

Sexual Jealousy

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Abstract

Sexual jealousy is a basic emotion. Although it lacks a distinctive facial expression and is unlikely to solve problems of survival, it evolved because it solves adaptive problems of mating. Some adaptive functions are similar in men and women at one level of abstraction, such as warding off potential mate poachers and deterring relationship defection. Other functions are sex-differentiated, such as increasing paternity probability for men and monopolizing a mate's economic commitments for women. Dozens of studies have documented sex-differentiated design features of jealousy: The relative upset about sexual and emotional aspects of infidelity; processing speed and memorial recall of sexual and emotional infidelity cues; physiological distress to sexual and emotional infidelity cues; qualities of same-sex rivals that evoke jealousy, such as superior job prospects versus greater physical attractiveness; triggers of mate retention tactics; jealous interrogations following the discovery of infidelity; and whether an infidelity produces forgiveness or breakup. Although showing all the hallmarks of evolved functionality, sexual jealousy also leads to tremendous destruction, from humiliation to homicide. By these scientific theoretical and empirical criteria, sexual jealousy is properly considered not only "basic" but also "one of the most important emotions"

Keywords: jealousy, infidelity, emotion, evolution, mate retention

Introduction

Jealousy is usually defined as a complex emotional state activated when there is a threat to a valued social relationship (Daly, Wilson, & Weghorst, 1982). When the valued relationship is a close friendship, threats may come from friendship competitors who threaten to usurp a privileged position as a 'best friend' or BFF (best friend forever). When the valued relationship is a sexual mateship, threats may come from 'mate poachers' who show a keen interest in one's mate; from the mate who gives off cues to infidelity or relationship defection; or even from the

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relationship itself, as occurs when there is a mate value discrepancy, which might correlate with a threat hovering on the horizon of a relationship, even without an imminent threat of infidelity or defection (Buss, 2000).

Jealousy and envy are often used interchangeably in everyday life, but psychologists usually distinguish the two emotions. *Envy* is a complex emotion activated when someone else has something that you desire or covet but currently lack. You might envy a work colleague who has secured a better pay raise or promotion or you might envy a mating rival who is more attractive or well-liked. John might be envious of a neighbor who is married to an especially attractive or interesting woman. But John experiences jealousy if that neighbor shows behavior designed to tempt his own wife into a sexual liaison. Jealousy and envy, in short, are distinct emotions, despite their interchangeable usage in everyday discourse.

From an evolutionary perspective, jealousy and envy have distinctly different functions that render them separate emotional adaptations. Envy has been hypothesized to motivate actions designed to obtain the coveted benefits someone else has that one lacks, and also to undermine or derogate rivals who seem to possess benefits that one lacks (DePriore, Hill, & Buss, 2012). Jealousy, in contrast, has been hypothesized to function to motivate behavior designed to ward off threats to valued relationships with behavior ranging from vigilance to violence (Buss, 1988a; Buss & Shackelford, 1997).

If two emotions have different evolved functions with correspondingly distinct 'design features', they are considered to be distinct adaptations, even if they share some features and overlap in some affective or cognitive elements (Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998). For example, a woman might become *enraged* at a peer getting a promotion she felt she deserved instead and become *enraged* at a husband caught *in flagrante delicto* with their neighbor's wife – an affective state common to envy and jealousy. But envy and jealousy have distinct social inputs, information processing procedures, and behavioral outputs. The input of a man having an affair provokes rage if the man is her husband, but not if the man is her co-worker. The input of a man getting an undeserved promotion provokes rage if the man is her rival co-worker, but not if the man is her husband. Similarly, the behavioral output of the two emotions are distinct. The woman envious about her co-worker getting a promotion might evaluate the value of that promotion, and consequently redouble her efforts at work, ingratiate herself with her boss, or try to undermine the projects of her co-worker. The woman experiencing jealousy about her husband's infidelity might engage in other information processing procedures, such as gauging the value of the relationship and the magnitude of the threat. And contingent on those and other information processing procedures, she might engage in different sorts of behaviors, ranging from withdrawing to a retaliatory affair to divorce.

The key point is that distinct inputs, distinct decision rules, and distinct behavioral outputs are the hallmarks of distinct adaptations. As with most adaptations, distinct emotion adaptations may have some or many common components. The visual system, for example, is used in both food selection (e.g., to select ripe berries) and mate selection adaptations (e.g., to select mates with cues to health). But the fact that adaptations share common components does not imply that they are not functionally distinct adaptations, in this case for solving adaptive problems of food consumption and sexual consummation, respectively. Analogously, envy and jealousy may share some affective components such as rage, but if they also display distinct inputs, cognitive procedures, and behavioral outputs, they are properly treated as functionally distinct adaptations.

Is Jealousy a "Basic" Emotion from an Evolutionary Perspective?

The scientific literature on emotions is rife with debates about whether there exist "basic" emotions. Debates also surround the proper criteria for evaluating whether an emotion is basic or not. The most prominent proponent of the existence of basic emotions is Paul Ekman, who hypothesizes the existence of six or seven: anger, disgust, fear, happiness, sadness, and surprise are the most agreed-upon six, with contempt being a seventh candidate around which there is some empirical evidence, but less than that of the other six (Ekman, 1973, 1999; Ekman & Cordaro, in press). The central criterion for evaluating an emotion as basic, within Ekman's theoretical framework, is whether the emotion has a *distinctive facial expression* that can be recognized universally – an idea originally advanced by Charles Darwin in his book *The Expression of Emotions in Man and Animals* (Darwin, 1872). Other criteria proposed by Ekman for considering emotions as basic include distinctive universal signals, presence in other primates, distinctive physiology, rapid onset, brief duration, automatic appraisal, and unbidden occurrence (Ekman, 1994). Jealousy does not appear on Ekman's list of basic emotions, and indeed no theorists have proposed that jealousy has a distinctive and universally recognized facial expression. Nor does jealousy always have a rapid onset. Nor is jealousy's duration always brief. Rather than being considered "basic," jealousy within Ekman's framework may be considered "derived" or a "blend" of different emotions such as anger, fear, and sadness (Ekman, personal communication).

The second key proponent of basic emotions from a somewhat different evolutionary framework is that of Robert Plutchik, who proposes eight primary emotions – anger, fear, sadness, disgust, surprise, anticipation, trust, and joy (Plutchik, 1980). Plutchik's criteria for basic emotions include: (1) present in non-human animals, (2) universally present across cultures in humans, and (3)

functional in helping organisms solve adaptive problems of survival. As with Ekman's framework, jealousy does not make Plutchik's list of basic or primary emotions.

