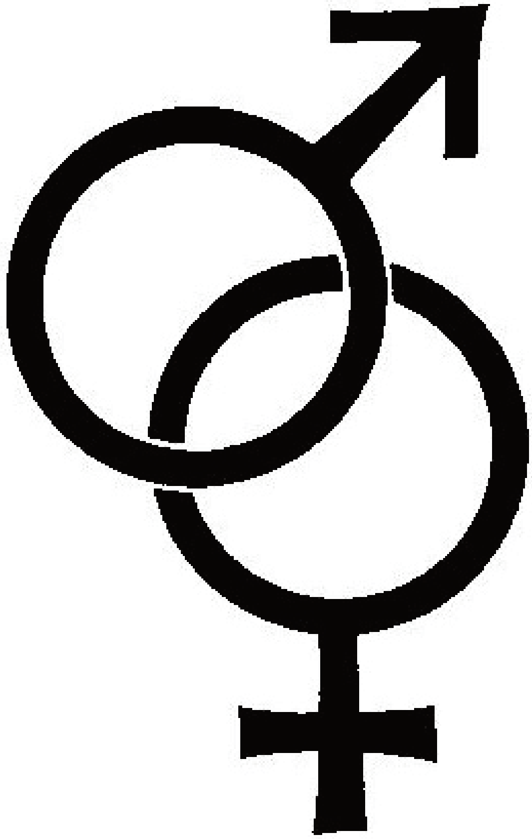

Evolved Sex Differences in Modern Context

David C. Geary

Darwin's (1871) sexual selection – competition with individuals of the same sex and species for access to mates and discriminative choice of mating partners – is now widely accepted in the biological sciences as the primary source of evolved sex differences, but remains controversial in psychology and the social sciences. Nevertheless, I have argued that the associated principles of intrasexual competition and intersexual choice provide the unifying framework for not only understanding the biological basis of human sex differences, but also for more fully understanding cultural and historical variation in how these differences are expressed (Geary, 2010). Here, I use sex differences in patterns of academic achievement, behavioral aggression and risk taking, psychological disorders, and occupational achievement to illustrate how sex differences in a variety of evolved traits can manifest in a modern context.

Keywords: evolutionary psychology, gender, males, male studies

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Psychologists and social scientists have documented sex differences in social behavior, cognitive abilities, and academic outcomes to name just a few for more than 100 years (e.g., Woolley, 1910, 1914; for summary see Ellis et al., 2008). The prevailing view 100 years ago and a prominent view today is that these differences are the result of some form of socialization (e.g., Wood & Eagly, 2002). Woolley (1914) introduced the idea that some human sex differences might be the result of evolution and sexual selection – traits that facilitate competition for mates (intrasexual competition) or that influence mate choices (intersexual choice; Darwin, 1871) – but then quickly rejected the idea. Sexual selection in fact languished in the backwaters of biological theory and research for 100 years (Cronin, 1991), but this has changed over the past four decades. Biologists have now demonstrated that traits that facilitate competition for mates or that influence mate choices become elaborated over evolutionary time and that their here-and-now proximate expression is influenced by pre- and post-natal exposure to sex hormones (Andersson, 2004; Adkins-Regan, 2005). In one of my books, Male, female, I used this theoretical approach to organize and integrate human sex differences across a wide range of traits, from parenting to play and social development to brain and cognition (Geary, 1998, 2010).

In many ways, the world within which most of us now live differs in important ways from the ecologies in which our ancestors evolved. For instance, given species-typical social experiences all children learn the language to which they are exposed with little effort or explicit instruction. But, success in the modern world requires much more than this; reading, writing, and basic mathematics are now critical to a productive life. I have proposed that these non-evolved academic competencies are built from more basic, evolved systems (Geary, 1995) through instruction and the domain-general abilities of working memory and fluid intelligence (Geary, 2005, 2007, 2008). In this view, reading and writing, as examples, are built from the evolved language system among others (e.g., theory of mind).

