

Why Do Men Rape? An Evolutionary Psychological Perspective

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Rape of women by men has occurred throughout recorded history and across cultures. In this article, we discuss rape from an evolutionary psychological perspective. Evolutionary psychology is a powerful heuristic tool that allows researchers to develop and test novel hypotheses about complex behaviors such as rape. Some researchers have argued that men have evolved psychological mechanisms that motivate them to rape in specific contexts. We discuss evidence consistent with this claim, and argue that a more nuanced view of men's rape behavior is necessary. We propose that it may be useful to characterize rapists as belonging to one of several types, distinguished by individual differences as well as by the circumstances in which they are predicted to commit rape. We discuss research evidence in support of each rapist type, as well as the need for future research. Finally, we discuss research concerning women's rape-avoidance psychology and behavior.

Keywords: rape, rape avoidance, evolutionary psychology

Rape is a fact of life across cultures (Rozée, 1993; Sanday, 1981). In American samples, estimates of the prevalence of rape vary with the population studied, but are as high as 13% for women (Kilpatrick, Edmunds, & Seymour, 1992). Rape is likely more common, however, because rapes often go unreported. Researchers estimate that 67–84% of rapes are not reported (Greenfield, 1997; Kilpatrick et al., 1992). Although other forms of rape occur (e.g., male–male rape), this article focuses on the rape of women by men. Rape is typically defined, and defined in this article, as the use of force or threat of force to achieve penile–vaginal penetration of a woman without her consent (Kilpatrick et al., 1992; Thornhill & Palmer, 2000).

Before we review rape from a modern evolutionary psychological perspective, we provide a brief, nonexhaustive review of evolutionary psychology (for a more complete review, see Buss, 2004; Tooby & Cosmides, 2005). Evolutionary psychology is a powerful heuristic tool that can be used to generate new testable hy-

potheses across all domains of psychology. Evolutionary psychology rests on several key premises (Buss, 2004; Tooby & Cosmides, 2005). The first premise states that the complexity of human behavior can only be understood by taking into account human evolutionary history and natural selection. Second, behavior depends on *evolved psychological mechanisms*. These are information-processing mechanisms housed in the brain that register and process specific information and generate as output specific behaviors, physiological activity, or input relayed to other psychological mechanisms. Third, evolved psychological mechanisms are functionally specialized to perform a specific task or to solve a specific problem that recurrently affected reproductive success over evolutionary history. This premise is often referred to as *domain specificity*. Finally, the *numerousness* premise states that human brains consist of many specific evolved psychological mechanisms that work together to produce behavior. Together with other theoretical tools and heuristics provided by modern evolutionary theory, these premises are used to generate testable, falsifiable hypotheses.

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Misconceptions About Evolutionary Psychology

Some scholars believe that evolutionary psychological research is conducted to justify rac-

ism, sexism, or other undesirable “-isms.” For example, Tang-Martinez (1997, p. 116) describes a common feminist view that evolutionary psychology is, “inherently misogynistic and provides a justification for the oppression of women.” However, the feminists to whom Tang-Martinez refers are committing what is known as the *naturalistic fallacy*: the error of deriving what *ought* to be from what *is*. This error can be demonstrated clearly with an example: No sensible person would argue that a scientist researching the causes of cancer is thereby justifying or promoting cancer. Yet some people argue that investigating rape from an evolutionary perspective justifies or legitimizes rape (e.g., Baron, 1985; Marshall & Barrett, 1990, cited in Thornhill & Palmer, 2000).

Related to the naturalistic fallacy is the false belief of *genetic determinism*: The idea that behavior is unalterable, programmed, or otherwise unchangeable. Biologist John Maynard Smith noted that genetic determinism is, “an incorrect idea that is largely irrelevant, because it is not held by anyone, or at least not by any competent evolutionary biologist” (1997, p. 524). No evolutionary psychologist would argue that because rape is produced by evolved mechanisms, we should accept its occurrence. The goal of evolutionary psychology, like the goal of any science, is to further our understanding of the phenomenon of interest, which in this case is rape. Researching rape from an evolutionary psychological perspective does not justify this heinous act. Our goal is a greater understanding of the causes of rape, which may help others prevent its occurrence.

Finally, researchers using an evolutionary psychological perspective often frame hypotheses in terms of the costs and benefits to an organism of performing a particular behavior. These costs and benefits refer to the effects on reproductive success over evolutionary time. Costs decrease the probability of successful reproduction, whereas benefits increase the probability of successful reproduction. These terms are sometimes misconstrued as referring to a more general idea of perceived costs and benefits to the individual or to society. However, these terms carry no moral or ethical meaning and are used only in terms of naturally selected biological functioning.

Comparative Psychology of Sexual Coercion and Rape

Evolutionary metatheory has been used to generate the hypotheses that sexual coercion and rape occur in species in which males are more aggressive, more eager to mate, more sexually assertive, and less discriminating in choosing a mate (Thornhill & Palmer, 2000). Sexual coercion and rape occur in insects (Linder & Rice, 2005; Thornhill, 1980, 1981), amphibians and reptiles (Reyer, Frei, & Som, 1999; Shine, Langkilde, & Mason, 2003), fish (Magurran, 2001; Plath, Parzefall, & Schlupp, 2003), birds (Gowaty & Buschhaus, 1998; Pizari & Birkhead, 2000), and primates (Smuts & Smuts, 1993; Wrangham & Peterson, 1996), among others.

Two species in particular provide clear examples of adaptations in males to rape females. A large body of evidence demonstrates that male scorpionflies (*Panorpa vulgaris*) have a notal organ that is designed exclusively to facilitate sexual access to a female in a coercive fashion, that is, rape (Thornhill, 1980, 1981; Thornhill & Sauer, 1991). Scorpionfly males do not always secure copulations through rape. Instead, males display conditional mating strategies. Males that are able to produce food for the female are allowed to mate without coercion. Males that are not able to do so resort to the conditional rape strategy and use of the notal organ (Thornhill, 1980, 1981; Thornhill & Palmer, 2000). Thus, male scorpionflies exhibit evidence of specific anatomical traits that evolved to facilitate rape and of a conditional strategy of sexual coercion.

