traits of the spouse reflect the preferences of parents, and not the preferences of children; thus, getting a divorce can pay in terms of increasing the chances of marrying somebody who complies with one's own preferences. Moreover, even if spouses are of high mate quality, there is no guarantee that they will remain so. For instance, an injury from a fight, hunting or a health problem may prevent a man from supplying his family with adequate resources (Fisher, 1992). Additionally, he may engage in extramarital relationships and divert his resources away from his family (Buss, 2003). Last but not least, although parents screen prospective spouses for their children, their choices may not always be correct, or they may simply have been deceived into accepting as in-laws individuals of low mate value.

Consequently, there are strong evolutionary pressures for mate preferences that guide choice within marriage to evolve. And they are effective in doing so as it can be seen in the reasons most frequently given for divorce. For instance, resource provision is an important trait in a marital partner, so laziness and failure to carry out economic duties are two of the main causes of divorce across different cultures (Betzig, 1989). So, mate preferences actively guide mating decisions: For instance, by having a preference for industry, individuals end up divorcing lazy spouses and staying married to industrious ones. In the absence of these preferences, individuals would remain married to spouses who are lazy, barren, abusive etc., seriously compromising their reproductive success.

The model of parental choice can also be applied to gain insights into the evolution of mating strategies. In particular, in the case of divorce an effective strategy for children is to stay married and wait until their parents become old and weak, and no

longer able to influence mate choices. They can then divorce their spouses and marry someone of their own choice. An even more effective strategy can be for children to accept their parents' choices but balance the cost of parental choice through extramarital relationships.

In more detail, when parents exercise choice they are likely to compromise on genetic quality, which implies that offspring are likely to find themselves married to individuals of lower genetic quality than they desire and would have chosen themselves. Accordingly, an offspring's strategy that balances the costs of parental choice is to stay married to a spouse that their parents have selected for them, and simultaneously seek good genes outside of the marriage in extramarital relationships.

This is not a trouble-free strategy however, particularly for women, who risk suffering punishment in the hands of their husbands. For instance, among the Chinookans in North America, 'a wife's punishment for adultery was the loss of her ears or the end of her nose' (Ray, 1938, p. 73). However, this strategy can be potentially more effective for women given that men are less discriminating with whom they have sex with (Buss, 2003). Therefore, a man of high genetic quality would be willing to engage in a short-term relationship with a woman of inferior genetic quality. Moreover, this strategy has additional benefits because, by staying married to spouses their parents have chosen for them, daughters and sons avoid confrontation. If they choose to divorce someone that their parents have selected, the latter may retaliate by imposing costs on them, or they may arrange another marriage with someone of their choice. Thus, this strategy is particular useful in scenarios where divorce is unlikely to be effective or likely to be costly.

Future directions

Advancing our understanding of how sexual selection works in our species offers new directions for research. To begin with, if during human evolution parents had been successful in controlling the mate choices of their children, we would expect a number of adaptations to have evolved through parental choice. Accordingly, one goal for future research should be to identify these adaptations.

Such an endeavor can be accomplished through developing a better understanding of in-law preferences and how they differ from mate preferences. In this way, we will be able to distinguish between the adaptations that have been shaped by parental choice and the ones that have been shaped by mate choice. For instance, parents are particularly interested in an in-law's family background. Accordingly, among mechanisms that have been shaped by parental choice, we would expect to see in suitors a tendency to advertise their good family background (e.g., by displaying good manners), or to see in parents a very sensitive disposition towards anything that may threaten their family's reputation (e.g., inappropriate sexual behaviour from a family member). This is, however, a

challenging line of research, given that there are considerable overlaps between in-law and mate preferences.

Moreover, the theoretical framework presented here enables us to generate testable hypotheses. For instance, given that parental control over mating is biased against females, and because daughters are unlikely to match the physical strength of their parents, we would expect women to have evolved to be more efficient than men in psychologically manipulating their parents. In addition, as parental choice is dominated by men, we would expect further daughters to have evolved to be particularly manipulative of their fathers.