Although the frameworks of Ekman and Plutchik are both "evolutionary," from the perspective of modern evolutionary psychology the central criteria for considering an emotion as "basic" or "primary" require re-evaluation. Specifically, considering an emotion or any other psychological mechanisms as basic requires the answer to one key question: *Did the emotion evolve, shaped by selection, because it solved an adaptive problem – that is served a specific function – tributary to reproductive success?*

This criterion for considering an emotion as basic or primary requires a bit more elaboration in order to contrast it with the theoretical frameworks of Ekman and Plutchik. Unlike both Ekman's and Plutchik's frameworks, there is no requirement of presence in non-human animals, primate or otherwise. No one would deem the adaptation of echolocation not "basic" in bats, even if it exists rarely outside of bat species. Some adaptations exist in only a single species, such as language in humans (Pinker & Bloom, 1990). Although many or most emotions may indeed exist in other species or exist in precursor forms in earlier lineages, such existence in other species is neither necessary nor sufficient for deeming an emotion as basic according to the modern evolutionary psychological framework.

Second, possessing adaptive functionality is equated with the current understanding of function in modern evolutionary biology and psychology (e.g., Buss, 1995; Dawkins, 1982; Tooby & Cosmides, 2005; Williams, 1966). Specifically, differential *reproductive* success, not differential *survival* success, is properly considered the "engine" of the process of evolution by selection. Survival is important only inasmuch as it contributes to reproduction. Moreover, some adaptations evolved that were detrimental to survival, but they evolved nonetheless because they contributed to relative reproductive success. Examples include the cumbersome plumage of peacocks, the costly production of enormous racks in elk, and elevated levels of risk-taking in human males – all of which lead to shorter lifespans for the males encumbered by them. Because these qualities lead to greater mating success, however, they evolved despite their costs in the currency of survival.

This shift is important when it comes to jealousy because sexual jealousy does not necessarily solve a problem of survival. Rather, it has been hypothesized to exist because it contributed to the solution of adaptive problems of mating. For example, the primary functions of male sexual jealousy are hypothesized to include deterring infidelity, deterring mate poachers, and deterring defection from the mateship – effects which contribute to a man's reproductive success by ensuring paternity certainty and monopolizing his mate's reproductive value. Its irrelevance

to survival in no way disqualifies jealousy as basic or primary. Of course, successful mate retention also may contribute to solution to a survival problem, especially for women who retain mates who partially function as "body guards." The key point is that contribution to relative reproductive success, not relative survival success, is the critical criterion for the evolution of basic emotions and all other psychological adaptations.

Finally, the fact that jealousy does not exhibit a distinctive and universally recognized facial expression is irrelevant to whether or not it qualifies as a basic emotion. It must have evolved and have a distinct adaptive function or functions, with *function understood as the specific way in which it contributed to differential reproductive success*, not within an outmoded framework that focuses solely on survival. Basic emotions, of course, are expected to be universal, that is present in humans across cultures. However, universality alone can never be used as a sole criterion. There exist some universals of humans, such as the use of fire, which may have attained their universality not because specific adaptations for them evolved, but rather because they were discovered and then spread across populations through a process of cultural transmission.

Phenomena that seem like jealousy may exist in other primate species such as chimpanzees (de Waal, 1982). Nonetheless, it takes unique forms and has distinctive design features in humans due to the particular mating strategies within the human repertoire. Male chimpanzees, for example, show a sort of jealous-like behavior toward the female and lower-ranking males primarily when the female is in estrus. They sometimes direct aggression toward the other male, but sometimes toward the female for consorting with him. In contrast, men show sexual jealousy throughout the ovulation cycle of their partner, although there is some evidence that it might be especially acute when the partner is ovulating (Haselton & Gangestad, 2006).

According to the foregoing analysis, a compelling case can be made that jealousy is indeed a primary or basic emotion. There is good evidence that the complex emotion of jealousy evolved primarily because it solved several key adaptive problems of mating that are tributary to reproduction. Jealousy in mating relationships is largely irrelevant to survival, and in some cases actually is detrimental to survival. A man whose jealousy, upon discovering a mate poacher engaged in sexual relations with his wife, might cause him to launch a physical assault puts himself at risk of getting injured or killed by the man he is attacking. Jealousy hardly promotes survival. But if it led over the long course of human history, on average, to greater reproductive success, it would have evolved despite its on-average cost to individual survival.

Jealousy, in short, fulfills the key modern evolutionary criterion of being a basic or primary emotion, even though it lacks a distinctive facial expression, even

though its central functions in solving adaptive problems may not be linked to survival, and whether or not it is present in other species.

Destructive Consequences of Sexual Jealousy: From Humiliation to Homicide

Sexual jealousy is far from a trivial emotion. One index of importance of an emotion is the range of consequences it produces. Jealousy produces an astonishingly large range of consequences, many of which are known to be destructive. It can lead to cutting off a partner's relationships with friends and family, which in turn leads to the partner experiencing reduced self-esteem, isolation, anxiety about well-being, and the terror of being brutalized (Buss, 2000; Wilson & Daly, 1992). It is the leading cause of spousal battering (Daly et al., 1982) and intimate partner violence more generally (Buss & Duntley, 2011). Intimate partner violence can range from minor slaps to brutal beatings. And in cases in which a man suspects that a mate is pregnant with a child that is not his, it can lead to blows directed at the partner's abdomen, which in some cases lead to the killing of the unborn child she is carrying (Buss & Duntley, 2011).

Jealousy is also the leading cause of the murder of mates and ex-mates, particularly wives, girlfriends, ex-wives, and ex-girlfriends (Buss, 2006; Daly & Wilson, 1988). Two key triggers seem to set men off on a murderous rage – when the man suspects or knows that his partner has been sexually unfaithful and when she leaves the relationship and the man believes that the departure is irrevocable or permanent. Women's jealousy can also lead to mate murder, but at less frequent rates. When women do kill their partners, two key predictors are: (1) when the woman is defending herself against a man who is coming after her in a jealous rage, and (2) after a prolonged period of repeated episodes of physical abuse by a jealous man, and the woman sees no other way to escape her jealous mate's abuse (Daly & Wilson, 1988).

Jealousy is not just dangerous for mates and ex-mates. It is also dangerous to those who befriend, consort with, or show romantic or sexual interest in a mate or ex-mate. A vivid case is that of Ron Goldman, a casual friend of Nicole Brown Simpson, who was murdered because he happened to be with Ms. Simpson when she was murdered (the criminal trial of O.J. Simpson for her murder resulted in a verdict of 'not guilty,' but a civil trial in which he was accused of committing 'wrongful death' returned a verdict of 'guilty.'). Mate poachers are frequent targets of homicidal ideation and same-sex rival murders (Buss, 2006; Duntley, 2005). Less dramatic perhaps is the psychological anguish experienced by a woman's friends and family who are driven away by a jealous man in his attempt to socially isolate or "mate guard" her.

