

Mating Strategies and Gender Differences in Pro-sociality: Theory and Evidence

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Abstract

This article examines gender differences in pro-sociality using theories from evolutionary psychology and empirical evidence from experimental economics. Although there has been extensive prior research in both fields, there remains a large disconnect between the source of gender differences in pro-sociality and experimental research aimed at informing cooperation and generosity. Thus, the main contribution of our article is to bridge this gap by arguing that differences in male and female motives for pro-sociality stem, at least in part, from gender differences in mating strategies. In particular, we discuss gender differences in: (i) signaling behaviors; (ii) conformance to social norms; and (iii) approaches toward resolving intra- and inter-group dilemmas. This article may be a useful resource for those hoping to gain a better understanding of the foundations of gender differences in pro-sociality; likewise, it draws useful attention to empirical research aimed at promoting charitable giving and enhancing resource allocation efficiency. (JEL codes: D03, D64)

Keywords: Welfare economics, pro-social behaviors, gender differences

1 Introduction

A human's interactions are determined by the level of his/her pro-sociality, i.e. concern for the welfare and rights of others. Throughout human history, pro-sociality has evolved alongside human nature and economic development. In hunter-gather societies, it was vital to human survival, with male warriors playing the lead role in fighting against nature. In industrialized societies, females' rapidly increasing market participation has elevated them to a more decisive position in economic and social development. For these reasons, the connections between evolutionary theory and evidence on gender differences in pro-sociality are very important. Indeed, evolutionary psychology can help us to better understand gender differences in economic behaviors. Some examples include charitable giving, bargaining, and cooperation, all of which are ultimately the product of the interaction of male and female mating strategies. Nevertheless, previous surveys of gender differences have failed to examine these connections.

Understanding gender differences in pro-sociality is imperative. For example, in the context of theoretical models, having a better understanding of the type of environment in which one gender might display

systematically greater pro-sociality and altruism than the other can aid in developing models on charitable giving, bargaining, and household decision-making. This knowledge might also impact empirical research by influencing views on gender differences in the labor market (Bobcock and Lasehever 2003), intergenerational transfers, or household bargaining among spouses. Indeed, fundraisers for charity have come to realize the substantial giving potential of female donors; as a result, they have begun to design sex-specific solicitation strategies (Andreoni and Vesturlund 2001). Policymakers have also noted substantial sex differences in philanthropy, with women apparently more responsive to the need for charitable giving. Illuminating such systematic differences informs economists' models, data analyses, and research methodologies.

The previous experimental literature has provided evidence on gender differences in risk and other preferences (Holt and Laury 2002; Eckel and Grossman 2008c; Croson and Gneezy 2009), competitive behaviors (Gneezy et al. 2003; Niederle and Vesturlund 2007), and altruism (Eckel and Grossman 1998; Andreoni and Vesturlund 2001). Likewise, various survey papers have also discussed gender differences in social dilemmas (Ledyard 1995) and economic decision-making (Eckel and Grossman 2008a). Additionally, the social psychology literature has focused on gender differences in cognition, reasoning (Baumeister and Sommer 1997; Cross and Madson 1997; Gabriel and Gardner 1999), and social roles (Eagly 1987).

Although there has been extensive previous research in this area, there remains a large disconnect between the evolutionary source of gender differences in pro-sociality and experimental research aimed at informing cooperation and generosity. In the current study, we highlight the evolved role of sex-specific mating strategies in creating gender differences in pro-sociality. In particular, we discuss that gender differences in pro-social behavior can stem from specific mating strategies associated with: (i) male costly signaling; (ii) female conformance to social norms; and (iii) tactics for resolving inter- and intra-group dilemmas.

This article integrates theory and evidence from experimental economics, evolutionary psychology, and social psychology. Each of these literatures has unique advantages. For example, the experimental approach uses a random selection and assignment process, leaving it possible to investigate causal relationships. Additionally, experiments allow researchers to isolate one factor (e.g. strategically motivated pro-sociality) from other factors (e.g. pure warm-glow). Moreover, they are replicable, making it rather simple to test the robustness of hypotheses with individuals from different demographic backgrounds and directly compare competing theories. At the same time, evolutionary and social psychologists provide us with mating motive explanations for the origins of human

pro-social behaviors, and shed light on how these behaviors evolved differently for males and females.

We have chosen to focus narrowly on mating motives as a source of gender differences, largely due to the fact that this explanation ties naturally to differences in pro-sociality. Nevertheless, while we focus on mating motives, we recognize that there are multiple explanations for evolved gender differences (Kenrick and Luce 2000). A specific example relates to costly signaling and pro-sociality. While there are both intrinsic and ‘status’ motives for charitable contributions, Section 2 below focus exclusively on ‘status’ motives. Comparing and contrasting between multiple explanations is beyond the scope of our article, so we leave this valuable task to future research.

Our article relates to the recent review of gender differences in preferences by Croson and Gneezy (2009). Their comprehensive paper reviews the literature on gender differences in economic experiments and identifies robust differences in risk preferences, social (other-regarding) preferences, and competitive preferences. Our article differs from theirs, in that it focuses on the underlying source of gender differences in pro-social behavior, rather than the differences in the expression of preferences. Further, our article discusses the mating motive, while Croson and Gneezy (2009) only speculate to some degree on the source of gender differences.

The remainder of the article is organized into four sections. Sections 2, 3, and 4 review the literature explaining how males and females are motivated differently for pro-social behaviors. Section 2 focuses on costly mating motives, which are ingrained in human nature and demonstrated primarily by males whose pro-social behavior can be explained as a costly signal of their underlying abilities. Section 3 centers on pro-social behaviors driven by social norms, with much female pro-sociality being explained by females’ relatively greater sensitivity to social cues (Gilligan 1982). Section 4 reviews pro-social behaviors driven by group effects, arguing that some male pro-sociality can be motivated by inter-group effects, while some female pro-sociality may appeal to intra-group effects. Finally, Section 5 summarizes the article and discusses potential policy implications.