Male orangutans (*Pongo pygmaeus*) also deploy conditional strategies of sexual coercion and rape. Orangutans are unique among apes in that they live solitary lives. Females therefore do not have mates or kin that may deter or prevent rape (Wrangham & Peterson, 1996). This fact alone makes rape a more viable strategy for male orangutans. Forced copulations account for up to half of all copulations (Mitani, 1985; Wrangham & Peterson, 1996). These forced copulations seem to be performed primarily by a subset of males. Wrangham and Peterson (1996) reviewed evidence indicating that male orangutans exist as one of two distinct morphs or behavioral types. The large morphs weigh significantly more, move much slowly,

and are typically able to find females willing to mate with them. The small morphs are typically unable to find females willing to mate with them. These small morphs are more likely to chase down and rape females. This represents a conditional strategy. If the smaller males are unable to gain sexual access to females through intrasexual competition and by being attractive to females, they may use the conditional strategy of chasing down and raping a female.

Comparative evidence indicates that males of many species have evolved strategies to sexually coerce and rape females. Rape in humans must also reflect adaptations constructed over evolutionary time. Although numerous explanations have been offered to explain rape in humans (e.g., learning or enculturation, mental illness, personality differences, drug and alcohol use, and other factors; Bergen & Bukovec, 2006, Dean & Malamuth, 1997, Lalumière & Quinsey, 1996), these factors alone cannot explain the existence of such seemingly complex behavior. These factors may increase the likelihood of rape, but cannot explain the complex organized behavior seen in rape. Only two explanations are likely to be true: that rape is the product of specialized psychological adaptation, or that it is a byproduct of other adaptations in the male mind (Palmer & Thornhill, 2003a, 2003b; Thornhill & Palmer, 2000). What evidence supports the hypothesis that rape is the result of an adaptation?

Evidence of Human Adaptations for Sexual Coercion and Rape

For rape to be produced by evolved psychological mechanisms, it must have recurrently generated reproductive benefits for ancestral rapists. These benefits must have outweighed the costs that men may incur if they attempt or successfully complete a rape. Despite the costs, there is evidence that rape may have increased the number of women with whom ancestral men copulated and, therefore, the reproductive success of rapist males (Gottschall & Gottschall, 2003; Holmes, Resnick, Kilpatrick, & Best, 1996; Krueger, 1988; Shields & Shields, 1983; Thornhill, 1999; Thornhill & Palmer, 2000).

Men do not have morphological features analogous to the notal clamp of male scorpionflies. Any rape adaptations that men possess are likely to occur in the form of psychological

mechanisms. Thornhill and Thornhill (1992; see also Thornhill, 1999; Thornhill & Palmer, 2000) have identified several possible rape adaptations. These adaptations are proposed to be universal features of male psychology that are activated under specific circumstances.

A hypothesized design feature of rape adaptations involves mechanisms that cause men to evaluate the sexual attractiveness of rape victims differently than for consensual partners. Specifically, a rapist might be more successful reproductively by maximizing the chance that a one-time forced copulation will result in pregnancy. According to this hypothesis, a would-be rapist may be more likely to target a highly fertile woman than a woman who is less fertile (Thornhill & Palmer, 2000). Human female fertility (current likelihood of conception per copulation) peaks in the early to mid-20s. Therefore, if women in this age range are overrepresented in reports of rape, it is possible that this reflects a male adaptation that leads to raping fertile women more often than nonfertile women. Numerous studies have documented that young women are most often targeted by rapists, and that women of peak fertility are overrepresented in reported and unreported rapes (Ghiglieri, 2000; Greenfield, 1997; Kilpatrick et al., 1992; Shields & Shields, 1983, Thornhill & Palmer, 2000; Thornhill & Thornhill, 1983). This evidence does not support exclusively rape-specific adaptation, however, because men exhibit a preference for sexually attractive partners in general, not just in contexts of rape (see, e.g., Buss, 1994, 2004).

We, like others (e.g. Thornhill & Palmer, 2000), propose that rape is a conditional strategy that may potentially be deployed by any man. Similarly, Shields and Shields (1983) argued that men use a conditional mating strategy consisting of many mating tactics, including rape. At least one-third of men admit they would rape under specific conditions, and many men report coercive sexual fantasies (see Malamuth, Huppert, & Paul, 2005, for a review). Such evidence suggests that rape adaptations might be universal features of male psychology. Empirical support for evolutionary psychological hypotheses of rape has been mixed. For example, the mate-deprivation model of sexual coercion, in which men with limited or no sexual access to women rape for lack of other options, typically has not been supported (Mala-

muth et al., 2005; but see also below). This mixed support may reflect a lack of appreciation that there may be several distinct types of rapists. As a heuristic strategy, we have defined several rapist types. Specifying these types may generate new insights and testable hypotheses. Other researchers have suggested that defining subtypes of rapists can be potentially valuable (Malamuth et al., 2005).

We hypothesize that rape may represent a conditional mating strategy, present in all men, which may result from several qualitatively different ancestral contexts combined with individual difference factors among men. Specifically, we propose five types of rapists (or contexts of rape), (1) disadvantaged men who resort to rape, (2) “specialized” rapists who are sexually aroused by violent sex, (3) men who rape opportunistically, (4) high-mating-effort men who are dominant and often psychopathic, and (5) partner rapists motivated by assessments of increased risk of sperm competition. We next discuss evidence for each type of rapist.