Finally, jealousy can also exert corrosive effects on the individual experiencing this brutal emotion. Experientially, jealousy is linked with an array of negative feelings, including sadness, depression, rage, embarrassment, fear, and humiliation (Buss, 2000). And it can lead to much seemingly self-destructive behavior, including alcohol and drug abuse, to acts of suspicion and accusation, and stalking and other forms of violence that undermine the very relationship a man or a woman is trying to preserve (Buss & Duntley, 2011; Duntley & Buss, 2012).

Jealousy, in short, produces a tremendous range of destructive behavior ranging from humiliation to homicide. These outcomes furnish an additional rationale for considering jealousy to be an important or central emotion in the human repertoire of emotions.

Mainstream Social Science Theories of Jealousy

Although jealousy historically has been largely neglected by social scientists, it has not been entirely ignored. Several authors have proposed theories to explain the origins and existence of jealousy. Freud was perhaps the first to formulate a hypothesis about jealousy (Freud, 1910). In his view, jealousy originated in the *Oedipus complex*, upon the realization by the young male child that it had a rival for his mother's love and affection, an intrasexual competitor in the form of his father. Daly and Wilson (1990) argue that Freud conflated two different types of rivalries – one real, and one fictitious. Boy and father compete, according to Daly and Wilson, for the mother's time and resources, and this sort of conflict is well-predicted by theories of parent-offspring conflict. But boy and father do not compete for sexual access to the mother, and there is no evolutionary rationale for expecting that they will do so. To my knowledge, there is no empirical evidence that sexual jealousy originates from a young boy viewing his father as a competitor for his mother's sexual resources.

According to psychologist Hupka, jealousy is a *social construction*: "It is unlikely ... that human beings come 'prewired,' so to speak, into the world to be emotional about anything other than the requirements for their immediate survival ... the desire to control the sexual behavior of mates is the consequence of the social construction of the gender system. Social construction refers in this context to the *arbitrary assignment of activities and qualities to each gender* (e.g., the desire for honor, beauty, masculinity, femininity, etc.)." (Hupka, 1991, p. 254, 260; emphasis added). According to this argument, society or culture assigns men and women roles and activities, and presumably assigns men the role of controlling the sexuality of their partners. Since social constructions are arbitrary, they should vary widely from culture to culture. We should find cultures where men are jealous, but women are not; others where women are jealous and men are not. And in cultures

that do not make these arbitrary assignments, there should be a total absence of jealousy predictions known to be empirically wrong.

The psychiatrist Bhugra (1993) argues that jealousy is a result of "*capitalist society*." According to this argument, capitalist societies place a premium on personal possessions and property, which extend to possessing other people. Capitalist society encourages "treating the love object in a literal object manner, taking the partner to be the individual's personal possession or property" (p. 272). If this theory is correct, then several implications follow. First, men and women living in capitalist societies should be equally jealous and jealous about the same things. Second, men and women living in socialist, anarchist, or dictatorship societies should be entirely free of jealousy. Third, because "motives for jealousy are a product of the culture," (p. 273) there should be wide variability across cultures in motives for jealousy.

Another explanation of jealousy invokes *low self-esteem, immaturity, or character defects* (Bhugra, 1993). According to this line of thinking, adults who enjoy high self-esteem, maturity, and psychological soundness should experience less jealousy or not experience jealousy at all. If personality defects create jealousy, then curing those defects should eliminate jealousy.

A fifth explanation proposes that jealousy is a form of *pathology*. The core assumption behind this explanation is that extreme jealousy results from a major malfunction of the human mind. Curing the malfunction should eliminate jealousy. Normal psychologically healthy people, according to this account, simply do not experience extreme or intense jealousy. Empirically, however, there is a large psychiatric literature in which individuals have been diagnosed as having pathological jealousy or synonymous labels – delusional jealousy, the Othello Syndrome, morbid jealousy, or the erotic jealousy syndrome. Some instances of jealousy are undoubtedly pathological or delusional (Buss, 2000; Easton, Schipper, & Shackelford, 2007). Nonetheless, it is also clear that many people diagnosed as having pathological jealousy turn out to have spouses who have in fact been sexually unfaithful, so it is not clear that "pathology" is the correct diagnosis (see Buss, 2000, for numerous examples).

Some of these explanations contain grains of truth. Sometimes jealousy is indeed pathological, a product of brain injury from boxing or warfare (Johnson, 1969). Some aspects of cases diagnosed as pathological do include strong evidence of actual delusions, as when a man came to believe that his wife set her Christmas tree lights to blink in synchrony with those of the neighbor across the street (in this case, it turned out that the wife was indeed having an affair with the neighbor, even though the belief in Christmas tree light synchrony was almost certainly delusional)(Buss, 2000).

Expressions of jealousy do vary somewhat from culture to culture. Among the Ache of Paraguay, jealous rivals settle disputes through ritual club fights, whereas among the Kipsigis in Kenya, the offended husband might demand a refund on the brideprice he paid for his wife (Borgerhoff Mulder, 1988; Hill & Hurtado, 1996).

None of these mainstream explanations, however, squares with the known facts about jealousy. Even among the Ammassalik Eskimos in Greenland, sometimes held up as a culture lacking jealousy, it is not unusual for a husband to kill an interloper who has sex with his wife (Mirsky, 1937). And contrary to Margaret Mead's assertion that Samoans are entirely lacking in jealousy and "laugh incredulously at tales of passionate jealousy," jealousy in Samoa is a prominent cause of violence against rivals and mates and they even have a word for it, *fua* (Freeman, 1983, p. 244). To cite one example, "after Mata, the wife of Tavita, had accused his older brother, Tule, of making sexual approaches to her during his absence, Tavita attacked his brother, stabbing him five times in the back and neck" (Freeman, 1983, p. 243-244). Samoan women also succumb to fits of jealousy. In one case the husband of a 29 year old woman named Mele left her for another woman, so Mele sought them out and "attacked them with a bush knife while they were sleeping together" (Freeman, 1983, p. 244). Cultures in tropical paradises that are entirely free of jealousy exist only in the romantic minds of optimistic anthropologists, and in fact have never been found (Brown, 1991; Freeman, 1983).