2 Males’ costly signaling: prosocial to signal

Costly signaling, i.e. sacrificing one’s own resources, may be a form of self-presentation. Some common examples of costly signaling include public philanthropy or time spent volunteering in a homeless shelter.

For instance, Griskevicius et al. (2007) documents that on Valentine’s Day 2003, America’s leading authority on philanthropy announced that

real estate mogul Donald Trump had pledged \$1 million to charity (Foundation Center 2003). A few days earlier, Ted Turner had also pledged an entire billion to humanitarian causes (Cable News Network [CNN] Interactive, 1997). The motivations of both men seem somewhat puzzling given that both appear to epitomize the cold-blooded and self-interested capitalist. Although it might have been a mere coincidence that Trump's donation was announced on Valentine's day, the connection between philanthropic displays and courtship is nevertheless solid.

In this section, we discuss studies that demonstrate how the costly-signaling motive manifests itself in men and women. We include experimental evidence on the differences between males' and females' conspicuous philanthropic displays in response to mating motives. We likewise include natural field evidence on human males' unique costly signaling in social dilemma environments (e.g. sharing food in hunter-gatherer societies). Finally, we discuss the social welfare effect of costly signaling behaviors (status-seeking).

We find that costly signaling behaviors, particularly public philanthropic contributions, are observed mostly in males. This is likely due to the evolutionary benefit of such displays to courtship strategies. Indeed, the ultimate motive for philanthropic displays might be to enhance status and increase the chance of finding a desirable mate.

2.1 Gender differences in costly-signaling

Public philanthropy, a costly signaling act, signals first: (i) an individual's ability to procure resources (Miller 2000); and secondly (ii) an individual's pro-social personality, i.e. willingness to sacrifice his/her own resources for others (Miller 2007). Both of these underlying traits are desirable in a potential mate, but their relative desirability differs between men and women. For instance, literature on human mate choice suggests that males and females exhibit asymmetric preferences for owned economic resources signaled by the opposite sex. Women indicate that economic resources in a man are a necessity, while men appraise economic resources in women as a luxury (Li et al. 2002; Li and Kenrick 2006). The differences may arise from the fact that a man's reproductive value may be more closely associated with his ability to provide economic resources to support his offspring. In contrast, a woman's reproductive value may be more related to health and fertility (Buss 1989).

Indeed, variations in men's status and resources seem to be universal across human societies and groups, both modern and primitive (Li et al. 2002). These variations directly affect the survival rates of potential offspring; as a result, women pay much more attention to males' status and ability to acquire resources. For example, Li et al. (2002) distinguished

between male and female views toward necessities and luxuries, with a necessity being an essential consumption item that tends to be favored when budgets are low and choices are constrained. Necessities received high priority in the study, which found that men viewed physical attractiveness as a necessity, while women viewed status and resources as necessities. This makes sense, in that, to the extent a woman's fertility is related to her observable physical features, men may strongly desire at least a moderate level of physical attractiveness. Similarly, to the extent that variation in men's status and resources have affected survival rates of offspring in humanity's evolutionary past, it makes sense for women to require more of such traits before becoming concerned about other characteristics. Thus, while women have become evolved to scrutinize such cues as males' status and earning capacity, men have become evolved to value visual signals of physical attractiveness and age as fertility cues in women. Likewise, kindness and intelligence are necessities to both men and women (Li et al. 2002). Given these observations, we would expect men to be more likely to engage in conspicuous philanthropic displays of resources due to the fact that women place considerably more emphasis on cues of wealth and status when selecting a romantic partner.

2.1.1 *Conspicuous/philanthropic displays*

Psychologists have conducted a variety of lab experiments demonstrating that males are more likely to behave pro-socially in environments that present mating opportunities. Table 1 lists theories and experimental evidence on gender differences in costly signaling behaviors. Janssens et al. (2010) investigated whether exposure to mating cues, such as physical attractiveness, activates the goal to signal one's mate value to members of the opposite sex. Men should be more likely to notice products that would signal their financial resources to women, as their mate value is partly determined by their financial prospects. The study demonstrated that exposure to a sexily dressed woman increases single males' likelihood of noticing status products in a visual display.

A recent study by Sundie et al. (2011) further demonstrated the connection between showy spending by males and the mating motive. Meanwhile, females perceive those males who conspicuously consume as more desirable mates (for short-term mating). The study further showed that such conspicuous consumption may serve more as a short-term rather than a long-term mating strategy. Both findings support the link between conspicuous consumption and male mating strategies. Saad and Gill (2003) investigated gift-giving among young adults. They conducted a survey to investigate motives for offering a gift to a romantic partner. The subjects responded to the frequency of giving a gift for different causes, and also responded to the motive as either tactical (e.g. a motive