Disadvantaged Men

The first hypothesized rapist type includes men who are motivated to rape if they have no other means of securing copulations. This may be referred to as the *disadvantaged male* hypothesis. This hypothesis also has been referred to as the *mate deprivation hypothesis* (Lalumière, Chalmers, Quinsey, & Seto, 1996). It is supported by data indicating that rapes are committed disproportionately by men with low socioeconomic status (Kalichman, Williams, Cherry, Belcher, & Nachimson, 1998; Thornhill & Thornhill, 1983). Furthermore, Krill, Lake, and Platek (2006) presented evidence that men convicted of rape display lower facial symmetry, an indicator of poor genetic quality. Facial symmetry is linked positively with physical and psychological health (Shackelford & Larsen, 1997), and men with lower facial symmetry are perceived as less attractive and as less desirable mates (Gangestad & Thornhill, 1999; Gangestad, Thornhill, & Yeo, 1994). Deprived of mates by normal means, some men may resort to rape. Identification of such a rapist type, however, would not necessarily imply a conditional strategy for rape. One can imagine that when reproductive opportunities are dismal, some men might be motivated to take more risks in all

domains, with one domain being sexual assertiveness, which might lead to rape.

Specialized Rapists

Another type of rapist may be the *specialized rapist*. Men in this group are distinguished by being sexually aroused by violent sexual stimuli. These men may possess a psychology that produces differences in sexual arousal in response to depictions of rapes versus depictions of consensual sex. Because rape carries high potential costs for the rapist, particularly if caught in the act, rapists with a psychology that motivated quicker arousal and ejaculation during rape might have been more successful than men who did not possess such a psychology (Thornhill & Palmer, 2000).

Support for the existence of this hypothesized group has been generated by investigating whether men are aroused by depictions of rape versus depictions of casual sex. Meta-analyses indicate that convicted rapists demonstrate greater sexual arousal to scenes of sexual coercion involving force than do nonrapists (Hall, Shondrick, & Hirschman, 1993; Lalumière & Quinsey, 1994; Thornhill & Thornhill, 1992).

Specialized rapists also might possess mechanisms that cause them to evaluate the sexual attractiveness of rape victims differently than the sexual attractiveness of consensual partners. According to this hypothesis, a rapist will be more likely to rape a highly fertile woman than a woman who is less fertile (Thornhill & Palmer, 2000). Research has demonstrated support for this hypothesis (see above for details). However, it is unclear if this reflects a specialized rape adaptation or a more general male mating strategy. Future research might test the hypothesis that men evaluate the sexual attractiveness of rape victims differently than the sexual attractiveness of consensual partners by examining whether men target for rape reproductive-age women who are in the most fertile phases of their menstrual cycles. Such a finding would provide stronger support for this rapist type.

If a rape is a one-time event, it might make adaptive sense for the rapist to inseminate the woman with an ejaculate that contains a high sperm count or that otherwise increases the chance of successful fertilization. Indeed, Thornhill and Palmer (2000) have hypothesized

that some rapists may be capable of producing a high-sperm-count ejaculate that would increase the chance of fertilization. Men seem to be capable of unconsciously adjusting sperm number in ejaculates, such as in response to a greater risk of sperm competition (Baker & Bellis, 1989, 1993), but it is unknown whether rapists adjust sperm numbers during rape. Evidence for this would lend support to the specialized rapist type.

Researchers have argued that premature ejaculation might have been adaptive ancestrally, perhaps by minimizing the chances of predation or detection by jealous mates (Hong, 1984; see also Gallup & Burch, 2004). It also might make adaptive sense for a rapist to ejaculate as soon as possible after achieving copulation. This would reduce the chances of being injured or retaliated against. Therefore, it is possible that selection may have acted to minimize the time it takes for a man to ejaculate during a rape. Research is needed to test this hypothesis. For example, one might compare the average pre-ejaculatory copulation length during rape versus during consensual copulation.

There is indirect evidence corroborating the hypothesis that rapists' ejaculates are more competitive than nonrapists. Gottschall and Gottschall (2003) estimated that pregnancy rates resulting from rape are two times that of consensual per-incident rates. That is, approximately 6% of rapes result in pregnancy compared to approximately 3% of consensual copulations. Even after controlling statistically for the age of the woman, the researchers identified a higher conception rate for rapes than for consensual sex. This evidence suggests that there may be something different about rapists' psychology or the competitiveness of their ejaculates. Further research is needed, however. One promising area of research is the study of semen chemistry. Burch and Gallup (2006) hypothesized that men may have an adaptation that functions to adjust semen chemistry to cause ovulation immediately following a rape. Future research could profitably test this hypothesis, perhaps by comparing chemical constituents of ejaculates produced by men exposed experimentally to a coercive sexual scenario with ejaculates produced by men exposed experimentally to a noncoercive sexual scenario.

Opportunistic Rapists

The third hypothesized rapist type is the *opportunistic rapist*. These men generally seek out receptive women, but might shift to sexual coercion and rape if women are not receptive, or if the associated costs, such as injury or retaliation by the victim, the victim's family, or society, are particularly low. All rapists are predicted to be attuned to a potential victim's vulnerability, but an opportunistic rapist is especially so. The universality of laws and societal norms prohibiting rape (wife rape being a special exception; see below) indicates an appreciation that men are more likely to rape when the costs are low (Palmer, 1989; Thornhill & Palmer, 2000). The fact that rapes regularly occur during wartime has been presented as evidence of the assessment of victim vulnerability and decreased likelihood of detection (e.g., Gottschall, 2004). Men in war are likely to have lowered costs of committing rape, because punishment or retaliation is less likely.

The evidence for the existence of this type of rapist, however, is minimal. Theft also is common during war, and for the same reason: punishment or retaliation is unlikely. Support for this hypothesized type may be seen in research demonstrating that women with family members, particularly adult male family members, living nearby are much less likely to be physically assaulted by their partner (Figueredo et al., 2001; Kanin, 1957). This suggests that potential rapists are attending to the probability of retaliation by a victim's adult male family members.

High-Mating-Effort Rapists

A fourth hypothesized rapist type is the *high-mating-effort* rapist. High-mating-effort rapists, in contrast to other types, such as disadvantaged rapists, appear to be more sexually experienced (Lalumière & Quinsey, 1996). These rapists may be characterized as aggressive, dominant, and having high self-esteem. Such rapists often may be characterized as psychopathic (Lalumière, Harris, Quinsey, & Rice, 2005). Lalumière et al. argue that high mating effort is an important facet of psychopathy. They argue that although most men appear to deploy mating strategies according to environmental contexts, psychopathic men deploy a high-mating-effort strategy in most contexts, pursuing many part-

ners with little investment, and using coercion and rape when noncoercive tactics fail. There is evidence that psychopathic men display lower fluctuating asymmetry, an index of overall fitness (Lalumière, Harris, & Rice, 2001), further distinguishing this rapist type from others, such as the disadvantaged rapist.