I proposed in *Male, female* that women's tendency to compete through the subtle manipulation of social relationships, for instance, by spreading gossip to sully other women's social reputation, resulted in an evolutionary elaboration of language and related competencies (e.g., face processing; see also Geary, Winegard, & Winegard, 2014). These sex differences in turn may provide girls and women with advantage in academic domains that are built from language and related cognitive competencies. I overview in the first section below the evidence for the prediction of corresponding sex differences in reading and writing, and reprise an earlier argument that men's advantage in some areas of mathematics are secondary to evolved difference in spatial abilities and in interest in non-living things (Geary, 1996). In the second section, I expand the linking of evolved sex differences to modern contexts as related to behavioral risk taking (e.g., violence) and psychological disorders (e.g., anxiety and depression). In the final section, I explore how evolved motivational and cognitive biases influence sex differences in occupational choices and success.

SEX DIFFERENCES IN ACADEMIC COMPETENCIES

Ellis et al. (2008) identified 21 studies published in the past seven decades of children's and adolescents' liking of school. In every nation in which it has been assessed and without exception, girls report liking school more than boys. It is also the case that girls typically get better grades than do boys from elementary school through college in North America, Latin America, Europe, Asia, and Oceana. This is nothing new, as the earliest study of this kind was published more than one hundred years ago (Miles, 1910). These differences emerge because the social organization of schools is better suited to girls and because in relation to boys, girls are more compliant with teacher requests, miss fewer school days, and turn in their assignments with greater frequency. At the same time, there is no sex difference in overall academic competence (Willingham & Cole, 1997), but there are consistent differences in some specific academic areas, including reading, writing, mathematics, and the sciences (Hedges & Nowell, 1995).

The largest differences favoring girls are for components of writing, including spelling and the correct use of grammar; about 7 out of 10 girls outperform the average boy in overall writing performance. Girls also have a small but very consistent cross-national advantage in reading achievement (Machin & Pekkarinen, 2008; Stoet & Geary, 2013), with about 3 out of 5 girls outperforming the average boy. The largest differences favoring boys are for the physical sciences, mechanics, and technology (Hedges & Nowell, 1995; Stumpf & Stanley, 1998); in some of these areas, more than 9 out of 10 boys outscore the average girl. Boys' advantage in mathematics is small and varies from one nation to the next (Stoet & Geary, 2013), but there are more consistent sex differences in some areas of mathematics (Halpern, Benbow, Geary, Gur, Hyde, & Gernsbacher, 2007). There is no question that the development of these and any academic competence is dependent on experiences, especially sound schooling. The question here is whether any more basic cognitive sex differences make learning of some academic areas easier for girls than for boys and easier for boys than for girls in other areas.

Academic Patterns

I have argued elsewhere that the working memory and attentional components of intelligence – there appear to be no substantive sex differences in intelligence, but more males at the high and low ends (Strand, Deary, & Smith, 2006) – contribute to the ability of people to modify evolved cognitive systems to learn how to read, write, do geometry, and other culturally-specific academic competencies (Geary, 2007). As noted, even with similar average IQs, sex differences can emerge in academic domains to the extent there are sex differences in the evolved systems on which the academic competences are built.

Reading

As noted, girls and women have a modest but consistent advantage on reading tests, across historical periods and nations (Hedges & Nowell, 1995; Machin & Pekkarinen, 2008; Willingham & Cole, 1997; Stoet & Geary, 2013). I have suggested that the advantage of girls and women in the mechanics of language production and in language comprehension evolved through their use of relational aggression to control social relationships, and secondarily may provide them with an advantage when learning how to read and in comprehending text that involves nuanced social relationships.

As an example, one of these likely evolved differences involves a bias for women to engage both hemispheres during the processing of some language sounds and during language comprehension (Kansaku, Yamaura, & Kitazawa, 2000; McGlone, 1980). Pugh et al. (1997) found that the representation of language sounds in the both the left- and right-hemisphere is strongly associated with skill at making correspondences between letters and the associated sounds. In other words, individuals (more women than men) who process language sounds in both the left- and right-hemisphere may be more skilled at matching letters to their correct English pronunciations, a critical skill for decoding unfamiliar words during reading. Women's richer input layers in Wernicke's area (critical for language processing), as potentially related to the discrimination of language sounds may be an important source of this advantage (Leonard et al., 2008), but this remains to be determined. My point is that there are biologically-based sex differences in language processing that make the use of phonetic decoding, a critical early reading skill, easier for girls and women than boys and men.