Table 1 Theory and experimental evidence on costly signaling behaviors

Evolutionary and social psychologists Theory: Costly Signaling: Zahavi (1975)	In brief: a variety of conspicuous displays serve as important communication functions, advertising an individual's ability to garner scarce resources and possibly signaling the possession of desirable traits	Males conspicuously consume to display, i.e. philanthropy $M > F$
Experimental evidence Saad and Gill (2003)	Tactical motive for gift giving Subjects from an eastern Canadian university With mating cues versus control subjects are males ranging from ages 17 to 32 years	$M > F$
Janssens et al. (2010)	Induce mating goals for both males and females Subjects from introductory psychology class	Spending: young male spent much more on conspicuous consumption M: conspicuous consume; F: boost public helping
Griskevicius et al. (2007)	Who conspicuous consumes; how it is interpreted Subjects from a large public university	Conspicuous consumption: driven by males. Interpreted: short-term > long-term mating
Sundie et al. (2011)		
Nature field evidence Hawkes et al. (2001)	Hadza meat sharing Tanzanian Hadza people	Male: star hunters share irrespective of the return
Smith and Bliege Bird (2000)	Turtle hunting and sharing strategies Meriam people of Torres Strait, Australia	Males: costly signaling is not subject to reciprocation, but serves as a means to broadcast signals of the signaler
Economists Status-seeking: Frank (1985), Congleton (1989) Ball et al. (2001)		Positive: status-seeking behavior might have lots of positive externalities Negative: individuals may overinvest in positional goods High status subjects always capture the rent Undergraduate students from Virginia Tech or University of Arizona Low status mimic contributions by high status leaders, but not vice versa
Kumru and Vesturlund (2008)		Subjects recruited from the Pittsburgh Experimental Economic Laboratory subject pool
Other evidence Glazer and Konrad (1996) Harbaugh (1998)		Charities publish names of contributors in ranked orders Prestige motives play an important role in charitable contributions

arising from internal factors like ‘displaying long-term interest’, or ‘displaying generosity’) or situational (e.g. a motive triggered by external factors, like ‘occasional demand for birthday’). They showed that men’s gift-giving behaviors are motivated significantly more by tactical motives (e.g. displaying financial resources, showing affection, and displaying generosity) than are women’s.

Meanwhile, [Griskevicius et al. \(2007\)](#) compared males’ and females’ different pursuits of conspicuous displays under mating motives. They showed that the mating motive boosted females’ conspicuous (i.e. blatantly social and easily observable, such as helping in public) benevolence, but failed to boost their inconspicuous (i.e. nonsocial and unlikely to be observed) helping. On the other hand, the mating motive led men to increase their spending on conspicuous purchases (products that are luxurious and publically consumed, like philanthropic contribution), but failed to lead men to spend more on inconspicuous purchases, such as necessities.

Investigating gender differences in conspicuous consumption is particularly important to studies on public philanthropy. The costly signaling theory suggests that conspicuous consumption, e.g. public philanthropy, could potentially act as a display of resources and generosity, signaling an individual’s ability to incur cost by sacrificing his/her resources. It ultimately serves to increase the signaler’s prestige and status ([Griskevicius 2007](#)).

As quoted by [Dowd \(1996\)](#), Ted Turner said, ‘I talked to both Bill Gates and Warren Buffett, the two richest men in the country, and they would be inclined to give more if there was a list of who did the giving rather than the having’. [Glazer and Konrad \(1996\)](#) observe that charities frequently publish the names of contributors, providing various threshold amounts of giving in clearly defined, rank-ordered categories with labels such as ‘contributor’, ‘benefactor’, etc. (in lieu of reporting the actual amounts given). As early as 1974, Gary Becker developed an economic model wherein the amount the donor gives (rather than the quantity of the public goods he receives) enters into the utility function. [Harbaugh \(1998\)](#) used empirical data on charitable contributions grouped by threshold categories to estimate a utility function that can differentiate between intrinsic motivations and extrinsic concerns for ‘prestige’. While Harbaugh reported that both factors play a role in the amount given, his study did not distinguish between genders.

Human males’ unique sharing behavior can also be explained by costly signaling. [Miller \(2007\)](#) argued that this altruistic meat-provision might possibly be favored in part by sexual selection. Risky big-game hunting ensured the best hunters could feed their own offspring. Recent studies suggest that the most successful hunters provide the pro-social public good

widely and unconditionally when it is costly to acquire, but are more likely to keep it for their own household when acquisition costs are much lower¹ (Bliege Bird 1999, 2007; Bliege Bird and Bird 2001). This indicates the signaling function of the pro-social behavior. Indeed, the shift of foraging strategies depending on scarcity of the resources tends to attract higher quality female mates (Gurven et al. 2000; Hawkes and Bliege Bird 2002). Gurven et al. 2000 collected data among forager-horticulturists tending to indicate that those who shared and produced more than average (signaling cooperative intent or ability to produce) were rewarded more than those who shared below average. These results provide insight into the motivations behind costly expenditures for establishing and reinforcing status and reputation. Such wide sharing of meat may not be a conscious courtship strategy or a causal factor of good hunters' reproductive success; however, an evolved hunting strategy may be caused by underlying traits such as high-quality genes (Daly and Wilson 1988).

2.2 Costly signaling and status-seeking behaviors

Costly signaling behaviors are usually associated with the goal of enhancing status, which ultimately contributes to reproductive success. While evolutionary and social psychologists have focused on human's costly signaling behaviors, economists turn to its efficiency impact, i.e. the externality of status-seeking behaviors. Table 1 juxtaposes the theories and experimental evidence for the two arenas. The central tenet of costly signaling theory is a variety of conspicuous animal displays (Zahavi 1975; Miller 2000) indicating one's ability to support offspring, e.g. the ability to procure resources, or pro-social acts that work as a good indicator of ability to support offspring. For instance, the peacock shows off its gorgeous tail, which signals its ability to garner resources, as well as possible desirable traits that can be passed on to offspring. Likewise, male Arabian Babbler birds compete to be the sentinel for their group members to enhance their status and attract potential mates. Chimpanzee hunting is best explained as a male strategy for gaining and maintaining higher status. Gurven and von Ruedon (2006) showed that the Kuna of Panama maintain records (trophies) of individual tapir kills and accord status to men with the greatest number of trophies. Evolutionary and social psychologists argue that different approaches taken by men and women in pursuit of costly signaling-directed pro-social behaviors have significantly

¹ Both Hadza and the Meriam meat-sharing patterns are best supported by costly signaling theory as evolution of 'men's work'. Evidence of both Hadza and the Meriam meat-sharing pattern cannot be explained by hypothesis like 'sharing as an exchange' or risk-reduction related reciprocity (Hawkes et al. 2001).

affected status-seeking behavior among peers, and, consequently, led to their different social and economic statuses (Markus and Kitayama 1991; Baumeister and Sommer 1997).