Research evidence corroborates the plausibility of this rapist type. Dean and Malamuth (1997), for example, found that men who scored high on a Sexual Experience measure, "were more likely to report sexual coercion if they were also self-centered as opposed to nurturant" (p. 74). Premarital sexual coercion is associated with sexual promiscuity, earlier onset of sexual activity, and greater sexual experience (Christopher, Owens, & Stecker, 1993; Lalumière et al., 2005). Lalumière and Quinsey (1996) found that a strong indicator of past sexual coercion is positive self-perceived mating success and an extensive history of casual sexual relationships. Finally, the risk of date rape is greater when the man initiated the date, spent money on the woman, and provided transportation (Muehlenhard & Linton, 1987). Perceived relative deprivation, in which an individual's (high) expectations about having sex are not satisfied (Malamuth et al., 2005) also may play a role in the sexually coercive behavior of high-mating-effort men. For example, men who report a greater likelihood of committing rape tend to endorse statements expressing an increased perception of mate deprivation, but do not report an overall fewer number of sexual opportunities (Glick & Fiske, 1996; Lonsway & Fitzgerald, 1995). More research must be conducted to test this hypothesized rapist type. For example, researchers might test whether men convicted of date rape or sexual assault score higher on measures of psychopathy.

Partner Rapists

A final hypothesized rapist type includes men motivated to rape their partners under conditions of increased sperm competition risk. Sperm competition is the competition that can occur between the sperm of different males to a female's eggs (Parker, 1970). The outcome of sperm competition is biased in favor of males who produce greater numbers of sperm (Parker, 1970, 1982; Pound et al., 1982). Rape in response to increased risk of sperm competition is

most likely to occur when a man learns or suspects that his long-term partner recently has been sexually unfaithful (Thornhill & Thornhill, 1992).

Partner rapes comprise a substantial proportion of reported rapes (Kilpatrick et al., 1992; Russell, 1990). Between 10% and 26% of women report experiencing rape in marriage (Russell, 1990; Watts, Keogh, Ndlovu, & Kwaramba, 1998). Women are particularly likely to be raped by their partner during a breakup instigated by men's concerns about their partner's infidelity (Thornhill & Palmer, 2000). Until very recently in Western society, it was not considered a crime if a man forced his wife to have sex with him. The right of men to sexual access to their partner was considered absolute, and only relatively recently in the United States have men been prosecuted for raping their wives (Bergen, 1996; Russell, 1990).

Studying men's psychological reactions to risk of sperm competition is another method by which the hypothesis that men are motivated to rape their partners under conditions of sperm competition might be tested. If men display psychological reactions to risk of sperm competition in noncoercive contexts, it is also possible that they do so in coercive or rape contexts. Research evidence indicates that men do display such psychological reactions. For example, men are more aroused by and prefer sexually explicit images that suggest the occurrence of sperm competition than by sexually explicit images that do not suggest the occurrence of sperm competition (Kilgallon & Simmons, 2005; Pound, 2002). Furthermore, men who spend a greater proportion of time apart from their partners since the couple's last copulation (and therefore face a higher risk of sperm competition) report that they find their partner more attractive, are more interested in copulating with their partner, and believe that their partner is more interested in copulating with them (Shackelford, Goetz, McKibbin, & Starratt, 2007; Shackelford et al., 2002). These results are independent of relationship satisfaction, total time since last copulation, and total time spent apart. The psychological mechanisms that lead men to experience greater interest in copulation, and to believe their partner is interested in copulation with them, also may be part of the

suite of mechanisms that lead men to coerce or rape their partners.

Finally, in a direct test of the hypothesis that men may rape their partners under conditions of sperm competition, Goetz and Shackelford (2006) documented in two studies that men's sexually coercive behavior is positively related to their partner's infidelities, that is, to the risk of sperm competition. Men with partners who committed infidelities, or who suspected that their partner had committed infidelities (indicating increased risk of sperm competition), were more likely to perform sexually coercive behaviors, including rape. These findings are consistent with the existence of psychological mechanisms that motivate men to commit partner rape in response to risk of sperm competition.

In summary, it may be useful to characterize rapists as falling into one of several categories or types, specifically (a) disadvantaged men, (b) specialized rapists, (c) opportunistic rapists, (d) high-mating-effort men, and (5) partner rapists. Although future research is needed to test the hypothesized types of rapists, prior studies offer some preliminary support for this model. We have identified potential unique ancestral contexts and individual differences that may have selected for conditional rape strategies. But these contexts and individual differences can be overlapping. This is to be expected, however, as we argue that all men may possess adaptations to rape. For example, a high-mating-effort context and an opportunity context are not mutually exclusive: a man who devotes much of his time and energy to gaining short-term matings may be even more likely to commit rape when circumstances (such as wartime) allow him to do so at decreased cost (e.g., retaliation).

The existence of adaptations to rape does not mean that rape is inevitable or justified. Like all psychological mechanism, rape mechanisms require functioning genetic and environmental components. Rape is only predicted to occur under specific environmental circumstances that activate men's evolved psychology. Furthermore, because rape behaviors may have a genetic component does not mean that men cannot control their behavior. Just as men thwart their evolved psychology every time they choose less calorically dense food over more calorically dense food (as when one is on a diet), so too can men thwart evolved mechanisms that may otherwise lead them to sexually coerce or rape.

Women's Defenses Against Rape

Rape is a traumatic event that is likely to have been a recurrent problem for women over evolutionary history. Rape often leads to many negative consequences for women and, therefore, women may have evolved psychological mechanisms designed to motivate rape-avoidance behaviors. There are several reasons why rape is traumatic for women. These include disrupting a woman's parental care, causing a woman's partner to abandon her, and causing a woman serious physical injury (Thornhill & Palmer, 2000) or death (Shackelford, 2002). Aside from death, perhaps the greatest cost to women who are raped is the circumvention of their mate choice. This is because anything that circumvents women's choice in mating can severely jeopardize their reproductive success (Symons, 1979).

