

**APPLICATIONS OF SIGNALING THEORY
TO CONTEMPORARY HUMAN COURTSHIP**

By

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ABSTRACT OF THE DISSERTATION

Applications of Signaling Theory to Contemporary Human Courtship

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Signaling theory, a popular approach in ethology and theoretical biology, can be employed to better understand social interaction in humans. Applied to contemporary human courtship, signaling theory can provide a framework for interpreting information transmitted at an initial encounter, signals conveyed at key relationship phases both within a romantic couple and to outside parties, and the regular communicative exchange within established relationships. This dissertation applies signaling theory to courtship in testing evolutionary hypotheses within three projects, each involving a different subject population situated at a salient courtship phase. The first project addresses the signaling value of women's faces absent any other information, which is analogous to a first meeting prior to the beginning of courtship. Testosterone-mediated facial features were positively associated with viewer perceptions of masculinity, positively associated with

self-reports of sociosexual attitudes and behaviors, and negatively associated with viewer perceptions of attractiveness. The second project explores the signaling potential of engagement rings among a sample of Ohio newlyweds. Engagement ring cost was positively associated with male income and female income, and was negatively associated with female age, indicating that engagement ring cost may reflect both male and female mate value. The cost of engagement rings as a proportion of male salary was positively associated with courtship duration, suggesting that engagement ring cost may reinforce a signal of commitment already conveyed by a lengthy courtship. The third project concerns notions of spousal obligation on the Honduran island of Utila. This project used an experimental interview setting to elicit and measure audience effects. In response to key questions about characteristics sought in wives, men interviewed in the presence of their wives used more forceful rhetoric. Furthermore, men's responses more frequently emphasized women's morality whereas women's responses more frequently emphasized male resource control.

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Portions of this research were previously published as Cronk and Dunham (2007), “Amounts spent on engagement rings reflect aspects of male and female mate quality” in *Human Nature*, and Campbell et al. (2009), “The association between men’s ratings of women as desirable long-term mates and individual differences in women’s sexual attitudes and behaviors” in *Personality and Individual Differences*. Research resulting from the same field season as was used in Chapter 4 of this dissertation was previously published in Cronk and Steadman (2002) and Cronk et al. (2009), both of which were highly instructive for my work. I owe gratitude to my collaborators on these projects: Lee Cronk, Shannon Steadman, Lorne Campbell, Jeffrey Simpson, Alison Milroy, and Carol Wilson. I am further thankful to William Irons, Tara Wigington, and Amy Jacobson for their contributions to companion projects to the Utilian and facial features research used in this dissertation. Concurrently with writing my dissertation, I was involved in the writing of two review articles: Kimmeldorf et al., “Gift-giving as signaling,” which is currently in revision; and Dunham, “The role for signaling theory and receiver psychology in marketing,” which is forthcoming in *Evolutionary Psychology in the Business Sciences* with Springer. I feel that this dissertation has profited from these works and wish to thank my collaborators for the former article, Marcia Kimmeldorf and Michael McCullough, as well as my editor for the latter chapter, Gad Saad, for their work and feedback. I also wish to thank Will Brown, Drew Gerkey, and Marie Diener-West for fruitful advice they gave me regarding analytical techniques for

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DEDICATION

To my mother, for supporting my obstinately tenacious goal to become an evolutionary anthropologist ever since I asked her to read *Lucy* to me when I was seven years old. And to Elliott, whose intellectual and creative passions I hope to one day support just as faithfully.

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Chapter One: Introduction

1. Courtship Signaling

Signaling theory, when applied to contemporary human courtship, can help us to develop a more thorough understanding of the operations of attraction, commitment, and marital expectations. This dissertation seeks to investigate applications of signaling theory to sexual and romantic relationships in three projects: a study of how the masculinity and attractiveness of northeastern United States college-aged women's facial features may provide cues to health, fertility, sexual attitudes, and sexual behavior; a study of how engagement ring costs in the urban Midwest may signal certain qualities of male and female mate value, as well as features of the relationship; and a study of how notions of marital obligation are signaled between spouses in a Caribbean society with extended male absence, a practice of male financial support, and many opportunities for infidelity. These three projects span distinct relationship phases. The study of women's facial features, as assessed by men otherwise unfamiliar with these women, focuses on the initial encounter, where first assessments would be based on lust or other reactions to physical signals and cues in the absence of further information. The study of engagement rings, based on newly married individuals' recollections, examines relationships at a transitional time of stated commitment. The study of spousal obligation, incorporating subjects from varied relationship statuses, investigates role negotiation and communication within established marriages. By incorporating an examination of different signaling mechanisms at varied relationship phases, this dissertation provides a robust exploration into the ways that signaling theory can inform an evolutionary interpretation of contemporary human courtship.

Because biologists engaged in the study of animal communication have produced the bulk of scholarship in signaling theory, most of the literature focuses on non-human animal examples. Scholars in other disciplines, most notably anthropologists, have also begun to apply signaling theory to human behavior (e.g., Smith & Bliege Bird 2000, 2003; Sosis 2001; Cronk 2005). In deference to the wealth of scholarship from the field of animal communication, I have reviewed work on signaling theory and mate choice across species and provide examples that draw heavily from research on non-humans. I address existing scholarship on signaling theory in human courtship to which this work contributes. Finally, I provide context on contemporary Western courtship dynamics, particularly in regard to relationship chronology and changing norms.

Portions of the literature review for this introduction have profited from two literature reviews to which I have contributed but which are not yet published. Dunham (forthcoming) applies signaling theory and receiver psychology to marketing and contexts within the business world. Kimmeldorf et al. (unpublished manuscript) examines gift-giving as signaling. Similar portions within my review of signaling theory in this chapter and those articles represent my scholarly input to these projects.

2. A Short Primer on Signaling Theory

Applied to biological phenomena, signaling theory investigates the transmission of information from one individual, called a sender, to another individual, called a receiver, and attempts to explain this behavior within an evolutionary framework. In their seminal work on animal signaling, Maynard Smith and Harper (2003: p. 3) define a signal as “any act or structure which alters the behavior of other organisms, which evolved because of that effect, and which is effective because the receiver’s response has

also evolved.” Signals may take many forms, including physical characteristics, such as estrous swellings in some primates; vocalizations, such as calls of mated gibbons; displays, such as the courtship dance of the jumping spider; and chemical stimuli, such as pheromones.

Signaling theory is essentially about communication in a very broad sense; indeed, signaling theory is the dominant theoretical perspective within the scientific study of animal communication. To animal behaviorists, communication can be inferred to have happened whenever the signals transmitted by one organism influence the behavior of others (Wiley 1983). Individuals use signals to convey a wide assortment of personal information on topics such as health, fertility, commitment, resource control, and dominance. These signals are received and interpreted by other individuals, who are often but not always members of the same species. An organism may signal to attract a potential mate, to discourage rivals, to deter predators, or to indicate group affiliation.

Signals are engineered to convey relevant information about a sender to a receiver. As such, they are not arbitrary. Because honest signals contain a link to the underlying attribute being communicated, these pieces of information can be useful in guiding current and future interactions between individuals. However, the honesty of signals cannot be taken for granted because senders may benefit from manipulating the behavior of receivers by use of dishonest signaling. This manipulation may not be in the best interest of the receivers. Avenues of inquiry in signaling theory both investigate the routes to signal reliability and strategies that receivers employ to avoid exploitation (Maynard Smith & Harper 2003).

The form of the signal itself reflects the association between the signal and what

semioticians would call the signified, or the quality being conveyed. Signal reliability can be ensured by any of three different criteria: (1) where production of the signal would be prohibitively costly for a sender of low quality; (2) where the sender would not gain from falsely producing the signal, even if the signal were cost-free, particularly where the sender and receiver have a common interest; and (3) where the signal cannot be faked (Maynard Smith & Harper 2003). In addition to these three routes to signal reliability, signals may also be honest due to high punishment costs or reputational effects in social species, including humans (Maynard Smith & Harper 2003).

Signals employed in courtship represent the most attention-grabbing and longest-recognized arena within the study of signals. Although signals related to sexual selection operate across all classes of animals, birds have received what is perhaps the earliest and most detailed treatment in the scholarly literature. Darwin (1859) first speculated in *On the Origin of Species* that female choosiness might drive the evolution of male characteristics, noting, “I can see no good reason to doubt that female birds, by selecting, during thousands of generations, the most melodious or beautiful males as mates, according to their standards of beauty, might produce a marked effect” (89). Darwin elaborated on this idea in *The Descent of Man, and Selection in Relation to Sex* (1871), wherein he devoted four chapters to the discussion of secondary sexual characteristics in birds, including ornamentation, song, dance, and weaponry for defense. Addressing the function of male display, Darwin posits, “Ornaments of all kinds, whether permanently or temporarily gained, are sedulously displayed by the males, and apparently serve to excite, or attract, or charm the females” (1871b: 86). Bright birds, with an assist from the founder of evolutionary science, have continued to offer numerous case studies in

signaling theory to the current day.

2.1. Signal Design Principles

According to classic biological approaches to signaling theory (e.g., Maynard Smith & Harper 2003), signals are designed by selection and produced by a sender to meet a specific need. Signaling happens when one individual has information that a second individual does not, and where sharing that information benefits both. For example, signaling allows a predator to know which prey will be less susceptible to attack, an avian mother to know which of her chicks most needs a worm, and a peahen to know which peacock would make the best mate. Conversely, signaling allows a prey animal to avoid being pursued, a starving chick to get a meal, and a peacock to gain an opportunity to reproduce.

Signaling also occurs across species. The classic example of this is the stotting of Thomson's gazelles (Caro 1986; Fitzgibbon & Fanshawe 1988). Upon spying a cheetah or African Wild Dog, a fit gazelle will leap repeatedly in place, displaying his awareness that a predator is in the vicinity. Stotting, in effect, lets the predator know that that particular gazelle is prepared to flee and that perhaps another gazelle would make a more vulnerable meal. Stotting behavior varies between predator types and stotting gazelles have a greater survival rate when pursued by African Wild Dogs, a coursing predator, than gazelles that do not stot (see also Maynard Smith & Harper 2003 and Searcy & Nowicki 2005).

Extended to a context more familiar to many anthropologists, signals can also be consciously designed by humans to meet different personal and commercial ends. Signals in humans are designed not solely by evolution but also are shaped by social

influences; indeed, several elements of human signaling operate outside of biology. Engagement rings given in human courtship and the statements made in interview settings are both candidates for signals designed by humans, rather than by natural or sexual selection, that nevertheless may convey information about evolutionarily-relevant traits. Another example is the signaling seen in advertising and other business contexts (Ambler & Hollier 2004; Salamon Deutsch & Deutsch 2006). These examples of signaling theory follow the same elements of signal design and appeal to receiver psychology as seen in biological signals.

A signal is effective because it has a link, either by costliness or identity, with the underlying information represented by the signal; the design of the signal further ensures faithful transmission to other individuals. Effective signal transmission demands three central components of signal design: (1) detectability, or the ease with which a signal can be perceived as distinct from its background; (2) discriminability, or the ease with which it can be separated from other stimuli with which it could be confused; and (3) memorability, or the ease with which it can be remembered (Guilford & Dawkins 1991).

Characteristics are only signals if the response of receivers has had a role in the evolution of that character (Krebs & Dawkins 1984; Zahavi 1991). Signal transmission thus depends not only upon a sender and a message sent, but also upon a receiver whose understanding of the world is such that the signal can be properly interpreted to evoke the appropriate response. The degree to which a signal is conspicuous, is stereotyped, and includes redundant features and alerting characteristics all enhance the likelihood a receiver will detect a signal (Wiley 1983).

Signals do not generally occur singly; rather, they are often transmitted at the

same time as a receiver observes other qualities about an organism. Multiple traits indicating genetic quality may coalesce into one overarching signal of quality transmitted to potential mates. Preferences for multiple traits are constrained by the cost of assessing those traits in comparison to the cost of basing mating decisions on one trait alone (Pomiankowski & Iwasa 1993; Andersson & Iwasa 1996). If each assessment carries a small cost, individuals will likely evolve preferences to assess multiple traits. However, the system becomes unstable if cost increases. In that situation, organisms are likely to refocus attention on single traits (Andersson & Iwasa 1996). “Beauty” may represent a cohesive integration of multiple human traits, with mate decisions partially based upon assessment of this combined quality (Fink & Penton-Voak 2002). If multiple traits coalesce to give a cohesive insight into the immune response of a potential mate, such a combined signal might be more reliable than individual signals, which might be easier to fake. An alternative view posits that multiple sexual signals are due to a co-evolutionary process wherein senders attempt to block reception of rivals’ signals and receivers develop fine-tuned abilities to separate the honest, salient features from the noise (Lozano 2009).

2.2. Cues

A cue is any animate or inanimate feature that can be used by an organism to inform and guide future action (Hasson 1994; Maynard Smith & Harper 2003); as in formal signaling theory, the two classes of individuals involved in cue transmission are referred to as “senders” and “receivers.” The crucial distinction between signals and cues is that signals evolved due to their effect on others whereas cues did not. Specifically, signals evolved because they influenced the knowledge of receivers about senders, even

at a cost to the senders' somatic fitness. Cues, in contrast, do not confer a somatic cost upon the sender, may not be heritable, may evolve due to natural selection rather than the effect on the receiver, and may be maintained despite offering receivers more information about senders than is necessarily in the best interest of senders (Hasson 1997).

Furthermore, signals can be activated and de-activated, whereas cues are permanently in place (Maynard Smith & Harper 2003). Both senders and receivers generally benefit from signals; cues may benefit the receiver alone.

An example of a cue is the weight difference in funnel-web spiders, which determines whether an interloper will instigate or retreat from a contest (Riechert 1978; classified as a cue by Maynard Smith & Harper 2003). The act of vibrating the web is an index, but the size difference itself did not evolve due to receiver psychology and is fixed at a specific point in time. Although not signals themselves, cues are important for a comprehensive understanding of signaling theory and are considered as part of signaling theory for the purpose of this dissertation.

2.3. Signal Costs

Signals are distinct from other biological features because the sending organism pays a cost and the receiving organism provides a benefit to the sender (Hasson 1997). Much discussion on the honesty or reliability of signals revolves around costly signaling. Cost in the signaling sense generally does not mean financial costliness, although there are some exceptions; rather, it refers to a mixture of strategic and efficacy costs involved in the production and transmission of the signal (Krebs & Dawkins 1984; Cronk 2005). Efficacy costs are the baseline costs necessary to ensure that the signal may be reliably perceived and interpreted by the receiver. Visually, acoustically, or otherwise “noisy”

environments make it more difficult for receivers to discriminate signals from the background, thus resulting in increased efficacy costs for signalers. For example, finch songs have higher amplitude when the external environment is loud (Maynard Smith & Harper 2003; Ryan & Cummings 2005). In contrast, strategic costs are prohibitive for the sender; these are generally the costs entailed when researchers refer to “costly” signals. The presence of strategic costs in a signaling system increases honesty because the cost to a dishonest signaler is higher than the benefit. This could either be because production of the signal reduces available bodily resources for somatic needs or because the signal makes the organism more vulnerable to parasites, pathogens, and predators. Efficacy costs, too, may be substantial depending upon environmental constraints. As such, referring to signals as “costly” without a more nuanced consideration of efficacy and strategic costs may be misleading (see Cronk 2005).

In terms of signal design features, detectability and discriminability both rely on efficacy costs. Memorability, in contrast, derives from the salience of the stimulus and is not ensured by efficacy costs. Strategic costs may contribute to memorability, but so do all other features of signal design that increase the signal's conspicuousness or its significance to the receiver (Guilford and Dawkins 1991).

Along with imposing strategic and efficacy costs, signals confer benefits; otherwise, it would not behoove senders to pay the costs of signal production and transmission. If higher quality signalers pay lower costs or reap greater rewards for the signals they transmit than do lower quality signalers, the qualities of signals and signalers should be tightly correlated (Grafen 1990; Getty 1998). Signaling theory abounds with mathematical models to illustrate the constraints of signaling and emergence of adaptive

strategies (see especially Fisher 1930 and Grafen 1990). According to Johnstone's (1997) model of the differential costs and relative benefits for senders of low and high quality, costs are consistently higher for signalers of low quality but benefits are the same for both classes of signalers. Therefore, the point at which the costs of signal production outweigh the benefits is considerably lower for signalers of low quality than for signalers of high quality. The point of optimal signaling differs between the two signalers, with the signaler of high quality having a higher optimal signaling level than the signaler of low quality. It is still possible for a sender to signal at a higher level than would be optimal, but it would be unwise to do so once the cost of signaling outweighs the benefit, thus limiting the opportunity for cheating. Thus, selection favors senders whose displays are energetically cheap to produce relative to their available resources and where such displays do not entail significant risk (Johnstone 1997).

All signals have efficacy costs and may have strategic costs; these are not always easily distinguishable in practice. Maynard Smith and Harper (2003) note that the brighter plumage of *Psylloscopus* warblers in shaded areas (Marchetti 1993) may be due to the efficacy costs associated with dim lighting conditions (Johnstone 1997), but also that the additional predation risk of bright coloration may present a strategic cost. As the distinction between strategic and efficacy costs is often blurred and much of the existing literature focuses upon strategic costs, future investigations should afford greater attention to efficacy costs (Johnstone 1997; Ryan & Cummings 2005).