However, an advantage in language processing may give girls a boost during the early phases of reading acquisition, when phonemic decoding is particularly important, but may be less important for skilled readers. In other words, the relation between the sex differences in language processing and reading achievement may differ depending on the skill level of the sample and the reading competency being assessed. These basic language processing differences might result in a sex difference among students (or adults) who are still dependent on phonological decoding (i.e., poor readers), but may not be as important for more skilled readers. In an analysis of sex differences in the academic achievement of 1.5 million adolescents across 75 nations or economic regions (e.g., Hong Kong), Stoet and Geary (2013) found such a pattern. At the lowest levels of reading competence, girls' skills are about ½ a standard deviation better than boys' skills, but the gap narrows to 1/5 of a standard deviation at the highest skill levels.

Independent of brain anatomy, sex differences in reading interests contribute to the sex difference on reading comprehension tests (Asher & Markell, 1974). Girls and women read more than boys and men and read more about romance and other interpersonal relationships than do boys and men, whereas boys and men read more about politics, competition (e.g., sports), and technical matters (e.g., Benton, 1995; Willingham & Cole, 1997). These sex differences mirror some of the sex differences seen during children's social development (e.g., in peer relationships), in adolescent and adult behavioral and social interests (e.g., engagement in group-level sports; Deaner et al., 2012), and as related to object use; I proposed that the latter is related to a male-bias in tool construction and use during our evolutionary history (Geary, 2010). In short, I am proposing that the sex differences in reading interests and through this reading comprehension reflect deeper sex differences that are a reflection of our evolutionary history. Girls and women are more interested in the details and nuance of their actual social relationships than are boys and men, for instance, and this interest is expressed in their leisure reading and contributes to the sex differences in amount of leisure reading and through this reading comprehension.

Mathematics

Mathematics is considered a gateway to employment in well-paying and prestigious science, technology, engineering, and mathematics professions (STEM), and because of this the issue of sex differences in mathematical competence is a continuing source of review, conjecture, and heated debate (Halpern et al., 2007; Ceci & Williams, 2007; Ceci, Williams, & Barnett, 2009; Stoet & Geary, 2012). As noted, there are small or no average sex differences for many mathematical domains and in some nations girls have higher average mathematics achievement than boys (these tend to be nations with low overall achievement; Stoet & Geary, 2012). There are, nonetheless, several areas in which boys and men have advantages – for instance, some areas of geometry and in solving word problems – and especially for problems that are novel, difficult, and when visuospatial representations can be used to aid in problem solving (e.g., Johnson, 1984; Penner, 2003). Overall, at the high end of mathematical competence there are between two and four boys and men for every girl and woman, depending on the difficulty of the test; the more difficult the test, the larger the gap (Stoet & Geary, 2013; Wai, Cacchio, Putallaz, & Makel, 2010)

In a 1996 target article in *Behavioral and Brain Sciences*, I argued that these differences are related, at least in part, to the advantage of boys and men in the spatial abilities that support navigation in large-scale space as well as to sex difference in interest in people versus things (Geary, 1996); the latter is associated with greater interest in STEM fields and, as noted, I suggested is related to men's bias toward tool construction in traditional societies and presumably throughout our, at least recent evolution (Murdock, 1981). I also proposed that the sex differences in variability in mathematical ability and achievement – there are not only more boys and men at the high, but often more at the low ends of these tests – can be indirectly linked to sexual selection.

Sex differences in navigational and other spatial abilities are found in species in which male have larger home ranges than females (Gaulin & Fitzgerald, 1986; Jašarević, Williams, Roberts, Geary, & Rosenfeld, 2012). The large home ranges in turn are typically associated with searching for mates. For humans, the sex difference in home range size is found in traditional societies (Cashdan, Marlowe, Crittenden, Porter, & Wood, 2012), and may be related to intertribal warfare, hunting, and long-distance political affiliations that are often associated with finding a wife or gaining social status. Sexually selected traits are typically more variable in their expression than naturally selected traits (Cotton, Fowler, & Pomiankowski, 2004) and thus boys' and men's spatial abilities should be more variable than that of girls and women (e.g., Levine, Vasilyeva, Lourenco, Newcombe, & Huttenlocher, 2005). To the extent spatial abilities contribute to mathematics achievement, boys and men are predicted to be more variable on mathematics tests.