Researchers have speculated that a variety of female traits evolved to reduce the risks of being raped. Smuts (1992) argued that women form alliances with groups of men and other women for protection against would-be rapists. Wilson and Mesnick (1997) proposed and found support for the *bodyguard hypothesis*: Women's mate preferences for physically and socially dominant men may reflect antirape adaptation. Of course, women may form alliances or prefer dominant mates for reasons other than to avoid rape. Alliances offer protection from such dangers as assault or predation, and dominant mates may possess higher-quality genes, for example. Davis and Gallup (2006) proposed the intriguing possibility that preeclampsia and spontaneous abortion may be adaptations that function to terminate pregnancies not in the woman's best reproductive interests, such as those resulting from rape. Little empirical work has been conducted to identify specific psychological mechanisms that evolved to solve the recurrent problem of rape avoidance.

Thornhill and Thornhill (1990a, 1990b, 1990c) have demonstrated that the psychological pain that women experience after being raped may be produced by evolved mechanisms designed to focus women's attention on the circumstances of the rape, particularly the social circumstances that resulted in the rape. They argue that, like physical pain, psychological pain motivates individuals to attend to the circumstances that led to the pain and to avoid

those circumstances in the future. Victims of rape who have more to lose in terms of future reproductive success will also experience more psychological pain relative to women with less to lose in terms of future reproductive success (Thornhill & Thornhill, 1983, 1990a; Thornhill & Palmer, 2000). For example, reproductive-age women are hypothesized to experience more psychological pain due to the greater risk of conception. Thornhill and Thornhill (1990a) documented support for this hypothesis, documenting that reproductive-age women are more traumatized by rape than are postreproductive-age women or prereproductive-age girls.

The research conducted by Thornhill and Thornhill focuses on the aftereffects of being raped and on the psychological pain that may motivate women to avoid the circumstances leading to the rape. Very little research, however, has been conducted to identify the specific behaviors women may deploy to avoid being raped.

Petralia and Gallup (2002) examined whether a woman's capacity to resist rape varies across the menstrual cycle. Women in the fertile phase of their menstrual cycle showed an increase in handgrip strength, but only when presented with a sexual coercion scenario. Women not in their fertile phase did not show an increase in handgrip strength. Furthermore, women in all other conditions, including women in the fertile phase who were presented with the neutral control scenario, showed a *decrease* in handgrip strength posttest. This provides evidence for specialized mechanisms designed to motivate women to behave in ways that cause them to be less likely to be raped. Women who experience increased strength during their fertile phase would be better equipped to defend themselves from would-be rapists. The research by Petralia and Gallup (2002) provides evidence consistent with the hypothesis that women have evolved mechanisms that motivate rape avoidance behaviors.

Chavanne and Gallup (1998) investigated the performance of risky behaviors by women in the fertile phase of their menstrual cycles. A sample of women were asked where they were in their menstrual cycles, and to indicate whether they had performed a range of behaviors in the past 24 hrs. Behaviors were ranked by women in a separate study according to how likely performing the behaviors might result in

a woman being sexually assaulted, with riskier behaviors given higher risk scores. Individuals' risky behavior was estimated by taking the summed composite score of all performed activities. Women in the fertile phase of their menstrual cycle reported performing fewer high-risk behaviors. There was no difference in the likelihood of performing low-risk behaviors between women in their fertile phase and women outside their fertile phase. This research has some methodological problems that prevent firm conclusions, however. First, the researchers used only one method (i.e., the forward-cycle method) to assess women's menstrual status. Also, Chavanne and Gallup do not specify how the inventory of risky behaviors was developed, noting only that a preliminary sample of women rated the riskiness of the behaviors. In addition, the dependent variable may be confounded with diversity of activity. For example, a woman who performed 10 nonrisky behaviors (each scored as a 1 on the riskiness scale) could receive the same score as a woman who performed two high-risk behaviors (each scored as a 5 on the riskiness scale; see Bröder and Hohmann, 2003, for discussion). Despite these methodological issues, this research documented a significant decrease in performance of risky behaviors by women in the fertile phase of their menstrual cycle. This evidence is consistent with the hypothesized function of rape-avoidance mechanisms, particularly when women are fertile.

The Chavanne and Gallup (1998) study was replicated by Bröder and Hohmann (2003) using a within-subjects design. Twenty-six women who did not currently use oral contraceptives were tested weekly for 4 successive weeks. The results indicated that women in the fertile phase of their cycle selectively inhibit behaviors that would expose them to a higher risk of being raped, despite performing *more* nonrisky behaviors. These results provide a conceptual replication of the results reported by Chavanne and Gallup. Women perform fewer risky behaviors when they are fertile, while still demonstrating a higher overall activity level (Morris & Udry, 1970). This selective behavior indicates that women may have evolved specialized psychological mechanisms designed to motivate behaviors that decrease the risk of being raped. Although this study addressed many of the issues in the Chavanne and Gallup

research, there is still no indication of how risky behaviors were identified. This study also used the somewhat problematic forward and reverse-cycle counting methods for identifying the fertile phase of the menstrual cycle, both of which depend on the potentially unreliable self-reports of participants (Bröder & Hohmann, 2003).