Costly signaling theory has been applied to topics outside of traditional evolutionary theory, particularly in regard to commerce. The waste inherent in costly signaling stands in contrast to the neoclassical economic view of humans as rational

actors. Predating formal signaling theory, John Stuart Mill (1848) noted that luxury items are purchased for the sake of the owner's reputation, accruing from the costliness of the product, which thus makes them an appropriate good for taxation. Thorstein Veblen's (1899) notion of conspicuous consumption, widely cited across the social sciences, further considered costliness and ostentatious display of wealth as signals of status. Spence's (1973) work on job market signaling argued that the possession of an honors degree from a highly esteemed university provided a potential employer with an expensive testament to the applicant's quality. More recent work on costly signals in financial contexts includes examinations of open market share repurchases (Bhattacharya & Dittmar 2004), advertising expenditures (Ambler & Hollier 2004), and organizational citizenship behavior (Salamon Deutsch & Deutsch 2006).

2.4. Receiver Psychology

Context matters: without the right context, a signal is just a stimulus. A patron's loud voice in a nightclub carries one type of meaning; a pastor's loud voice in a sermon carries a different one. The loud voice in the nightclub is what makes that signal detectable and discriminable from its surroundings. The loud voice during a sermon is an attempt to render the message more persuasive and memorable. The first is an example of efficacy costs; the latter is an example of strategic costs. Increasing the volume of speech does not inherently render the underlying message more honest, but it may contribute to perceptions of honesty tied to reputational effects. A pastor who speaks vociferously signals to his parishioners that he really means what he says. If that same pastor were later found to have misled his flock, such as by excoriating same-sex sexual behavior while himself hiring a male prostitute for sexual services, a portion of the

resulting media backlash may be due to humans' desire to punish when our cheater detection mechanisms (see Cosmides & Tooby 1992) are overridden by persuasive rhetoric.

Detectability, discriminability, and memorability do not absolutely protect against the invasion of cheaters into the system. Such cheaters could exhibit a signal without possessing the character that the signal supposedly conveys and could be tolerated in a population so long as the fitness benefit of believing the signal is greater than the fitness cost of occasionally being deceived (Krebs & Dawkins 1984). This requires that the signals are honest on average (Johnstone & Grafen 1993).

Krebs and Dawkins (1984) cast senders as manipulators and receivers as mind-readers in their examination of receiver psychology. In this view, signals evolved due to the co-evolution between roles of manipulators, who alter the behavior of others to their own advantage, and mind-readers, who anticipate signalers' future behavior and react accordingly. Signals are thus effective because they decrease the receiver's uncertainty regarding the signaler's future behavior (Krebs & Dawkins 1984).

Common interests between senders and receivers that are recognized by both parties can help overcome receiver skepticism, as the receiving organism can distinguish the benefit to both itself and the sender for correct interpretation and response to a transmitted signal. High strategic costs serve to convince receivers of the signal's honesty and relevance due to converging interests between a particular sender and a particular receiver, despite broader conflicts of interests between classes of senders and receivers (Cronk 2005). Across species, individuals may have conflicting interests due to resource scarcity (wherein a resource exploited by one individual cannot be used by

another), competition for mates (wherein successful mating increases one's own reproductive success while limiting a rival's opportunities), or direct self-preservation (for example, wherein a predator has an interest in obtaining food whereas a prey animal has an interest in not being eaten). Confluences of interest may arise within specific dyads or sets of individuals despite the broader conflicts of interests between the classes represented by these groups (e.g., males and females, predators and prey, German and Allied troops, et cetera). Cronk (2005) reviewed common interests between specific individuals who belonged to classes with broadly divergent interests, including previous research on grassroots lobbying (Kollman 1998) and trench warfare in World War I (Axelrod 1984) alongside more traditional, biological examples. Although these examples come from non-mating contexts, the idea of conflicts and confluences of interest may also be applied to courtship, as men and women have diverging biological interests due to the generally greater investment of females in each offspring but often have converging interests within specific dyads. Men may employ strategically costly signals to convey these commonalities of interest to mates or potential mates.

2.5. Signal Forms

Honest signals work because they overcome the skepticism of receivers; a way to make signals believably honest is to insure that it is difficult for senders to signal falsely. Hard-to-fake signals can take two major forms: indices and signals with high strategic costs, which are generally referred to as "costly signals" and include handicaps. Handicaps are the flashy stars of signaling theory: showy exhibitions of quality that weaken the sender by virtue of their cost. For example, a large tail both requires valuable somatic resources and encumbers a peacock's ability to evade predators. Zahavi (1975)

claimed that vivid, showy tails signal a peacock's health and genetic quality to peahens. Such an imposing cost would make faking the signal prohibitively costly, thus ensuring the honesty of the signal to receivers. Individuals who are of insufficient quality to signal a feature would find it very difficult to convincingly do so, as such signaling demands greater metabolic resources than the sender has in reserve or because the deficiency would be obvious to receivers.

One major reason why handicap signals are so relevant to biologists is that certain forms may convey immunocompetence, which is the organism's ability to protect itself against parasites and pathogens. Only the most healthy, most immunocompetent individuals could bear the costs of immunosuppression while efficiently and effectively manifesting elaborate signals (Hamilton & Zuk 1982; Folsted & Karter 1992). The immunocompetence handicap hypothesis (Hamilton & Zuk 1982) predicts that parasite-resistant individuals would need to expend less effort and fewer resources in parasite defense and would thus have more resources at their disposal to use in courtship signaling (John 1997). In this view, handicap signals can be characterized as not being a "waste" of resources but instead as showcasing "flamboyance and exuberance" in an attempt to display the "prosperity" of the sending organism (John 1997).

Costly signals, handicaps or otherwise, can also convey information about an individual's commitment to a certain individual, group, or institution. Commitment may be important to potential sexual and social partners, as it sets a foundation for mutual or collective investment and the anticipation of future behavior. One relevant arena for signaling commitment in non-human primates as well as humans is the formation of coalitions for territorial defense and outgroup aggression (e.g., Manson & Wrangham

1991). Frank (1988) argued that moral obligation represents a hard-to-fake signal of commitment in humans, an avenue of research that has been expanded by Sosis (2003) and Soler (2008).

In contrast to handicaps, an index is unfakeable because it is causally dependent upon the trait being signaled (Maynard Smith & Harper 2003). The use of “index” and “indices” in animal behavior studies derives from the semiotic category of an “index” or “indexical sign.” In semiotics, an index is a sign, or signifier, that is causally or physically linked to the characteristic, or signified, about which the signifier provides information. As such, an index is neither symbolic nor iconic, but rather is directly contingent upon the underlying characteristic of interest (Peirce 1931; Fitzgerald 1966). The semiotic category of indexical signs also includes signals that would be considered cues within animal behavior studies. Signaling theory borrows the semiotic term “index” to refer to a signal that relies on the underlying trait for its production in a direct and immutable way. As such, indices are not costly; they cannot be faked and the organism does not expend resources or effort in order to display the signal. An example of an index is vocal frequency as an indicator of vocal cord length in vertebrate animals, such as seen in the roaring contests of red deer (see Maynard Smith & Harper 2003). Searcy and Nowicki (2005) challenge this position in their argument that "the boundary between handicap and index signals" (p. 17) may be blurred due to developmental costs.

A minimal cost signal is, self-evidently, a signal that imposes a minimal cost or no cost upon the sender. As such, minimal cost signals are neither indices nor handicaps. Minimal cost signals may be evolutionarily stable where senders and receivers would rank their preferences for outcomes in the same order. Minimal cost signals may also be

reliable where dishonest signaling is punished, where senders and receivers have overriding common interests, or where minimal cost signals may solve coordination problems between individuals that expect repeated interactions (Maynard Smith and Harper 2003).

An example of a minimal cost signal comes from the mating behavior of *Drosophila subobscura*. Females of this fruit fly species mate only once in a lifetime; an already-inseminated female refuses to allow a new male to mount her. Male *Drosophila subobscura* perform an elaborate courtship dance for up to an hour, including scissoring motions of the wings and tapping with the forelimbs. When approached by a new male, a mated female extrudes her ovipositor to signal that she has already been inseminated. The male then ceases courtship display. Both parties have an interest in the cessation of unsuccessful courtship: the male would benefit by flitting away to court a receptive female and the female would benefit by avoiding the nuisance of an unwelcome suitor. By use of this minimal cost signal, the female communicates sufficient information to the male for the common interest to be recognized and for the male to move on to a more receptive potential mate (Maynard Smith 1956; Maynard Smith & Harper 2003).

Handicap, costly, honest, hard-to-fake, index, and minimal cost signals, along with cues, may be difficult to distinguish from each other. Part of this is because these are not mutually exclusive distinctions; indeed, some categories overlap by definition. Costly signals include all signals with strategic costs, including both handicaps and certain signals that are costly but which do not compromise the bodily integrity and safety of the sending organism. Hard-to-fake signals include both handicaps and indices. Honest signals include handicaps, indices, and other signals that operate under certain

constraints, such as minimal cost signals where both sender and receiver know about their common interests before the signal is produced. Handicaps and indices are categorically distinct from each other, and cues are definitionally distinct from all forms of signals.

Along with the nested ways in which these categories may be applied, scholars may disagree upon the correct categorization for any given trait, and some research in signaling theory does not conform to this typology. Maynard Smith & Harper (2003) have devised a detailed examination of the various signal forms and Cronk (2005) has elaborated further in applying signaling theory to contemporary human phenomena. This dissertation follows the divisions between signal forms delineated in these two works. The chart below provides a brief summary of different signal types, definitions for the type, the strategic cost associated with producing the signal, and an animal or human example for each.

Signal Type	Definition	Cost	Example
Handicap	A signal that imposes a test on an organism with a cost that negatively impacts survival (Zahavi 1975).	High	Peacocks' tails (Zahavi 1975).
Costly	A signal that is considered reliable due to its high strategic costs. All handicaps are costly, but not all costly signals are handicaps.	High	Turtle hunting by Meriam islanders (Smith & Bliege Bird 2003).
Honest	A signal that is honest because it is either hard-to-fake or because senders and receivers have common interests that they recognize at the start of their encounter.	Mixed	Job market signaling (Spence 1973).
Hard-to-fake	Hard-to-fake signals, as a category, include both indices and signals with strategic costs that are high for dishonest signalers to bear (Cronk 2005).	Mixed	Moral commitments (Frank 1988).

Signal Type	Definition	Cost	Example
Index	An unfakeable signal that is causally dependent on the trait being displayed.	None	Red deer roars (Clutton-Brock & Albon 1979; Maynard Smith & Harper 2003).
Minimal cost	A signal that confers minimal or no cost upon the sender; may be reliable due to common interests, reputational effects, or risk of punishment.	Low	Ovipositor display in <i>Drosophila subobscura</i> (Maynard Smith 1956; Maynard Smith & Harper 2003).
Cue	A feature of the world that can be used by an organism as a guide to future action (Hasson 1994). Cues are not signals.	None	Weight difference in funnel-web spiders (Reichert 1978; Maynard Smith & Harper 2003).

Table 1.1: Definitions, costs, and examples of various signal forms

3. Sexual Selection Theory

Applying signaling theory to contemporary human courtship requires insights from sexual selection theory, which encompasses both intrasexual and intersexual selection. Intrasexual selection consists of competition between members of the same sex for access to mates; intersexual selection, generally referred to as mate choice, consists of preferences for particular qualities in potential mates. Charles Darwin (1871) began this area of inquiry with his speculation on sexual selection across all classes of animals and his exhaustive survey of mating behavior in wildlife. The geneticist and mathematician Ronald A. Fisher (1930) contributed the idea of runaway sexual selection, wherein the development of attractive traits is perpetually reinforced by the choosing sex and the character rapidly escalates in conspicuousness. Like Darwin and Zahavi, Fisher is one of those figures in evolutionary scholarship whose name has turned adjectival: much research attributes elaborate, showy characteristics to “Fisherian sexual selection” (e.g., Searcy & Andersson 1986; Pomiankowski & Iwasa 1998; Mead & Arnold 2004).

Much of the mate choice literature refers to “quality” or “value” of potential mates. In evolutionary terms, mate value can broadly refer to any mixture of factors that

fall into four major categories. The first category consists of heritable benefits accrued to offspring that would contribute to that offspring's health and survival, such as factors indicating a strong immune system (i.e., parasite-mediated sexual selection, Hamilton & Zuk 1982). The second category includes heritable benefits accrued to offspring that would make that offspring more sexually attractive or otherwise more likely to secure high quality mate(s) as a mature organism, as indicated by the mate choice of others and prevailing local notions of what is attractive (i.e., the "sexy sons" hypothesis, Weatherhead & Robertson 1979). The third category, which is particularly related to male mate choice of females, focuses on fertility and youth, where youth is often seen as a proxy for remaining lifetime reproductive potential (e.g., Rutowski 1982). The final category, which operates primarily in female mate choice of males, involves willingness and ability to invest care and resources into provisioning the mate and offspring (e.g., Nisbet 1973). Because the foundation of mate choice research focuses on non-human animals, assessments of mate quality do not often consider personality, temperament, or compatibility. Research into mate choice in humans does recognize components of mate value that do not neatly conform to these four avenues; however, the terms "mate quality" or "mate value" are generally used as shorthand for the sum of qualities that make someone a desirable sexual or romantic partner.

The notion that males court and females choose dominates the theoretical, observational, and experimental mate choice literature. The most cogent explanation for this is the parental investment hypothesis, which generalizes that the sex that invests the most heavily in offspring will be choosier and that members of the lower-investing sex will compete for access to mates (Trivers 1972). In most mammalian species, females

make a considerably higher investment in offspring than do males, largely due to the high costs of gestation and lactation. Adding to that is the scarcity of biparental care and even greater paucity of pair bonds in mammals, reflected in the observation that only 3% of mammalian species are monogamous (Kleinman 1970). As such, mammalian females generally have more to lose than males for poor mating decisions and tend to be more selective in their choice of mates.

The mating strategy most advantageous for an organism may vary within the species, contingent upon the individual organism's quality and the context of mating. The most adaptive mixed strategy for males will vary; a male may benefit both from investing in offspring with a paired female but also by pursuing opportunities to mate with other females without investing in the resulting offspring (Trivers 1972). Further, within monogamous species, exaggeration of showy characteristics is expected to correlate with opportunity for extrapair copulations more so than with securing a high quality primary mate (Hamilton 1990). The strategy enacted by an organism need not be constant; indeed, the most adaptive strategy is to vary behavior to best suit the context in which mating occurs.

Assortative mating is the concept that individuals tend to select mates with a value equal to that of the selecting organism, in terms of status, quality, size, or some other character (see Penke et al. 2007 for review in humans). This may more succinctly be stated as "like attracts like." Within species, females in particularly good condition and of high fitness tend to choose mates based on phenotypic quality more frequently than do females of lower phenotypic condition. The existence of assortative mating can account for the development of costly signaling even under strictly monogamous

circumstances (Hooper & Miller 2008).

Under certain conditions, male and female offspring would be expected to benefit differently from mate choice decisions made in the preceding generation. According to the sexy sons hypothesis, female mate choice operates to confer a reproductive, but not survival, benefit to sons only (Weatherhead & Robinson 1979). If mate choice operates to select mates of sturdy immune response, both daughters and sons would benefit. If female mate choice evolved to benefit daughters, however, the system would be more quickly self-reinforcing and would be based upon selecting male mates who signal that they would have been successful had they been female (Seeger & Trivers 1986).

Although mate choice is expected to more heavily impact the reproductive success of the sex that invests less in offspring (Trivers 1972), some mate selection will focus on the heavily investing sex. Clutton-Brock (2009) recently noted the paucity of data on sexual selection in females and argued that most sexual selection operating on females is related to intrasexual competition for resources rather than for access to mates. When male mate choice is exhibited in species where females invest more heavily in offspring, males often focus on features that signal youth and fertility. In baboons, male choice focuses largely on the size of female genital swellings (Domb & Pagel 2001), with swelling size indicating current fertility. In humans, Borgerhoff Mulder (1988) found that Kipsigis men paid higher bridewealth for younger, healthier females. Although these elements focus more on the reproductive potential of the female mate rather than on heritable qualities of fitness, they indicate an assessment based on a physical character rather than a resource.

Female, as well as male, birds are heavily ornamented in some species. Although

sexual selection generally operates more heavily among avian males than females, certain mating contexts may emphasize male mate choice and female-female competition (reviewed in Amundsen 2000). Females are expected to compete for mates whenever resources are limited (Petrie 1983; Amundsen 2000). In such cases, female ornamentation could be interpreted as the effect of selection operating among females (Amundsen 2000).

Although the classic divisions of sexual selection are intrasexual competition and mate choice, sexual conflict between males and females represents a third avenue of sexual selection theory with growing scientific currency (Chapman et al. 2003; Tregenza et al. 2006). Sexual conflict (Williams 1966; Chapman et al. 2003; Tregenza et al. 2006) investigates the ways in which male and female motivations in mating are not perfectly aligned; examples can be found in species ranging from fruit flies to humans. Resulting from this, both sexes can develop physical, biochemical, and behavioral strategies to ensure that their interests are served; the other sex can develop counter-strategies in response. This can but does not always result in a coevolutionary arms race, such as seen in the dose-dependent toxicity of *Drosophila melanogaster* seminal fluid to females (Chapman 1995; Lung et al. 2002). Sexual conflict in humans is generally but not always less lethal (see Daly & Wilson 1988). At the intersection of signaling theory and sexual selection theory, it may be useful to think of sexual conflict as the backdrop upon which common interests between senders and receivers can be negotiated. As such, courtship signaling may allow for a circumvention of sexual conflict by clarifying, communicating, and facilitating the satisfaction of shared interests between males and females.