The tendency of males to invest in positional goods and strive for high status is characteristic in a hierarchical society, mainly due to the privilege enjoyed by the high status group. Several experiments have studied how status influences the general population. Kumru and Vesterlund (2008)'s experiment showed that the low status group would mimic the behavior of the high status group, but not vice versa. Shang and Croson (2007)'s field experiments on voluntary giving for charity found that people consider the gender of past donors important in deciding whether to mimic their contribution. While women are influenced by women, men are influenced by men. This finding may indicate that social status is competed for among the same genders, rather than across genders.² Glaeser et al. (2000) found evidence suggesting that individuals with high-status characteristics tend to extract larger rents from a voluntary non-market transaction. Ball et al. (2001) pointed out that status may have become an evolved signal to entitlement of resource, which over time, affects resource allocation between high and low status groups. Ultimately, males with a high status have a better chance of attracting desirable females.

Nevertheless, the efficiency of such status-seeking behaviors is controversial. For a long time, status-seeking has been regarded as inefficient (Congleton 1989; Hopkins and Kornienko 2004). The argument was that expenditures on positional goods do not create social wealth but merely redistribute it. Thus, the investment in positional goods may be regarded as a dead-weight loss. These conclusions were based largely on the observation that status-seeking imposes negative externalities on other status-seekers. Nonetheless, many status games involve activities that benefit individuals not actively involved in the game of interest (Congleton 1989) (e.g. competition for the generous philanthropist.). Hawkes and Bird (2002) provided the connection between displaying costly signal and pro-social behaviors: if pro-social behaviors result in displays that can signal the obtainers' desirability, then competition for such displays can result in pro-social activities. This striving and competition to show off resources is further supported by experimental research on inducing philanthropy.

² It also coincides with the idea of Eckel and Grossman (2001) on bargaining power between genders. The difference of bargaining power between genders will be further discussed in Section 3.

3 Females' other-regarding: pro-social to conform to social norm

The stereotype is that women are more other regarding than men. Other-regarding preference is indispensable in human social interaction. Other-regarding preferences affect individuals' views on whether and how to enforce social norms, which directly affect the giving and helping behaviors in any society. A series of studies model other-regarding preferences as fairness reciprocity (e.g. [Rabin 1993](#)), inequity aversion (e.g. [Bolton and Ockenfels 2000](#), [Fehr and Schmidt 1999](#)), and altruism (e.g. [Andreoni 1989](#)). While the models give a better description of individuals' other-regarding preferences, gender differences in such preferences and the consequent pro-social behaviors also vary. A better understanding of the origin and development of gender differences in other-regarding preferences provides a basis for more accurate modeling of markets with increasing female participation, particularly those for philanthropy and charity giving.

In this section, we review literature examining gender differences in role-related social norms. We find that, in general, women are more sensitive to social cues; as a result, they are more responsive to social approval and disapproval. We include evidence on gender differences in reasoning from social psychology literature and studies on investigating role-related expectations for men and women. We further include evidence on interaction between genders. We review studies discussing approaches for promoting pro-sociality based on such gender differences. We also note a caveat to our findings: different genders may display different risk attitudes, providing an alternative explanation for some of the differences we note below.

3.1 Reasoning social norm

One way in which women and men have been thought to differ with respect to other-regarding preference-related pro-social behaviors is in their reasoning about such preferences ([Gilligan 1982](#); [Mills et al. 1989](#)). Social psychologists claim that the 'economic man' is a good predictor of men's behavior in situations where social norms permit or reinforce the pursuit of pecuniary self-interest. In contrast, women present different social norms ([Eckel and Grossman 1996](#)). Indeed, [Gilligan \(1982\)](#) contended that women are socialized to conceive of themselves as connected to others; consequently, their moral sensibility reflects a strong concern with the care and connection to others, while men are more concerned with justice. [Eckel and Grossman \(1996\)](#) showed provocative evidence that men make decisions on principle, while women's morals are more situational and sensitive to changes in environment.

Women are also more inclined to mention dilemmas involving personal relationships, where the dilemmas seem to have elicited care-oriented reasoning (Mills et al. 1989). While men are nurtured to be more assertive than women, women are encouraged to show empathy and be egalitarian (Niederle and Vesterlund 2007). Harenski et al. (2008) investigated the neural mechanisms underlying moral sensitivity. They confirmed that females evaluating moral stimuli show more activity in brain regions associated with care-based processing, while males show more activity in regions associated with justice-based processing. The studies, taken together, paint women as valuing and being valued for fairness and cooperation.

The difference in reasoning implies that females' strong connection to interpersonal interaction makes them more sensitive to external forces that compel them to behave. This is particularly true for those external forces that emphasize female role-related norms. On the other hand, if males behave more in accordance with principles, then they may perceive norm enforcement with negative incentives (i.e. threat, punishment) as unfair. This might detrimentally affect their generosity. The following sub-section discusses males' and females' different role-related responses to social norms.

3.2 Role-related social norm

One way in which women and men have been thought to differ with respect to their pro-social behaviors is the role-related expectation. Social-role theory suggests that different norms lead men and women to develop different expectations about the costs and rewards of altruistic behaviors; thus, they develop different reactions to situations governed by these norms. While mating motives are believed to lead women to display care and empathy and to conform more to others' preferences, men are usually expected not to conform (Griskevicius et al. 2006).

