Women, Power, and Sex Composition in Small Groups: An Evolutionary Perspective

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Summary Despite the massive influx of women into the workforce, women have made only minor gains into top management positions. Most explanations for this asymmetry have been based on sex differences in socialization and traits. We propose that an evolutionary psychological perspective offers an alternative explanation: sex differences in power are due to differences in the way men and women use influence behaviors in *small groups*, and these differences were sculpted, in part, by natural selection. This produced sex differences in psychological and physiological mechanisms – principally in the neuroendocrine system – that influence motivations to use influence in groups. We review studies on sex differences in influence in small groups. For each type of influence behavior that we examine – competition, dominance, and coalition formation – we discuss ultimate and proximate causes. We conclude with implications for future research and for public and organizational policy.

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Introduction

The influx of women into the workplace has been one of the most significant structural changes in Western industrialized nations over the past 50 years. Yet women's integration into traditional male roles has been slower than expected (Council of Economic Advisors, 1992; Valian, 1997). While women represent over 40% of the global workforce, their share of management and executive positions does not exceed 20% and 3%, respectively (Wirth, 2001). This asymmetry continues in most post-industrial nations despite educational parity and equal opportunity laws. Moreover, men and women do not differ in general intelligence and are similar on many personality traits (Geary, 1998).[1] Therefore, we need explanations other than those based on socialization or traits to understand why sex differences in power and economic status continue to persist. A promising approach involves looking at sex differences in influence behavior at the level of the *small group* (Archer, 1996; Maccoby, 1998). The small group – committees, work groups, task forces, management teams – is a primary arena in which influence behavior occurs. Growing bodies of evidence suggest links among evolved psychological and physiological mechanisms, sex differences in social behavior, and the interpersonal context of the small group (Geary, 1998; Maccoby, 1998). This paper examines these areas and presents an evolutionary psychological explanation of sex differences in influence behavior in small groups.

Evolutionary psychology is a synthesis of psychology and evolutionary biology that uses the logic of natural selection to examine human mental processes and behavior. Evolutionary analyses involve both *ultimate* and *proximate* causes. Ultimate causes refer to selection pressures – presumed past conditions – that favored the evolution of particular traits. For example, cold

[1] The differences in verbal ability (favoring women) and mathematical ability (favoring men) are modest, while the sex differences in spatial visualization (favoring men) are large. There are also large differences between men and women on some personality traits: aggression, nurturance, emotional stability, and conscientiousness (Geary, 1998).

climatic conditions sculpted a short bodily stature because shorter limbs allow the blood to circulate more quickly, keeping fingers and toes warm in cold weather. In looking for ultimate causes, evolutionary psychologists make use of literature in paleontology, archeology, and anthropology for reconstructions of the conditions facing early humans. Proximate causes refer to existing physiological or psychological mechanisms that influence current behavior, some of which are *adaptations*—features exhibiting special design that evolved to solve specific problems in specific contexts related to survival or reproduction. These include, for example, mechanisms that predispose people to behave altruistically towards family members. In looking for proximate causes, evolutionary psychologists often refer to the literatures in motivation, decision-making, physiology, and neuroscience. Most psychological mechanisms are common to both sexes. Some mechanisms, however, are more characteristic of one sex or the other because they solved reproductive problems unique to each sex—for example, mechanisms that predispose women to nurture children.

The evolutionary perspective acknowledges the importance of learning and individual differences (Colarelli, 2003). However, for subsets of behaviors that have been evolutionarily linked to recurring problems of survival and reproduction, adaptations will, in a statistical sense, have a stronger influence than learning or individual dispositions. Changing behavior that stems from an adaptation is difficult. One strategy is to modify the context that evokes the behavior; another is to accept the behavior and leverage the adaptation to achieve a desired goal (Colarelli, 2003; Nicholson, 1997).

Figure 1 provides an evolutionary psychological model of the etiology of sex differences

Insert Figure 1 About Here

in influence behavior in small groups. The model suggests that: (a) persons in a same-sex or mixed-sex groups serve *evocative stimuli* for influence-related behaviors, (b) neuroendocrine and other brain systems process these stimuli, often in sexually dimorphic ways, and (c) despite learning histories and individual differences, some sex differences in reactions to same and opposite sex group members often emerge. These factors allow the context of the small group to play an important role in gender differences in influence behavior and power.

Trait theory and social role theory provide alternative perspectives on the etiology of sex differences in social behaviors. Trait theory suggests that traits primarily influence how people respond to social situations. Traits are inherited or acquired early in childhood, and they are generally stable throughout an individual's lifetime (Eysenck & Eysenck, 1985). To the extent that men, on average, have more of a particular trait than women, men will behave differently than women (Browne, 2002; Morrison, et al., 1992). Since traits are difficult to change, behavioral change in social systems occurs by training people in areas not or minimally influenced by traits, by selecting people with desired traits, or by firing people with undesirable traits. Social role theory is frequently contrasted with evolutionary psychology (e.g., Archer, 1996). It assumes that social behavior is primarily a function of learning. Through the socialization process, people learn how to behave in social situations. Social role theorists regard the sexual division of labor as a historical cause of sex differences in social behavior. This perspective assumes that male and female psychological hardware is similar, that the mind is a general learning mechanism, and that sex differences in social behavior are due to learning

(Eagly & Wood, 1999). Thus, changing sex differences in social behavior is primarily a matter of training, education, and altering the social structures that telegraph sex role expectations.