Additionally, in post-industrial societies parents cannot directly control the mate choices of their children so we expect that they use indirect means of manipulation. Future research should attempt to identify the specific tactics that parents employ to influence the mate choices of their daughters and sons. By assessing the effectiveness of these tactics, we can measure the strength of parental choice as a sexual selection mechanism in modern post-industrial societies.

Furthermore, parental attempts to control mating should give rise to social institutions that uphold this control. For instance, arranged marriage, child betrothal, female circumcision, foot binding, etc., are social structures that promote parental control over mating. It can be predicted that these customs and practices exist only in societies where parents can exercise direct control over mating and not in societies where mating is based on free choice. Accordingly, the presented theoretical framework can promote the understanding of these social structures and guide further research on cultural evolution.

The theoretical and empirical developments discussed here can stimulate research in disciplines other than psychology and evolutionary theory. In particular, in post-industrial societies where mate choice is exercised predominantly by parents, there is less selection pressure for traits that connote genetic fitness, as this is not considered of primary importance by parents. However, selection pressures should change dramatically in post-industrial societies where mate choice is relatively free. In particular, there should be strong selection pressures for traits that connote genetic quality which is considered important by mate- seekers.

This can potentially explain the huge growth of beauty industry in Western countries: The growth in demand for beauty in the mate market triggered the supply of a wide range of products (make up products, hairs products, light food products etc.) and services (nail works, beauticians, hairdressers, plastic surgery, liposuction etc.) that enhance one's looks. A fruitful area of research in psychology and marketing would be then to examine the changes that the loss of parental power over regulating mating brings and the new needs for products and services that arise from this transformation.

Summary and Conclusions

Evolutionary psychologists argued that the mind evolved in an environment different from our own (Tooby & Cosmides, 1990), but, without taking into consideration the anthropological record, many depict this environment as being similar to our own. For instance, Miller (2000) presents ancestral hunters and gatherers spending their evenings flirting in the African savannah, and choosing their own spouses. However, the anthropological record indicates that less than 5% of foraging societies practice marriage through free courtship, while the great majority practice arranged marriage (Apostolou, 2007b).

Perhaps one explanation for this bias is that the vast majority of research takes place in Western post-industrial societies where mate choice is free. This has a dual effect: It influences the way researchers understand the world, and it makes their theories appealing to their audience, which comes from the same cultural setting. Thus, although many of these theories need to be revised to fit with the phenomena they predict, they sound exciting and realistic to people who live in a free-mating world, and who have little knowledge of the premises of evolutionary psychology or the anthropological record. The wide acceptance of these theories by the general audience feeds back to reassure their creators of their plausibility. Last but not least, many of the theories on the evolution of human mating behavior were influenced from studies on animal behavior where female choice appears to be the primary sexual selection force. However, our species is different from other species in many respects, one being the workings of sexual selection.

Following a path more closely to the premises of evolutionary psychology an emerging research has attempted to shed light on previously understudied aspects of human evolution. In particular, conflicting interests over mating induce parents to control the mating decisions of their children and choose spouses for them. This gives rise to sexual selection under parental choice where traits that appeal to parents are selected and spread to the population. Parental choice is prevalent in modern and historical pre-industrial societies, which indicates that it was also prevalent during most human evolutionary time. The model of parental choice provides a more realistic framework for understanding the evolution of specific aspects of mating behavior such as honest signaling, mate preferences and sexual strategies.

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REFERENCES

Apostolou, M. (2007a). Elements of parental choice: The evolution of parental preferences in relation to in-law selection. *Evolutionary Psychology*, *5*, 70-83.

Apostolou, M. (2007b). Sexual selection under parental choice: The role of parents in the evolution of human mating. *Evolution and Human Behavior*, *28*, 403-409.

Apostolou, M. (2008). Parent-offspring conflict over mating: The case of beauty. *Evolutionary Psychology*, *6*, 303-315.