Women labeled as suffering from "pathological jealousy" sometimes turn out to have husbands who have been romancing other women for years. To understand jealousy, we must peer deep into our evolutionary past to a time before computers, before capitalism, and even before the advent of agriculture.

Evolutionary Theories of Jealousy: Function and Sex Differences

Donald Symons was the first to write explicitly about jealousy from an adaptationist evolutionary perspective (Symons, 1979). He emphasized that sexual jealousy is a prominent emotion in marriages: "Trobriand males are extremely jealous of their mates; a man may kill his wife for adultery, but more commonly he thrashes her, or sulks" (Symons, 1979, p. 113). He continues: "To the extent that marriage has emotional sexual underpinnings, the most relevant emotion is not lust but jealousy, especially male jealousy" (p. 123).

Symons was the first to posit sex differences in jealousy: "... a wife's experience of sexual jealousy varies with the degree of threat to herself that she perceives in her husband's adultery, whereas a husband's experience of sexual jealousy is relatively invariant, his wife's adultery almost always being perceived as threatening" (p. 232). And he is explicit about the hypothesized function: "... the ultimate function of male sexual jealousy is to increase the probability that one's

wife will conceive one's own rather than someone else's child ..." (p. 242). Symons makes clear that jealousy as a solution to the problem of jeopardized paternity probability does *not* imply the presence of a conscious male motive involving compromised paternity.

Regarding sex differences, Symons makes clear that he is *not* proposing that men have a greater capacity for jealousy or experience jealousy any more intensely than do women when it is activated. And indeed, studies that assess jealousy using "global" measures such as "how often do you experience jealousy" or "when jealous, how intense are your feelings" mostly show no sex differences (Buss, 2000). "When wives do experience jealousy, there is no reason whatever to believe that their experiences are any weaker or stronger than husbands' experiences" (Symons, 1979, p. 245).

Nonetheless, Symons does hypothesize that women's jealousy is not inevitable or "obligate." His rationale is that humans evolved in the context of mild polygyny, in which women sometimes had to share a husband with one or more co-wives. The key to women's jealousy, according to Symons, is the magnitude of threat posed by her mate having sex with another women: "A husband's dalliance may have no effect whatsoever on his wife's reproductive success or it may presage a liaison that will entail a reduction in the husband's investment in his wife and her children; furthermore, today's paramour may be tomorrow's co-wife" (p. 246). Consequently, he hypothesizes that selection favored a context-conditional jealousy adaptation in women with the capacity to distinguish threatening from non-threatening adultery, and to experience jealousy as a function of the perceived threat to the husband's investments. In contrast, from a man's perspective, his mate having sexual intercourse with another man always poses some risk of decrease in paternity probability, assuming that she is not pregnant or post-menopausal.

Although Symons argues that male sexual jealousy is more invariant and 'obligate' than female sexual jealousy, he does propose contexts in which male sexual jealousy can be suppressed or deactivated – notably, in the context of wife-swapping, 'swinging,' and polyamory. He suggests that these activities are motivated by men's evolved desire for sexual variety, and that having sexual access to other women in an exchange is a tradeoff for allowing other men to have sex with his wife. Nonetheless, studies of swinging and polyamory do note that jealousy is a pervasive problem in their communities (Buss, 2000), suggesting that it is difficult to entirely suppress male sexual jealousy when witnessing or knowing that a wife is having sex with other men.

The next milestone in the evolutionary analysis of jealousy came from Martin Daly and Margo Wilson (Daly et al., 1982; Wilson & Daly, 1992). They argue that jealousy cannot be defined purely as an internal emotion nor purely as an external situation. Instead, sexual jealousy is "a complex psychological system whose

function is inferred from observable combinations of circumstance and response – a system that is activated by a perceived threat that a third party might usurp one's place in a sexual relationship and that generates a diversity of circumstantially contingent responses aimed at countering the threat" (Wilson & Daly, 1992, p. 303).

Like Symons (1979), they note that sexual jealousy and their somewhat broader construct of "male sexual proprietariness" should have sex-differentiated design features due to the different adaptive problems men and women historically have faced as a consequence of mate infidelity and sexual interlopers. First, because human reproductive biology entails internal female fertilization, males face the problem of investing resources in putative children that are actually sired by rival men – an adaptive problem not faced by women. Consequently, male sexual jealousy should focus heavily on *sexual* infidelity *per se*. Second, males risk losing the mating partner to an intrasexual rival if she leaves the relationship entirely – an adaptive problem men and women both face (Wilson & Daly, 1996). Male sexual jealousy, therefore, should focus heavily on solving these two key adaptive problems.

Women's probability of maternity is not affected in the slightest by her husband's sexual infidelity. A man's sexual infidelity, however, does probabilistically jeopardize the man's investments, attentions, and resources, all of which could be channeled away from a woman and her children and diverted to the female sexual interloper.

Daly and Wilson cite two empirical studies that suggest sex differences in the psychology of sexual jealousy. In a study of dating couples' responses to hypothetical jealousy-inducing scenarios, men reported greater concern and distress about their partner's sexual contact with a rival male (Teismann & Mosher, 1978). Women, on contrast, expressed concern about allocation of their boyfriend's time, attention, and money to rival women. A similar sex difference was discovered using a different methodology by Francis (1977).

Most importantly, Daly et al. (1982) and Wilson and Daly (1992, 1996) document extensive empirical evidence that male sexual jealousy is the key emotion behind enormous amounts of mating-related violence. They show that men's non-lethal and lethal violence is triggered by ecologically valid cues that are probabilistically linked with threats to the man's exclusive sexual access to his mate – centrally cues to sexual infidelity and cues to defection from the mating relationship.

Moreover, they document that women at the greatest risk of jealous violence are young women – those who are highest in reproductive value. This may seem paradoxical at first blush. Why would the most valuable mates be the targets of the most intense violence? Daly and Wilson argue that precisely because young

women are so valuable, sexual jealousy and proprietariness will be maximally activated. In a general sense, organisms can be expected to have adaptations to guard with varying degrees of ferocity resources as a function of their varying value to reproduction. It's not worth allocating effort to monopolize resources with little or no value. So Daly and Wilson suggest that the apparent paradox is not really a paradox at all – men are predicted to experience jealousy, and engage in mate monopolization behavior ranging from vigilance to violence, as a function of the reproductive value of their mates. Although not discussed explicitly by Daly and Wilson, the same prediction should apply to women – the intensity of jealousy and consequent mate monopolization efforts should also vary as a function of the mate value of their mates.