Sex Differences in Competition, Dominance, and Coalition Formation in Small Groups

Previous reviews of workgroups (Guzzo & Shea, 1992) and reviews of sex differences in small group behavior (Anderson & Blanchard, 1982; Baird, 1976; Dion, 1985; Wood, 1987) give limited attention to sex composition and influence behaviors. The literature on sex differences in influence behaviors, on the other hand, gives limited attention to the context of the small group (e.g., Pratto, 1996; Stuhlmacher & Walters, 1999). Although there are large literatures on tokenism, diversity, and group heterogeneity, they tend to focus outcomes other than sex differences in influence behavior—outcomes, such as social isolation of tokens, group composition and attractiveness of the group to minorities, and the effects of diversity on group performance (Powell & Graves, 2003). Therefore, it is important to examine studies related to sex differences in, and the effects of sex composition on, influence behavior in small groups. We limit our review to the influence behaviors of competition, dominance, and coalition formation in small groups because they are common in small groups of both humans and non-human primates (Boyd & Silk, 1997).[2]

Four patterns emerged from the studies we reviewed. First, regardless of the type of group, sex composition affected group dynamics and influence strategies, and the effects appeared stronger in naturally occurring than experimentally created groups. Second, the

[2] Our literature search focused primarily on studies where (a) subjects were observed in groups, (b) outcomes were noted by sex in mixed-sex groups, (c) studies involved variables related to competition, dominance, or coalition formation, and (d) subjects were adults from normal populations. Our criteria for studies of communication mediated communication groups were similar, but, in addition, we required that at least one condition in a study involve a virtual group.

behavior in all-male groups was more aggressive, competitive, and exploitative. Third, all-male groups developed steeper dominance hierarchies. And fourth, in mixed-sex groups, men were more dominant than women, although not consistently.

Competition

Competition involves individuals or groups pitted against one another where the success of one individual or group results in the failure of the other. Competitors have differentiated, mutually exclusive goal regions: when one achieves a goal, others will be unable to attain their goal (Deutsch, 1949). A competitive *situation* is a context that elicits competitive behavior; competitive *behavior* includes acts where an individual or group attempts to best another. A variety of behavioral strategies can be used to compete (e.g. aggression, bluff, forming alliances).

Sex differences are evident in competition. Male athletes are, on average, more competitive than female athletes (Gill, 1988, 1993). In the workplace, men compete with one another for status, advancement, and the attention of members of the opposite sex more directly and intensely than women do (Browne, 2002; Maccoby, 1998). In experimental studies involving competitive situations, all-male groups typically behave more competitively than all-female groups (Rosenbaum, et al., 1980; Schopler, et al., 2001). Men and women typically react differently to competitive situations. Men are more aroused by competition and enjoy it more (Maccoby, 1998; Rosenbaum, et al., 1980) and are more affected emotionally by winning or losing than women (Vetere, 1977).

In situations that are competitively neutral, competitive behavior is more likely to *emerge* in all-male than in all-female groups. This is evident beginning at around age five, when boys and girls begin to form same-sex playgroups. Compared to girls' playgroups, boys’ playgroups

involve more competitive interaction, engage in more competitive games, and place more emphasis on formal rules. By contrast, girls' playgroups are more collaborative, engage in more cooperative play, and place more emphasis on group harmony. Because they are less likely to focus on explicit rules, girls' playgroups require more fine-tuned dyadic interaction (Maccoby, 1998). These sex differences in behavior in children's playgroups seem to be unique to *group* situations (Maccoby, 1998). Similarly, competitive behavior is more likely to emerge from groups of adult men than women (Dabbs, 2000; Savicki, Kelley, & Lingenfelter, 1996a, 1996b).

Competition *between* groups is also more characteristic of boys' playgroups. During free play activities, boys are more likely than girls to spend time in competitive activity between groups (Maccoby, 1998). Interestingly, when a group of boys is competing with another group, boys discourage aggressive behavior of members within their groups. To compete successfully, group members must cooperate with one another. Competition is also more likely to emerge between groups of men than between groups of women (Geary, 1998). Competition by warfare for power and resources is perhaps the most widespread example of male-male competition between groups. There are no known examples of warfare between groups of women (Buss, 2004).

The nature of the situation and task influence whether all-male or all-female groups will be more effective in competitive situations. When working on production tasks in moderately competitive situations, all-male groups tend to be more productive than all-female groups (Rosenbaum, et al., 1980; Wood, Polek, & Aiken, 1985). Perhaps this is because moderately competitive conditions allow cooperation to emerge among men. However, in highly competitive situations, female groups are more productive on production tasks (Rosenbaum, et al., 1980). This may be because women – even under competitive conditions – are more likely than men to

cooperate (Wood, et al., 1985).[3] These differences in interaction process may also explain another sex difference: all-female groups generate higher quality solutions than all-male groups in discussion tasks (Wood, et al., 1985). Harmonious interaction is more likely to facilitate high performance on ill-structured problems (Zand, 1974).

Relatively little research has been done on competition between the sexes, either in mixed-sex groups or between all-male and all-female groups.[4] Weisfeld's (1986) review found three trends. First, when competing in mixed-sex groups, girls and women fell into two groups—depressors and elevators. Depressors lowered their performance when competing with men, allowing men to win; elevators would compete with men to their fullest. Second, the effects of female performance depression were strongest in naturalistic, as opposed to controlled experimental studies. And third, women were most likely to depress their performance when men were visible (i.e., when competition was face-to-face). Men and women also react differently to competition in mixed-sex groups. Men prefer *not* to compete with women—fearing that if they won they would be criticized for competing against women or humiliated if they lost. Women indicate that they would feel guilty if they won (Meara & Day, 1993).

Evolutionary psychological explanations for sex differences in competition in groups: Ultimate causes.

Male-male competition for access to fertile females occurs when females are the more scarce reproductive resource. In mammals (and in most other animals), females are the scarcer reproductive resource because of a male bias in the *operational sex ratio* (Alcock, 1998). At any

[3] Airline stewardesses do not like to have all men sitting in the emergency row exit seats because, in the event of an emergency, men are likely to compete over who is in charge instead of following an orderly procedure to get everyone out safely (Dabbs, 2000, p. 62).

[4] That so little research has been done on mixed-sex competition is in itself a telling point about the novelty of mixed-sex competition in the workplace, sports, and politics.

given time, there are more reproductively viable men than women in a population. Women produce few eggs compared to men's production of huge quantities of sperm. Women's reproductive capacity is also limited by gestation, birth, lactation, and menopause. Because of these differences, women have a women have a lower fitness variance (the probable range in the number of offspring an individual will produce in his or her lifetime) than men. While most women bear at least one child, physiological constraints limit women to bearing a maximum of about 10 to 15 children. While some men father no children and many father several, others, particularly in polygamous societies, sire dozens.