A wide variety of experiments have provided evidence on this issue. Solnick (2001) explored the behavior of men and women in an ultimatum game with gender open information. Her study used the strategy method, where responders indicated their minimum willingness to accept. Gender was communicated by the first name of the counterpart. Solnick (2001) found that the proposers offered less to female responders, while responders demanded more from female proposers (higher minimum acceptable amount). Such difference in expectation significantly affected the bargaining power between males and females. Ayres and Siegelman (1995) found significantly different negotiated prices depending on the gender of the bargainers; dealers using scripted bargaining strategies quoted significantly lower prices to white males than to black or female buyers.

Babcock and Laschever (2007)'s evidence further supports the expectation that females conform to others' preferences. They concluded that when women negotiate, they are very pessimistic about how much is available. Thus, women typically ask for, and get, 30% less than men. Such pessimistic expectation is further evidenced by the fact that women will pay as much as \$1,353 to avoid negotiating the price of a car.

3.2.1 *Pro-sociality in cross-sex interactions*

The different expectations regarding social norms for males and females further affect the interaction between genders. Evolutionary psychologists predict that sex pairing will be an important factor, with each sex exhibiting a preference for the other. Eckel and Grossman (2001) found chivalry between female proposers and male responders, with men accepting lower offers from women than from men. They also found solidarity, with women accepting lower offers from women than from men. Castillo et al. (1999) presented similar results in a field experiment where they investigated bargaining in the taxi market in Lima, Peru. They found that male passengers received higher initial prices than women.³ In addition, men were 7% more likely to be rejected than women, and were also more likely to face shorter negotiations. Such chivalrous relationships are also consistent with males' costly signaling mating motives. Saad and Gill (2006) argued from the evolutionary perspective that males make more generous offers when pitted against a female as opposed to a male. Females, on the other hand, make equal offers independently of the sex of the recipient. Male allocators are altruistic towards female recipients and yet competitive towards male recipients. This contrast is explained as a manifestation of social rules which evolved from the male predisposition to use resources to attract mates. In contrast, female allocators are more concerned about fairness when making offers to recipients. These stronger fairness concerns of females are further supported by Andreoni et al. (2002), who examined how charitable giving is influenced by the person in the household who is primarily responsible for giving decisions. Looking at single-person households, they found that men and women have significantly different tastes for giving, potentially setting up conflict for married couples. With respect to total giving, the study found that married households tend to resolve these conflicts in favor of the husband's preferences. In contrast, when women are the decision-makers, they tend to give to more charities, but to give less to each charity.

³ Taxi drivers in Lima are predominantly males. In this field experiment, all drivers were male. Passengers were trained confederates.

3.3 Response to social approval/disapproval

Females are more concerned about other people's perceptions of them, while males make decisions based more on principle (Gilligan 1982). As a result, females contemplating deviant acts perceive higher threats of embarrassment than their male counterparts. In contrast, condemning males' un-generous behavior may have a detrimental effect on male philanthropy.

Women's shame makes them more responsive to threats or punishments for behaviors that fail to conform to social norms. Garza and Ottone (2009) used a dictator game with three participants in a group. Two of the participants played a dictator game, with the third participant having the choice of incurring a cost to punish the dictator (strategy method was implemented). The study found that women reacted to the punishment threat by increasing their transfer to the recipient, while men did exactly the opposite. Specifically, male dictators would display significantly lower altruism after this credible threat.

The crowding-out effect of punishment incentives on norm-motivated behaviors has been investigated in some detail. Fehr and Rockenbach (2003) showed that punishment incentives are detrimental to trustworthiness. They argued that while punishment incentives are aimed at promoting pro-sociality, they only work when perceived as just or legitimate. In fact, an unfair punishment may deter cooperation. Houser et al. (2008) results present even stronger evidence that punishment crowds out norm-based motivations, even when the offer is determined randomly by nature rather than intentionally by an individual. They attributed this phenomenon to a 'cognitive shift' that crowds out norm-based motivations in general. The difference is that the threat in the latter studies is from a second party rather than a third party (see Fehr and Fischbacher 2004 for a clearer distinction between second and third party punishment). Meanwhile, emerging results show that women are more likely to perceive greater punishment threats than men (Carmichael 2004). The results also conform to the evidence that women are more risk-averse and more sensitive to threats of shame and embarrassment (Blackwell 2000).

Role-related norms play an important role in generating both male and female generosity, which is consistent with the different ways males and females reason. For example, females exhibit situational morality, while males base their decisions more on principle. Although males' decisions are robust to the change of environmental parameterizations, males are usually no more generous than their female counterparts. For example, Eckel and Grossman (1996) investigated gender differences through a 'punishment game'. Subjects could choose to split a larger pie with a partner having bad cooperation records, or a smaller pie with a partner

Table 2 Differences in male and female's altruism

Theory and experimental evidence	Study details	Pro-social behaviors: prediction and evidence	
Theory: Gilligan (1982)	<i>Reasoning diff.:</i> female situational morality, male on principle	Pred.: Female altruism more volatile	
Exp. Evid.: Eckel and Grossman (1996)	Dictator game, varying punishment prices Subjects from Virginia Polytechnic Institute and State University and Wayne State University	Low relative price $W > M$	High relative price $W = M$
Andreoni and Vesturlund (2001)	Dictator game varying altruism prices, endowment Subjects from university of Wisconsin and at Iowa State University	$W > M$ ($P < 1$)	$W < M$ ($P > 1$) ^a

^aThe altruism is measured in proportion to endowment. Looking at the absolute amount, male giving was stable, while female giving was more volatile.

having good cooperation records. The results showed that when relative prices are higher, less females sacrifice their own resources to punish defectors; however, females are no less generous than males' under both low and high relative prices. In contrast, male generosity is robust to the change in relative prices. The results conform with Gilligan's theory on males making decisions on principle, but also demonstrate the tendency of females to be more altruistic. Croson and Buchan (1999) found that women are more likely to reward generous contributions in the trust game. Eckel and Grossman (1998) reached a similar conclusion. Andreoni and Vesturlund (2001) presented gender differences in a more detailed manner by varying both the price of giving and endowment of the subjects (Table 2). They found that when the relative price changes in favor of giving (cheaper to give), males are more generous than females; however, when the relative price of giving is greater than or equal to one, women appear more generous than men. This is partially consistent with previous findings in which males' absolute amount of generosity remains relatively constant with increasing relative prices (Eckel and Grossman 1996).