Honest information conveyed through signaling benefits both the individual

sender and receiver, even though these classes of actors may have conflicts of interest within the mating market. Although the contrast is not as striking as it is within predator-prey interactions, courtship, like parenting, is filled with scenarios where actors' interests are not perfectly aligned. Males and females as broad classes have divergent goals in regard to mating, but the goals of individual males and females may converge. In a rough evolutionary sense, males generally benefit from mating with as many females as possible, but preferably with those of higher quality rather than lower quality. Conversely, a female generally benefits from mating with a single male of high phenotypic quality or, in species with paternal investment, a male who shows evidence of a willingness and ability to invest in her and in their mutual offspring. This rubric is a simplification, as optimal mating strategies vary considerably both within and between species, but it does provide a rough theoretical basis for the conflicts between males and females in courtship. Courtship signaling within a framework of sexual conflict allows for the negotiation and attainment of a compromise that may be in mutual self-interest.

4. Courtship Signaling in Humans

Sexual selection, as a field of inquiry, has a more storied formal history than does signaling theory. Andersson's (1994) exhaustive overview of mate choice across species only makes two explicit references to signals. The first highlights Darwin's initial speculation on female choice for bright birds (p. 11); the latter consolidates contributions from Maynard Smith, Zahavi, Grafen, Dawkins, and Krebs into a single paragraph, noting that animal communication is a "developing field with which sexual selection theory shares much ground" (p. 442). This intersection between mate choice and signaling theory forms the basis for the study of courtship signaling. Courtship signaling

consists of the set of physical or behavioral signals employed to attract and retain mates and the receiver psychology of potential mates. Handicap, honest, costly, hard-to-fake, index, and minimal cost signals may all be employed in courtship signaling and receiver interpretations of cues may also be included under the rubric of courtship signaling.

Although researchers in animal behavior have dominated the courtship signaling literature, some psychologists, anthropologists, and other social scientists have begun to examine human courtship through the lens of signaling theory.

Courtship, as a process, may be thought of as a specialized form of cooperative behavior within a backdrop of conflict between males and females. Successful courtship provides opportunities for an individual to realize his or her own self-interest with the consent and investment of another party. Further, courtship serves as a mutual audition, wherein individuals seek to establish a series of expectations built upon affiliation, sexual access, and social privileges. Although much human research follows the “males court, females choose” paradigm so popular in animal behavior studies, it would be foolhardy to not consider women as fully engaged participants in the process, both sending their own signals to males and being chosen by them.

Although the sexual selection literature on nonhuman species often emphasizes the advantages to males of polygyny and promiscuity, investigation of courtship signaling in Western romantic relationships generally presumes monogamy or monogamy with occasional infidelity. Due to the reluctance of women to acquiesce to a short-term strategy that does not benefit them, the limited pool of available partners, social norms encouraging monogamy (at least in the form of serial monogamy if not lifelong monogamy), and such messily intoxicating feelings as love, often the most parsimonious

strategy for a high-quality male is to accurately signal his desirable traits in the aims of winning the affections of a likewise high-quality female. Signaling theory offers a framework for explaining how honest communication can be ensured by the common interests of assortatively mated men and women.

Previous work by anthropologists and evolutionary psychologists has demonstrated some universalities in mate preferences and some local ecological or social influences mediating these. Across cultures, both men and women show broad preferences for kindness and a good sense of humor (Buss 1989). Women tend to show a greater interest in resource control and men tend to show a greater interest in youth, which may be a proxy for fecundity. Both sexes prefer attractive partners, but male preferences for female attractiveness are greater than female preferences for male attractiveness. In examinations of newspaper personal advertisements, females signal youth and seek male resource control whereas males signal resource control and seek female youth (Pawlowski & Dunbar 1999; Gustavsson et al. 2008). McGraw (2002) found that the degree to which females specified physical preferences for males was correlated with the degree to which the females signaled their own physical attractiveness. These tendencies are broad but do show cross-cultural variance, particularly in response to local ecological conditions. A Swedish study of personal advertisements found no sex differences in requests for or descriptions of physical attractiveness, although men's advertisements sought younger women and women's advertisements sought male resource control (Gustavsson et al. 2008). In research into trade-offs between different features sought in potential mates, men prioritized female physical attractiveness and women emphasized male status and resources. Both sexes

placed a premium on kindness and intelligence (Li et al. 2002). Iredale et al. (2008) found that men in the presence of a beautiful woman donated a greater proportion of money to charity in an experimental setting than did men in the presence of an attractive man or alone.

Some social scientists have applied a signaling theory framework to their discussion of courtship behavior in bar and nightclub settings relevant for contemporary dating. Non-verbal initial courtship signals exhibited by men in a bar setting, including glances and attempts to move closer, were positively correlated with successful courtship initiation, suggesting that such behavior can serve as self-presentation and signals of mate quality (Renninger et al. 2004). Women's straightforward introductory statements that indicated interest in dating were assessed as more effective signals by both men and women in a recent lab-based study; men also considered the act of a woman giving her phone number to a man to be highly effective (Wade et al. 2009). Hugill et al. (2010) review the available literature on the role of human body movement in mate selection, including both ethological and laboratory studies, and conclude that further research using motion-capture videography, as consistent with Brown et al. (2005), would enhance the existing corpus of knowledge beyond that offered by nightclub and bar settings where factors other than movement itself can influence perception.

Commitment invested in one potential mate curtails or prohibits investment in other potential mates. As males of high attractiveness may have access to more mates (Thornhill & Gangestad 1994), their need to signal commitment in order to obtain a mate may be lessened in comparison to males of lesser attractiveness. This also has implications for female short-term mating strategies, where the goal may be to procure

quality genes for offspring, as opposed to long-term mating strategies, where emphasis may instead be placed upon parental care.

5. Courtship Dynamics

Context shapes experience. As people are not simply data points but rather are individuals influenced by many different forces, including messages from peers and society, this research requires an understanding of how courtship and relationships are defined and experienced. For the sake of simplicity, “courtship” as discussed in this dissertation refers to the process of establishing and maintaining a heterosexual, socially monogamous dyadic relationship that may or may not lead to cohabitation or marriage. This process encompasses what evolutionary biologists and behavioral ecologists refer to as “mating effort,” which in humans may begin with a series of attempts to signal one’s value as a mate and to assess the mate value of a potential sexual or romantic partner. Certainly, similar processes may be seen in same-sex relationships or in relationships without an expectation of social monogamy, but these are beyond the scope of this writing.

The sociological and historical context of Western relationships contributes to the ways that people, including my research subjects, experience attraction, commitment, and marital life. Romantic relationships take many different forms and each is a distinct partnership for the individuals involved, but some notes on the historical and contemporary forms of marriage, as relevant for this project, are warranted.

5.1. Marriage, Traditionalness, and Changing Norms

Same-sex marriage is now legal in five U. S. states, the District of Columbia, and

several countries, as of June 2010¹. This legal and social shift, along with increased rates of cohabitation, longer-established rising rates of divorce, and more equitable division of household labor, reflects a reduced emphasis on conventional heterosexual marriage as a social expectation and route to sexual legitimacy. Cherlin (2004, 2009) posits that the symbolic value of marriage has increased as the practical and near-obligatory meaning of marriage has declined. Within American society, the dominant form of marriage has transitioned from the institutional marriage, where marital satisfaction is derived from pride in fulfilling social obligations, to the companionate marriage, where happiness arises from the closeness between spouses as lovers and friends, to the individualized marriage, characterized by individual autonomy, renegotiation of spousal roles, and open communication channels. Cherlin (2004) argues that “the breakdown of the old rules of a gendered institution such as marriage could lead to the creation of a more egalitarian relationship between wives and husbands” (p. 848).

The primary benefit of modern American marriage may be “enforceable trust,” as marriage requires a public commitment, generally expressed in the audience of one’s social network, to a lifelong relationship (Cherlin 2004). Less formal relationship forms, including cohabitation, do not involve such a public recognition of relationship status and may be easier to extract oneself from in difficult times. While marriage may not be as central of a social institution in contemporary Western life as it was in years past, it still has significant symbolic capital. Cherlin (2004) speaks of the symbolic significance of marriage as follows:

What has happened is that although the practical importance of being married has

¹ Massachusetts (Goodridge v. Department of Public Health, 5/17/2004); Connecticut (Kerrigan v. Commission of Public Health, 10/10/2008); Iowa (Varnum v. Brien, 4/3/09); Vermont (Bill S.115, 4/7/09); New Hampshire (Bill HB436, 6/3/09); and Washington D. C. (City Council Bill 18-482, 12/15/09).

declined, its symbolic importance has remained high, and may even have increased. Marriage is at once less dominant and more distinctive than it was. It has evolved from a marker of conformity to a marker of prestige. Marriage is a status one builds up to, often by living with a partner beforehand, by attaining steady employment or starting a career, by putting away some savings, and even by having children. Marriage's place in the life course used to come before those investments were made, but now it often comes afterward. It used to be the foundation of adult personal life; now it is sometimes the capstone. It is something to be achieved through one's own efforts rather than something to which one routinely accedes (p. 855).

Levi-Strauss (1969) argues that marriage represents a formal commodification of women as wives, and that as such it is a contract between men rather than between a husband and a wife. Although that concept may seem dated and contemporary Western women, on average, have greater autonomy and earning potential than wives of the past, the transformation of woman into bridal object continues for many. In her criticism of the wedding-industrial complex and personal wedding memoir, Wicoff asserts, "I saw that being a bride was not about being myself, but about finding myself *as a bride*, because a bride is not an individual woman, but an icon of womanhood; a bride is not a person, but a thing" (2006: p. ix; emphasis in original).

5.2. Relationship Chronology

Romantic relationships as commonly experienced have a range of different stages, including flirting, dating, cohabitation, betrothal, and marriage. Although courtship in Western contexts often follows the rough order described above, it is important not to conceive of these stages as strictly linear or hierarchical. Most relationships do not lead to marriage and many people enter into flirting or dating without marriage as an intended goal. Cohabitation is a stable, enduring relationship status for many couples and should not be interpreted uniformly as a trial period for marriage, although it does serve that role for some relationships. In general terms, however, flirting precedes dating, dating

precedes both cohabitation and betrothal, and betrothal precedes marriage. The permanency or stability of relationships also shifts over time, including phases of uncertainty, security, instability, resignation, and dissolution. Fisher (1995) argues that, in addition to the stages of attraction and attachment, human romantic relationships also experience a phase of detachment, wherein individuals disassociate themselves emotionally and perhaps physically from affiliation.

A common lyrical trope is for male vocalists to beseech their fictionalized girlfriends for sexual access, only to have these women respond by demanding commitment. The protagonist of Meatloaf's "Paradise by the Dashboard Light," driven wild by sexual desire, swore to love his girlfriend forever so that she would consent to sex in a parked car. At the end of the song, the anguished man swears that he will "never break [his] promise or forget [his] vow" and both characters sing that they are "praying for the end of time" so they can end their time together (Steinman 1976). In "Keep Your Hands to Yourself," performed by the Georgia Satellites, a courted woman does not acquiesce to sexual activity upon the promise of lifelong partnership, but rather insists upon "no huggin' no kissin' 'til [she gets] a wedding ring" (Baird 1986). In more recent musical history, Beyonce Knowles's "Single Ladies" anthemically exhorts "If you liked it then you shoulda put a ring on it" (Knowles et al. 2008), providing a retort to male sexual jealousy and attempts to constrain female sexuality. These examples are by no means exhaustive, but they do provide a quick glimpse into popular music's treatment of marriage or betrothal as a prerequisite for sexual intercourse; the coverage of infidelity and illicit desires in song is even further ranging.

Relationship partners have mutual interests: ultimate goals to support each other

in survival and reproduction of shared offspring, as well as proximate desires for sexual pleasure, happiness, harmony, and fulfillment. Certainly not all people wish to reproduce, not all parents intended to become parents, and some individuals who desperately want to have children are unable to biologically do so. However, those of us who do not reproduce have less genetic representation in future generations. The integration of a gene-centered view of evolution (Williams 1966; Dawkins 1976) and the phenotypic gambit (Lloyd 1977; Maynard Smith 1978) emphasizes why ultimate goals of reproduction influence contemporary human behavior among people who do not actively seek to have children: the genes that underlie attractive attributes and successful mating behaviors are found in greater frequency in succeeding generations and we can, to some degree, infer the genotype from the outwardly-observable behavior. The same principles that we find attractive when looking for reproductive partners are, broadly speaking, attractive when biological reproduction with that partner is not a goal, whether because of personal choice, infertility, or same-sex relationships.

My interest in considering signaling transmission and interpretation over the course of a relationship takes its own cue from Fisher's tripartite divisions of love (1998). According to this model, the initial stage of lust is replaced by attraction and attachment in turn, with each phase driven by neuroendocrine substrates for love and encompassing its own suite of emotional, psychological, and behavioral responses. The first project in this dissertation, which studies women's facial features as cues of testosterone exposure and sociosexuality, looks at incipient potential relationships at their potential inception, thus corresponding to the stage of lust. The next project, which investigates engagement rings as signals of male and female mate value as well as features about the courtship,

looks at relationships at a transitional time of commitment that would vary between Fisher's (1998) stages, but which presumably would fall within the phase of attraction for most couples. It may be most useful to think of this study as situated at the capstone of attraction and leading to attachment. The final project, which examines verbal and vocal characteristics in response to questions about spousal obligation, focuses on a time of established attachment within married couples, both in the interview themes and the target respondents. As these studies examine three slices within relationships rather than encapsulating entire phases and illuminating transitions between them, I have found it most useful to think of them as complementary to Fisher's tripartite divisions (1998) rather than as direct illustrations of them.

6. Organization

The preceding, although brief, overview of a wide range of literatures is essential for the production and comprehension of this dissertation. Although I am an evolutionary anthropologist, this work has been informed by contributions beyond that foundation, including biology, cultural anthropology, psychology, sociology, and economics. Signaling theory and sexual selection theory provide the theoretical framework; research on relationships from anthropological, sociological, psychological, and economic perspectives helps to contextualize it.

The following chapter, on women's facial features and sociosexuality, examines the link between physical characteristics, behavior, and perception. Women's facial features, particularly those influenced by testosterone exposure, may best be thought of as cues. They are a feature that can be used by human males to guide and inform future action. Women's faces did not evolve to display signs of testosterone exposure due to

their effect on men, nor are these facial features readily able to be turned on and off. Their status as cues, rather than as signals, is reinforced by the observation that women may seek to mask the expression of these features through cosmetics use or elective procedures.

The third chapter, on engagement rings, investigates the information that rings may signal about a courtship and both involved parties. Engagement rings do seem to serve a signaling function, but perhaps the most interesting message from this chapter is that they may be misleading signals. Despite temptation to consider rings as costly signals due to their financial expense, they do not impose so great a cost as to compromise the giver's ability to procure basic sustenance or maintain bodily integrity. They may best be considered either inefficient signals or minimal cost signals with variable honesty; they further fit into Sozou & Seymour's (2005) model of a "costly but worthless gift."

The fourth chapter, on interview responses to questions about spousal expectations, considers speech and content characteristics in a setting notable for conservative social norms and a high opportunity for infidelity. Audience effects in these responses illuminated how both rhetoric and the content of responses could serve as signals between spouses. The interviews, in addition to providing data about Utilian social life, gave spouses an opportunity to convey expectations to each other. These acts may best be thought of as minimal cost signals that are relatively reliable due to confluences of interest in knowing expectations between spouses.

Courtship signaling is an attractive area of inquiry in the growing interdisciplinary field of evolutionary approaches to contemporary human behavior. It represents a

marriage of two subfields of biology yet incorporates a wide variety of influences from other scientific and social scientific disciplines. As the scholars who may dip into the well of signaling theory are so varied, it is crucial to support a consistent classification schematic, to recognize the instances of signaling theory where they appear, and to not overstate the operations of signaling theory when scant evidence exists to support one's claims.

Chapter Two: Female Facial Masculinity, Attractiveness, and Sociosexuality

1. Introduction

Within evolutionary psychology, perception research often focuses upon viewer interpretation of physical characteristics, including people's facial features. One of the most significant influences upon human facial features is androgen exposure. In both men and women, testosterone facilitates the development of masculine facial features (Penton-Voak & Chen 2004). Specifically, testosterone's effects can be most clearly seen in the jaw and chin (Farkas 1981; Rosa & Basir 2002). In this area of research, "masculinity" and "femininity" refer to sex-typical facial characteristics that are known to vary with testosterone exposure.

Testosterone and other androgens influence the brain and behavior in two ways: by organizing the brain prenatally and by activating the neurological pathways to mediate behavior in adolescence (Davis 2000; van Anders & Hampson 2003). Due to these effects and the considerably greater exposure to androgens in males than in females, it is reasonable to assume that some gender-stereotypical behaviors may arise from differences in testosterone levels between men and women (Townsend 1999).

On the basis of the above reasoning, masculine facial features in women should be associated with their sexual behaviors and attitudes. Specifically, women and men who have a more masculine facial appearance, indicative of greater testosterone exposure, should score higher on a measure of sexual unrestrictedness. Furthermore, high testosterone in women, as reflected in a high waist-to-hip ratio (WHR), is also correlated with lower fertility (Singh 2002). Considering these associations, men may prefer women with lower circulating testosterone, or who had lower testosterone

exposure prenatally and during puberty, as mates. Such women would be expected to have less masculine faces.