Because the range of reproductive success is smaller for women, it is in women's reproductive interests to be selective and mate with “high quality” men whenever possible (Cronin, 1991). Because the range of reproductive success is greater for men, reproductive competition among men is greater (Daly & Wilson, 1988). To gain access to desirable women, men had to (and still must) compete with one another. Men compete with one another to display qualities that women value in a mate—good genes and the ability to provide protection and provisioning for offspring (Geary, 1998).

In humans and a few other species (e.g., chimpanzees), male-male competition occurs not just between pairs of males during mating season, but within *groups* of males in which competition is endemic. The evolution of male-male competition in groups probably resulted from the ecology of food availability and women's dependence on men as providers and protectors. When conditions required women to forage in larger groups – probably when early hominids left the forests for the savannah, where food was less concentrated and patchier – several men were required to band together to protect larger groups of women. These conditions also enhanced the role of men as providers because they imposed greater transportation costs on

women, who were less mobile due to infants requiring their care (Wrangham & Peterson, 1996). Under these conditions, women would tend to prefer to mate with men who could successfully compete for resources, and this in turn would stimulate male-male competition in the group (Miller, 1998).

Referential models suggest that male-male competition in groups has a long evolutionary history, and that access to females was an ultimate cause. Competition among chimpanzees exhibits some of the same patterns found among humans. Sex differences in competitive play styles and gender segregation among young chimpanzees are "strikingly similar" to those found in human children (Maccoby, 1998, p. 290). A good deal of overt competitive behavior among adult male chimpanzees occurs over status in the dominance hierarchy. Competitive displays (e.g., rocking large tree branches, charging, hurling stones) normally occur between mature males competing for position (Goodall, 1986). Competition *between* groups of male chimpanzees is also common, typically occurring over food-rich territory (Goodall, 1986).

The male-male competition that occurs among hunter-gatherers is less overt and less intensive than among our primate cousins. Modern hunter-gatherers do not live in rigid dominance hierarchies and do not routinely rely on agonistic competition to determine access to scarce resources (Boehm, 1999). Many hunter-gatherer bands develop elaborate sharing systems for food and prohibitions against blatant competitiveness and self-promotion (Boehm, 1999; Cashdan, 1990). Nevertheless, competition among male hunter-gatherers occurs, with men competing with one another primarily for women (Knauft, 1991). Men who are the best hunters or who are strong, clever, and quick-witted tend to have more status and a greater number of wives and sexual liaisons (e.g., Gregor, 1985).

Evolutionary psychological explanations for sex differences in competition in groups: Proximate causes.

A growing body of evidence suggests that physiological mechanisms influence competitiveness. For example, male mice with a deficiency in TRP2 expression fail to show aggressive behavior toward other males, and they initiate sexual behaviors toward both males and females (Stowers, Holy, Meister, Dulac, & Koentges, 2002).[5] There is considerable evidence on the relationship between testosterone (T) and the propensity to engage in competitive activities (Dabbs, 2000; Panksepp, 1998). T influences the propensity to compete, the intensity of competitive behavior, and responses to competition (Dabbs, 2000). Men produce five to seven times more T than women (Nelson, 2000). However, variation in T levels is common within each sex, and T levels are higher in competitive individuals regardless of sex.

Men's T responses are more sensitive than women's to winning and losing. Among women, T levels of winners and losers remain flat or decline during and after competition (Bateup, Booth, Shirtcliff, & Granger, 2002; Mazur, Susman, & Edelbrock, 1997), whereas among men, T levels rise during competition and remain high in the winners and drop in the losers (Booth, Shelley, Mazur, Tharp, & Kittok, 1989). This may reflect an evolved response to the greater importance of competition to men—for acquiring status, resources, and ultimately mates. Winners experience an elevated mood, which may increase their aspiration levels and motivate continued competition, while losers experience the opposite—perhaps motivating a re-evaluation of their competitive potential (cf. Nesse & Williams, 1995).

Catecholamine (e.g., adrenaline and noradrenaline) levels show somewhat similar sex differences as T levels in response to competition. A positive relationship between

[5]TRP2 is an ion channel expressed in the transient receptor potential family of neurons, located in the vomeronasal organ.

catecholamine and competitive (or achievement-demanding) situations occurs in men but not in women (Collins & Frankenhaueser, 1978). Age, may moderate this effect. Younger women do not show elevated adrenaline levels in response to stress, whereas older men *and* women do (Aslan, Nelson, Carruthers, & Lader, 1981). From an evolutionary standpoint, it would seem reasonable that women of childbearing age experience more neutral physiologic responses to aggressive situations because escalation of aggressive behavior could be problematic for the safety of children (Taylor, et al., 2000). Moreover, women experience a greater increase in the stress-related hormone, cortisol, during competition (Bateup, et al., 2002). That competition tends to be experienced as more stressful by women may also have evolutionary roots—to decrease risky and aggressive activities that might have negative consequences for the health and survival of offspring (Campbell, 1999; Taylor, et al., 2000).

Dominance

Dominance in small groups involves exerting control over people, situations, and resources. Although empirically related to leadership, dominance is narrower in scope. Leadership can extend beyond dominance to occupying a formal position and to the articulation of group goals. Ethologists typically define dominance as access to resources (Ellis, 1993), and access to resources influences position in a dominance hierarchy—the relatively stable ordering of status differences in a group or organization. As we pointed out in the previous section, much of male-male competition occurs over position in a dominance hierarchy. In this section we examine the sex differences in dominance behaviors and in dominance hierarchies in small groups.

Individual dominance

Behavioral dominance is commonly expressed and measured by speaking and non-verbal behaviors. More dominant people typically interrupt more, take more speaking time, and

maintain more eye contact; not surprisingly, subtle non-verbal cues (e.g., eye contact, body language) are critical to establishing dominance hierarchies in small groups (Rosa & Mazur, 1979). In experimental studies of same-sex groups, all-male groups generally exhibit more dominance behaviors than all-female groups. In all-male groups, men who speak first are more verbally assertive than men who speak last, while there are few differences among speakers in all-female groups (Kimble, Yoshikawa, & Zehr, 1981). All-female groups exhibit a more participative, less domineering, pattern of verbal exchange. For example, Savicki, et al. (1996a, 1996b) found that all-female groups engaged in more opinion change than all-male groups; all-female groups also engaged in more tension-reducing and affiliative language and were less likely to argue. Men were more likely to use coarse and abusive language. In mixed-sex groups, sex differences in dominance behavior are less consistent. Hawkins (1995) found that men and women did not differ in verbal contributions to a group discussion. However, other researchers found that men were perceived as exhibiting greater leadership, influence, and power than women (Lord, Phillips, & Rush, 1980). Men look more than women at interlocutors while speaking, and women tend to be more tense and embarrassed than men in mixed-sex groups (Dovidio, Ellyson, Keating, Heltman, & Brown, 1988).