BEHAVIORAL AND PSYCHOLOGICAL SEX DIFFERENCES

Among the many sex differences covered in *Male, female* are those related to risk taking and violence (see also Daly & Wilson, 1988). Across species, both of these behavioral tendencies are more common in the sex with more intense intrasexual competition over access to mates, including boys and men. The obverse side to this is risk avoidance, which is more common in the sex that invests heavily in offspring and is more discriminating in mate choices, including girls and women. Benenson (2014) nicely captured the concept in a recent book on sex differences in social behavior, *Warriors and Worriers*. The title maps nicely onto broader sex differences in psychopathology, namely externalizing and internalizing disorders, respectively (Caspi et al., 2014). I touch on some of these differences in the behavioral and psychological sex differences sections below.

Behavioral Sex Differences

On the basis of more intense intrasexual competition among men than women during our evolutionary history, it is not surprising to find that boys and men outnumber girls and women when it comes to violence and accidental injuries (Evans, 2006; Rosen & Peterson, 1990; Rushton, 1996). By the way, the best single indicator of more intense physical intrasexual competition in one sex or the other is a sex difference in physical size. This is indisputably true in humans, and is particularly large for upper body lean muscle mass and strength; when combined with differences in upper body skeletal structure, these differences suggest an evolutionary history of male use of projectile and blunt force weapons (Geary, 2010).

Violence

Consistent with an evolutionary history of physical intrasexual competition among males, there "is no known human society in which the level of lethal violence among women even approaches that among men" (Daly & Wilson, 1988, p. 146). In many cultures without formal laws and a central government to suppress violence (Pinker, 2012), murder can result in increased social status and marriage prospects for the perpetrator, although this is not typically the case in the modern world. In an analysis of same-sex homicide rates across modern and developing societies, including homicide records dating from more than 700 years ago, Daly and Wilson found that male-on-male homicide occurs between 30 and 40 times more frequently than does female-on-female homicide. Male-on-male homicide occurs most frequently during the initial mate-finding stage of the lifespan (i.e., late teens through mid-20s) and more frequently among unmarried than married men (Wilson & Daly, 1985). Moreover, roughly 2 out of 3 male-on-male homicides occur as a result of social conflict, rather than being crime-specific (e.g., during the course of a robbery) and more than ½ of the homicides are associated with "matters of status competition and the maintenance of face" (Daly & Wilson, 1988, p. 175). Status-related competition is in fact the core feature of male-male competition in many non-human species (Andersson, 1994), and thus Daly and Wilson's findings are not surprising.

Men not only kill each other much more frequently than do women, they also kill women more frequently than women kill men (Daly & Wilson, 1988). This form of male-on-female violence, as well as serious nonlethal assaults, often stems from mate guarding and sexual jealousy. Again, mate guarding is a common behavior in males of non-human species, especially when they invest in the wellbeing of any resulting offspring. I am not, of course, excusing these forms of violence, but rather noting that we can better understand them and perhaps address them by placing them within an evolutionary context. Even if male violence was once effective and adaptive, it no longer is nor should be in the modern world.

Accidents

When successfully executed, a risky behavior can result in fame and sometimes fortune, but often just a boost in status among your peer group. When unsuccessful (and sometimes when successful), risky behavior often leads to accidental injuries. In a comprehensive assessment of childhood injuries and deaths in the United States, Rosen and Peterson (1990) documented a much higher frequency of these in boys than in girls. Boys experience near drowning nearly twice as frequently as girls and die as a result of drowning almost four times as frequently as girls. Boys are injured and killed more frequently than are girls while riding bicycles, playing on recreational equipment, and during unorganized (i.e., not supervised by adults) sports activities. For every girl that is injured on a playground, four boys are injured. For every girl who sustains a serious burn, three boys sustain an equally-serious burn (e.g., while playing with fireworks).