In summary, the evolutionary analysis of jealousy by Symons and by Daly and Wilson provide a major theoretical foundation for the evolutionary analysis of jealousy. Rather than being viewed as a pathology, a character defect, a product of culture, or a product of capitalism, sexual jealousy is conceptualized as a functional emotion. The core function is retaining access to a valuable mate. Jealousy, according to this view, should be activated by threats to the mateship – threats of sexual infidelity by the mate, threats coming from potential mate poachers, and threats that the mate might defect from the relationship.

Importantly, although men and women are predicted to be equally jealous when confronted with these relationship threats, the psychological design of jealousy should differ between the sexes. Men more than women should focus on the sexual aspects of relationship threat, since ancestral men faced an adaptive problem no ancestral woman on earth has ever faced – the problem of compromised probability of being the genetic parent. Women risk a lot by a partner's sexual infidelity, but the risk is the loss of a different reproductively valuable resource – the mate's time, investments, and effort, all of which could get allocated to a rival woman and her children.

Interestingly, Wilson and Daly (1992) paved the way for research unknown at the time, predicting that "The impact of factors that an evolutionist would consider crucial to the domains of mate selection and mate guarding – ages, reproductive condition, joint and separate life histories, aspects of the resource circumstances of the mates and any rivals ... have yet to be (empirically) addressed" (p. 303). As we will see, subsequent research addressed precisely these and other key variables that an evolutionary analysis suggests will be critical to the psychological design of sexual jealousy.

Sex-Differentiated Design Features of Cues Activating Sexual Jealousy

Subsequent theorizing and research on jealousy built upon the foundation provided by Symons (1979) and Daly and Wilson (Daly, Wilson, & Weghorst, 1982; Wilson & Daly, 1992, 1996). Buss (2000, 2012) proposed that jealousy might help to solve the adaptive problems of relationship threat in several ways. First, it might sensitize a man to circumstances in which his partner might be unfaithful, thus promoting vigilance. Second, it might prompt actions designed to curtail his partner's contact with other men. Third, it might cause him to increase his own efforts to fulfill his partner's desires so that she would have less reason to stray. And fourth, jealousy might prompt a man to threaten or otherwise fend off rivals who show sexual or romantic interest in his partner. Echoing the evolutionary logic of Symons, Daly, and Wilson, Buss and colleagues (1992) predicted that men's jealousy, more than women's, should focus heavily on the potential sexual contact that his partner might have with another man.

Women also face a profound adaptive problem because of a partner's infidelity. Because men often (but not always) channel resources and investments to women with whom they have sex, a man might devote time, attention, energy, and effort to another woman and her children rather than to his regular mate and her children. For these reasons, women's jealousy, more than men's, is predicted to focus on cues to the long-term diversion of a man's commitment. Buss and colleagues (1992) proposed that one of the key cues to this long-term diversion of a man's resources is the degree to which he becomes *emotionally* involved with another woman, such as falling in love with her.

Prior to the work of evolutionary psychologists, dozens of empirical studies had explored the psychology of jealousy. The most common finding was that men and women do not differ in either the frequency or magnitude of the jealousy they experience. In retrospect, it is clear that the failure to find sex differences stemmed from the use of domain-general or global measures of jealousy, such as the intensity or frequency of jealousy experienced, uninformed by an evolutionary analysis of sexual jealousy.

Sex differences in reaction to threatening jealousy dilemmas. In the first systematic test of the hypothesized sex differences, 511 college students were asked to compare two distressing events: (A) Their partner having sexual intercourse with someone else, or (B) Their partner becoming emotionally involved with someone else (Buss et al., 1992). Fully 83% of the women found their partner's emotional infidelity more upsetting, whereas only 40% of the men did. In contrast, 60% of the men experienced their partner's sexual infidelity as more distressing, whereas only 17% of the women did. This constitutes a huge 43% difference between the sexes in their responses, which is large by any standard in the social sciences. By posing a

more precise question – not whether each sex experiences "jealousy," but rather which precise triggers of jealousy are more distressing – this evolutionary psychological hypothesis was able to guide researchers to discover a sex difference that had previously gone unnoticed by mainstream jealousy researchers.

Those who are dispositionally or chronically more jealous show even larger sex differences in jealous responses to sexual versus emotional infidelity (Miller & Maner, 2009). This latter finding highlights the importance of integrating stable individual differences with evolutionary theories of sex differences in personality (Miller & Maner, 2009).

Cross-cultural robustness of sex differences in reaction to jealousy dilemmas. These sex differences have now been replicated in *Germany*, the *Netherlands*, *Korea*, and *Japan* (Buunk, Angleitner, Oubaid, & Buss, 1996). They have also been replicated in *Brazil* (de Souza, Verderane, Taira, & Otta, 2006), *England* (Brase, Caprar, & Voracek, 2004), *Romania* (Brase et al., 2004), *Sweden* (Wiederman & Kendall, 1999), *Norway* (Kennair, Nordeide, Andreassen, Strønen, & Pallesen, 2011), *Spain*, *Chile* (Fernandez, Sierra, Zubeidat, & Vera-Villarroel, 2006), and *Ireland* (Whitty & Quigley, 2008). In sum, men's jealousy, compared to that of women, appears to be relatively more sensitive to cues of sexual infidelity. Women's jealousy, compared to that of men, appears to be relatively more sensitive to cues of emotional infidelity – the same sex differences have been found in all cultures that have been studied to date.

Sex differences in physiological responses to jealousy dilemmas. Verbal reports are reasonable sources of data, but ideally, converging evidence from other data sources is more scientifically compelling. To explore the generality of the above findings across different scientific methods, 60 men and women were brought into a psycho-physiological laboratory (Buss et al., 1992). To evaluate physiological distress from imagining the two types of infidelity, the experimenters placed electrodes on the corrugator muscle on the brow of the forehead, which contracts when people frown; on the first and third fingers of the right hand to measure electrodermal response, or sweating; and on the thumb to measure pulse or heart rate. Then participants were asked to imagine either a sexual infidelity ("imagining your partner having sex with someone else ... get the feelings and images clearly in mind") or an emotional infidelity ("imagining your partner falling in love with someone else ... get the feelings and images clearly in mind"). Subjects pressed a button when they had the feelings and images clearly in mind, which activated the physiological recording devices for 20 seconds.

The men became more physiologically distressed by the sexual infidelity. Their heart rates accelerated by nearly five beats per minute, which is roughly the equivalent of drinking three cups of strong coffee at one time. Their skin conductance increased 1.5 microSiemens with the thought of sexual infidelity. And

their corrugator frowning increased, showing 7.75 microvolt units of contraction in response to sexual infidelity, as compared with only 1.16 units in response to emotional infidelity.