A recent study by Garver-Apgar, Gangestad, and Simpson (2007) tested the hypothesis that women are more attuned to signs of a man's potential sexual coerciveness during the fertile phase and are more accurate at detecting sexually coercive men during the fertile phase. A sample of 169 normally ovulating women watched short segments of videotaped interviews of men. The women were then asked to rate the men on several items that were summed to create an overall coerciveness score. Average coerciveness scores for each man were computed. Finally, women's menstrual status was estimated using the reverse-cycle counting method. The results indicated that women in the fertile phase of their menstrual cycle rated the men as more sexually coercive. This suggests that women at greater risk of conception may be more attuned to signs of male sexual coerciveness than women at lesser risk of conception. This may represent an evolved cognitive error management bias (see Haselton, Nettle, & Andrews, 2005, for an overview) towards identifying men as sexually coercive, which might serve to protect women from being raped. This research provides more evidence that women may have evolved psychological mechanisms that motivate behaviors that guard against men's sexual coercion and rape. We note, however, that the participants viewed videos of strangers. Studies demonstrate that women have a greater fear of stranger rape than of being raped by someone they know (Thornhill & Thornhill, 1990b), which suggests that stranger rape was the greater adaptive problem. This is despite modern patterns of rape, which indicate that women are more likely to be raped by someone they know (Kilpatrick et al., 1992; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). These results may reflect the greater potential costs associated with stranger rape, such as a decreased likelihood of investment by the genetic father of resulting offspring. Would similar results be found by testing women's coerciveness ratings of acquaintances or other familiar men? Future research is needed to ex-

plore these effects in greater detail. For example, researchers might ask women to rate the coerciveness of familiar faces of classmates or celebrities.

In summary, limited previous work suggests that women may have evolved psychological mechanisms that motivate them to avoid being raped. These studies have not assessed specific behaviors performed to avoid rape. Rather, the results of these studies suggest that women may have evolved mechanisms that motivate them to assess the risk of sexual coercion, such as the riskiness of walking in a dark parking lot alone, and the coerciveness of a particular man.

Concluding Comments

Evolutionary psychology is a powerful heuristic tool that allows researchers to consider rape in a new light. Researchers have argued that men have evolved psychological mechanisms that motivate them to rape in specific contexts. Although some evidence is consistent with this hypothesis, more research must be conducted before we can conclude that men have specific adaptations for rape. We propose that a more nuanced view of rapists is needed, in which rapists may be thought of as belonging to one of several types distinguished by the contexts in which they are predicted to commit a rape. Researchers also have hypothesized that women have evolved mechanisms that motivate behaviors to avoid being raped. Some evidence supports this hypothesis. Researchers also must continue to investigate women's evolved rape-avoidance mechanisms before generating conclusions. Future research should continue to investigate the psychological mechanisms that may motivate men's rape behavior and women's rape-avoidance behavior. It is our hope that a deeper understanding of the causes of rape will aid in its prevention.

References

- Baker, R. R., & Bellis, M. A. (1989). Number of sperm in human ejaculates varies in accordance with sperm competition theory. *Animal Behaviour*, *37*, 867–869.
- Baker, R. R., & Bellis, M. A. (1993). Human sperm competition: Ejaculate adjustment by males and the function of masturbation. *Animal Behaviour*, *46*, 861–885.

- Bergen, R. K. (1996). Wife rape: Understanding the response of survivors and service providers. In C. Renzetti & J. Edleson (Series Eds.), *Sage series on violence against women*. California: Sage.
- Bergen, R. K., & Bukovec, P. (2006). Men and intimate partner rape: Characteristics of men who sexually abuse their partner. *Journal of Interpersonal Violence, 21*, 1375–1384.
- Bröder, A., & Hohmann, N. (2003). Variations in risk-taking behavior over the menstrual cycle: An improved replication. *Evolution and Human Behavior, 24*, 391–398.
- Burch, R. L., & Gallup, G. G. (2006). The psychobiology of human semen. In S. M. Platek & T. K. Shackelford (Eds.), *Female infidelity and paternal uncertainty* (pp. 141–172). New York: Cambridge University Press.
- Buss, D. M. (1994). The strategies of human mating. *American Scientist, 82*, 238–249.
- Buss, D. M. (2004). *Evolutionary psychology* (2nd ed.). Boston: Allyn & Bacon.
- Chavanne, T. J., & Gallup, G. G. (1998). Variation in risk taking behavior among female college students as a function of the menstrual cycle. *Evolution and Human Behavior, 19*, 27–32.
- Christopher, F. S., Owens, L. A., & Stecker, H. L. (1993). Exploring the dark side of courtship: A test of a model of male premarital sexual aggressiveness. *Journal of Marriage and the Family, 55*, 469–479.
- Davis, J. A., & Gallup, G. G., Jr. (2006). Preeclampsia and other pregnancy complications as an adaptive response to unfamiliar semen. In S. M. Platek & T. K. Shackelford (Eds.), *Female infidelity and paternal uncertainty* (pp. 191–204). New York: Cambridge University Press.
- Dean, K. E., & Malamuth, N. M. (1997). Characteristics of men who aggress sexually and men who imagine aggressing: Risk and moderating variables. *Journal of Personality and Social Psychology, 72*, 449–455.
- Figueredo, J., Corral-Verdugo, V., Frias-Armenta, M., Bachar, K. J., White, J., McNeill, P. L., Kirsner, B. R., & del PilarCastell-Ruiz, I. (2001). Blood, solidarity, status, and honor: The sexual balance of power and spousal abuse in Sonora, Mexico. *Evolution and Human Behavior, 22*, 293–328.
- Gallup, G. G., Jr., & Burch, R. L. (2004). Semen displacement as a sperm competition strategy in humans. *Evolutionary Psychology, 2*, 12–23.
- Gangestad, S. W., & Thornhill, R. (1999). Individual differences in developmental precision and fluctuating asymmetry: A model and its implications. *Journal of Evolutionary Biology, 12*, 402–416.
- Gangestad, S. W., Thornhill, R., & Yeo, R. A. (1994). Facial attractiveness, developmental stability, and fluctuating asymmetry. *Ethology and Sociobiology, 15*, 73–85.
- Garver-Apgar, C. E., Gangestad, S. W., & Simpson, J. A. (2007). Women's perceptions of men's sexual coerciveness change across the menstrual cycle. *Acta Psychologica Sinica, 39*, 536–540.
- Ghiglieri, M. P. (2000). *The dark side of man*. New York: Perseus Books.
- Glick, P., & Fiske, S. T. (1996). The Ambivalent Sexism Inventory: Differentiating hostile and benevolent sexism. *Journal of Personality and Social Psychology, 70*, 491–512.
- Goetz, A. T., & Shackelford, T. K. (2006). Sexual coercion and forced in-pair copulation in humans as sperm competition tactics in humans. *Human Nature, 17*, 265–282.
- Gottschall, J. (2004). Explaining wartime rape. *The Journal of Sex Research, 41*, 129–136.
- Gottschall, J. A., & Gottschall, T. A. (2003). Are per-incident rape-pregnancy rates higher than per-incident consensual pregnancy rates? *Human Nature, 14*, 1–20.
- Gowaty, P. A., & Buschhaus, N. (1998). Ultimate causation of aggressive and forced copulation in birds: Female resistance, the CODE hypothesis, and social monogamy. *Integrative and Comparative Biology, 38*, 207–225.
- Greenfield, L. (1997). *Sex offenses and offenders*. Washington, DC: Bureau of Justice Statistics, U.S. Department of Justice.
- Hall, G. C. N., Shondrick, D. D., & Hirschman, R. (1993). The role of sexual arousal in sexually aggressive behavior: A meta-analysis. *Journal of Consulting and Clinical Psychology, 61*, 1091–1095.
- Haselton, M. G., Nettle, D., & Andrews, P. W. (2005). The evolution of cognitive bias. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 724–746). Hoboken, NJ: Wiley.
- Holmes, M. M., Resnick, H. S., Kilpatrick, D. G., & Best, C. L. (1996). Rape-related pregnancy: Estimates and descriptive characteristics from a national sample of women. *American Journal of Obstetrics and Gynecology, 175*, 320–324.
- Hong, L. K. (1984). Survival of the fastest: On the origin of premature ejaculation. *The Journal of Sex Research, 20*, 109–122.
- Kalichman, S. C., Williams, E. A., Cherry, C., Belcher, L., & Nachimson, D. (1998). Sexual coercion, domestic violence, and negotiating condom use among low-income African American women. *Journal of Women's Health, 7*, 371–378.
- Kanin, E. J. (1957). Male aggression in dating-courtship relations. *American Journal of Sociology, 63*, 197–204.
- Kilgallon, S. J., & Simmons, L. W. (2005). Image content influences men's semen quality. *Biology Letters, 1*, 253–255.