Apostolou, M. (2010a). Parental choice: What parents want in a son-in-law and a daughter-in-law across 67 pre-industrial societies. *British Journal of Psychology*, *101*, 695-704.

Apostolou, M. (2010b). Sexual selection under parental choice in agropastoral societies. *Evolution and Human Behavior*, *31*, 39-47.

Apostolou, M. (2011a). Inheritance as an instrument of parental control over mating. *Journal of Social and Personal Relationships*, *28*, 374-382.

Apostolou, M. (2011b). Parent-offspring conflict over mating: Testing the tradeoffs hypothesis. *Evolutionary Psychology*, *9*, 470-495.

Balsdon, J. P. V. D. (1962). *Roman women: Their history and habits*. London: The History Book Club.

Betzig, L. (1989). Causes of conjugal dissolution: A cross-cultural study. *Current Anthropology*, *30*, 654-676.

Borgerhoff Mulder, M. (1988). Kipsigis bridewealth payment. In L. Betzig, M. Borgerhoff Mulder & P. Turke (Eds.), *Human reproductive behaviour, a Darwinian perspective* (pp. 65-82). Cambridge: Cambridge University Press.

Broude, G. J. & Green, S. J. (1983). Cross-cultural codes on husband-wife relationships. *Ethnology*, *22*, 263-280.

Buss, D. M. (2003). *The evolution of desire: Strategies of human mating* (2nd ed.). New York: Basic Books.

Buunk, A. P., & Castro Solano, A. (2010). Conflicting preferences of parents and offspring over criteria for a mate: A study in Argentina. *Journal of Family Psychology*, *24*, 391-399.

Buunk, A. P., Park, J. H. & Dubbs, S. L. (2008). Parent-offspring conflict in mate preferences. *Review of General Psychology*, *12*, 47-62.

Chagnon, N. A. (1992). *Yanomamo* (4th ed.). Fort Worth: Harcourt Brace Jovanovich College Publishers.

Darwin, C. (1871). *The descent of man and selection in relation to sex*. London: Murray.

Diamond, J. (1938). The Sarcee Indians of Canada. *Bulletin of the Canada Department of Mines, National Museum of Canada, 90*, 1-98.

Ember, C. R. (1978). Myths about hunter-gatherers. *Ethnology, 17*, 439-448.

Ewers, J. C. (1958). *The Blackfeet Raiders on the Norhtwestern Plains.* Norman: University of Oklahoma Press.

Farthing, G. W. (2005). Attitudes toward heroic and nonheroic physical risk takers as mates and as friend. *Evolution and Human Behavior*, *26*, 171-185.

Fisher, H. E. (1992). *The anatomy of love*. New York, NY: Norton.

Fischer, A. H. & Rodriguez Mosquera, P. M. (2001). What concerns men? Women or other men? *Psychology Evolution and Gender, 3*, 5-25.

Flinn, M. V. (1988). Daughter guarding in a Trinidadian village. In L. Betzig, M. Mulder, & P. Turke (Eds.), *Human reproductive behaviour* (pp. 189-200). London, GB: Cambridge University Press.

Flinn, M.V. & Low, B. S. (1986). Resource distribution, social competition and mating patterns in human societies. In D.I. Rubenstein & R. W. Wrangham (Eds.), *Ecological aspects of social evolution* (pp. 217-243). Princeton, CT: Princeton University Press.

Gangestad, S. W., & Simpson, J. A. (2000). The evolution of human mating: trade-offs and strategic pluralism. *Behavioral and Brain Sciences, 23*, 573–644.

Gernet, J. (1970). *Daily life in China on the eve of the Mongol invasion 1250-1276*. Stanford, CA: Stanford University Press.

Gruenbaum, E. (2001). *The female circumcision controversy*. Philadelphia, PA: University of Pennsylvania Press.