Women tended to show the opposite pattern. They exhibited greater physiological distress at the thought of emotional infidelity. Women's frowning, for example, increased to 8.12 microvolt units of contraction in response to emotional infidelity, as compared with only 3.03 units of contraction in response to sexual infidelity. The convergence of psychological reactions of distress with physiological patterns of distress in men and women strongly supports the hypothesis that humans have evolved mechanisms specific to the sex-linked adaptive problems they recurrently faced over evolutionary history.

Although not all published studies replicate the physiological sex differences (e.g., Harris, 2000), the weight of subsequent studies has robustly supported them (see Buss, 2012, for a summary). For example, the most thorough and well-conducted study was published by Pietrzak, Laird, Stevens, and Thompson (2002). They found the predicted sex differences using *four* physiological measures: heart rate, electrodermal activity (skin conductance), electromyographic activity (brow corrugators contraction), and skin temperature. A subsequent study also found support for the predicted sex differences using fMRI techniques, which measure neurophysiological activation (Takahashi et al., 2006). Future studies using physiological measures, including replications of fMRI, would be of great value in testing the theory of evolved sex differences in jealousy (Sagarin et al., 2012).

Cognitive design features of sexual jealousy. Achim Schutzwohl (2004, 2006) performed a series of laboratory experiments using standard cognitive procedures such as decision time, information search, cognitive preoccupation, and memorial recall in response to jealousy-inducing scenarios and stimuli. Schutzwohl and Koch (2004) used an entirely new method that has never been used in jealousy research. They had participants who were currently romantically dating listen to a story about their own romantic relationship in which an infidelity was said to have occurred. Embedded within the story were five cues that had been previously determined to be cues highly diagnostic of *sexual infidelity* (e.g., He suddenly has difficulty becoming sexually aroused when you and he want to have sex) and five cues highly diagnostic of *emotional infidelity* (e.g., He doesn't respond any more when you tell him that you love him). In a surprise memorial recall test a week later, men more than women spontaneously remembered more cues to sexual infidelity (42 percent versus 24 percent), whereas women more than men remembered more cues to emotional infidelity (40 percent versus 29 percent). These findings support the hypothesis that sex differences in jealousy are quite real and cannot be dismissed as an "experimental artifact" (Schutzwohl & Koch, 2004).

Collectively, the studies by Schützwohl and his colleagues show that men more than women showed faster decision time, greater information search, more cognitive preoccupation, and better memorial recall of the *sexual* aspects of infidelity stimuli and scenarios. Women, in contrast, showed faster decision time, more intense information search, greater cognitive preoccupation, and better memorial recall of the *emotional* aspects of infidelity stimuli and scenarios. In short, the psychological design of sexual jealousy does not merely consist of affective components; it also includes the ways in which women and men perceive, search, encode, and remember information about the details of a partner's infidelity.

Characteristics of mating rivals. A partner's potential and actual infidelities constitute key threats to a valued romantic relationship. Another key threat comes from intrasexual rivals. Abundant evidence suggests that *mate poaching* is a common human mating strategy (Schmitt & Buss, 2001; Schmitt et al., 2004). Although sometimes seen as morally repugnant, mate poaching has an evolutionary logic in that many desirable potential mates are already in existing romantic relationships. Indeed, in many or most traditional cultures, most post-pubescent females are married (Symons, 1979). Given a mildly polygynous mating system characteristic of humans, most cultures contain a pool of unmated bachelors and a more limited pool of unmated females, creating a great incentive for mate poaching. Mate poaching by rivals can have the goal of a short-term sexual temptation or a longer-term mating relationship.

Sexual jealousy, consequently, should be activated to the degree that the rival or potential mate poacher poses a viable threat – if the rival exceeds an individual on key components of mate value. Since key components of mate value are universally sex-differentiated, different rival characteristics should pose sex-differentiated threats and evoke sex-differentiated levels of jealousy or emotional distress. A cluster of predictions following from this hypotheses was tested in Korea, the Netherlands, and the United States (Buss, Shackelford, Choe, Buunk, & Dijkstra, 2000).

In all three cultures, men more than women report greater distress when a rival surpasses them on financial prospects, job prospects, and physical strength. And in all three cultures, women report greater distress than do men when rivals surpass them on facial attractiveness and bodily attractiveness. Although additional cross-cultural tests are needed, the fact that precisely the same sex differences in upset due to rival characteristics emerged in cultures as diverse as The Netherlands and Korea supports the key evolutionary hypothesis about jealousy evoked by rivals differing in sex-differentiated qualities linked to male and female mate value. Potential mate poachers pose threats to the degree to which they more closely embody the mate value qualities desired by each sex. Moreover, other studies document that men are more distressed by a partner's heterosexual affair than by a

partner's homosexual affair – illustrating in a different context that jealousy focuses on viable rival threats, in this case one that jeopardizes paternity probability (Confer & Cloud, 2011).

Table 1. *Sex Differentiated Design Features of Sexual Jealousy*

Relative Upset About Sexual and Emotional Aspects of Infidelity

Men more than women give more weight to sexual aspects of infidelity.
Women more than men give more weight to emotional aspects of infidelity.

Cross-cultural Robustness of Relative Upset About Aspects of Infidelity

Germany, the *Netherlands*, *Korea*, *Japan* (Buunk, Angleitner, Oubaid, & Buss, 1996), *Brazil* (de Souza et al., 2006), *England* (Brase, Caprar, & Voracek, 2004), *Romania* (Brase et al., 2004), *Sweden* (Wiederman & Kendall, 1999), *Norway* (Kennair, Nordeide, Andreassen, Strønen, & Pallesen, 2011), *Spain* (Fernandez et al., 2007), *Chile* (Fernandez, Sierra, Zubeidat, & Vera-Villarroel, 2006), and *Ireland* (Whitty & Quigley, 2008).

Cognitive Design Features of Sexual Jealousy

Men preferentially process cues to sexual infidelity.
Women preferentially process cues to emotional infidelity.
Men more quickly process cues to sexual infidelity.
Women more quickly process cues to emotional infidelity.
Men show greater memorial recall of cues to sexual infidelity.
Women show greater memorial recall of cues to emotional infidelity.

Physiological Design Features of Sexual Jealousy

Men show greater EEG, EMG, heart rate, and skin temperature when imagining a partner having sexual intercourse with a rival.
Women show greater EEG, EMG, heart rate, and skin temperature when imaging a partner falling in love with a rival.
fMRI study shows sex-differentiated pattern of brain activation to sexual versus emotional infidelity.

Counter-jealousy Tactics Following Discovery of One's Infidelity

Upon discovery of one's infidelity, men more than women deny any emotional involvement with the extra-pair partner.
Upon discovery of one's infidelity, women more than men deny any sexual involvement with the extra-pair partner.