3.4 Risk attitudes explains volatility in female pro-sociality

Females' sensitivity to environmental parameters can be explained by risk-aversion, which ultimately originates from mating motives. 'Fitness variance' is much lower for females than males; as a result, females take less risk in the sexual selection process. Males are disposed to risky competitive tactics (especially under a more hierarchical society where winner-takes-all⁴), e.g. winning fights over other males or displaying signs of 'good genes', even at a higher likelihood of death. These risky tactics, however, have paid off in reproductive currencies on average over human evolutionary history (Daly and Wilson 1988). Consequently, females are selected to become much more risk-averse than their male counterparts.

Eckel and Grossman (1999) observed that gender pro-sociality seems to be conditional on the level of risk present in the experiment. In decisions where risk is involved, e.g. for the proposer in ultimatum games, there appear to be no systematic differences in behavior across genders. However, for decisions involving no risk, such as for dictators or 'punishers', women tend to be more generous and socially oriented in their behavior. Croson and Buchan (1999) presented similar results in a cross-culture trust game. They found significant gender difference in the riskless reciprocity decisions and no difference in the risky trusting decisions. In Brown-Kruse and Hummels (1993), males were found to contribute at higher rates than females. This may be due to different risk preferences between genders.

4 Inter- and intra-group effects on pro-sociality

Social norms are group-level phenomena that may have shaped human pro-social behavior in decisive ways (Henrich et al. 2001). Norms emerge through interactions in groups and apply to interactions within groups; group members enforce them, and they often arise in the context of inter-group conflicts (Bornstein 2003).⁵ Evolutionarily minded social

⁴ Dekel and Scotchmer (1999) developed an evolutionary model of preference-formation to investigate to what extent evolution leads to risk-taking in winner-take-all environments. For example, if winner-take-all determines males' chances of reproduction, males will evolve to be risk-takers. Males inherited risk-taking behavior from ancestors in whom risk-taking was evolutionarily selected via winner-take-all games.

⁵ Both Hadza and the Meriam meat-sharing patterns are best supported by costly signaling theory as evolution of "men's work". Pro-social behaviors among genetic unrelated humans are usually explained as strategic behaviors, like reciprocal altruism (Trivers 1972). However, recent literature proposed a puzzle for reciprocal altruism directed pro-social behavior. Evidence of both Hadza and the Meriam meat-sharing pattern cannot be explained by hypotheses like "sharing as an exchange" or risk-reduction-related reciprocity (Hawkes et al. 2001). That is, the star hunters share regardless of whether they will get food in return in the future.

scientists assert that human altruism and cooperation are the result of the species' unique history of inter-group conflict and warfare (Van Vugt et al. 2007). Current evolutionary models are based on the idea that human altruism and pro-social behaviors evolved through the selective (cultural or biological) extinction of groups in inter-group conflicts (Henrich and Boyd 2001; Boyd et al. 2003).

Nevertheless, inter-group conflict and intra-group norm enforcement have shaped male and female pro-sociality in different ways. Such differences ultimately originate from sex differences in human mating strategies, which have shaped the minds of men and women differently (Buss and Schmitt 1993). The spoils of an inter-group victory substantially enhance males' mating opportunities (Van Vugt et al. 2007); thus, it is important for men to invest their resources in forming coalitions to engage in inter-group aggression. In contrast, it is attractive for women to invest resources in creating and maintaining supportive social networks for the protection of themselves and their children (Taylor et al. 2000). Therefore, women may have a stronger interest in keeping the group together. They may also take on the role of peacekeeper (Van Vugt et al. 2008).

This section reviews the effects of inter- and intra-group norm enforcement on male and female pro-sociality and explores their differences in reasoning, individual and group conflict (e.g. the traditional public goods games), and intra- and inter-group conflict, (e.g. games that involve tension between intra- and inter-group; a step-level public goods game; in-group and out-group members).

4.1 Reasoning differences

Evolutionary psychology and social psychology literature indicate gender differences toward in-group and out-group members. Table 3 compares theories and experimental evidence demonstrating gender differences in pro-sociality when conflicted with interests between inter- and intra-groups. Cross and Madson (1997) argue that important gender differences in social behavior may be explained by differences in the construction and maintenance of self-definition, e.g. like self-construal proposed by Markus and Kitayama (1991). The idea is that men rely on independent self-construal, while women depend on interdependent self-construal. For example, women more often described interpersonal problems as a source of distress. In addition, women were more likely to discuss interpersonal topics, such as personal feelings and problems, while men were more likely to discuss less personal topics such as sports and politics (Cross and Madson 1997). Baumeister and Sommer (1997) offered an extension of Cross and Madson (1997)'s analysis of gender differences by arguing that men have the same motivation for social bonds; however, men seek social