- Kilpatrick, D., Edmunds, C., & Seymour, A. (1992). *Rape in America*. Arlington, VA: National Victim Center.
- Krill, A. L., Lake, T. M., & Platek, S. M. (2006, June). Do "good genes" predict forced copulation? A test of whether facial symmetry is related to sexual battery. Poster presented at the annual meeting of the Human Behavior and Evolution Society, Philadelphia, PA.
- Krueger, M. M. (1988). Pregnancy as a result of rape. *Journal of Sex Education and Therapy*, *14*, 23–27.
- Lalumière, M. L., Chalmers, L. J., Quinsey, V. L., & Seto, M. C. (1996). A test of the mate deprivation hypothesis of sexual coercion. *Ethology and Sociobiology*, *17*, 299–318.
- Lalumière, M. L., Harris, G. T., Quinsey, V. L., & Rice, M. E. (2005). *The causes of rape*. Washington, DC: American Psychological Association Press.
- Lalumière, M. L., Harris, G. T., & Rice, M. E. (2001). Psychopathy and developmental instability. *Evolution and Human Behavior*, *22*, 75–92.
- Lalumière, M. L., & Quinsey, V. L. (1994). The discriminability of rapists from non-sex offenders using phallometric measures: A meta-analysis. *Criminal Justice and Behavior*, *21*, 150–175.
- Lalumière, M. L., & Quinsey, V. L. (1996). Sexual deviance, antisociality, mating effort, and the use of sexually coercive behaviors. *Personality and Individual Differences*, *21*, 33–48.
- Linder, J. E., & Rice, W. R. (2005). Natural selection and genetic variation for female resistance to harm from males. *Journal of Evolutionary Biology*, *18*, 568–575.
- Lonsway, K. A., & Fitzgerald, L. F. (1995). Attitudinal antecedents of rape myth acceptance: A theoretical and empirical reexamination. *Journal of Personality and Social Psychology*, *68*, 704–711.
- Magurran, A. E. (2001). Sexual conflict and evolution in Trinidadian guppies. *Genetica*, *112–113*, 463–474.
- Malamuth, N. M., Huppin, M., & Paul, B. (2005). Sexual coercion. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 394–418). Hoboken, NJ: Wiley.
- Maynard Smith, J. (1997). Commentary. In P. Gowaty (Ed.), *Feminism and evolutionary biology* (p. 522). New York: Chapman & Hall.
- Mitani, J. C. (1985). Mating behavior of male orangutans in the Kutai Reserve. *Animal Behaviour*, *33*, 392–402.
- Morris, N. M., & Udry, J. R. (1970). Variations in pedometer activity during the menstrual cycle. *Sensory Processing*, *2*, 90–98.
- Muehlenhard, C. L., & Linton, M. A. (1987). Date rape and sexual aggression in dating situations: Incidence and risk factors. *Journal of Counseling Psychology*, *34*, 186–196.
- Palmer, C. T. (1989). Is rape a cultural universal? A re-examination of the ethnographic evidence. *Ethnology*, *28*, 1–16.
- Palmer, C. T., & Thornhill, R. (2003a). Straw men and fairy tales: Evaluating reactions to *A natural history of rape*. *The Journal of Sex Research*, *40*, 249–255.
- Palmer, C. T., & Thornhill, R. (2003b). A posse of good citizens bring outlaw evolutionists to justice. A response to *Evolution, gender, and rape*. Edited by Cheryl Brown Travis. (2003). Cambridge, MA: MIT Press. *Evolutionary Psychology*, *1*, 10–27.
- Parker, G. A. (1982). Why are there so many tiny sperm? Sperm competition and the maintenance of two sexes. *Journal of Theoretical Biology*, *96*, 281–294.
- Parker, G. A. (1970). Sperm competition and its evolutionary consequences in the insects. *Biological Reviews*, *45*, 525–567.
- Petralia, S. M., & Gallup, G. G. (2002). Effects of a sexual assault scenario on handgrip strength across the menstrual cycle. *Evolution and Human Behavior*, *23*, 3–10.
- Pizzari, T., & Birkhead, T. R. (2000). Female feral fowl eject sperm of subordinate males. *Nature*, *405*, 787–789.
- Plath, M., Parzefall, J., & Schlupp, I. (2003). The role of sexual harassment in cave and surface dwelling populations of the Atlantic molly, *Poecilia mexicana* (Poeciliidae, Teleostei). *Behavioral Ecology and Sociobiology*, *54*, 303–309.
- Pound, N. (2002). Male interest in visual cues of sperm competition risk. *Evolution and Human Behavior*, *23*, 443–466.
- Pound, N., Shackelford, T. K., & Goetz, A. T. (2006). Sperm competition in humans. In T. K. Shackelford & N. Pound (Eds.), *Sperm competition in humans* (pp. 3–31). New York: Springer.
- Resnick, H. S., Kilpatrick, D. G., Dansky, B. S., Saunders, B. E., & Best, C. L. (1993). Prevalence of civilian trauma and post-traumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology*, *61*, 984–991.
- Reyer, H. U., Frei, G., & Som, C. (1999). Cryptic female choice: Frogs reduce clutch size when amplexed by undesired males. *Proceedings of the Royal Society of London Series B: Biological Sciences*, *266*, 2101.
- Rozée, P. D. (1993). Forbidden or forgiven? Rape in cross-cultural perspective. *Psychology of Women Quarterly*, *17*, 499–514.
- Russell, D. E. H. (1990). *Rape in marriage* (Rev. ed.). Indianapolis: Indiana University Press.
- Sanday, P. R. (1981). The socio-cultural context of rape: A cross-cultural study. *Journal of Social Issues*, *37*, 5–27.