Much research on facial masculinity and mate choice focuses upon global measures of the masculinity of the entire face, often by experimentally altering composite photographs to increase or decrease the distances between sex-differentiating facial features (e.g., Penton-Voak et al. 2001; Swaddle & Reiersen 2002). Given this foundation, examining the effects of individual facial components in actual, not composite, facial photographs may supplement our understanding of discriminable elements of facial attractiveness. This chapter investigates the signaling capacity of specific facial features indicative of testosterone exposure through their associations with sociosexuality, attractiveness, and perceived masculinity. The analysis incorporates physical measurements of facial features, self-reports of sexual permissiveness, and raters' assessments of facial photographs.

Portions of this research contributed to Campbell et al. (2009), although the analysis for this chapter and that study differ in one key method, which will be addressed in the discussion. Major findings for the corresponding portions remain consistent with those reported in Campbell et al. (2009).

2. Mate Preferences, Hormones, and Facial Correlates

Considerable research has investigated the association between male physical appearance, testosterone exposure, and attractiveness. Masculine features, particularly those of the lower face, positively correlate with women's ratings of male dominance (Perrett et al. 1998). Female preferences for these features increase during the follicular phase of the menstrual cycle (Penton-Voak & Perrett 2000), which is measured as the

time from the first day of menstruation until the day of ovulation. Male facial masculinity is positively correlated with testosterone level (Penton-Voak & Chen 2004) and is associated with lower levels of fluctuating asymmetry (FA; Gangestad & Thornhill 2003). As such, male facial masculinity and facial FA may be mutually reinforcing signals of an underlying quality. If high levels of testosterone serve as an immunocompetence handicap (Hamilton & Zuk 1982) in human males, the masculinity of facial features could convey information about a man's health to potential mates.

In females, facial and body characteristics may also provide cues to underlying health conditions. Highly masculinized female faces are associated with high FA due to developmental instability (Gangestad & Thornhill 2003). Women's facial masculinity is associated with greater rates of self-reported respiratory infections, but female facial attractiveness was not significantly correlated with self-reported illnesses (Thornhill & Gangestad 2006). Women who have more masculine facial features, which are themselves cues of a history of high testosterone exposure, may have poorer health and decreased fertility. These associations may also negatively impact others' assessments of their appeal as long-term romantic partners.

Female mate value is also tightly linked to cues of fertility. Youth can be taken as a meaningful signal of fertility due to two factors (Buss 1989). First, younger women by definition have a greater proportion of their potentially childbearing years ahead of them. Second, younger women have greater ease of conception, due to age-related infertility and subfertility that may affect older pre-menopausal women. Furthermore, physical attractiveness is positively correlated with fertility (Buss & Barnes 1986). Cues to fertility are also reflected in physique. High Waist-Hip Ratio (WHR) is associated with

more health problems and elevated testosterone due to its effects on fat deposition patterns (van Anders & Hampson 2003; Bjorntorp 1988). Low WHR is associated with better health and greater reproductive potential (Singh 1993; Janieska et al. 2004). As such, attending to facial feature cues of fertility, namely youth and physical attractiveness, may be relevant in male mate choice of women.

Along with conveying information about fertility, facial appearance is correlated with behavioral traits. In an Australian sample, women with highly symmetric faces became sexually active at a younger age than their less symmetric counterparts (Rhodes et al. 2005). Also, women with facial features that were perceived as more feminine reported more long-term, but not short-term, romantic partners than their peers and report younger ages at first intercourse (Rhodes et al. 2005). However, Rhodes et al. (2005) investigated but did not find a statistically significant correlation between rated facial masculinity and self-reported history of extra-pair copulations in Australian college-aged women.

Viewer assessments of facial attractiveness may convey information to scientists about how people prioritize partner preferences. Female facial femininity is associated with perceived attractiveness in manipulated photographs of masculinized and feminized average composite faces (Penton-Voak et al. 2004). Levy et al. (2007) found that heterosexual men expended more effort in a key-pressing behavioral probe to extend viewing time of beautiful female faces, as compared to effort expended to view average female faces or male faces of any attractiveness. Photographs of female faces with lips and eyes experimentally manipulated to indicate increased dominance or submissiveness were assessed as less attractive than unmanipulated photographs (Keating & Doyle

2002). In addition, female facial and body attractiveness are significantly and positively correlated (Thornhill & Grammer 1999).

Facial preference studies have found largely consistent results across cultures. Cross-culturally, women with more feminized facial features are perceived as more attractive and more fertile than women with less feminized features (Cunningham et al. 1995). However, attractive women are also perceived as less sexually faithful (Cunningham 1986). In rural Malaysia, feminized female faces were perceived as healthy, fecund, and “nice” whereas masculinized female faces were perceived as “nasty” (Scott et al. 2008).

3. Sociosexuality and Attitudes towards Extra-dyadic Sexual Encounters

In addition to mediating the development of masculinized facial features, androgens can have organizational and activational effects on the brain. In adolescent females, estrogens are primarily responsible for pubertal development but androgens are associated with libido (Udry et al. 1986). Androgen level is a strong predictor of teenage male sexual intercourse (Mazur et al. 1994), but studies on the association between testosterone level and intercourse in teenage girls are conflicting. Udry et al. (1986) found no hormone effects on intercourse in teenage girls, although testosterone was associated with higher projections of future intercourse, whereas Halpern et al. (1997) found that higher levels of testosterone in females were associated with younger age at first intercourse. The lack of a more robust link between androgens and intercourse in teenage girls may be attributable to the greater effect of individual differences in social environment in female sexual experience than in males (Udry & Billy 1985). In adult life, higher circulating androgen levels in women predict increased sexual desire, a

greater number of sexual partners, greater sexual proceptivity, and more frequent intercourse around the time of ovulation (Cashdan 1995; Meston & Frohlich 2000).

Sexual unrestrictedness is measured by the Sociosexual Orientation Inventory and computed as a weighted composite (Simpson & Gangestad 1991). SOI is computed as a summed score of five components: (C1) number of partners within the past year, (C2) number of partners predicted within the next 5 years, (C3) number of one-night stands, (C4) frequency of sexual fantasy, and (C5) attitudes towards engaging in uncommitted sex (Gangestad & Simpson 1990); the SOI instrument is included in Appendix 1. SOI is calculated as follows: $SOI = 5(C1) + 1(C2) + 5(C3) + 4(C4) + 2(C5)$. Higher SOI scores denote a less restricted sociosexual orientation, indicating greater sexual permissiveness, which may or may not be useful as a predictor of sexual fidelity. Infidelity risk may be a pressing concern of men who engage in long-term mating strategies, as a man whose partner has engaged in extrapair sex may unknowingly invest in the biological offspring of another man. Most men value sexual fidelity in prospective mates, express sexual jealousy, and react negatively to a partner's infidelity (Buss & Schmitt 1993; Daly & Wilson 1988). Furthermore, having a higher number of former sexual partners is negatively associated with male evaluations of female attractiveness (Kenrick et al. 2001). What is less certain is whether sociosexual orientation predicts infidelity risk; indeed, sociosexuality is not isomorphic with promiscuity, and sociosexually unrestricted individuals do generally prefer stable monogamous relationships to indiscriminate coupling (Simpson & Gangestad 1991; Simpson et al. 2004).

Clark (2004) found that the strongest individual predictor of women's SOI was the amount of money spent on alcohol in the preceding month, but that self-rated

attractiveness, 2D:4D digit ratios, and scores on a mental rotation test were also predictors. As prenatal testosterone exposure is associated with 2D:4D digit ratios and spatial reasoning, these findings suggest that SOI may also be influenced in part by developmental androgen levels. The finding that SOI is associated with self-assessments of attractiveness suggests that women may facultatively alter their mating tactics according to their expectations of their own prospects.

In a British sample, male and female raters assessed both real and composite faces of sociosexually unrestricted women as more attractive than their more sociosexually restricted counterparts. Sociosexually unrestricted female composites were judged as more feminine than sociosexually restricted faces, but these results were not statistically significant when limited to male raters only (Boothroyd et al. 2008).

Research has investigated the associations between self-reported sociosexual orientation and viewer assessments of restrictedness or unrestrictedness. Viewer perceptions of sociosexual unrestrictedness are positively associated both with actual SOI score and with actual responses to individual questions (Boothroyd et al. 2008). In a behavioral thin-slicing experiment designed to investigate men's assessments of women's sociosexuality, men perceived valid, poor, and misleading cues (Stillman & Maner 2009). Valid cues, which correctly predicted both actual SOI and male predictions of SOI, were eyebrow flashes, glances at an attractive male confederate, and displaying little attention to solving a puzzle task. Misleading cues, which predicted male assessments of SOI but not females' actual SOI, were smiles, laughs, closeness to the male confederate, and provocativeness of dress.

Weis and Slosnerick (1981) found that the majority of U.S. college-aged students

disapproved of extramarital sexual encounters but found associations between previous sexual experiences and attitudes towards extramarital sex. Acceptance of extramarital sexual activity was positively correlated with premarital sexual permissiveness and strong associations between sex, love, and marriage. However, these results were stronger for males than for females (Weis and Slosnerick 1981); as such, the association between extrapair copulations and SOI may not be as significant in women. In a later study, college-aged participants reported social norms disapproving of extra-dyadic sexual activity during dating relationships but that a majority of subjects reported a history of themselves having been involved in extra-dyadic sexual encounters (Wiederman & Hurd 1999). These extra-dyadic encounters were most correlated with (1) the participants' associations between sex, love, and marriage; (2) the participants' beliefs that romantic love relationships should be pursued as sexual games where partners are kept guessing as to one's true intentions; and (3) self-perceived ability to successfully deceive a dating partner (Wiederman & Hurd 1999).

In Seal et al.'s (1994) study, individuals were asked how likely they would be to (a) initiate and (b) respond positively to different behaviors with a hypothetical, attractive member of the opposite sex. The following six behaviors were addressed: smiling, saying hi, engaging in conversation, agreeing to get together informally on campus, exchanging phone numbers, and agreeing to an off-campus romantic date. Of the six behaviors addressed, only one, agreeing to an off-campus romantic date, is a clear violation of an exclusive romantic commitment. The others can be interpreted as indicators of general sociability. Flirtation was not included, but even flirtation is not necessarily an indication of willingness to engage in extradyadic sexual encounters but

rather may signal sociability, casualness, and related personality traits.

Seal et al. (1994) interpret their findings as consistent with Simpson and Gangestad's (1991, 1992) evolutionary interpretation for variance in sociosexuality: unrestricted individuals require less time to evaluate a potential mate and should become more readily sexually involved, are less concerned with issues relevant to relationship boundaries, and are more willing to disregard relationship exclusivity in becoming involved in extra-dyadic encounters. None of Seal et al.'s (1994) female respondents, regardless of SOI score, said that they would engage in sex on a first date, but 72% of male respondents reported that they would.

Sociosexually unrestricted women rate themselves as relatively attractive (Reise & Wright 1996). Townsend and Wasserman (1997) found that women's SOI scores did not affect their willingness to date stimulus figures in an experimental design. Women's assessments of male attractiveness vary more than men's assessments and are not mediated by sociosexuality (Townsend & Wasserman 1997).

Cues to female sociosexuality may be important from an evolutionary perspective even if SOI is not a direct indicator of infidelity risk. If cues to sociosexuality were discriminable to observers, they would give prospective mates an indication as to what a woman's reproductive strategy may be more generally and thus offer clues to what signals and forms of investment these women might seek. Boothroyd et al. (2008) speculate that men may prefer sociosexually unrestricted women in both long-term and short-term contexts due to lesser investments of their own mating effort. Alternately, perhaps sociosexually unrestricted individuals pursuing likewise unrestricted partners while sociosexually restricted individuals may preferentially seek each other as mates.

Thus attending to phenotypic cues of sociosexuality could help men gauge their own mating strategy and could curtail unnecessary expenditures of mating effort.

One's own mating strategy and condition influence partner choice. Sociosexually unrestricted men display a preference for women with low fluctuating asymmetry, a general measure of health, to women with low waist-hip ratio, which is a more direct correlate of fertility than general health. Sociosexually restricted men do not show as much of a preference for low FA women (Perilloux 2004). Less attractive individuals do not exaggerate their perceptions of the attractiveness of their dating partners and men are less affected by their own self-perceived attractiveness in dating preferences than are women (Lee et al. 2008). If a man chooses a long-term mating strategy, he can increase the survival of his progeny, enhance paternity confidence, and attract women of higher mate quality (Geary 2000).

Less sociosexually restricted individuals are less inclined to stay in unsatisfactory relationships (Simpson & Gangestad 1992), suggesting that the temptation for extrapair encounters may be lesser simply because unsatisfactory relationships are more likely to end. Although this could negatively impact a man's long-term mating strategy through the loss of a partner and potentially less frequent interaction with progeny, it could also provide a benefit to men in terms of avoiding cuckoldry. It could also convey an important signal to men with sociosexually-unrestricted partners that it would improve their reproductive chances to be attentive to the needs and desires of their mates, or else risk losing them.

Premarital sexual activity, particularly the number of past partners, positively predicts self-reports of perceived future extramarital sexual activity in unmarried college

students (Bukstel et al. 1978). Women with high numbers of sexual partners were found to have relatively low WHRs, substantially higher SOI, greater childhood gender nonconformity, more fluid sexual identity, and a greater preference for attractive partners (Mikach & Bailey 1999). Interviewers, who did have information about participants' sexual behavior, rated women with large numbers of past sexual partners as more physically and behaviorally masculine (Mikach & Bailey 1999). On no measures of mate value did women with high numbers of past sexual partners score lower than women with fewer past partners (Mikach & Bailey 1999). This finding suggests that unrestricted sociosexuality is not an alternative mating strategy for women of lesser mate value. Rather, it may be a strategy for women of high mate value to gain access to access to males of high physical quality.

Female unrestricted sexuality may be a phase of young adulthood, with women exhibiting greater sexual restrictedness as they grow older and produce children (Townsend et al. 1995). As such, projections of future sexual behavior from SOI scores of college-aged females should be taken cautiously.

4. Hypothesis and Predictions

I hypothesize that female facial features may provide adaptively relevant cues to sexual behavior, which are in turn reflected in male assessments. This study predicts that sex-differentiating facial features (1) will correlate positively with perceived masculinity, (2) will correlate positively with SOI score, (3) will correlate negatively with sexual attractiveness, and (4) will correlate negatively with desirability as a long-term mate.

5. Method and Materials

Methods for this study were previously reported in Campbell et al. (2009). The

following report of the study methodology is roughly identical to that contained within the published account, but includes minor elaborations and clarifications.

5.1. Stimulus Participants

One hundred and forty female college students participated in the first stage of this study, which was part of a larger study on cosmetics. Cosmetics were not examined in the portion of the project to which I contributed and thus are not discussed in the scope of this dissertation. Participants were recruited through newspaper advertisements and were paid \$15 for their participation. These subjects completed a questionnaire containing the sociosexual orientation inventory (SOI), an evaluation of self-reported health, the Big Five Personality Profile, and questions regarding cosmetics usage.

Study participants were instructed to not apply any makeup before the study, thus allowing their unenhanced face to be photographed. Prior research has demonstrated that the topography and color of the skin of women's faces is related to men's ratings of their faces (e.g., Fink et al. 2006; Fink et al. 2001; Fink & Mads 2008), and therefore this step was important so that women did not have the opportunity to alter the appearance of their skin prior to being photographed. Upon arrival, participants first answered a short questionnaire. They were then asked to remove glasses, earrings, and other accessories, tie back their hair so it did not cover their face, and to look directly at a digital camera with their lips together and a neutral facial expression. High-resolution pictures (300 dpi) were taken of each woman's face using a Nikon digital camera (Model E950), at the size of 1600 pixels high by 1200 pixels wide. Participants were then thanked and debriefed.

5.2. Assessment Participants

The facial photographs were assessed in two phases by female and male research

participants. None of the assessment participants were aware of the study predictions, the stimulus participants' specific questionnaire responses, or SOI scores.

Ten trained female raters, who were recruited from a large Canadian university, evaluated the photographed faces. For each picture, the raters evaluated masculine facial appearance and feminine facial appearance on a 7-point scale, with 1 being "not at all" and 7 being "very much." Masculine facial appearance and feminine facial appearance were highly correlated ($r=.91$), so feminine facial appearance was reverse-scored and these two items were averaged to create an index of masculinized facial appearance.

One hundred and forty-two men were recruited from introductory psychology classes at a large Canadian university to provide ratings of the faces. Each rater was shown the faces of 28 randomly selected women from the study, one at a time, on a computer screen. As such, each rater evaluated only a portion of the sample and each stimulus face was only evaluated by a portion of the raters. When a face appeared on the screen, each rater evaluated how well 6 items described that woman on a 7-point scale. Because the average inter-rater agreement for each item was high ($\alpha=.85$, range .67 to .96), scores were averaged across the raters for each item.

Independent from the female raters' assessments of perceived femininity and masculinity, male research volunteers evaluated how physically attractive and sexually attractive each woman was. These two items were highly correlated ($r=.97$), so they were averaged to create an index of sexual attractiveness, wherein higher scores indicated greater sexual attractiveness. To assess long-term mate desirability, raters were presented with the following questions:

1. How good of a long-term mate would this woman be?

2. How fertile does this woman appear?
3. How many men would want to be in a long-term relationship with this woman?

Responses to these three items were on a 7-point scale with 1="very few" and 7="very many." Men also evaluated trustworthiness based on three items:

1. How trustworthy does this woman appear to be?
2. How loyal/faithful would this woman be in a long-term romantic relationship?
3. How kind and supportive is this woman?