Rosen and Peterson (1990) concluded that the sex differences in accidental injury and death rates were related to the sex differences in activity levels, risk taking, and the frequency of engagement in rough-and-tumble and competitive play. Evans (2006) made a similar conclusion based on the finding that the sex difference in traffic fatalities, including pedestrians who are killed, peaks in the late teens and early 20s, that is, during the mate finding stage of the lifespan. Again, engaging in risky, competitive behaviors is common in species in which male compete intensely for access to mates (Andersson, 1994).

Psychological Sex Differences

Whereas boys and men are more likely to act on their feelings, sometimes to their determinant and sometimes to that of others, girls and women are more likely to internalize their social and psychological issues. As a result, girls and women outnumber boys and men when it comes to anxiety, depression, and eating disorders.

Anxiety and Depression

One of the mechanisms underlying the sex difference in accidental injury is risk aversion. This in turn is associated with a fuller consideration of the potential adverse consequences of the behavior; boys and men are aware of these but they discount them and focus instead on the potential rewards. The affective component of this mechanism is likely to be lower thresholds for fear and anxiety, and rumination on potential consequences of one's decisions. The benefits are reduced injuries and other costs associated with risk taking, but these benefits may come at a cost of increased risk of anxiety-related disorders. Indeed, beginning in adolescence and continuing through adulthood, there are almost twice as many girls and women who suffer from socially important levels of anxiety and depression as same-age boys and men (e.g., Kessler, Berglund, Demler, Jin, Merikangas, & Walter, 2005; Nolen-Hoeksema, 1987).

Rumination allows for a more complete evaluation of risks or the nuance of social relationships, but can also increase risk of depression. Compounding these biases, are girls' and women's use of relational aggression – gossip, social manipulation, shunning – for competing with one another; intrasexual competition is more physical and intense among men, but it also occurs (more subtly) among women. One consequence, I believe, is a higher sensitivity of girls and women to the nuance of social relationships that often provides a competitive advantage in attempting to monitor and out maneuver same-sex rivals, but also results in increased risk for internalizing disorders. This is analogous to the cost–benefit trade-offs associated with boys' and men's risk taking.

Further, girls and women use relational aggression to gain access to coveted resources, especially romantic partners (see Geary et al., 2014). Sensitivity to nuance of this maneuvering, as well as disclosure in interpersonal relationships and thus risk of social manipulation by former best friends, appear to make girls more vulnerable to anxiety and depression than boys when victimized by same-sex peers (e.g. Bond, Carlin, Thomas, Rubin, & Patton, 2001). It is not that boys and men are completely clueless when it comes to this form of competition, but rather it does not have the same degree of social and thus emotional potency as it does for girls and women. The greater intimacy in girls' and women's close same-sex relationships provides important social support, but also comes with risks. Girls and women who co-ruminate too often – repeatedly discuss unsolvable and emotional personal issues – are at risk for later depression (Rose, Carlson, & Waller, 2007); co-rumination also results in increased stress hormone levels (Byrd-Craven, Geary, Rose, & Ponzi, 2008). Girls and women also react more strongly – and thus are more likely to become depressed – to conflict with important people in their life, especially "threats to intimacy and closeness in relationships" (Leadbeater, Blatt, & Quinlan, 1995, p. 12). Adolescent girls, for instance, are four times more likely than same-age boys to experience anxiety and depression following a lost relationship. On top if this, girls and women often experience symptoms of depression when negative life events affect their family or friends, whereas boys and men typically do not.

Eating Disorders

When it comes to men's mate choice preferences, "plump" women are considered more attractive than slender women in 44% of human cultures, as compared to 19% of cultures in which slender women are considered more attractive (Anderson, Crawford, Nadeau, & Lindberg, 1992). The preference for heavier women is strongest in cultures with unpredictable food supplies and thus a wise preference. Even in societies in which slender women are preferred by men as romantic partners, their preferences are still for women with an average body mass index, not the very slender women portrayed in fashion magazines (Rozin & Fallon, 1988). With these facts in mind, why do some women in modern societies develop severe eating disorders? For every adolescent boy or man with anorexia nervosa (self-starvation to stay thin) or bulimia nervosa (binge eating, followed by fasting or vomiting) there are nine same-age girls and women with a similar disorder (American Psychiatric Association, 1994).