Jealousy Induced by Rival Characteristics

Men more distressed by rivals with greater job and financial prospects.
Men more distressed by rivals who are physically stronger.
Women more distressed by rivals who are higher in facial attractiveness.
Women more distressed by rivals who are higher in body attractiveness.

Table 1. – *Continued*

Jealous Mate Retention Behaviors

- Men married to physically attractive women show more intense mate guarding.
- Men married to younger women show more intense mate guarding.
- Men show more intense mate guarding when partner is both physically attractive *and* near ovulation.
- Women married to men with higher income show more intense mate guarding.
- Women married to men higher in "status striving" show more intense mate guarding.

Jealous Interrogations Following Discovery of Infidelity

- Did you have sex with him? Men more likely to grill partner about sexual aspects.
- Do you love her? Women more likely to grill partner about emotional aspects.

Forgiveness or Breakup Following Infidelity

- Men, relative to women, find it more difficult to forgive a sexual infidelity.
 - Women, relative to men, find it more difficult to forgive an emotional infidelity.
 - Men, relative to women, are more likely to break up following a sexual infidelity.
 - Women, relative to men, are more likely to break up following emotional infidelity.
-

In short, a formidable body of research has documented a number of sex-differentiated design features that define the evolved emotion of sexual jealousy (see Table 1). Men and women differ in their relative upset about sexual and emotional infidelity, which correspond to the sex-differentiated adaptive problems they historically faced in the context of forming long-term mateships. These sex differences are robust across methods (e.g., forced choice dilemmas, measures of physiological distress) and across a wide spectrum of cultures. The sex differences emerge in studies of information processing of infidelity cues – speed of processing, attention, information search, and memorial recall. Moreover, sexual jealousy shows sensitivity to rivals who pose threats, depending on sex-differentiated components of mate value: job prospects, financial prospects, and physical strength (men more than women); facial and body attractiveness (women more than men).

The empirical evidence supports the hypothesis that sexual jealousy is a basic or primary emotion. It evolved to guard against threats to a valued romantic relationship and possesses highly predictable sex-differentiated functional design features. Despite lacking a distinctive facial expression, there is no reason, from the perspective of modern evolutionary psychology and biology, *not* to consider sexual jealousy a basic evolved emotion that should be included within any comprehensive theory or taxonomy of emotions (see Sabini & Silver, 2005, for

arguments for including both jealousy and parental love as basic emotions from an evolutionary perspective).

Behavioral Output of Jealousy: Mate Retention Tactics, Interrogation Following Infidelity, Forgiveness, and Breakups

Emotions such as sexual jealousy could not evolve unless they influenced behavior, either directly or indirectly. Studies of the behavioral output of sexual jealousy have focused on a broad class of behaviors called mate retention tactics (Buss, 1988b; Buss & Shackelford, 1997). Buss (1988b) developed a taxonomy and corresponding measurement instrument consisting of 104 acts of mate retention, clustered into 19 mate retention tactics. These ranged from vigilance (e.g., checking up on a partner, dropping by unexpectedly, snooping through mail) to violence (e.g., threats, hitting).

Men's, but not women's, intensity of mate retention was predicted by their *wife's age* – younger wives are recipients of more mate retention effort than older wives. Specifically, men married to younger women were more likely to conceal their wives from other men, monopolize their time, punish flirting and other signals that their wife might be unfaithful, engage in emotional manipulation, ratchet up their signals of relationship commitment, increase the flow of resources, increase their signals of possession with words, physical proximity, and jewelry, threaten rivals with violence, and actually direct violence toward potential mating rivals (Buss & Shackelford, 1997). These effects remain robust even after controlling for the age of the men doing the mate guarding. Interestingly, age discrepancies – when men were married to women substantially younger than themselves – also predicted the intensity of men's mate retention tactics, an effect also found by Daly and Wilson (1988) in the context of violent tactics. Importantly, age-related predictors of men's mate retention tactics remained strong after statistically controlling for "length of relationship." No such correlates were found between the husband's age and the wife's mate retention tactics.

Analogous correlations supported the hypothesis that men would devote greater mate retention effort as a function of the *physical attractiveness* of the wife. Husbands' perceptions of their wife's physical attractiveness proved particularly predictive of mate retention tactics, especially increased vigilance, commitment, resource display, verbal signals of possession, physical signals of possession, and intrasexual threats. Haselton and Gangestad (2006) replicated this effect in a sample of dating couples, finding that a woman's physical attractiveness was a large predictor of the intensity of men's mate retention tactics. In contrast, women's perceptions of their husband's physical attractiveness were either uncorrelated with, or slightly negatively correlated with, their mate retention tactics.

Women's mate retention tactics, in contrast to those of men, were significantly predicted by their husband's *financial income* and by the intensity of his *status striving* (Buss & Shackelford, 1997). Women married to men with higher earnings, for example, engaged in more vigilance, more appearance enhancement, and more possessive ornamentation. Women married to men high in status striving tended to punish their mates for flirting and other cues to infidelity, engage in emotional manipulation such as guilt induction, provide sexual inducements, enhance their appearance, and engage in more verbal signals of possession in public contexts. In short, the intensity of women's mate retention tactics were predicted by sex-differentiated components of mate value, notably their husband's financial earnings and the effort their husbands allocated to getting ahead in the status hierarchy.

Beyond these within-sex predictors of mate retention tactics, the study of married couples also reveals overall sex differences in the types of mate retention tactics deployed. Men more than women reported using resource display and intrasexual threats to retain their mates. Women more than men reported using appearance enhancement and verbal signals of possession in public contexts to retain their mates.

In summary, the behavioral output of sexual jealousy in mate retention tactics shows all the hallmarks of "special design" that are sought in documenting an adaptation (Williams, 1966). Men and women differ predictably in the types of mate retention tactics they use, with appearance enhancement being more often used by women and resource display being used more often by men. And sex differences in the components of mate value – notably resources, status, youth, and physical attractiveness – predict the intensity of sex-differentiated effort allocated toward retaining spouses.

Jealousy interrogations and relief following the discovery of infidelity. Other studies have discovered other design features of sex differences in the behavioral output stemming from the psychology of jealousy. One study found that women experienced more *psychological relief* when they discovered that their partner was not emotionally unfaithful, whereas men experienced greater relief upon the disconfirmation of a partner's sexual infidelity (Schutzwohl, 2008). Women more than men inquire about the *emotional* nature of a partner's extra-pair relationship, whereas men more than women inquire about the *sexual* nature of a partner's extra-pair relationship (Kuhle, Smedley, & Schmitt, 2009; Schutzwohl, 2006).