Communication modality seems to influence sex differences in dominance behaviors, particularly in mixed-sex groups. Research on groups has typically examined groups that have interacted face-to-face (FtF). However, in recent years, a number of studies have examined interactions in computer mediated communication (CMC) groups—individuals interacting with one another in groups through cyberspace and without necessarily seeing each other. Thus, interactions are primarily based on verbal exchanges without visual cues. Although men tend to

display more dominance behaviors in FtF groups, CMC groups tend to equalize sex differences in dominance behaviors. McGuire, Kiesler, and Siegel (1987) found that while men gave five times as many first suggestions for a solution as women in FtF mixed-sex groups, women were just as likely as men to first suggest a solution to the problem presented in mixed-sex CMC groups. Adrianson (2001) found that, in mixed-sex CMC groups where the sex of group members was anonymous, women changed their opinions to a stronger opinion and changed their opinion more often than men.

While the personality *trait* of dominance has some effect on dominance behavior, its effects are not robust. Aries Gold, and Weigel (1983) found that trait dominance correlated significantly with six of nine individual behavioral dominance measures among subjects in all-male groups, while it correlated with only one behavioral dominance measure in all-female groups. Trait dominance was uncorrelated with behavioral dominance measures in mixed-sex groups. Carbonell (1984) found that the majority of high-dominance subjects, when paired with a partner of the same sex, assumed the leadership role. However, when in a mixed-sex dyad, a smaller percentage of high-dominance women assumed a leadership role. These results are somewhat consistent with the evolutionary position that psychological mechanisms can short circuit personality traits in contexts that activate mechanisms.

Dominance hierarchies

Dominance hierarchies with clear and large status distinctions are a feature of most all-male groups (Baumeister & Sommer, 1997). Although dominance hierarchies exist in all-female groups, status distinctions are fewer in number and subtler than in all-male groups (Low, 2000). Sex differences in dominance hierarchies are evident beginning in childhood. Boys’ playgroups establish clear dominance hierarchies; whereas girls' playgroups have flatter structures

(Maccoby, 1998). Sex differences are also evident in adult groups. Mast (2001) found that although both all-male and all-female groups formed dominance hierarchies, all-male groups were more hierarchically organized.

Groups in prisons are particularly instructive because sex-segregation is imposed in prisons and occurs over a long time, providing the opportunity for stable, naturally occurring groups to develop. Prison life for men is dictated by “toughness,” and bullying is common. The basic sub-unit of male inmates’ world is a hierarchical clique—a small group of inmates controlled by and loyal to a leader who provides both physical and economic support to its members (Ireland, 1999). These cliques are classic dominance hierarchies. They have well-defined patterns of authority, subordination, deference, and prestige. Power is clearly and firmly institutionalized (Onojeharho & Bloom, 1986).

While male inmates cope with institutionalization through a highly stratified social structure, female inmates cope with prison life through a quasi-collectivist social structure. Female prisoners develop strong friendship bonds and pseudo-familial relationships (Fox, 1982; Ward & Kassebaum, 1965). Leadership tends to be diffused in the women’s prison community. The basic subunit of female inmates' world is a pseudo kinship structure of "play families," consisting of relationships that are recognized and divided into family roles. Each family member is expected to play out her role (e.g., mother, sibling, father), and the peers are expected to respect the roles. Cooperation, mutual aid, and cohesion are important facets of prison “family” relations. The inmate community in women’s prisons may be viewed as a large network of loosely structured nuclear families linked together by filaments of kinship ties to other inmates and families (Galliombardo, 1966).

Evolutionary psychological explanations for sex differences in dominance in groups: Ultimate causes

Two probable ultimate causes of sex differences in dominance behaviors were addressed in the previous section on competition: (1) women were a scarce reproductive resource for which men competed, and (2) the ecological conditions that contributed to humans becoming a territorial and group-living species. A third cause might be that dominance in men was a sexually selected trait. Social status and dominance were probably qualities that women valued in men because they signaled the ability to provide protection and resources. Therefore, men who were predisposed toward behaving dominantly were more likely to survive and reproduce.[6]

There are at least two plausible ultimate causes for sex differences in dominance hierarchies—sex differences in intragroup competitiveness and differences in the work typically performed by all-male and all-female groups over millennia. Different social structures were more adaptive to differences in the competitiveness of groups. In all-male groups, with more intragroup competition and a higher potential for conflict, a hierarchical structure was adaptive. By submitting to a hierarchical authority structure to make decisions and allocate resources, there is less need for group members to quarrel over every decision (Pierce & White, 1999). Once established, a hierarchy keeps competition and conflict at manageable levels (Ellis, 1993). Numerous studies have found that, among primates, when the dominant male is removed from an intact group, competition and conflict escalate until the group establishes a new dominance hierarchy (e.g., McGuire, Raleigh, & Johnson, 1983). Female groups, on the other hand, being

[6] That male dominance is valued by women is indicated by the fact that it is associated with greater reproductive success in all but modern societies (Betzig, 1986). Although male dominance is not associated with reproductive success (number of children fathered) in modern societies, high status men in modern societies have intercourse with more women than low status men (Perusse, 1993). The lack of association between dominance and reproductive success in modern societies is probably due to the availability of birth control.

less competitive, have less need for a hierarchical structure because most problems can be solved by collaboration and cooperation.