My suggestion is the combination of men's focus on women's physical traits when they make their mate choices, women's self-focus on these same traits, and mass media presentations of increasingly thin fashion models create a sometimes deadly mix for some women. Specifically, women's motivation to compete for romantic partners is based, in part, on enhancing the traits that men find attractive. For some women, however, this competitive motivation is being expressed in unchecked and unhealthy ways, especially in perfectionistic and competitive women (Bardone-Cone et al., 2007). When these women are exposed to unusually thin fashion models, there appears to be modest increases in their dissatisfaction with their body and distortions of their beliefs about eating (e.g., Bardone-Cone & Cass, 2007; Grabe, Ward, & Hyde, 2008). The combination can result in a run-away female intrasexual competition and develop into anorexia nervosa, if the woman views thin models as symbolic competitors – how they need to look to attract a high-status husband – and focus on their physical appearance as a means to compete, as many women do. The inherent motivational bias is the same as other women, but has spun out of control due to some combination of personality, media portrayals of "attractive" women, and other factors, no doubt.

SEX DIFFERENCES IN OCCUPATOINAL INTERESTS AND ACHIEVEMENT

In traditional societies, men are much more focused than women on attaining social and culture status, because success in these cultural spheres often meant the difference between reproducing and not (Irons, 1979). To be sure, social status is important to women and their children, but the consequences of not achieving some modicum of success are not as severe as they are for low status men (see also Hopcroft, 2006; Low, Simon, & Anderson, 2002). It follows from these patterns that men will have an inherent motivational bias to devote time and effort into achieving success in their cultural niche. In the modern world, this translates into men being more focused on occupational success than women. They are predicted to be more likely to pay the costs, including working more hours, taking riskier assignments and jobs, and reduced social and leisure time than are women to achieve occupational success. All of these predicted patterns are found in the modern workplace (Browne, 2002): Across occupations "evidence consistently suggests that despite comparable educational qualifications, tenure, and occupational attitudes, women have not achieved occupational status comparable to that of men" (Phillips & Imhoff, 1997, p. 46). I am not arguing that bias does not sometimes contribute to these differences, but I am saying that bias is not a sufficient explanation for all of them.

In addition to motivational differences, there are cognitive and social traits that are proximate factors that contribute to the sex differences in occupational attainment as well as differences in occupational choices. I illustrate these differences for STEM fields, as these are often a source of social and political contention (National Academy of Sciences, 2006).

Cognitive Influences

More men than women enter high-paying STEM occupations and this pattern contributes to the overall wage advantage enjoyed by men (Paglin & Rufolo, 1990). The attainment of the educational credentials that allow access to a high-paying STEM career, such as engineering, is made easier by a number of cognitive factors; specifically, above average general intelligence and above average spatial, mathematical, and mechanical competencies (Gottfredson, 1997; Humphreys, Lubinski, & Yao, 1993; Paglin & Rufolo, 1990); these same competencies contribute to long-term success in these fields (Kell, Lubinski, Benbow, & Steiger, 2013). Sex differences in spatial, mathematical, and mechanical competencies contribute to the sex difference in the proportion of men and women entering STEM fields. Individuals who enter these fields tend to have SAT-M and Graduate Record Examination-Quantitative scores that are in the 600 to 800 range (500 is average and 800 is the top score) and the ratio of men to women with scores in this range is between 2:1 to more than 5:1 (Paglin & Rufolo, 1990). The ratio of top-scoring men to women on physics tests is nearly 3:1 and about 2.5:1 on chemistry tests (Stanley, 1993). A similar pattern is found for advanced placement tests, including tests in all areas of physics and chemistry (Stanley, Benbow, Brody, Dauber, & Lupkowski, 1992). In other words, many more men than women have the minimal spatial, mathematical, and mechanical competencies needed to succeed in many STEM fields. This said, I note to the reader that women who enter STEM careers are very similar to their male colleagues in many ways (Lubinski, Benbow, Shea, Eftekhari-Sanjani, & Halvorson, 2001); there just are not as many of these women as men.

As I mentioned earlier, at least some of these sex differences appear to be related to the sex difference, favoring boys and men, in evolved spatial-navigational competencies and are thus indirectly related to sexual selection (Geary, 1996). It is also likely that the sex difference, favoring boys and men, in object-oriented interests and activities contributes to some of these sex differences (e.g., in mechanical competencies). These in turn may indirectly reflect the male bias in tool construction in traditional societies and presumably throughout our evolutionary history, as noted.