Table 3 Theory and experimental evidence on group effects

Inter-group conflict	General prediction	Intra-group conflict	General prediction
Henrich et al. (2001) Buss and Schmidt (1993) Boyd et al. (2003)	Male pro-social to in-group members more with the presence of inter-group conflict	Tyalo et al. (2000); Rapoport and Chammach (1965); Cross and Madson (1997); Eagly (1987).	Females make effort to maintain intra-group relationships
Experimental evidence			
Inter-group conflict		Intra-group conflict	
Van Vugt et al. (2007)	M > F		
Undergraduate students at the University of Southampton, England			
Van Vugt and Spisak (2008)	Preference for gender of the leader: Inter-group conflict: M > F Efficient outcome: M > F	Van Vugt and Spisak (2008)	Intra-group conflict: F > M (preferred) Efficient outcome: F > M
Undergraduate students from an English university			
		Simpson (2003)	Contribution in social dilemma without fear: F > M Undergraduates at a large university
Charness and Rustichini (2010) Students at the University of California at Santa Barbara	Male signal formidability to outgroup: M (Inter) > M (Intra)	Charness and Rustichini (2010)	Female signal cooperatives to intragroup: F (intra) > M(intra); F (intra) > F (inter)
		Nowell and Tinkler (1994)	Cooperation: female group highest Undergraduate subjects at Weber state University

connections in larger groups, with the aim of achieving a favorable position in the social hierarchy. Women, on the other hand, seek those connections in smaller, or even dyadic, relationships. If this is true, we would expect to observe systematic differences in males' and females' group-oriented behaviors. While male behavior is more inter-group oriented, female behavior is more intra-group oriented (Baumeister and Sommer 1997).

The differences in the way males and females reason in conflicts are consistent with the social-role theory (Eagly 1987). The theory suggests that females facing conflicting interests between themselves and their group defect much less out of greed than out of fear. Specifically, the male role includes norms that encourage competition and aggression (Eagly 1987), while the female role not only de-emphasizes aggression but emphasizes avoidance of aggression from others or harm to oneself. This leads to more pro-social behavior from females in this scenario. In addition, women are more concerned than men about the quality of interpersonal relationships, group cohesiveness, and the development of shared norms in a group. Thus, while men have a higher drive to display independence and distinctiveness in a group (Baumeister and Sommer 1997; Cross and Madson 1997), women are more willing to shun female group mates who act against group norms.

4.2 The social dilemma: individual and group conflict

The public goods game captures the tension between individual and group interests, enabling us to test Taylor et al.'s (2000) argument on females' pro-sociality to invest in their own groups. As early as 1965, Rapoport and Chammah raised the question of whether gender affects cooperation in social dilemmas involving conflicting interests between individuals and their groups; they reached strong theoretical expectations of sex differences in cooperation. Nevertheless, there is a lack of findings on systematic differences between males and females. Some find females to be more pro-social than males in such dilemmas (Dawes et al. 1977; Nowell and Tinkler 1994; Seguinio et al. 1996), while others find males more cooperative than females (Brown-Kruse and Hummels 1993). Others find no differences at all (Sell et al. 1993).

Therefore, it is unclear which is the more pro-social gender in social dilemmas. This is partially due to the volatility of the environment. Females' low level of cooperative behavior in Brown-Kruse and Hummels has already been attributed to the risk involved, i.e. to contribute either all or zero endowment (Eckel and Grossman 2001). If gender does capture the diffused status characteristics in organizations [Sell et al. (1993) find group composition does not matter for cooperativeness],

then a sequential public goods setting may further promote pro-sociality (Kumru and Vesturlund 2008).

The failure of previous literature to draw conclusions was attributed to failure to distinguish between free-riding behaviors driven by ‘fear’ and ‘greed’ (Simpson 2003). Simpson hypothesized that while male defection is motivated by greed (e.g. the temptation to cheat and exploit others: the payoff for unilateral defection is higher than for mutual cooperation), female defection is motivated by fear (e.g. the risk of exploitation by cheaters: the payoff for mutual defection is higher than for unilateral cooperation). Simpson showed that in the prisoner dilemma with no fear but only greed, females present significantly more cooperative behavior than males. However, he failed to find gender differences in pro-sociality under the dilemma with no greed but only fear. Kuwabara (2005) re-tested Simpson’s hypotheses through a new asymmetric game. The new experiment supported the fear hypothesis and suggested mediating effects of expectations about partners on sex differences in cooperation. Overall, such differences in fear are driven by risk-aversion, which ultimately originates from mating motives (see Section 3.4 for detail).

4.3 Intra- and inter-group conflict

If females are more pro-social in conflicting interests between themselves and the group, then males present much greater pro-sociality (i.e. sacrifice for in-group members) when confronting conflicting interests between the group and out-group members. Such differences, as argued above, ultimately originate from males’ mating motives; the spoils of an intergroup victory substantially enhance their mating opportunities (Van Vugt et al. 2007). Further, the Male–Warrior Hypothesis proposed that better male warriors achieve more status and reproductive success in traditional societies (Chagnon 1988; Van Vugt et al. 2008) and that men’s behaviors and cognitions are more intergroup oriented than women’s. Aside from the theory support from Cross and Madson (1997) and Baumeister and Sommer (1997), this hypothesis is also supported by the fact that in history, males have usually been the ones to fight against the out-group invasion and protect women and juveniles.

The Male–Warrior hypothesis leads to the prediction that men, more than women, may increase their altruistic group contributions during inter-group competition. Indeed, male warriors have more sexual partners and greater status within their community than do other men. Men also recall group events better than women (Gabriel and Gardner 1999). In fact, studies show that as early as adolescence, girls are more likely to value characteristics related to sensitivity to specific others and interpersonal harmony, while boys are more likely to value characteristics

related to competitiveness and social dominance (Gabriel and Gardner 1999). Van Vugt et al. (2008) found that in step-level public goods games, men contributed more to their group if their group was in competition with other groups, as compared to no inter-group competition. On the other hand, female cooperation was relatively unaffected by inter-group competition.