A second, and related, ultimate cause may have been the organization of work. Ancestral male groups were probably involved in warfare and hunting large animals (Tooby & DeVore, 1987). These activities required individuals to work together in a tightly coordinated, interdependent fashion. Hierarchical structures were the most effective way to organize groups to carry out these tasks. Submitting to a dominance hierarchy maximized each individual's interests by enhancing his survival and reproductive opportunities. The work of ancestral women, on the other hand, most likely involved child-care and, quite likely, food gathering (Verelli & Tishkoff, in press). These tasks involve lower levels of coordination and interdependence, minimal inter-group competition, and a relative lack of subordinating individual interests to group goals (Low, 1990). Dominance hierarchies would be unnecessary for accomplishing these tasks and might be dysfunctional. The chronic conflict associated with jockeying for position in dominance hierarchies would create an unhealthy environment for child rearing and shared childcare (Campbell, 1999). Because it was adaptive for men and women to organize same-sex groups differently, natural selection may have sculpted mechanisms in men to perceive, organize, and respond to hierarchies in male groups and mechanisms in women to operate more collaboratively in same-sex groups.

Referential models from chimpanzees, other primates, and hunter-gatherers suggest these sex differences in dominance hierarchies were likely to have existed among ancestral humans. Dominance hierarchies among male chimpanzees, for example, are considerably steeper than those of females (deWaal, 1998). Similarly, dominance hierarchies among male hunter-gatherers, while less rigid than among chimpanzees, are steeper than the more subtle and flatter hierarchies

among women (Boehm, 1999). Hierarchically organized groups of male chimpanzees engage in war-like raids into territories of neighboring chimpanzee communities and also defend the community against intruders (Goodall, 1986). Warfare among hunter-gatherers is a male activity, and it is typically carried out in hierarchically organized groups (Boehm, 1999; Chagnon, 1997). Referential models of hunting behavior also indicate that it is primarily a male activity, and that alloparenting (i.e., temporarily caring for a child that is not one's own) and cooperative childcare occur among hunter-gatherer women and to some extent among chimpanzee females (Boehm, 1999; Goodall, 1986).[7]

Evolutionary psychological explanations for sex differences in dominance in groups: Proximate causes

There is substantial evidence demonstrating the link between T levels and dominance behaviors. Men, who are typically more dominant than women, have higher levels of T than women (Nelson, 2000). Dominant men have higher levels of T than submissive men (Mazur & Booth, 1998). Women in occupations that require dominant behavior (e.g., executive) have higher T levels than women in occupations that require less dominant behavior (e.g., secretary; Purifoy & Koopmans, 1980). Thus, T is a likely proximate cause of sex differences in dominance behavior in groups.

The neurotransmitter serotonin also appears to play a role in achieving status in a dominance hierarchy. Serotonin is a monoamine neurotransmitter that has been found to play a role in the regulation of mood, control of eating, sleeping, arousal, and the regulation of pain. One study found that serotonin levels in alpha vervet monkeys were twice as high as in other members of the community (Raleigh, McGuire, Brammer, Pollack, & Yuwiler, 1991). However,

[7] The Agta of the Philippines are a well-known exception to male political dominance among hunter-gatherers (Griffin & Estioko-Griffin, 1985). However, hunting among the Agta women typically is for small game and is often

when the alpha males lost their dominant position, their serotonin levels plummeted. When the alpha male was removed from a group and another male was selected at random and given antidepressants (which boosted his serotonin level), that individual rose to alpha male—in every instance. Serotonin may enhance dominance by helping an individual be more relaxed and tolerant of others, thus allowing one to appear confident, calm, and in control. It is likely that individuals with enduringly higher serotonin levels gravitate toward leadership positions, although there is probably some degree of reciprocal causation in that being in a high status position may increase serotonin levels.

Estrogen may *reduce* serotonin levels (Jensvold, 1996; Stewart, 1998), which would suggest that women, on average, might have lower serotonin levels than men. This is consistent with the epidemiological evidence showing that the rates of depression and anxiety in women are about twice those in men (Nolen-Hoeksema, 1987). Lower serotonin levels in women may partially explain why there are more men in dominant positions and why women prefer flatter hierarchies. Somewhat greater levels of anxiety and depression may be adaptive for caring for children. Being more anxious, women would gravitate towards intimate, stable, and reciprocal relationships, which provide a nurturing environment for raising children. They would tend to avoid environments characterized by conflict laden and disruptive interpersonal relationships, which are endemic to dominance hierarchies. Greater levels of anxiety may also increase mothers' empathy for children's suffering and heighten maternal vigilance for children's safety.

Similarly, women are, on average, more fearful than men (Campbell, 1999), and this also may influence sex differences in dominance behaviors. The physiological mechanism here is probably cortisol, which women produce higher levels of than men in threatening situations (Kirschbaum & Hellhammer, 1994; Mazur, et al. 1997). This difference would appear to be

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done by solitary women hunting with a dog. This style of hunting allows a woman to bring a small child with her.

adaptive because of the importance of the mother's physical well-being to the survival of her children. In pre-welfare state societies, children would be less likely to survive if the mother, rather than the father, was injured or killed (Campbell, 1999).[8] Therefore, women's fitness would have been enhanced by a heightened sensitivity to physical danger and a response repertoire to avoid confrontation, in most situations, rather than to react aggressively (Taylor, et al., 2000).

Women had, and have, much to fear from men—rape, abuse, assault, and harm to offspring (Daly & Wilson, 1988). Therefore, in encounters with men, women will be less likely to display dominance-oriented behaviors if doing so increases the probability of physical threat. Women may have evolved mechanisms that are acutely sensitive to cues of male anger and that minimize their own dominance displays when men are present to avoid antagonizing them (Dovidio, et al., 1988). Non-verbal cues are important in communicating emotions, particularly those related to aggression and fear (Ekman, 1973), and it is well established that women and men differ in the expression and perception of non-verbal behavior (Hall, 1984). Women, for example, are more sensitive to expressions of anger and aggression than men (Goos & Silverman, 1999; Rotter & Rotter, 1988). These sex differences may partially explain why women are more satisfied with CMC groups than men. Members of CMC groups are often physically separated and anonymous. Therefore, emotional cues transmitted by face-to-face interaction are unavailable, and the possibility of physical violence or retaliation is remote. These features of CMC groups may make them less threatening and more attractive to women.