Social Influences

I suspect that social sex differences may be relatively more important than the cognitive ones for understanding the why more men than women enter and stay in STEM fields. When women and men are free to choose their own careers, their occupational interests and choices consistently differ (Su, Rounds, & Armstrong, 2009). On occupational interest tests, "young women (score) higher than young men on domestic, artistic, writing, social service, and office service vocational interests and young men (score) higher than young women on business, law, politics, mathematics, science, agriculture, athletics, and mechanical interests" (Willingham & Cole, 1997, p. 178). The sex difference in vocational interests is especially striking among the mathematically gifted. When they are in their 20s, for every mathematically-gifted woman who is working toward or who aspires to earn an advanced degree in a STEM area, there are eight equally-talented men (Lubinski & Benbow, 1994).

For these gifted individuals, the sex difference in the pursuit of an advanced education in STEM areas cannot be attributed to cognitive factors, because all of these women have the mathematical and intellectual competencies necessary to succeed in these careers, nor can the difference be attributed solely to a bias against women; gifted women, as a group, do not view mathematics as a "male" occupation and are not discouraged from pursuing math-intensive careers (e.g., Raymond & Benbow, 1986). Rather, the sex difference in the pursuit of STEM careers is driven in part by the occupational and social interests of these gifted men and women; see National Academy of Sciences (2006) for an alternative explanation.

People who enter STEM fields tend have a relatively "low need for people contact" (Lubinski, Benbow, & Sanders, 1993, p. 701) and tend to prefer work environments that provide many theoretical and investigative activities. Mathematically-gifted men who enter these fields do indeed show this pattern of occupational and social interests. As a group mathematically-gifted women "are more socially and esthetically oriented and have interests that are more evenly divided among investigative, social and artistic pursuits" (Lubinski et al., 1993, p. 702). In short, proportionally few of these women enter STEM fields because they have broader social and occupational interests than their male peers. The gifted women who do enter these fields are very successful in them, but as they move from graduate school to their mid-30s, more of these women than their male peers make trade-offs that will likely effect their career development; specifically, women but not men who have children shift their priorities so they can devote more time to their families and to the wider community (Ferriman, Lubinski, & Benbow, 2009). This pattern follows from an evolved sex difference in the motivation to achieve cultural success, as well as the sex difference in the level of investment in children (Geary, 2000).

DISCUSSION

Biologists are now in agreement that Darwin's (1871) sexual selection represents a powerful set of processes has shaped and will continue to shape the evolution of all sexually reproducing species

(Andersson, 1994), including our own. To be sure, there is much to be learned, including how the expression of evolved biases is influenced by developmental experience and current context. There are also unresolved issues regarding the evolution of competitiveness in females, especially when they do not compete for mates (Clutton-Brock, 2009; Lyon & Montgomerie, 2012; Stockley & Bro-Jørensen, 2011); it is now clear that females in many species are highly competitive with one another, although not typically to the same degree as males. These however are just nuances that need to be fleshed out within the context of the strongly supported theoretical framework of sexual selection.

With respect to humans, we will never fully understand developmental and cultural influences on the many sex differences that have been discovered (see Ellis et al., 2008) without placing them in the context of evolution in general and sexual selection in particular (Geary, 2010). We also need to explore more deeply how evolved biases in social behavior, motivation, and cognition are expressed in modern contexts and how these manifest themselves in our day-to-day lives, as with the illustrations I have provided here (see also Winegard, Winegard, & Geary, in press). For those readers who remain unconvinced, I ask you to reflect on the theory of evolution, of which sexual selection is one set of pressures. Evolution is not just another psychological, sociological, or anthropological theory; it has proven to be the unifying meta-theory for all of the biological sciences. Eventually, all psychological, sociological, and anthropological models will need to be reconciled with the principles of natural and sexual selection, which are not only compatible with social and experiential influences on the expression of sex differences, these influences are expected. The reader can choose to be part of the discovery process or you can let these forthcoming scientific advances pass you by.

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