Experimental evidence further supports different self-recognition between males and females. Charness and Rustichini (2010) conducted an experiment where people played a Prisoner's Dilemma Game with a partisan audience watching the choice. They found that behavior is significantly affected by the interaction of gender and place: males cooperate substantially more often when they are observed by people from the other group, while females cooperate significantly more when they are observed by people from the same group. It leads to the conclusion that while both males and females wish to gain the approval of their in-group members, the actions that are socially desirable differ across gender. Males wish to signal that they are formidable, while females wish to signal that they are cooperative.

Males' strong willingness to show formidability is highly evident in their punishment behavior towards out-group members. Goette et al. (2006) used all young male subjects from the Swiss Army to show that even with random assignment, punishment from a third party is especially high when the victim of defection in a prisoner dilemma is an in-group member as opposed to an out-group member. Bernhard et al. (2006) investigated indigenous groups in Papua New Guinea and found that the third party punisher punishes significantly more if the punisher and the recipient in the dictator game are from the same group. Nevertheless, neither study compared the punishment behavior between genders; Goette's subjects were all young males, while Bernhard et al. did not report specific gender composition. However, such strong out-group hostility cannot be supported by multi-level group selection theory, suggesting that normative obligations are more likely to apply only to in-group members. People who do not belong to the group neither obey the norm nor benefit from norm enforcement.

Gender differences in pro-sociality toward in-group and out-group members are also supported by people's choice of leaders when confronting inter- or intra-group threats. Van Vugt and Spisak (2008) found a strong preference for female leaders during intra-group competition and male leaders during inter-group competition. Such preferences are consistent with the efficient outcome. Vugt and Spisak found that investments were higher under a female than under a male leader in the intra-group condition. Conversely, investments were higher under a male than under a female leader in the inter-group condition. The results are also supported

by [Little et al. \(2007\)](#), who showed that people were more likely to vote for a (manipulated) feminine face when there is peace or internal conflict, but switch their vote to a (manipulated) masculine face when their country is at war.

5 Discussion

This article has reviewed a stream of literatures that bridge the gap between evolutionary psychology and experimental economics on gender differences in pro-sociality. The fundamental sources for such differences are attributed to gender differences in mating strategies, which are demonstrated as males' costly signaling motive, females' conformity to social norms, and inter- and intra-group effects, which induce pro-sociality in both males and females. Such differences can contribute to empirical research on charitable giving, bargaining and gender differences in the labor market.

For example, while male generosity can be elicited through costly signaling (Section 2) and inter-group conflicts (Section 4), female generosity can be generated by propagating role-related social norms or using social approval/disapproval (Section 3). This is consistent with [Griskevicius et al.'s \(2007\)](#) results, but suggests that females' pro-sociality is judged more by their helpfulness and kindness, while male pro-sociality may be motivated by a willingness to expend resources.

In Section 3, we conclude that female pro-sociality is sensitive to environmental parameters due to females' risk-aversion. Accordingly, charities that want to elicit female generosity may need to: (i) appeal to women's caring natures (charities on children); and (ii) reduce the risk level of the product. Specifically, the seed money approach in charitable may be helpful in generating female generosity.

Meanwhile, females' stronger other-regarding preferences (Section 3) may serve to overcome the difficulties faced by public bureaucracies in designing institutions aimed at encouraging efficient resource allocation by discouraging opportunism at the expense of the common good. Recent non-experimental evidence supports the hypothesis that gender-specific preferences matter for resource allocation. [Lott and Kenny \(1999\)](#) and [Edlund and Pande \(2002\)](#) argued that men and women may have different policy preferences, and [Dollar et al. \(1999\)](#) showed that female participation in politics is negatively correlated with corruption measures.

Given that in our field, literatures on laboratory experiments are generally focused on undergraduates, young males, and young females, there may be potential for a selection effect on males' pro-social behavior driven by mating strategies. While subjects in experimental studies are more

representative of the unmarried population, marital status may nonetheless be relevant for pro-social behaviors. In fact, [Janssens et al. \(2010\)](#) found that single males are more responsive to mating cues, which are less effective on married men. Additionally, while men and women have different tastes for giving [for instance, [Andreoni et al. \(2002\)](#) found that women prefer to give more to charities but to give less to each], it is also interesting to note that married households tend to resolve these conflicts largely in favor of the husband's preferences. These differences provide an interesting foundation for future research. For instance, on the function of joint decision-making in married households.

We bridged the gap between the source of gender differences in pro-sociality and experimental research aimed at informing cooperation and generosity. Nevertheless, certain conclusions about either sex (e.g. that men make decisions more based on principle) may not necessarily hold in a broader context (e.g. when men are interacting with females). Still, it is important to learn both the broad principle and the exceptions that may apply in certain special contexts.

Meanwhile, we also refer to risk preferences in explaining gender differences in pro-sociality, particularly females' volatility in pro-social decisions. It is important to note, however, that there are differences between risk and uncertainty, and that decisions are also influenced by the amount at stake. Given the limited cases explored here, a broader study distinguishing these factors would be interesting and useful.

In summary, we have identified three underlying factors that drive gender differences in human pro-sociality: (i) males' costly signaling motive; (ii) females' preference to conform to social norms; and (iii) intra- and inter- group differences in tactics for resolving social dilemmas. Ultimately, these differences can be attributed to the human mating motive, which evolved differently for men and women. In addition, the evidence we reviewed informs that gender differences in pro-sociality are reinforced both by the 'ingrained' nature and the exogenous impact of 'nurture'. For example, [Andersen et al. \(2008\)](#) found that the aggregate level of public good provision is much higher in matrilineal than in patriarchal societies.⁶ We hope this article serves as a bridge for connecting evolutionary theories with experimental research, and in doing so provides inspiration for additional research aimed at designing institutions to promote cooperation and social welfare.

⁶ Such difference is due primarily to Khasi men contributing more than patriarchy male counterparts.

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