Coalitional behavior

Coalitions are temporary alliances within larger units that are organized for the purpose of attaining coalition members' goals. Coalitions are ubiquitous in political life, from family

[8] Even in post-industrial society, children still receive better care when living with their birth mother than in other situations, including with the birth father and a stepmother (Case & Paxson, 2001).

disputes to international conflicts. Boehm (1999) distinguishes between two types of coalitions, *microcoalitions* and *macrocoalitions.* Microcoalitions are alliances within a larger group; they divide the larger group. Macrocoalitions are alliances among the entire larger group; they typically arise from disputes *between* larger groups and unify each group.

Microcoalitions

Sex differences in microcoalitional behavior begin to appear in childhood (Low, 1990). Girls' microcoalitional alliances form and shift primarily on the basis of reputation and inclusion in friendship cliques. Boys' coalitions have more to do with rank (Goodwin, 1990). Children's coalitions are almost exclusively single-sex (Maccoby, 1998). Among adults, women in organizations tend to form stable and long-term microcoalitions with other women, while male microcoalitions are more short-term, fluid, and instrumental (Pfeffer, 1997). Women also have difficulty becoming integrated into male workplace coalitions. This may be because of the stronger in-group bias in all-female groups than in all-male groups (Rudman & Goodwin, 2004). Thus, men's greater coalitional flexibility may be what allows them to take greater advantage of social network resources and convert them into a power advantage.

Experimental studies of microcoalitional behavior have found that women are more accommodative and inclusive than men. They are also less concerned with winning and more concerned with fairness and equalization of outcomes; they display more interest in the quality of social interaction (Vinacke, 1959). In same-sex groups, women ally less often than men against a third, even when it was to their advantage. They also bargain less and are more likely to form coalitions when none is necessary to win. Vinacke (1959) found that a strong female group member would voluntarily give points to members who had weak bargaining positions; this did not occur in all-male groups. The stronger member of all-female groups often suggested that the

two weaker females join forces, an occurrence rarely found in all-male groups. In mixed-sex groups, men are again more exploitative and women more accommodative. Both sexes, when in the majority, tend to ally against the minority of the opposite sex (Bond & Vinake, 1961). Women typically join forces when they are in weak bargaining positions, while men ally when they are stronger. When in the minority, women will form alliances with men, while men tend not to form cross-sex alliances. In experimental studies involving coalitional behavior, women performed better than men in mixed-sex groups on outcome measures, especially when they were in the minority (Bond & Vinacke, 1961).

Macrocoalitions

Macrocoalitional behavior also appears in childhood. Both boys and girls form in-group/out-group distinctions (Maccoby, 1998), and it seems to be easily evoked in boys (Sherif, Harvey, White, Hood, & Sherif, 1954). Macrocoalitions are commonplace among adults in war and politics. The historical record of war and politics indicates that it is primarily men who engage in macrocoalitional behavior, in both traditional societies and in nation states (Wrangham & Peterson, 1996).

Evolutionary psychological explanations for sex differences in coalitional behavior in groups: Ultimate causes

Several environmental pressures may have been ultimate causes for the human proclivity, particularly the human male proclivity, to form coalitions. Food preferences and territoriality are likely candidates influencing macrocoalitional behavior. Our ancestors' preference for relatively scarce foods that were rich in carbohydrates and protein (e.g., fresh fruits, nuts, and meat) and the ecological conditions of patchy unpredictable food resources were probably important selection pressures on coalitional mechanisms (Wrangham & Peterson, 1996). Food preferences

and patchy food resources required early humans to travel widely to find food. Once food-rich territory was found, it would have to be defended. The defense of wide-ranging territory would require coordinated *group* action against outsiders who might be potential threats to resources. Moreover, since the availability of food resources would vary seasonally and by territory, group size would be unstable, rising and falling with the availability of resources, leading to temporary alliances (Chapman, Wrangham, & Chapman, 1995).

Microcoalitional behavior probably stemmed from intragroup competition over dominance. An ambitious subordinate would have little chance, by himself, of taking power from a strong alpha male. However, if he formed a coalition with other subordinates, he stood a better chance of dethroning the alpha. Boehm (1993, 1999) takes this logic further by positing that humans have an innate preference for egalitarianism that, in turn, motivates subordinates to engage in coalitional behavior to keep the dominant male from assuming too much power. He argues that the survival of small hunter gather bands (and hence individuals in the bands) is dependent on keeping the behavior of upstart and dominant males in check (Bohem, 1999). The long-term importance of food-sharing, household autonomy, and the lethal effects of weapons all act as incentives to subdue dominance struggles and encourage egalitarianism within the band.

Sex differences in coalitional behavior may have had their origins in sex differences in physical strength and mobility, lineality, and competitiveness. Physical strength and mobility were crucial to the acquisition and defense of territory. The male advantage in physical strength and mobility put men in a better position acquire and defend territory. Sexual dimorphism gave men the advantage in upper body strength, and factors associated with childcare gave men the advantage in mobility (Low, 1990, 2000; Wrangham & Peterson, 1996).[9] Greater mobility also

[9] Encephalization (enlargement of brain size) necessitated larger female pelvic bones, which put women at a mobility disadvantage vis-à-vis men. Moreover, because encephalization was associated with greater infant

tended to facilitate bonding among unrelated males. Patrilineality – women leaving their natal group to breed and rear offspring – meant that men could develop a wider array of alliances than women, with both kin and non-kin. Women, isolated from kin, would have only unrelated women with whom to develop alliances (Low, 1990). However, this gave women greater survival options. If men lost a territory, it usually meant death; fertile females, however, could leave a vanquished group to join a successful group (Wrangham & Peterson, 1996). Finally, the higher level of intrasexual competition among males would lead males to form coalitions to achieve dominance or restrict the alpha's dominance. Referential models of chimpanzees and hunter-gatherers corroborate inferences about early human coalitional behavior, with males engaging in more coalitional behavior and all-male coalitions operating more in the community sphere (Chagnon, 1997; de Waal, 1998; Goodall, 1986; Low, 2000; Wrangham & Peterson, 1996).

Sex differences in coalitional behavior persisted because they conferred reproductive advantages. Male coalition behavior is a strategy used in male-male competition. Men will cooperate with one another when it works to their advantage to enhance status and resource acquisition. Effective coalitional behavior enhances dominance, which in turn increases the chances of reproductive success (Betzig, 1986; de Waal, 1998). Although female dominance enhances reproductive success somewhat (Pusey, Williams, & Goodall, 1997), female coalitional behavior functions more to enhance parenting effort, primarily through assistance with childcare and social support (Low, 1990, 2000). Female sociality in non-human primates has a positive relationship with infant survival, independent of dominance (Silk, Alberts, & Altmann, 2003).