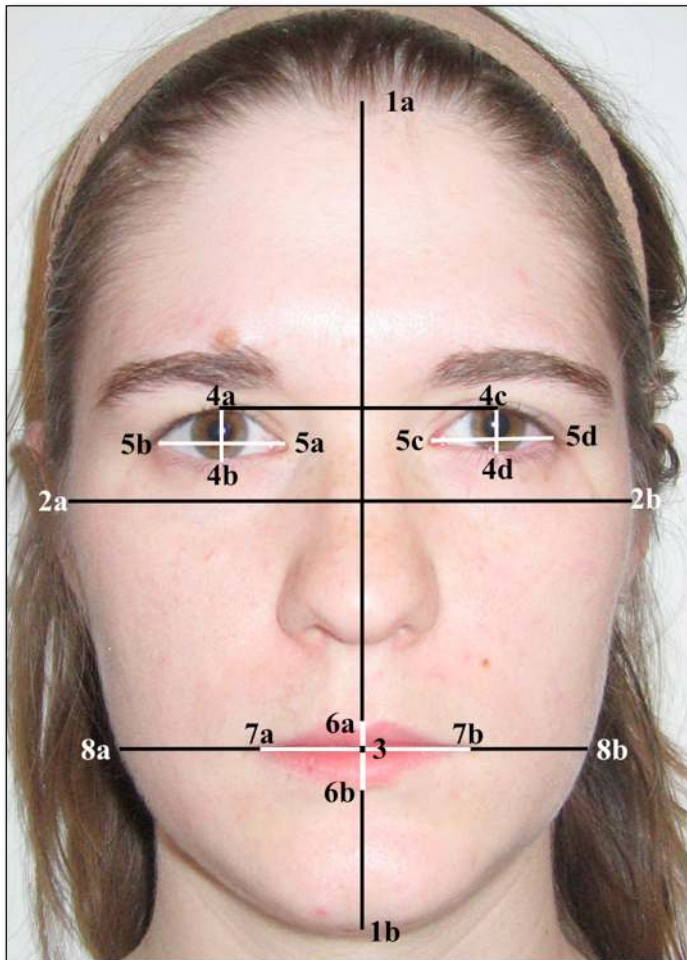
Responses for these items likewise were on a 7-point scale with 1="not at all" and 7="very much."

A study collaborator entered these six items into a Principal Components Analysis with varimax rotation and constructed a scree plot. Results indicated one factor for long-term mate desirability and one factor for trustworthiness. Scores within each factor were averaged, with higher scores indicating greater long-term mate attractiveness ($\alpha=.94$) and greater perceived trustworthiness ($\alpha=.96$). Long-term mate attractiveness and perceived trustworthiness were positively and statistically significantly correlated ($r=.43$, $p<.01$).

5.3. Measurement Methodology

To assess facial masculinity, markers were placed on the stimulus pictures as outlined in Gangestad and Thornhill (2003). Consistent with earlier studies (Penton-Voak et al. 2001; Gangestad and Thornhill 2003) indicating major sex-differentiating facial features, ten facial measurements were taken: (1) face length, (2) face width, (3) chin length, (4) eye height, (5) eye width, (6) interpupil distance, (7) lip height, (8) lip width, (9) jaw width, and (10) face length minus the length of the chin. Figure 2.1 depicts these measurement markers placed upon a volunteer for display purposes who

was not a participant in the study.



Legend			
Face length	1a-1b	Interpupil distance	4a-4c
Face width	2a-2b	Lip height	6a-6b
Chin length	3-1b	Lip width	7a-7b
Eye height	4a-4b & 4c-4d	Jaw width	8a-8b
Eye width	5a-5b & 5c-5d	Face length - chin	1a-3

Figure 2.1: Placement of markers for measuring facial masculinity

Ratios for three facial feature proportions were computed on the basis of initial data analysis. Departure from lip plumpness was calculated as lip width divided by lip height, departure from eye roundness was calculated as eye width divided by eye height, and the proportion of the face comprised of the chin was calculated as chin length divided by face length. To bring all measurements onto the same scale, each individual

measurement or ratio was divided by the mean for that measurement or ratio across all subjects. Values above 1 are more phenotypically masculine and values below 1 are more phenotypically feminine.

As face length, chin length, eye height, eye width, lip height, lip width, and face length minus the length of the chin were all components of the calculated ratios, they were excluded from the final analysis. The facial feature elements tested were limited to face width, interpupil distance, jaw width, departure from lip plumpness, departure from eye roundness, and the proportion of the face comprised of the chin. For all of these facial components, larger values are moving towards the more “masculine” direction.

As there are no specific predictions as to why sociosexuality, perceived masculinity, or attractiveness would correlate with certain facial features indicative of masculinity but not others, a full model for each prediction was constructed with all tested measurements. A refined model was then constructed with only those measurements identified as significant within the full model.

6. Results

The research supported all three predictions for some, but not all, facial measures indicative of masculinity. Controlling for other facial measurements, the only independent predictors of any of the variables of interest were jaw width, departures from eye roundness, departures from lip fullness, and proportion of the face comprised of the chin.

6.1. Descriptive Statistics

The mean age for photographed participants was 19.93 (sd=1.37, range=18-23). Sixty-nine women reported being single, 70 were in a dating relationship, and one did not

provide information. Reports of sexual attitudes and behavior varied across the sample. The mean SOI score was 49.34, with a standard deviation of 36.58 and a range of 10-234. The minimum possible SOI score is 10 and there is no upper limit. Mean number of sexual partners within the last year was 1.48 (sd=1.98, range 0-15) and the majority of respondents reported either zero (27.53%) or one (42.75%) sexual partner in the past year. The mean number of total previous partners was 3.33 (sd=4.81, range 0-30) and the majority of respondents reported 0 (21.74%), 1 (24.64%) or 2 (12.32%) total previous sexual partners. Mean number of anticipated sexual partners within the next five years was 3.47 (sd=5.31, range 0-50) and the majority of participants anticipated one (33.33%), two (18.12%), or three (17.39%) sexual partners within the next five years. The mean number of one-night stands was 1.13 (sd=2.57, range 0-16) and the majority of participants reported having had zero (58.70%) one-night stands; an additional 23.91% having reported having had only one one-night stand. The majority of respondents reported either never having sexual fantasies (31.54%) or having sexual fantasies less than monthly (25.38%). Only a small portion of respondents reported having sexual fantasies daily (5.38%) or almost daily (2.31%).

	Mean	St. Dev.	Max	Min
Age	19.93	1.37	18	23
SOI	49.34	36.58	10	234
# Sexual partners within past year	1.48	1.98	0	15
# Previous sexual partners, total	3.33	4.81	0	30
# Sexual partners in next 5 years, expected	3.47	5.31	0	50
# 1-night stands	1.13	2.87	0	16

Table 2.1: Descriptive Statistics for Stimulus Participants

Questions about sexual attitudes and behavior were administered with a 9-point Likert scale, with 1="strongly disagree" and 9="strongly agree." For simplification in

reporting descriptive statistics, scores of 1-4 are treated as disagreement and 6-9 are treated as agreement. For item 5, “Sex without love is OK,” the modal response was 1 and 55% of subjects gave responses indicating disagreement. For item 6, “I can imagine myself being comfortable and enjoying ‘casual sex’ with different partners,” the modal response was 1 and 74.62% of subjects gave responses indicating disagreement. For item 7, “I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her,” the modal response was 9 and 70.77% of respondents indicated agreement. Figure 2.2 displays the histogram of SOI scores for the sample population.

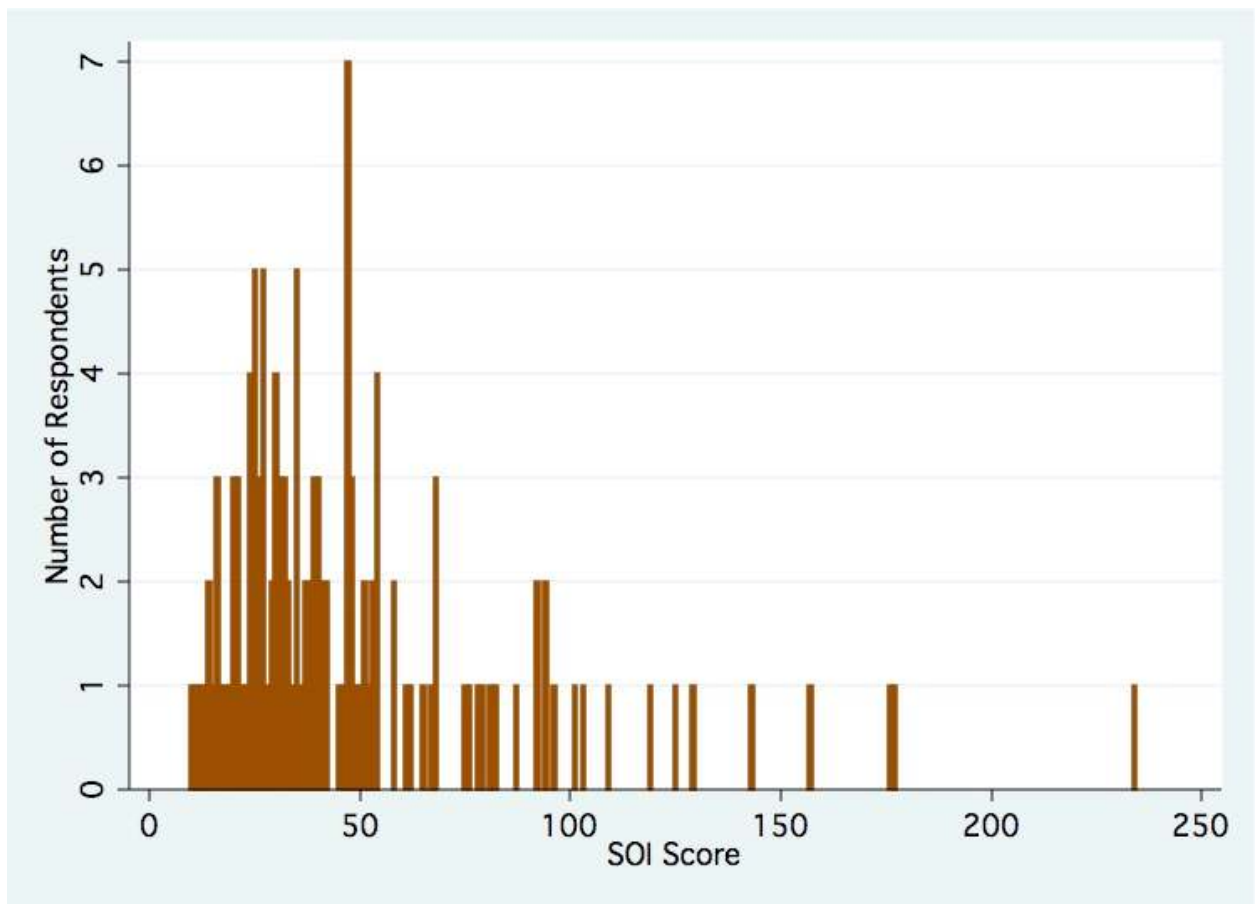


Figure 2.2: Histogram of SOI scores

6.2. Prediction 1: Facial Features and Perceived Masculinity

Consistent with the first hypothesis, women with more masculine facial features were perceived as more masculine by assessors. The proportion of the face comprised of the chin ($\beta=.247$, $p=0.002$), departures from eye roundness ($\beta=.191$, $p=.018$), and jaw width ($\beta=.192$, $p=.019$) positively predicted perceived masculinity. The refined model is highly significant ($F[3,135]=9.31$, $p<.001$, $\text{adj } R^2=.153$), as is the preceding full model with all tested measurements ($F[6,132]=4.95$, $p<.001$, $\text{adj } R^2=.147$). The partial regression plots in Figure 2.3 show the relationship between the three measures of interest and perceived masculinity in this study.

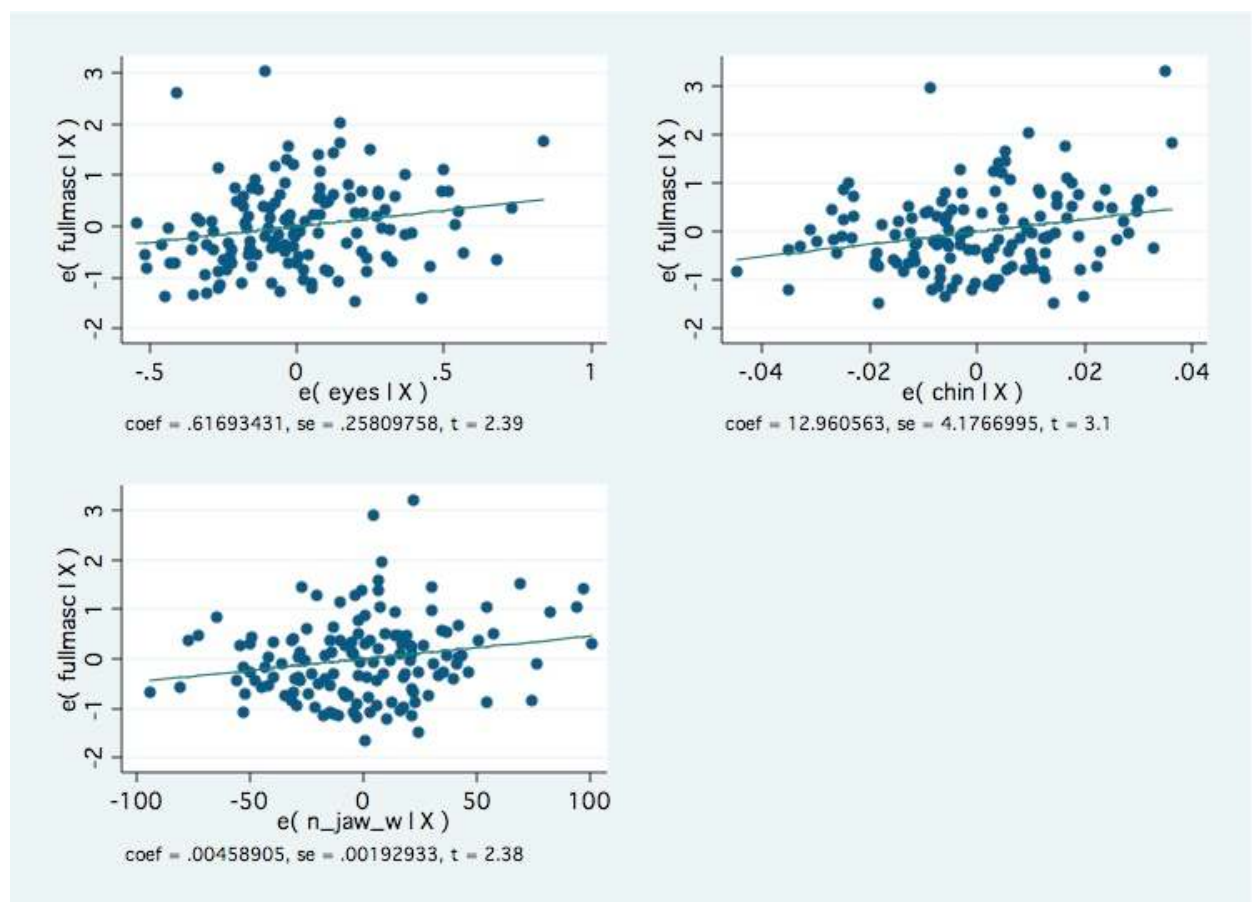


Figure 2.3: Partial regression plots to show regression of facial feature measurements on perceived facial masculinity

6.3. Prediction 2: Facial Features and Sociosexuality

On average, women with more masculine facial features were more sexually unrestricted than women with less masculine (i.e., more feminine) facial features. Taken alone, only the proportion of the face comprised of the chin was an independent positive predictor of SOI score ($\beta=.252$, $p=.003$). The full model with all tested measurements was not statistically significant ($F[6,122]=1.73$, $p=.120$, $\text{adj } R^2=.033$) but a simple linear regression with chin proportion as the sole predictor was highly significant ($F[1,127]=9.11$, $p=.003$, $\text{adj } R^2=.060$). This is also reflected in the moderate correlation between chin size and SOI ($r=.259$, $p=.003$).

However, multiple facial features interacted to more strongly predict SOI scores than did the proportion of the face comprised of the chin alone. Based on preliminary analysis, interaction effects were investigated between the different facial proportion ratios. When controlling for chin proportion by leaving it in the model, the interaction between chin size and departures from lip plumpness predicted SOI scores ($\beta=-1.445$, $p=.035$), as did the interaction between chin size and departures from eye roundness ($\beta=-1.154$, $p=.030$). Neither the interaction between lips and eyes ($\beta=1.676$, $p=.138$) nor the interaction between all three components ($\beta=-.150$, $p=.905$) were significant within the model, and the overall model was significant ($F[5,123]=3.05$, $p=.013$, $\text{adj } R^2=.074$).

Figure 2.4 below provides the partial regression plots for this analysis.