In another study of real-life jealousy interrogations, Kuhle (2011) examined actual infidelities captured on video through the reality program *Cheaters*. In coded analyses of interrogations captured on video upon discovery of their partner's infidelity, men more than women grilled their partners about the *sexual* aspects of the infidelity. Women, in contrast, grilled their partners about the *emotional* aspects of the infidelity. Among the most common questions posed by men was: *Did you*

have sex with him? For women, among the most common interrogations was: *Do you love her?*

Forgiveness or breakup following infidelity. When people discover that a romantic partner has betrayed them with an infidelity, they face a major decision: Should they forgive the partner and remain in the relationship or should they break up and end the relationship? The cross-cultural finding that infidelity is a major cause of divorce suggests that many choose to break up (Betzig, 1989). But not all do. The aftermath of infidelity undoubtedly depends on a variety of factors, such as family pressure, the presence of dependent children, and whether the betrayed partner is economically dependent on the unfaithful partner. Another key influence might be the particulars of the infidelity, and whether it involved sexual, emotional, or economic components.

Using a forced-choice procedure, Shackelford, Buss, and Bennett (2002) found that men, relative to women, reported they would find it more difficult to forgive a sexual infidelity than an emotional infidelity. Moreover, men, more than women, would be more likely to terminate a current romantic relationship following a partner's sexual infidelity compared with an emotional infidelity. Women showed the opposite pattern of responses, being more likely, relative to men, not to forgive and to terminate a relationship following an emotional infidelity than a sexual infidelity. Confer and Cloud (2011) found the exact same pattern in a separate study.

In summary, sex-differentiated behavioral output of jealousy follows patterns predicted in advance by evolutionary theories of jealousy. Men devote more effort to mate retention when their wives are young and attractive, two key cues to reproductive value. Women devote more effort to mate retention when their husband have high earnings and engage in high levels of status striving. Verbal interrogations following from the discovery of infidelity are also well predicted by the evolutionary account. Men more than women interrogate their partners about the sexual aspects of an infidelity, women more than men about the emotional aspects. And whether men and women forgive their partners following an infidelity depends, at least to some extent, on whether the infidelity involved a sexual liaison or a deep emotional involvement that presages the long-term re-allocation of resources.

Discussion

Sexual jealousy is a basic emotion in the sense that it evolved, shows a high level of functional complexity, and shows all the hallmarks of 'special design' required by standard in modern evolutionary biology and psychology. It lacks a

distinctive facial expression. Sexual jealousy in romantic relationships solves problems of mating, and may or may not promote survival (sibling jealousy, involving competing for parental resources, might promote survival – a key argument that highlights the different 'design features' of jealousy in different relationships). Yet sexual jealousy fulfills all the key criteria for solving adaptive problems inherent in long-term committed mating – threats to valued sexual and romantic relationships.

Unlike chimpanzees, who mate primarily when females enter estrus, humans have long-term committed mating in their strategic repertoire. Just as social exchange cannot evolve without solving the problem of cheater-detection (those who take benefits without reciprocating as promised or implied) (Cosmides & Tooby, 2005), long-term mateships could not have evolved without adaptations that functioned to minimize the probability of cheating in committed relationships. Just as there exist temptations to defect in social exchange, there exist temptations to gain benefits by diverting reproductively valuable resources to those outside of a committed mateship. Sexual jealousy is the emotion that evolved to combat this collection of threats – to guard against sexual or investment infidelity, to fend off interested mate poachers, and to motivate mate retention. In this sense, sexual jealousy is not only a *basic* emotion, it is a *necessary* emotion. Long-term committed mating could not have evolved in humans without an adaptation that increased the probability of reaping the reproductive rewards of the extraordinary investment expended and mating opportunity costs incurred when committing to a single mate. Sexual jealousy in mating relationships is that adaptation.

There now exists a considerable body of scientific research that supports the hypothesis that sexual jealousy is a fundamental evolved emotion. Although much of this research has focused on testing specific predictions about sex differences in the psychological design of jealousy, it is important not to overlook gender similarities or commonalities (Buss & Haselton, 2005). These include: (1) that jealousy is a complex emotion designed to alert an individual to threats to a valued mating relationship; (2) that jealousy is activated by the presence of interested and more desirable intrasexual rivals; and (3) that jealousy functions, in part, as a motivational mechanism with behavioral output aimed to deter "the dual specters of infidelity and abandonment" (Buss, 2000). Tests of predictions about gender differences should be interpreted within the context of these gender commonalities.

It is important to understand the historical context of theory and research on jealousy prior to modern evolutionary theoretical perspectives. Jealousy did not figure prominently in theories of emotions. It was not considered basic or primary, even by those adopting evolutionary perspectives that tied emotions to distinctive facial expressions, presence in other primates, or to solutions to survival problems. Theories of jealousy in mainstream social sciences explained it by invoking

arbitrary social constructions, character defects, the Oedipal complex, capitalism, culture, or pathology. Jealousy was regarded as sexually monomorphic in psychological design, essentially identical in men and women.

The introduction of a modern evolutionary psychological perspective on jealousy proved highly generative. It yielded a number of specific predictions about *psychological, cognitive, physiological, and behavioral* design features entirely missed by, and missing from, prior scientific research. An impressive body of research has now tested many of these sex-differentiated predictions. As in all social science research, every study contains flaws and limitations, and one can reasonably challenge the design and methods of any particular study. The weight of the scientific evidence, however, is more important than the details of any particular study, and that is how the merits of scientific theories are evaluated.

A recent meta-analysis of 209 effect sizes from 47 independent samples, for example, confirmed the robustness of the sex differences in relative sensitivity to emotional versus sexual infidelity (Sagarin et al., 2012). This robustness extends to studies that assess reactions to actual infidelities, not merely hypothetical infidelities. New studies continue to discover additional sex differences, such as in jealous interrogations following the discovery of an actual infidelity (Kuhle, 2011). Undoubtedly, there are other design features and behavioral manifestations of sexual jealousy that have yet to be discovered.

This now formidable body of theory and research poses a challenge to emotion theorists and researchers. It calls for a modern evolutionary analysis of the issue of which emotions are properly considered to be "primary" or "basic." It calls for the inclusion of jealousy in any emotion theory that aspires to be comprehensive. And judging from the tremendous range of sometimes-destructive consequences that follow from jealousy, from the devastating experience of humiliation to the horrors of homicide, jealousy is certainly a contender in the human panoply of emotions for "one of the most important. "

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