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helplessness, it increased the infant's dependency on the mother, which in turn probably restricted her mobility. Caring for a relatively helpless infant or child would require the mother to carry her infant with her or walk slowly so her child could keep up with her.

Evolutionary psychological explanations for sex differences in coalitional behavior in groups: Proximate causes

Sex differences in coalitional behavior appear to be influenced by sex differences in areas of the neuroendocrine system. Studies of non-human female mammals show lower indicators of stress (lower corticosteroid levels, longer life span) for those housed or grouped with other females. This is probably due to the evolutionary history of affiliative and intimate reciprocal relationships among females. Males show the reverse pattern: lower levels of stress when alone and higher levels of stress when grouped with other males (Taylor, et al., 2000). While the presence of other females (or males) can function as an evocative stimulus for an aggressive attack by females, the presence of other males increases sympathetic arousal in males, which is linked to hostility (Taylor, et al., 2000).

The hormone oxytocin appears to play a central role in women's affiliative tendencies (Carter, 1998; Taylor, et al., 2000). Oxytocin stimulates maternal and affiliative behaviors, and it has a calming effect. While both men and women produce oxytocin, women have more and its effects are stronger in women (Panksepp, 1998). Although the major function of oxytocin is probably to facilitate mother-infant bonding, it also plays a strong role in female-female affiliations, possibly by co-opting the maternal bonding function (Taylor, et al., 2000). Oxytocin also enhances social memories (Panksepp, 1998), and this may partially explain women's greater motivation for close and longer-term alliances.

Sensitivity to cues indicating membership in instrumental coalitions is probably a psychological mechanism that reflects sex differences in the evolutionary history of men and women in coalitions. Although women are superior to men at reading non-verbal cues in general

(Hall, 1984), men are more sensitive to non-verbal *coalitional* cues than women (Kurzban, Tooby, & Cosmides, 2001).

Conclusions, Limitations, and Implications

Despite the massive influx of women into the workforce in post-industrial nations, women have made only minor gains into top management positions. Most explanations for this asymmetry have been based on sex differences in socialization and traits. Yet these explanations have proven inadequate. Sex differences in occupational attainment persist despite equal educational opportunities and despite the fact the men and women differ only moderately on most psychological traits. We proposed an evolutionary psychological perspective as an alternative explanation. Sex differences in power and position are due, in part, to *evolved* differences in the way men and women use influence behaviors in *small groups*. Ancestral humans faced ecological conditions that sculpted preferences for social organization characterized by temporarily bonded, territorial male groups and by more stably bonded, family-centered female groups. These conditions plus male-male competition for access to women lead to the evolution of heritable mechanisms affecting sex differences in influence behavior in groups. The primary mechanisms affecting influence behaviors seem to be located in the neuroendocrine system. The evidence from the small group literature shows consistent differences between all-male and all-female groups in competitive, dominance, and coalitional behavior. The evidence from the neuroendocrinological literature suggests links between hormones, the brain, and influence behavior—particularly for the role of T in dominance and competitive behaviors and for oxytocin in coalitional behaviors.

Limitations

Although several scholars have presented sound theoretical arguments for analyzing group behavior in organizations from an evolutionary perspective (Jay, 1971; Nicholson, 1997, 2000; Tiger, 1969), we could find no empirical studies (including those we reviewed here) on influence behavior in small groups that were informed by an evolutionary perspective. Accordingly, we need systematic research on sex composition in small groups guided by an evolutionary psychological perspective. Theories about ultimate causes are a second limitation. There is little physical evidence about the social behavior of ancestral humans; thus, most of our evidence about how ecological conditions affected group behavior must of necessity come from referential models. Although the evidence from these models is supportive, they involve inferential leaps and must be regarded cautiously.

Implications

Theory and research

A major implication of the evolutionary psychological perspective is that it provides a new framework for developing hypotheses that may lead to a better understanding of behavior in organizations. One potentially fertile area is to view organizational behavior through the lenses of matches and mismatches between psychological mechanisms and activating contexts. Evolutionarily informed research in organizational behavior could identify characteristics of modern organizations and groups that resemble activating contexts for psychological mechanisms likely to produce potentially productive behavior—such as (appropriately channeled) competition, teamwork, and informal communication (Nicholson, 1997, 2000). On the other hand, it can help identify contexts may evoke dysfunctional responses due to mismatches between modern organizational structures and our ancient psychological mechanisms (Buss, 2000; Colarelli, 2003; Nicholson, 1997, 2000). These might include token

female membership in workgroups, structures that disconnect employees from small group affiliations, and inequitable reward systems.

The evolutionary psychological perspective should be particularly useful to research and theory on sex differences in group-oriented behavior in organizations. By acknowledging that some sex differences in social behavior are due to evolved mechanisms, an evolutionary approach goes beyond socialization to dig deeper. It may help identify mechanisms and contexts evoking differences relevant to organizational behavior, areas where differences are minimal or non-existent, and ways for leveraging larger differences to benefit women, men and organizations.

More research is also needed on mixed-sex groups, particularly among adults in organizations. Although women are now active participants in work and educational organizations, there is little programmatic research on influence behaviors in mixed-sex groups in these contexts. Most writing on influence-related interaction patterns of men and women at work tends to be anecdotal reporting (see Maccoby, 1998, cpt. 9). An evolutionary perspective might, for example, help us better understand the dynamics of tokenism. The male tendency to compete for dominance may be one reason why women's performance suffers and their contributions are suppressed in mixed groups (Inzlicht & Ben-Zeev, 2000; Powell & Graves, 2003).

What is the best way to train the sexes to compete with one another? A major justification for increasing the opportunities for young women to participate in sports is to prepare them for the competitive realities of the world of work. Yet, given the differences in male-male and female-female competition, can participation in all-female sports adequately prepare young women to compete in mixed-sex groups at work?