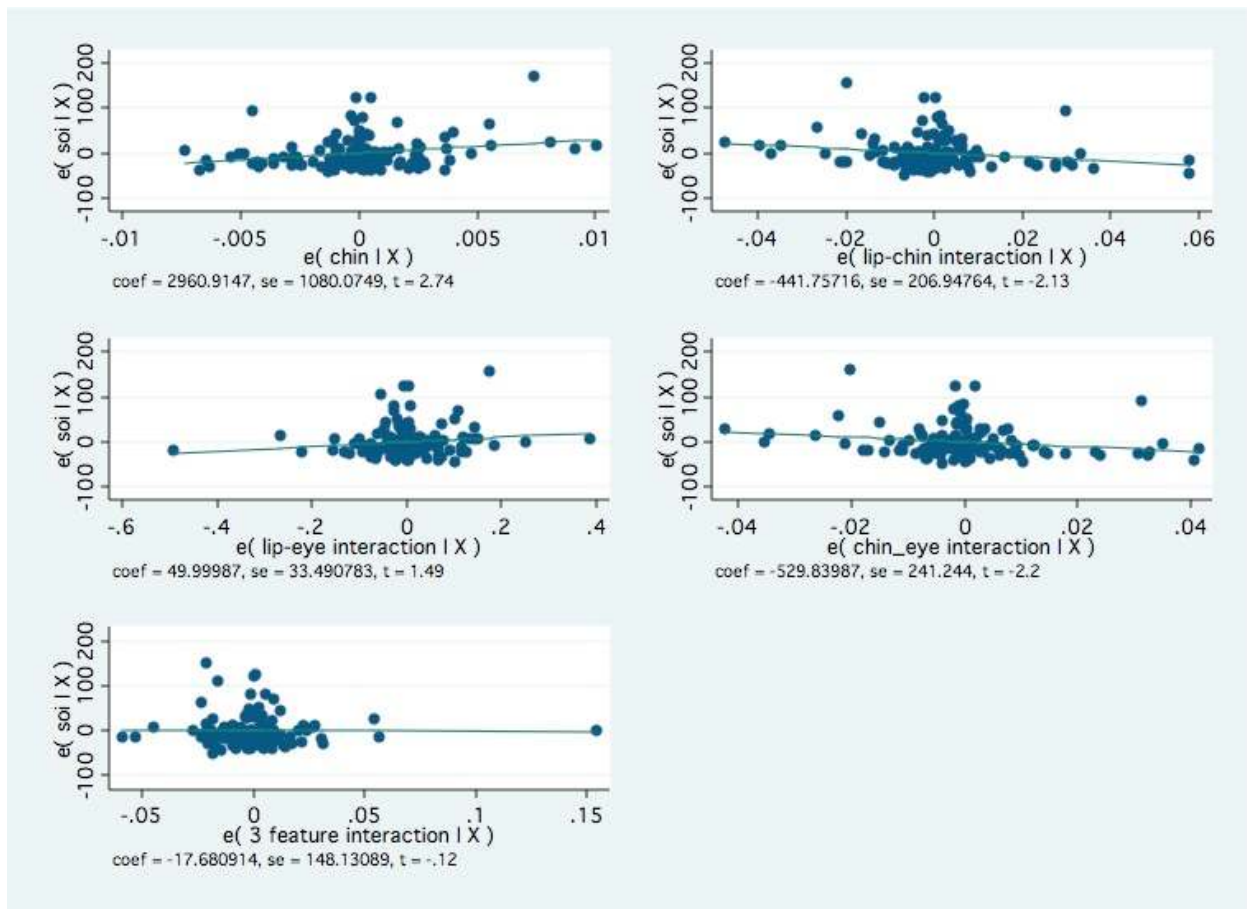


Figure 2.4: Partial regression plots for regression of facial feature interactions on SOI

6.4. Prediction 3: Facial Features and Desirability as a Short-Term Mate

A regression model of short-term mate desirability as predicted by facial feature measurements and ratios was statistically significant ($F[6,132]=2.50$, $p=.025$, $\text{adj } R^2=.061$). None of the individual measurements or ratios were independently statistically significant within the model, but jaw width ($\beta=-.182$, $p=.053$), departures from eye roundness ($\beta=-.156$, $p=.069$), and proportion of the face comprised of the chin ($\beta=-.187$, $p=.083$) all approached statistical significance within the model. In a refined model with just those three measurements as independent variables ($F[3,135]=4.62$, $p=.004$, $\text{adj } R^2=.073$), only departures from eye roundness were statistically significant ($\beta=-.169$,

$p=.045$); neither jaw width ($\beta=-.148$, $p=.082$) nor proportion of the face comprised by the chin ($\beta=-.149$, $p=.076$) were statistically significant at the $p\leq.05$ level. The partial regression plots for this model are below.

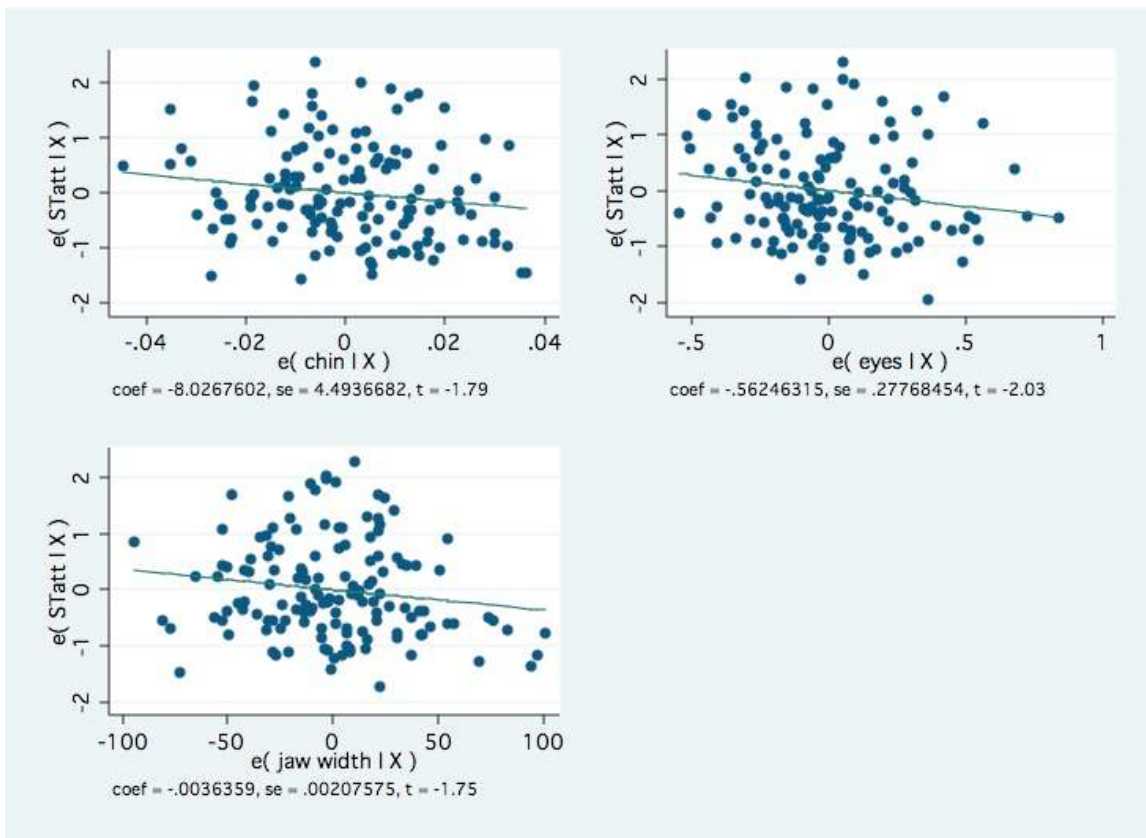


Figure 2.5 Partial regression plots for regression of facial features on short-term mate desirability

6.5. Prediction 4: Facial Features and Desirability as a Long-Term Mate

A regression model of long-term mate desirability as predicted by facial measurements and ratios was statistically significant ($F[6,132]=2.71$, $p=.017$, $\text{adj } R^2=.069$). Within the model, both departures from eye roundness ($\beta=-.172$, $p=.045$) and jaw width ($\beta=-.185$, $p=.049$) were statistically significant; the proportion of the face comprised of the chin approached but did not achieve statistical significance ($\beta=-.140$, $p=.097$). In a refined model with just those three facial features as independent variables

and long-term mate attractiveness as the dependent variable ($F[3,135]=4.90$, $p=.029$, $\text{adj } R^2=.078$), only departure from eye roundness was statistically significant ($\beta=-.183$, $p=.029$). Neither the proportion of the face comprised by the chin ($\beta=-.143$, $p=.088$) nor jaw width ($\beta=-.150$, $p=.076$) was statistically significant at the $p \leq .05$ level. The partial regression plots for this model are below.

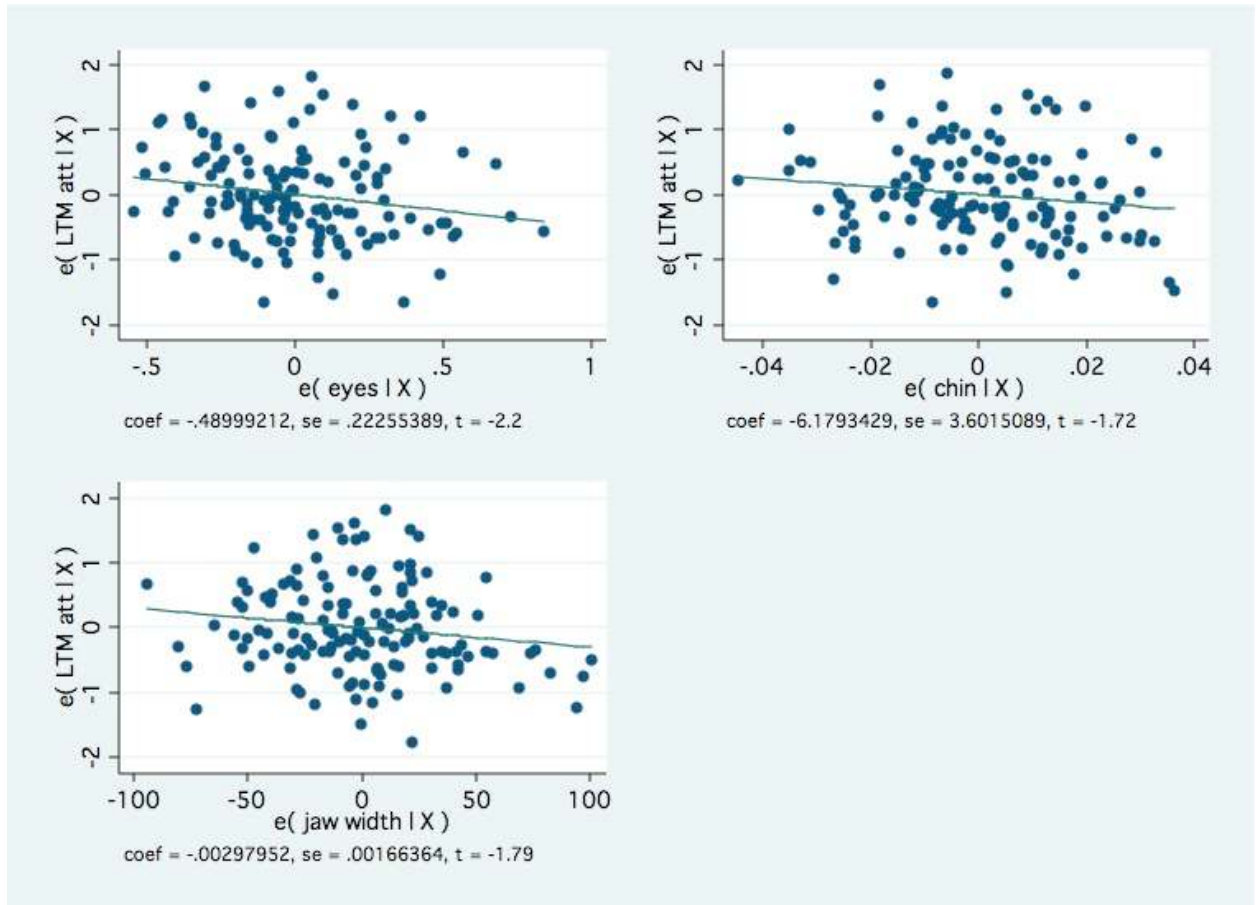


Figure 2.6: Partial regression plots for regression of facial feature measurements on long-term mate desirability

A regression model with trustworthiness as the dependent variable and the facial feature measurements and ratios as independent variables was not statistically significant ($F[6,120]=1.40$, $p=.220$, $\text{adj } R^2=.017$).

6.6 Relationships between Facial Features, SOI, Attractiveness, Perceived Masculinity, and Perceived Trustworthiness

Controlling for the effects of facial features, females with lower SOI scores were perceived as more trustworthy. In a model regressing perceived trustworthiness on SOI and all facial feature measurements and proportions, SOI was a highly significant negative predictor of perceived trustworthiness ($\beta = -.265$, $p = .004$). The overall model was significant ($F[7,120] = 2.23$, $p = .036$, $\text{adj } R^2 = .1153$), but no other independent variables were significant within the model, although departures from eye roundness approached significance ($\beta = -1.61$, $p = .076$).

A model with long-term mate attractiveness regressed against SOI along with all facial features and proportions was statistically significant ($F[7,120] = 2.50$, $p = .020$, $\text{adj } R^2 = .076$), but no independent variables within the regression were statistically significant. Jaw width approached statistical significance within the model ($\beta = -.202$, $p = .069$), with women who had wider jaws being assessed as less desirable as long-term mates, but SOI was not independently significant as a predictor within the model ($\beta = -.130$, $p = .145$).

Because long-term mate attractiveness and short-term mate attractiveness are so closely correlated ($r = .979$, $p < .001$), including one in a regression dwarfs the effects of the other covariates. The regression of short-term mate attractiveness, SOI, and all facial features and proportions on long-term mate attractiveness explains 96% of the variance ($F[8, 119] = 386.40$, $p < .001$, $\text{adj } R^2 = .960$), but this is primarily due to the overwhelming effect of short-term mate attractiveness ($\beta = .975$, $p < .001$). Face width is independently statistically significant within the model ($\beta = .038$, $p = .043$) and SOI approaches independent statistical significance ($\beta = -.033$, $p = .079$).

6.7 Additional Findings

Although participants were not asked about alcohol expenditures, as in Clark 2004, they did provide limited economic data. Mean monthly cosmetic expenditure was \$11.36 (sd=\$9.55, range=\$0-\$50). Mean monthly spending money was \$106.65 (sd=\$94.63, range=\$0-\$500). A linear regression model was constructed with the amount of money spent on cosmetics in the preceding month and total amount of spending money each month as independent variables and the number of previous sexual partners as the dependent variable. Previous sexual partners were not predicted by cosmetic expenditure ($\beta=-.050$, $p=.142$) but were predicted by total spending money ($\beta=.011$, $p=.019$). The overall model approached but did not achieve statistical significance at the $p \leq .05$ level ($F[2,133]=2.82$, $p=.063$, $\text{adj } R^2=.026$). A second linear regression model was constructed with the same independent variables and with anticipated future sexual partners as the dependent variable. Anticipated future sexual partners were negatively predicted by cosmetic expenditure ($\beta=-.100$, $p=.048$) and positively predicted by total spending money ($\beta=.015$, $p=.004$). The overall model was significant ($F[2,132]=4.70$, $p=.011$, $\text{adj } R^2=.052$).

Fluctuating asymmetry (FA) was measured and used in other research resulting from these data. In a regression with FA as the dependent variable and all facial measurements and ratios as independent variables, only jaw width positively predicted FA ($\beta=.643$, $p<.001$) and the model as a whole was highly significant ($F[6,133]=21.40$, $p<.001$, $\text{adj } R^2=.468$).

7. Discussion

The results of the tests for Prediction 1 showed that masculinity was moderately

predicted by jaw width, departures from eye roundness, and proportion of the face comprised of the chin. This finding indicates that there is overlap between the biologically based, testosterone-mediated suite of traits focused upon by researchers when they ask participants to assess “masculinity” and the way that the research participant interprets “masculinity.” This reinforces the validity of experimental methodologies that rely on rater assessments as proxies for phenotypic facial masculinity.

The result of the tests for Prediction 2 showed that the proportion of the face comprised of the chin is a statistically significant predictor of sociosexuality score. This result, though modest, indicates that one particular testosterone-mediated facial feature, the chin, may serve as a cue to sociosexual attitudes and behavior that are also believed to be due, in part, to the effects of testosterone. This cue may help prospective mates gauge mating strategy and compatibility.

The result of the tests for Prediction 3 demonstrated that testosterone-mediated facial features, particularly eye shape, are modestly associated with attractiveness as a short-term mate. Further, the result of the tests for Prediction 4 demonstrated that eye shape is also modestly associated with attractiveness as a long-term mate. Trustworthiness, however, was not independently associated with any sex-differentiating facial features. These results provide limited support to the idea that prospective suitors may attend to specific facial features, in this case eye shape, in assessing a woman’s attractiveness.

A broader model demonstrated that SOI is independently associated with perceived trustworthiness while controlling for all facial feature measurements and proportions. This suggests that assessors may perceive some facial cue that affects mate

preferences related either to sociosexual orientation itself or to some other feature associated with sociosexuality. This cue supersedes the effect of facial measurements and proportions included in the analysis for the association between SOI and perceived trustworthiness.

Campbell et al. (2009) relied upon a calculated global masculinity index resulting from factor analysis of the facial features addressed in this study. As I was not involved in the construction or analysis of that facial masculinity index, I have not included it in my analysis. The major research findings of that publication are consistent with my findings as reported in this chapter.