Hart, C.W.M., Pilling, A. R. & Goodale, J. C. (1988). *The Tiwi of North Australia*. New York, NY: Holt, Rinehart and Winston.

Hawkes, K. (1991). Showing off: Tests of an hypothesis about men's foraging goals. *Ethology and Sociobiology*, *12*, 29-54.

Howell, N. (2000). *Demography of the Dobe !Kung* (2nd ed.). New York, NY: Aldine De Gruyter.

Hynie, M., Lalonde, R. N., & Lee, N. (2006). Parent–child value transmission among Chinese immigrants to North America: The case of traditional mate preferences. *Cultural Diversity and Ethnic Minority Psychology*, *12*, 230–244.

Ikels, C. (1985). Parental perspectives on the significance of marriage. *Journal of Marriage and the Family*, *47*, 253-264.

Jackson, T.T. & Gray, M. (1976). Field study of risk-taking behaviour of automobile drivers. *Perceptual and Motor Skills*, *43*, 471-474.

Kelly, S. & Dunbar, R. I. M. (2001). Who dares, wins: Heroism versus altruism in women's mate choice. *Human Nature, 12,* 89-105.

Lee, R. B. & DeVore, I. (1968). *Man the hunter*. New York, NY: Aldine.

Lombardo, M. P. (2012). On the evolution of sport. *Evolutionary Psychology, 10*, 1-28.

Luo, S., & Klohnen, E.C. (2005). Assortative mating and marital quality in newlyweds: A coupled-centered approach. *Journal of Personality and Social Psychology, 88,* 304-326.

Miller, G. (2000). *The Mating Mind*. London, GB: BCA.

Murdock, G. P. (1949). *Social structure*. New York, NY: Free Press.

Nicolaisen, J. (1963). Ecology and culture of the pastoral Tuareg. *National museets Skrifter, Etnografisk Raeke, 9,* 1-540.

Pausanias (1918). *Description of Greece* (W.H.S. Jones, D. Litt., & H.A. Ormerod, Trans.). London: William Heinemann. (Original work published 2nd Century A.D.)

Perilloux, C., Fleischman, D.S., & Buss, D. M. (2008). The daughter guarding hypothesis: parental influence on, and emotional reaction to, offspring's mating behavior. *Evolutionary Psychology, 6,* 217-233.

Perilloux, C., Fleischman, D. S., & Buss, D. M. (2011). Meet the parents: Parent-offspring convergence and divergence in mate preferences. *Personality and Individual Differences, 50,* 253-258.

Ray, V. F. (1938). Lower Chinook ethnographic notes. *University of Washington Publications in Anthropology, 7,* 29-165.

Stephens, W. N. (1963). *The family in cross-cultural perspective*. New York, NY: Holt, Rinehart & Winston.

Stone, L. (1990). *The family, sex and marriage in England 1500-1800*. London, GB: Penguin Books.

Sussman, M. B. (1953). Parental participation in mate selection and its effect upon family continuity. *Social Forces, 1,* 76-81.

Tooby, J. & Cosmides, L. (1990). The past explains the present. *Ethology and Sociobiology, 11,* 375-424.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campell (Ed.), *Sexual selection and the descent of man: 1871-1971* (pp. 136-179). Chicago: Aldine.

Trivers, R. (1974). Parent offspring conflict. *American Zoologist, 24,* 249-264.

Turney-High, H. H. (1941). Ethnography of the Kutenai. *Memoirs of the American Anthropological Association, 56,* 2-202.

Vrissimtzis, N. A. (1997). *Love, sex & marriage in ancient Greece* (3rd ed.). Athens: Polygrama.

Walker, R. S., Hill, K. R., Flinn, M. V. & Ellsworth, R. M. (2011). Evolutionary history of hunter-gatherer marriage practices. *PLoS ONE, 6,* e19066.

Zahavi, A. & Zahavi, A. (1997). *The handicap principle: A missing piece of Darwin's puzzle*. New York, NY: Oxford University Press.

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