Studies investigating the role of biopsychological mechanisms in influence behavior are needed. For example, what happens to male and female T levels in mixed-sex and same-sex groups engaged in different types of activities? If women are placed in leadership roles or are instructed to behave dominantly in mixed-sex groups, does that affect their T levels? Do temporary increases in T or serotonin from external sources (e.g., injections, psychotropic drugs) increase female dominance in mixed or all-female groups? We need more work on the relationships among biopsychological mechanisms, psychological traits, and environmental influences. To what degree might mechanisms overlap or interact with personality traits? How do organizational characteristics affect the underlying biology of traits and mechanisms (Kemper, 1990; Udry, 2000)? The age-related effects on hormone levels are a particularly interesting area for research (Colarelli & Haaland, 2002). For example, women's estrogen levels are highest during their child-bearing years and begin to drop off in their 40s. This may have interesting implications for women's behavior in organizations and in groups. Women in their late 40s and 50s experience an increase in energy and aggression, what Margaret Mead referred to as "post menopausal zest." On the other hand, men's testosterone level declines with age, and men tend to assume more feminine qualities as they age. What are the implications of these age-related changes for organizational behavior, and in what ways might the age-related demographics of organizations affect outcomes at organizational and group levels?

Technology has been a great equalizer throughout history. Modern communication technologies may be the critical ingredients to minimizing sex differences in influence. Thus, continued and systematic research on CMC groups, particularly on mixed-sex groups, should be promising. Particular attention should be given to the effects of anonymity, physical proximity, and potential for subsequent FtF interaction among CMC group members. We also need more

comparative studies of CMC and FtF groups that examine the roles of non-verbal cues. As holographic communication emerges as a viable technology, it may become a useful means for studying the relationships among context, biopsychological mechanisms, fear, and influence.

To a considerable degree, biology keeps culture on a leash. Therefore, many of the practices that exist in modern organizations, particularly those that persist despite organizational researchers' insistence that they are problematic, are likely to be understood with more research on how evolved mechanisms guide behavior towards activities that people find inherently rewarding (Colarelli, 2003). The widespread use of the employment interview, for example, may be due to our evolved preference for acquiring information about other people through face-to-face interaction (Colarelli, 2003; Colarelli, Hechanova-Alampay, & Canali, 2002). The difficulty that women have in integrating themselves into male coalitions is probably another example of evolved mechanisms influencing organizational practices.

Practice

Traditional approaches to the problems of political and economic inequality between the sexes focus on *individuals*—individual women as representatives of a class of persons. Consequently, most interventions emphasize training, education, and affirmative action—all directed at individuals. Yet because men and women often behave differently in small groups, sex differences in influence patterns may be difficult to change by policies that focus on individuals. Therefore, interventions related to sex composition at the group level should be given greater consideration as a means of reducing social, political, and economic inequalities.

Although there will undoubtedly be legal implications, criteria related to groups may be more useful in assessing some affirmative action goals. For example, affirmative action accounting systems might look at the proportion of females in decision-making groups. By

current standards, an organization that employs a significant percentage of women in management positions would be making progress towards equal opportunity. Yet, if decision-making groups remained all-male or dominated by men, then women – despite their large overall representation – would remain relatively powerless. For many unstructured tasks, it may be more advantageous to select teams of women than to attempt to train men to behave in non-hierarchically problem-solving groups (Zand, 1974). Moreover, female teams would probably be more receptive to problem-solving training and structures. The economic success of women's micro-industries financed by the Grameen Bank in Bangladesh is an example of the economic and organizational potential of all-female groups (Yunus, 1999). Ninety-five percent of the Grameen Bank's borrowers are women, and female groups are a central feature of the bank's loan policy (Wahid, 1999).[10] It seems unlikely that the Grameen Bank could have achieved the success it did with male groups.

On the other hand, variation is critical to evolution and adaptation (Colarelli, 1998; 2003), and diverse groups of men and women may be more effective than single-sex groups in some circumstances (cf. Shrader, Blackburn, & Iles, 1997). One possibility is that relatively equal proportions of women and men would facilitate mutual learning and expand perspectives (Nicholson, 2000). Mixed-sex groups may be a particularly effective strategy for problem solving or for implementing decisions in a complex environment—assuming sufficient cultural acceptance and structural support for vibrant interaction between the sexes. On the other hand, given the evolved tendency of males to compete for dominance and the fact that mixed-sex

[10] The Grameen Bank developed a method of providing women with small loans without requiring collateral. Borrowers were required to join a small group of borrowers (consisting of five members). Obtaining a loan is based on the approval peers in the group and aid from the group can be helpful in business success and loan repayment. The Grameen Bank is one of the most successful Third World economic development programs (Wahid, 1999). By 1998, it established 1,118 branches, providing service to 38,766 villages. It has 2.3 million borrowers, $2.5 billion in cumulative loans, $185 million in savings, and a 98% loan collection rate.

groups are evolutionarily novel, such groups may – as some of the research we reviewed suggests – have the effect of suppressing the contributions of women, unless structural changes are implemented (for example, keeping women in a majority in mixed-sex groups, or controlling air time so that everyone contributes).

Among the most interesting findings of the studies we reviewed were that, compared to all-male groups, all-female groups were more cooperative and more productive on problem-solving tasks. Yet, it is ironic that, in modern organizations, where problem-solving and cooperation are critical to success, ancient mechanisms may be suppressing women's opportunities to make these contributions. By helping us understand the origins, nature, and effects of biopsychological mechanisms, an evolutionary psychological perspective offers an opportunity for scholars and practitioners to develop new avenues for power that can effectively and realistically allow talented women greater power in organizations.

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Figure 1

Model of Sex Differences in Influence Behavior in Small Groups

Influence Related Stimuli:

Visual	Auditory
• Proximity of conspecifics • Secondary sex characteristics • Non-verbal cues	• Interaction • Voice characteristics (pitch, expressiveness, calm vs. nervous)

Physiological and Psychological Mechanisms:

Sex Differences				
Activation of reward centers	Stress reaction	Arousal	Influence-related and contextual memories	Decision processes

Influence Behaviors:

Sex Differences		
Competition	Dominance	Coalition Flexibility

Possible Outcomes:

Sex Differences				
Individuals			Group	
Status change	Resource acquisition or loss	Physiological and psychological changes	Dominance hierarchy establishment or change	Coalitional flexibility