7.1 What Does “Masculinity” Mean, Anyway?

With the exception of the association between short-term mate attractiveness and long-term mate attractiveness, the strongest relationship observed in this study was that between facial features and viewer perceptions of masculinity. Considering that viewer projection of “masculinity” onto an unfamiliar photograph must be based exclusively on the physical appearance of that photograph, the presentation of individual facial features should have a considerable impact upon viewer perceptions of masculinity. Other static or semi-static factors that may affect perceived masculinity may include facial features not examined in this study, skin condition, and hirsuteness. Transient, mutable factors that may affect perceived masculinity include hairstyle, hair color, clothing, facial piercings, and other jewelry. This study attempted to minimize the effects of these factors by asking the participants to secure the hair away from the face and to remove jewelry. Participants were photographed from the neck up so that very little or no clothing remained in the picture frame. These conditions limited other markers of

masculinity so as to focus on sex-differentiating facial features that are known to vary by testosterone exposure.

All five of the major sex-differentiating facial features identified by Gangestad & Thornhill (2003), either alone or in tandem with another feature, were predictors of at least one of the variables of interest in this study. Features of the lower face accounted for the majority of facial feature effects on SOI, attractiveness, and perceived masculinity, which is consistent with the impact of testosterone on the lower face during pubertal development (Swaddle & Reiersen 2002). This study also confirms a previous finding on the relationship between SOI and desirability as a long-term mate (Campbell et al. 2004) when controlling for the effect of specific facial features indicative of masculinity.

Evolutionary analyses based upon facial masculinity may be met with the criticism that “masculinity” has meanings ascribed by society that may not match the usage of the term in the scientific literature. This study addresses that concern by providing evidence for an observable relationship between people’s perceptions of masculinity and the proportions of individual sex-differentiating facial characteristics. To avoid future conflict, however, it is important to specify clear definitions for terms that hold characteristically different connotations within the scientific literature and the humanities. One relevant element to address is whether “masculinity” and “femininity” are absolute binary concepts, with “masculinity” being “whatever femininity is not” and “femininity” meaning “whatever masculinity is not.” For example, a sharply angled, pointy nose may not appear “feminine” to an assessor, but neither would it necessarily appear “masculine.” The research in this study does support the idea that individuals

largely conceptualize masculinity and femininity as opposing characters, with masculine facial appearance and feminine facial appearance being highly correlated ($r=.91$).

Can feminine or masculine be defined without reference to the other? From a scientific perspective, they can. “Feminine” can be taken to mean both “what the populace conceives of as feminine,” which is a problematic definition at best, or as “pertaining to those characteristics most routinely exhibited by females.” The later definition, albeit normative, does not place “femininity” as the converse of “masculinity.” There is, however, a great deal of overlap between the two, in that many of the features that differ characteristically between the sexes do so in binary ways.

7.2 The Meaning and Limits of Sociosexuality in Assessing Infidelity Risk

To untangle the relevance of sociosexual orientation within romantic relationships, we require a better understanding of the relationship between sociosexuality and acts of infidelity. Simpson and Gangestad (1991) noted that “unrestricted individuals, relative to restricted ones, may be more likely to terminate unsatisfactory marital relationships or more easily drawn out of positive ones” (p. 879). Premarital sexual permissiveness is the strongest single predictor of extramarital sexual permissiveness (Singh et al. 1976) and investigations into extramarital sexual permissiveness have largely presupposed that individuals with liberal attitudes towards extramarital sex are predisposed to engage in extramarital sexual behavior (see Thompson 1983 for review). Thompson (1983) concludes, “There is little evidence to suggest that EMSP (extramarital sexual permissiveness) predicts behavior” (17). Thompson (1983) cautions against assuming that extramarital sex is not spousally-sanctioned and calls for more research to untangle the attitudinal and behavioral

components in extramarital sexual permissiveness and behavior. One item of evidence indicative of a disconnect between attitudes and behavior is the finding that Japanese women have greater disapproval of extramarital sex than American women, but had themselves engaged in extramarital sex with nearly as high of a frequency (Maykovich 1976).

In a laboratory study, Seal et al. (1994) found that sociosexually unrestricted participants reported a greater willingness to cross relationship boundaries in an experimental setting. However, willingness to cross relationship boundaries was defined as engaging in “behavior clearly violating the present ‘exclusive’ status of one’s own relationship status (e.g., exchanging phone numbers, asking for a date).” More unrestricted individuals than restricted individuals entered a drawing for a free date from a computer dating service while they were involved in an exclusive relationship and unrestricted individuals reported a greater willingness to engage in physically intimate encounters with people other than their primary partners (Seal et al. 1994). Men showed a greater willingness to engage in extradyadic romantic encounters than did women (Seal et al. 1994). The degree of relationship commitment had a greater effect on the willingness to engage in extradyadic encounters for restricted as compared to unrestricted individuals. While agreeing to a romantic date would arguably conflict with a stated monogamous relationship, the interpretation of exchanging telephone numbers as a violation of exclusivity is problematic. There are many reasons why an individual would seek to form and solidify social relationships that are unrelated to extra-dyadic sexual encounters. Rather than interpreting these findings to mean that less restricted individuals were more willing to pursue extra-dyadic relationships, one could argue that

less sociosexually restricted individuals may simply be more extroverted or gregarious.

Jackson and Kirkpatrick (2007) counsel that SOI is a limited measure of within-sex variation in mating strategy and argue that the traditional SOI primarily measures short term mating orientation and is only a weak inverse correlate of long term mating orientation. They advocate instead a separation of sociosexual attitudes from sociosexual behaviors and a second separation of restricted from unrestricted attitudes.

Motivational theories of infidelity, focusing explicitly on extradyadic sexual activity without the sanction of the relationship partner, incorporate individual differences in both the motivation and the predisposition to engage in adultery. Barta and Kiene (2005) found that individuals with a self-reported history of infidelity had a relatively unrestricted SOI when compared to subjects who had not reported having engaged in adultery, with males scoring more highly on SOI than women. SOI partially mediates the effect of gender on sexually motivated causes of infidelity, especially in males, and that women were more likely to report engaging in extradyadic sex due to dissatisfaction with the relationship partner (Barta & Kiene 2005). Feldman and Cauffman (1999) found that sexual permissiveness did moderately positively predict self-reported history of sexual betrayal in teenagers, with “cheating” self-defined but limited to petting or sexual intercourse while in a relationship with a different partner. In this study, males were more likely to self-report both having had sexual intercourse with another partner while in a primary relationship and holding permissive attitudes towards sexual betrayal (Feldman & Cauffman 1999). Both Barta and Kiene (2005) and Feldman and Cauffman (1999) acknowledge the possibility and implications of self-reporting bias in their respective studies.

In a self-selected sample reporting on morning-after emotions following a one-night stand, women reported fewer positive and more negative emotions (Plourde 2008). There was no significant interaction effect between relationship status and gender: women gave more negative responses, as did individuals who were involved in a relationship with another person at the time of a one night stand, but the increase in negative emotions for mated subjects did not show a sex difference.

Andrews et al. (2008) found that men were more accurate in assessing whether their female partners had disclosed having had affairs to researchers than women were in their assessments of their male partners' affairs. Furthermore, men who were incorrect in their assessments were more likely to make false positive errors, suspecting their partners of infidelity when no affair had taken place, than were women. Andrews et al. (2008) interpret the study to show that men may have a more fine-tuned mechanism to detect possible infidelity and that women may underreport their own illicit encounters.

8. Conclusions and Directions for Future Research

If women's facial features convey honest information about mate quality, male attention to these characteristics may aid in mating decisions. By clarifying the relationship between specific facial feature proportions indicative of masculinity, SOI, and attractiveness, this study provides evidence that women's faces may accurately and effectively signal information that may be of interest to prospective mates.

This study found that men considered sociosexually restricted women to be more attractive than sociosexually unrestricted women, which conflicts with Boothroyd et al.'s (2008) finding that sociosexually unrestricted women were judged as more attractive than sociosexually restricted women. Boothroyd et al (2008) used both composites of Scottish

subject photographs and real photographed faces of British university students. Composites were constructed from the top quartile and bottom quartile of SOI scores; sociosexually unrestricted composites were viewed as significantly more attractive by Internet-recruited assessors than composites of more sociosexually restricted individuals. Photographs of real faces were first assessed for attractiveness by same-sex participants and then presented to a later round of participants in pairs of individuals who scored the same or nearly the same attractiveness rating but differed in SOI. Participants selected with which photographed individual they would prefer a relationship, alternating by short-term and long-term contexts. Heterosexual men rated high-SOI women more attractive in both long-term and short-term contexts. Boothroyd et al. (2008) interpret their finding to suggest that “attractive women’s unrestricted scores may be the result of more attractive women having greater sexual opportunities and thus developing a less restricted outlook.” Noting several inconsistencies between their findings and those of Clark (2004) and Rhodes et al. (2005), Boothroyd et al. (2008) suggest that these differences may be due to different physical and behavioral effects of androgens across the life course and that future examination is warranted to resolve these inconsistencies. I concur with this assessment.

This research has certain limitations. For instance, circulating testosterone levels of the female participants were not assessed, meaning that we could not test whether testosterone levels were associated with, and perhaps directly responsible for, women’s sexual behavior and attitudes as assessed by the SOI and facial masculinity. This may be an insurmountable complication in psychological research, as a significant testosterone exposure of interest occurs prenatally and a longitudinal study of this nature, involving

pregnant women and their fetuses and follow-up two decades later, would be problematic at best. Although the usefulness of certain physical traits as proxies for prenatal testosterone exposure been reported in prior research, future research needs to directly assess the role of testosterone in explaining purported links between women's sexual behavior and attitudes, women's facial masculinity, and men's ratings of women's desirability as long-term mates. Further, a better understanding of the relationship between sociosexuality and behavior within established relationships is necessary to interpret the significance of sociosexual cues in facial features.

Chapter 3: Engagement Rings as Signals

1. Introduction

Engagement rings evoke a wide range of affective responses, wherein individual assessments of style and cost carry value judgments about both the woman wearing a particular ring and the man who gave it to her. These perceptions reflect diverse factors, including the individual's role in the exchange, aesthetic sensibilities, ideology, and, for outside observers, relationship status. While relatively little can be said with academic rigor about these stylistic components and emotional reactions, other elements regarding the signaling capacity of engagement rings are ripe for scientific inquiry.

Engagement rings are a common feature of heterosexual American courtship, conventionally offered by a man to a woman upon a proposal of marriage and often containing one or more diamonds. These rings convey information about the wearer's relationship status, but they may further signal additional information both to the prospective bride and other parties she encounters. As Wicoff (2006) notes in her criticism of the wedding industry and personal engagement memoir, the engagement ring is likely “the most emotionally, socially, fiscally, and psychologically packed symbol associated with weddings” (66). The iconic status of engagement rings, coupled with their expense and conspicuousness, make the transfer of an engagement ring an attractive opportunity by which to examine the applications of signaling theory to contemporary Western courtship. This chapter reports on a study designed to test evolutionary hypotheses regarding the information content of engagement rings at a transitional time of formalized commitment.

Previous scholars have suggested that engagement rings may perform a signaling

function. Miller (2000) has suggested that the costliness of extravagant jewels makes them good indicators of a man's wealth: "If a man can afford to dress as well as a peacock, he is probably not poor. If he gives you a very large diamond, he is likely to be rich. The more they can spend, the more they must have" (p. 123). Beyond the idea that a diamond ring may signal resource control, Camerer (1988) has suggested that a ring may signal a man's commitment to a relationship:

Consider an earnest young suitor, expecting a lifetime of familial production with his fiancée (given her consent); he will gladly "sink" the costs of a diamond ring and expensive dinners against the expected gains of joint production, if he must, to convince her of his intentions and elicit her cooperation. The lusty bachelor whose planning extends only to dawn cannot afford such costly investments, *ceteris paribus*, since he expects less gain from a short-term relationship with his lady of that evening (S183).

This study was designed primarily to test hypotheses about the value of an engagement ring as a signal to the prospective bride. Rings might also serve as signals to others, but that mechanism was not systematically examined in this study. This project also explored the possibility that, like other property transactions that take place at marriage (e.g., Borgerhoff Mulder 1988), engagement rings may convey information about mate preferences. This research was originally published in Cronk and Dunham (2007). This chapter builds upon that publication with additional contextualization, minor results, and discussion. Major results remain the same.

2. Nuptial Gifts

Although the practice of giving engagement rings would seem to be a distinctly human phenomenon, insights from the behavior of non-human animals contribute to a fuller understanding of courtship exchange. Nuptial gifts, often taking the form of courtship feeding wherein a male offers a food item to a prospective or receptive mate,

can be found among invertebrate (e.g., Vahed 1998, Huber 2005) and vertebrate (e.g., Mougeot et al. 2006) taxa. Such gifts often but not always provide nutritional benefits and their quality has been shown in some cases to correlate with aspects of male mate quality, such as immunocompetence in striped ground crickets, *Allonemobius socius* (Fedorka et al. 2005).

Although a human female receives no direct nutritional benefits from the gift of an engagement ring, an analogy to nuptial feeding in insects may illustrate the man's motivation in giving the ring, namely that such a gift may represent a directly observable and measurable form of mating effort. As such, the practice of giving rings may be partially reducible to quantitative analysis. Many types of property transfers occur before, during, and after marriage in different human societies (see Fortunado et al. 2006 for review from an evolutionary perspective) and are associated with aspects of both male and female mate quality. Bridewealth or brideprice may be the most obvious measure of perceived "mate value" among these property transfers. Among the Himalayan Kunhari, Rao (1998: 215) notes,

"Bridewealth is not related simply to what the groom's family is able to pay . . . but to the intrinsic 'worth' of the bride and her family. Thus a virgin 'fetches' much more than a widow, a beautiful girl more than an ugly one, and generally a rich man's daughter more than a poor man's."

Men among the agropastoralist Kipsigis of Kenya pay higher bridewealths when marrying younger women (Borgerhoff Mulder 1988). The effect of female age on Kipsigis bridewealth may be evolutionarily interpreted as a high male preference for younger brides due to the greater remaining lifetime reproductive potential of younger women.

Cross-culturally dowry may reflect competition among women for male mates

with high levels of resource control (Gaulin & Boster 1990). Rao (1988: 227) argues,

[Concurrent bridewealths and dowry] largely neutralize male and female competition for spouses and ultimately increase both individual and inclusive fitness By paying bridewealth for their sons and giving their daughters dowries, rich Kunhari and very rich Allaiwal parents maximize their own well-being, in terms of socioeconomic and reproductive interests, to the detriment of parents who 'invest' only in one gender.

Female-female competition as assessed by dowry size demonstrates that male as well as female mate choice can be influenced by a prospective mate's control of resources.

Despite prevailing notions that dowry is an antiquated practice, dowry is becoming increasingly prevalent in India and dowry values are increasing. Srinivasan and Lee (2004) report that the dowry system is resistant to social change in Northern India, likely due to the economic benefits that women receive from their dowries, but the majority of women disapprove of the practice. Shenk (2007) argues that a functionalist perspective, based on human behavioral ecology, could lead to improved dowry legislation, with an attendant benefit to the status of women and decrease in dowry-related violence. As such, the practice still has contemporary relevance and may offer a useful point of comparison for courtship exchange in Western settings. Within Western societies, female mate value has become increasingly impacted by women's earning capacity, as assessed by cohort studies of wives' premarriage earnings and husbands' occupational income and education (Sweeney & Cancian 2004). Bell (2008) argues that courtship in the post-industrial West has more in common with marriage-related property transfers seen in India and China than many initially presume, as community property law and prenuptial agreements in California illustrate the economic transfer of wealth and rights at marriage.

3. Previous Empirical Research on Gifts in Human Courtship

Other research has begun to integrate economic and evolutionary approaches to gift giving in human courtship. In a college-aged sample, men were more likely to report having received offers of sex in exchange for their investment and women were more likely to report having received offers of investment in exchange for sexual access (Kruger 2008). Participants did not view ongoing sexual relations and resource provisioning in committed relationships as an explicit exchange and the relatively low acceptance rate of exchange offers suggests that such explicit offers may not be a successful strategy (Kruger 2008). As offering of gifts in courtship may be a more acceptable and effective alternative than direct offers of money-for-sex, the practice of giving an engagement ring at the time of a proposal of marriage may represent the culmination of such exchanges.

Evolutionary psychologists have also investigated the role of dominance in gift exchange. Stirrat and Perrett (2008) found that college-aged women preferred to have men with high self-rated dominance pay for the meal on an outing, consistent with a provisioning strategy. More dominant females expressed a greater desire to have their meals purchased for them than did less dominant females. When dining with another female, women preferred to split the cost of the meal.

4. Historical and Cross-Cultural Context of Engagement Rings

Most scholarly work on wedding and engagement rings takes an approach based in history (Rothman 1984), cultural studies (Daas 2005), gender studies (Howard 2003), or law (Frazier 2001). Cronk and Dunham (2007) is the first study to systematically examine the signaling value of engagement rings in an evolutionary context.

Engagement rings have been offered in some courtships dating back to the Middle Ages and wedding rings are more ancient still (Brinig 1990); however, the custom of giving an engagement ring upon a promise to marry has only recently become quite commonplace. Within the United States, the engagement ring custom dates back to the mid-Nineteenth Century, but initially included rings given to men as well as to women (Rothman 1984). Within the Twentieth Century, a new pattern emerged wherein a man presents his fiancée with an expensive ring, usually including at least one diamond. The emergence of this new tradition may be the result of marital law reforms in the 1930s and 1940s, before which it was possible to sue for damages when an engagement was called off (Brinig 1990; Tushnet 1998). Brinig argues that diamond engagement rings offered a new form of security in the absence of the legal protections that the previous laws had afforded. Since the end of the Second World War, engagement rings have remained popular in the United States, with around 75% of all first-time brides receiving them (Brinig 1990; Rothman 1984).