- Shackelford, T. K. (2002). Are young women the special targets of rape-murder? *Aggressive Behavior*, 28, 224–232.
- Shackelford, T. K., Goetz, A. T., McKibbin, W. F., & Starratt, V. G. (2007). Absence makes the adaptations grow fonder: Proportion of time apart from partner, male sexual psychology, and sperm competition in humans (*Homo sapiens*). *Journal of Comparative Psychology*, 121, 214–220.
- Shackelford, T. K., & Larsen, R. J. (1997). Facial asymmetry as indicator of psychological, emotional and physiological distress. *Journal of Personality and Social Psychology*, 72, 456–466.
- Shackelford, T. K., LeBlanc, G. J., Weekes-Shackelford, V. A., Bleske-Rechek, A. L., Euler, H. A., & Hoier, S. (2002). Psychological adaptation to sperm competition. *Evolution and Human Behavior*, 23, 123–138.
- Shields, W. M., & Shields, L. M. (1983). Forcible rape: An evolutionary perspective. *Ethology and Sociobiology*, 4, 115–136.
- Shine, R., Langkilde, T., & Mason, R. T. (2003). Cryptic forcible insemination: Male snakes exploit female physiology, anatomy, and behavior to obtain coercive matings. *American Naturalist*, 162, 653–667.
- Smuts, B. B. (1992). Male aggression against women. *Human Nature*, 6, 1–32.
- Smuts, B. B., & Smuts, R. W. (1993). Male aggression and sexual coercion of females in nonhuman primates and other mammals: Evidence and theoretical implications. *Advances in the Study of Behavior*, 22, 1–63.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Tang-Martinez, Z. (1997). The curious courtship of sociobiology and feminism: A case of irreconcilable differences. In P. Gowaty (Ed.), *Feminism and evolutionary biology* (pp. 116–150). New York: Chapman & Hall.
- Thornhill, R. (1980). Rape in *Panorpa* scorpionflies and a general rape hypothesis. *Animal Behavior*, 28, 52–59.
- Thornhill, R. (1981). *Panorpa* (Mecoptera: Panorptidea) scorpionflies: Systems for understanding resource-defense polygyny and alternative male reproductive efforts. *Annual Review of Ecology and Systematics*, 12, 355–386.
- Thornhill, R. (1999). The biology of human rape. *Jurimetrics Journal*, 39, 137–147.
- Thornhill, R., & Palmer, C. P. (2000). *A natural history of rape*. Cambridge, MA: The MIT Press.
- Thornhill, R., & Thornhill, N. (1983). Human rape: An evolutionary analysis. *Ethology and Sociobiology*, 4, 137–173.
- Thornhill, N., & Thornhill, R. (1990a). Evolutionary analysis of psychological pain of rape victims I: The effects of victim's age and marital status. *Ethology and Sociobiology*, 11, 155–176.
- Thornhill, N., & Thornhill, R. (1990b). Evolutionary analysis of psychological pain following rape II: The effects of stranger, friend, and family member offenders. *Ethology and Sociobiology*, 11, 177–193.
- Thornhill, N., & Thornhill, R. (1990c). Evolutionary analysis of psychological pain following rape victims III: The effects of force and violence. *Aggressive Behavior*, 16, 297–320.
- Thornhill, R., & Thornhill, N. (1992). The evolutionary psychology of men's coercive sexuality. *Behavioral and Brain Sciences*, 15, 363–375.
- Thornhill, R., & Sauer, K. (1991). The notal organ of the scorpionfly (*Panorpa vulgaris*): An adaptation to coerce mating duration. *Behavioral Ecology*, 2, 156–164.
- Tooby, J., & Cosmides, L. (2005). Conceptual foundations of evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 5–67). Hoboken, NJ: Wiley.
- Watts, C., Keogh, E., Ndlovu, M., & Kwaramba, R. (1998). Withholding of sex and forced sex: Dimensions of violence against Zimbabwean women. *Reproductive Health Matters*, 6, 57–65.
- Wilson, M., & Mesnick, S. L. (1997). An empirical test of the bodyguard hypothesis. In P. A. Gowaty (Ed.), *Feminism and evolutionary biology* (pp. 505–511). New York: Chapman & Hall.
- Wrangham, R., & Peterson, D. (1996). *Demonic males*. New York: Houghton Mifflin.

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