Engagement to marry has historically conferred social legitimacy to sexual activity in the United States. As of the mid-Twentieth Century, half of American women were not sexual virgins at the time that they married, but a majority had had their first sexual intercourse after becoming engaged (Kinsey et al. 1953: 286). Sexual mores have changed in America since the mid-20th Century, as have views upon women's morality and sexuality (Cherlin 2004, 2009; Tanenbaum 2000), but attention to the close historical connection between intent to marry and sexual access can illuminate the legal ramifications of considering engagement rings as conditional gifts.

5. Legal Precedent

U. S. legal precedent regarding engagement ring ownership has shifted over time. The dominant legal view is that rings are considered unique conditional gifts due to the condition, namely mutual anticipation of marriage, under which they are given (McIntire v. Raukhorst 1989). One metaphor-heavy argument in favor of the view that engagement rings are conditional gifts can be seen in the 1957 ruling of *Pavlicic v. Vogtsberger*:

[A] gift given by a man to a woman on condition that she embark on the sea of matrimony with him is no different from a gift based on the condition that the donee sail on any other sea. If, after receiving the provisional gift, the donee refuses to leave the harbor,—if the anchor of contractual performance sticks in the sand of irresolution and procrastination—the gift must be restored to the donor. A fortiori would this be true when the donee not only refuses to sail with the donor, but, on the contrary, walks up the gangplank of another ship arm in arm with the donor's rival (quoted in Frazier 2001: p. 421).

Branching out from the notion that rings are conditional gifts, individual courts have been divided on rulings over the ownership of an engagement ring after a dissolved betrothal. Frazier (2001) notes,

Many courts reason that the engagement ring is an implied condition upon the subsequent marriage of the parties; when the marriage fails to ensue, the condition has not been met, and the donor is entitled to recover the engagement ring. To the contrary, other courts refuse to imply a condition of marriage to the engagement ring just because it was given during the engagement period and will not order recovery of the ring unless it was expressly conditioned upon a marriage which did not take place (p. 420).

U. S. divorce law has changed dramatically within the last several decades, shifting from assignation of blame to a rubric in which most divorces are treated as though one party is not wholly at fault. Prior to the increase in no-fault divorces, most courts ruled in favor of the recipient of the engagement ring when the giver broke the engagement, but this has changed with the growing tendency of courts to remove fault-finding from understanding

the relationship dynamics in marriage and including broken engagements within that rubric (Frazier 2001).

In a review of extant case law, Frazier (2001) found that a majority of jurisdictions ruled that the donor is entitled to repossess the ring upon a broken engagement. When the couple mutually agrees to dissolve the engagement, the woman is generally obligated to return the engagement ring. When the decision to end the engagement is not mutual, courts may follow either fault or no-fault procedures. Furthermore, these same courts indicated that the true ownership of the ring transfers from donor to recipient once the marriage takes place. In other jurisdictions, judges did not rule that the donor was inherently entitled to the return of an engagement ring but instead considered which parties should be considered at fault in case for the dissolution of the engagement (Frazier 2001).

Aronow v. Silver (1987) addresses the legal history of dissolved engagements, criticizing the sexist and archaic nature of fault rulings. The ruling further notes,

Men, because it was a man's world, were much more likely than women to break engagements. When one did, he left behind a woman of tainted repudiation and ruined prospects. The law, in a *de minimis* gesture, gave her the engagement ring, as a consolation prize (quoted in Frazier 2001: p. 432)

Reviewing the legal foundations for engagement ring ownership in the United States may be illustrative to some degree, but the actual practice of engagement ring giving (and returning or reclaiming in the event of an unsuccessful engagement) is almost always governed by convention rather than by a strict application of the rule of law. As such, the legal context of engagement ring exchange in the United States is likely to be less relevant to engaged couples than is social convention.

6. Consumption and Signals of Resources

Men have historically been cast as providers in American culture and others, but this may be changing (Williams 1999). In his seminal examination of consumption, Veblen (1899) argues,

The basis on which good repute in any highly organized industrial community ultimately rests is pecuniary strength; and the means of gaining pecuniary strength, and so of gaining or retaining a good name, are leisure and a conspicuous consumption of goods (p. 52).

Engagement rings may be one way to signal not only resource control but also consumption, prestige, and social status. Prestige goods have minimal intrinsic value and primarily serve to convey information about social status or to enhance social status through their display. Some prestige goods are exchanged to cement alliances and build an expectation of future association, as with the classic example of inter-island exchange in the Trobriand Kula ring (Malinowski 1922). A game theoretical model supports the argument that prestige goods arose as reliable signals of skill and expertise and that a signaling system can invade a non-signaling society (Plourde 2008). Engagement rings may be a distinct type of prestige good that signals the status of both the giver and the recipient over long expanses of time. As engagement rings are often worn daily by women for many years, if not for the duration of the relationship, and the giver of an engagement ring is generally known to or presumed by outside observers, this represents a distinct opportunity for the gift to continue to signal information about both parties long after the ring was bestowed.

Weddings themselves can convey and reinforce status, as represented by the multibillion-dollar wedding industry and the media glut of bridal magazines (see Howard 2006 for a discussion of the economics of the wedding industry). Cherlin (2004) builds

upon the idea of weddings as status symbols in modern life by noting that elaborate weddings may represent the personal achievements of the couple, both in terms of showcasing the supposed stability of the relationship and demonstrating the financial wherewithal to arrange such a soiree. Of course, both the signals of relational stability and resource control may be faked through the availability of credit and the determination to project a positive depiction to observers. Furthermore, this may be complicated by variation in the parties who actually pay for weddings: the couple, the family of the bride, the family of the groom, or some combination thereof.

7. Hypothesis and Predictions

Although previous research has been conducted on the association between engagement ring cost and such aspects of mate quality as commitment (Camerer 1988) and resource control (Miller 2000), this undertaking is the first systematic attempt to examine the signaling value of engagement rings from an evolutionary perspective. Sexual selection theory (Darwin 1871; Bateman 1948; Trivers 1972) generates the straightforward hypothesis that ring expenditures will be positively associated with characteristics associated with male and female mate quality. Based on this framework, I present the following three major predictions and one additional avenue for investigation.

(1) Resource control: Among many nonhuman species as well as in many human societies, the value of males as mates is closely related to their ability to provide resources that females need for reproduction. As a result, some of the signals that males send to attract mates serve to advertise their control of resources. Following Miller (2000) and sexual selection theory in general, I predict that ring cost will correlate positively with male income.

(2) Commitment: In species in which males and females form long-lasting pair bonds and in which males provide resources or care that are crucial for offspring to survive and thrive, natural selection would favor females who avoid being deserted by seeking mates who provide indications of their commitment to the relationship. In our species, long-lasting pair bonds and paternal investment, while not universal, are quite common. Most Americans enter into marriage with expectations of both a long-lasting bond and parental investment. Males in such a situation would increase their chances of obtaining a mate by providing signals of their willingness to commit to the relationship. A long courtship may serve as such a signal of male commitment, as may engagement rings. Rings might be most useful as signals of commitment in situations where other signals of commitment, such as a long courtship, are lacking. Following that logic, I predict that ring costs would be higher where the length of courtship before engagement is shorter.

(3) Female age: Because youth and nubility have been demonstrated to be desirable characteristics in females from the point of view of males (e.g., Borgerhoff Mulder 1988; Buss 1989), perhaps due to their association with high fertility, I predict that ring cost would be higher for younger women.

(4) Traditional values: Following a suggestion from a colleague, I explored the question of whether ring cost is associated with American cultural beliefs about “traditional” weddings. Many Americans’ beliefs about wedding traditions include the idea, which is encouraged by diamond industry advertising, that a man should spend the equivalent of two months’ salary on a ring. Specifically, I tested the hypotheses that (a) younger women are given more expensive rings because younger couples place more

value on tradition than older couples, and (b) men who believe that it is important to their fiancées to have traditional weddings will buy more expensive rings than men who do not think that their fiancées value traditional weddings.

8. Methods

Methods for this study were previously reported in Cronk and Dunham (2007). I sent questionnaires to 1000 couples married between June and November 2001, in Franklin County, Ohio. Using such a narrow time frame within a single geographic area eliminates complications of economic, social, and cultural changes that take place over longer periods. Franklin County, which includes Columbus and most of its suburbs, has a total population of 1.1 million people, issues approximately 8,500 marriage licenses each year, and maintained its marriage license records online at the time that the data was collected (Franklin County Probate Court 2009). Each household received only one survey so that each would provide information about a different marriage; information was not solicited from both spouses within a single marriage. The questionnaire elicited information about the age, income, and marital status of the individual responding and of his or her spouse as well as information about their courtship, their engagement, the engagement ring if one was given, and their wedding ceremony. Surveys were accompanied by stamped, self-addressed envelopes for anonymous return. Surveys were sent in two rounds, a round of 510 in the summer of 2002 and a round of 490 in the spring of 2003. In response to the suggestion of a colleague, the latter round contained additional questions about traditionalness.

Five hundred surveys were addressed to husbands and 500 were addressed to wives. Of the full mailing, 255 surveys were returned by the post office as undeliverable.

Of the remaining surveys, 256 were returned by recipients, yielding an effective response rate of 34%. Given that a typical response rate for anonymous, unsolicited mail surveys that offer minimal incentives is 20% or lower, this response rate is notable and acceptable. Men returned 33% and women 67% of the 256 completed surveys.

9. Descriptive Statistics

The median male annual income in the sample is \$35,000, and the median female annual income is \$28,000. Most respondents, 61% of males and 73% of females, were in their twenties at the time of the proposal, with a mean male age of 30 and a mean female age of 27. Courtship length was defined as the time from the couple's first date to the time the ring was given, which sometimes differed from the date of the proposal, or, when no ring was given at all, the time from the couple's first date to the time of the proposal. The mean courtship length of thirty-four months is misleading because of a few very long courtship lengths, including one of more than twenty-five years. More meaningful indicators of central tendency for courtship length are the mode and median, which are both two years.

Proposals of marriage within the sample were almost always by made by men (97%) rather than women (3%). Rings were given in nearly all (95%) of the engagements. In 85% of the cases in which a ring was given, it was given at the time the proposal was made. In 84% of the cases in which a ring was purchased, the man was reported to have borne the entire cost. In marriages that included the purchase of an engagement ring, the mean proportion of the cost paid by the man alone was 89%, with 2% being the mean proportion paid by the female, and 9% the mean proportion paid out of funds shared by the couple at the time the ring was purchased. The mean ring cost was

\$3,857.55. As a percentage of the man's annual income at the time of the proposal, the mean ring cost was 11%. Excluding marriages in which no ring was given, the mean cost was \$4,079.44, which was 12% of the man's income in those cases. Both figures are lower than the two months' salary (i.e., 17% of man's annual income) guideline that the diamond industry promotes as a standard for engagement ring purchases. Women participated in the selection of the ring 42% of the time, men selected the ring without the woman 52% of the time, and no ring was given in 5% of the marriages. The woman's participation in the selection of the ring appears to have had little effect on the cost of the ring, as the mean cost of rings when women were involved in their selection was only \$133.34 more than when women were not involved. In contrast, the proportion of the man's income that was spent on the ring was, on average, three percent lower when the woman was involved in choosing it than when she was not. Neither difference is statistically significant.

Within the sample, 74% of cases were first marriages for both the male and the female, 10% were first marriages for the females but not for the males, and 6% were first marriages for the males but not for the females. The remaining 10% were not first marriages for either party. Men who had been previously married were significantly older and wealthier than men marrying for the first time. The mean age for never-married men was 26, while the mean age for previously married men was 45 ($t=-15.26$, $p<.001$). The mean income for never-married men was \$39,003.89, while the mean income for previously married men was \$64,417.39 ($t=-3.30$, $p<.001$). The highest male annual income reported in the study was \$500,000; 5 respondents reported \$0 male annual income.

Neither the male's nor the female's numbers of previous marriages had statistically significant effects on the cost of the ring in dollars, but both had statistically significant effects on the proportion of the man's income that was spent on the ring. Men getting married for the second or more time spent an average of seven percent of their income on the ring, compared with twelve percent for men marrying for the first time. Similarly, men marrying women who had previously been married spent seven percent of their income on the ring, while men marrying women who had not previously been married spent twelve percent of their income on the ring. This association between previous marriages and reduced ring cost as a proportion of male income is likely the result of the strong associations among male and female age, the likelihood that the male or female was previously married, and male income. In short, men and women who are remarrying are likely to be older. Older men, including those marrying previously married women or who were previously married themselves, tend to buy more expensive rings, but they make so much more money than younger men that the proportion of their income going into the purchase of the ring is much smaller.

Because the number of previous marriages did not have an association with ring cost that was separate from the association between age and ring cost, all marriages, including those in which the male or female had been previously married, are included in the following analyses. Similarly, because the participation of the woman in the selection of the ring has no effect on the cost of the ring, it is disregarded in these tests. There were no significant differences in ring cost, either in absolute terms or as a proportion of the man's income, between cases in which the ring was given at the time of the engagement and cases in which it was given at some later time, so that variable was

dropped from consideration. These analyses also disregard the sex of the respondent because sex also did not have statistically significant effects on any of the variables of interest.

3.6 Results

Some couples shopped for their engagement rings together or used the wife's or common funds to cover some or all of the cost of the ring. Because this study is grounded in the analogy with nuptial gifts among non-humans, the analysis here is limited to marriages in which either no ring was given ($n=13$) or in which the ring was given by the man at the time he made a surprise proposal of marriage ($n=114$). A linear regression model with the cost of the ring in dollars as the dependent variable and male income, female income, and female age at the time of proposal as independent variables was highly significant ($F=21.90$, $p<.001$, $\text{adj } R^2=.357$). Male income ($\beta=.508$, $p<.001$), female income ($\beta=.305$, $p=.001$), and female age ($\beta=-.318$, $p<.01$) are all statistically significant within the model and together they explain 36% of the variance in ring cost. These overall results are replicated in subsamples based on the sex of the respondent, making it unlikely that the patterns observed in the whole sample reflect female ignorance about male income or actual ring costs or male ignorance about female income. This major finding was originally reported in Cronk and Dunham (2007) and supports Predictions 1 and 3. The partial regression plots for this relationship are shown in Figure 3.1 below.

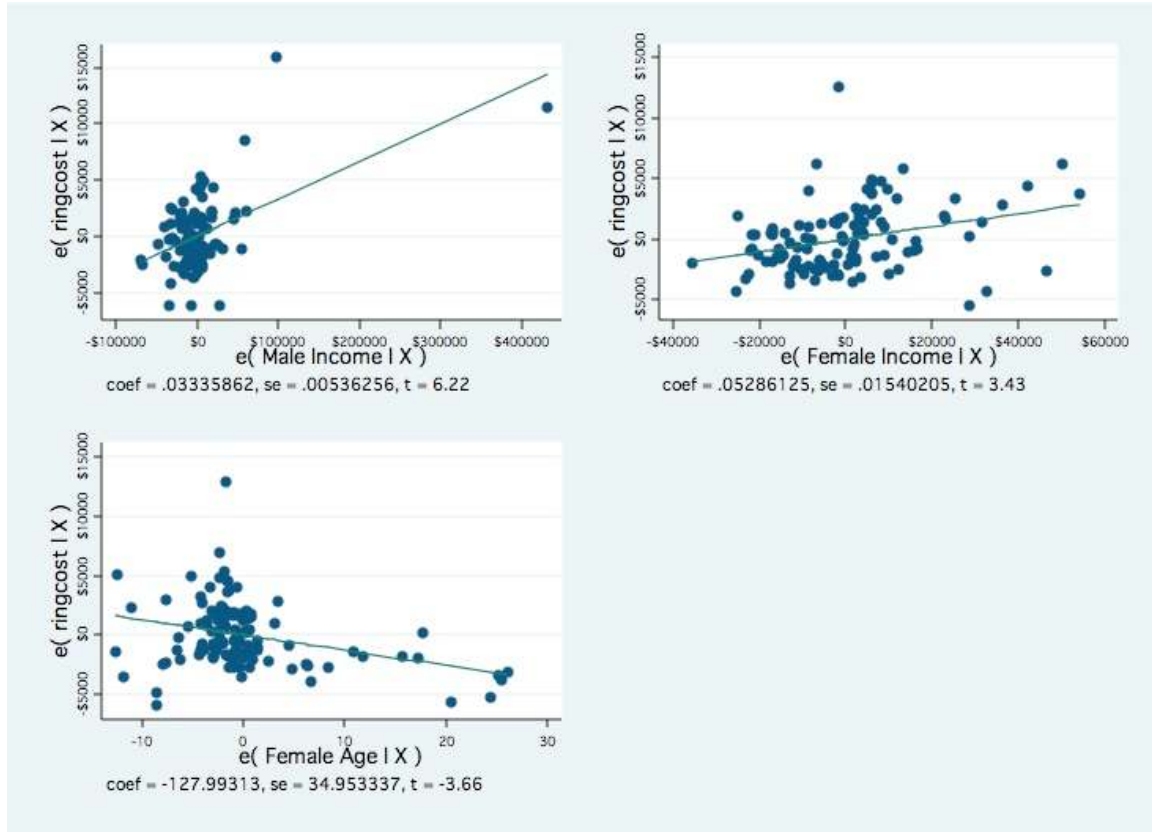


Figure 3.1: Partial Regression Plots for Regression of Male Income, Female Income, and Female Age on Ring Cost

As male income is the strongest single predictor of ring cost, it may be useful to examine ring cost across different wealth categories in addition to considering income as a continuous variable. The graph below shows mean and median absolute ring cost by quartile of male annual income.

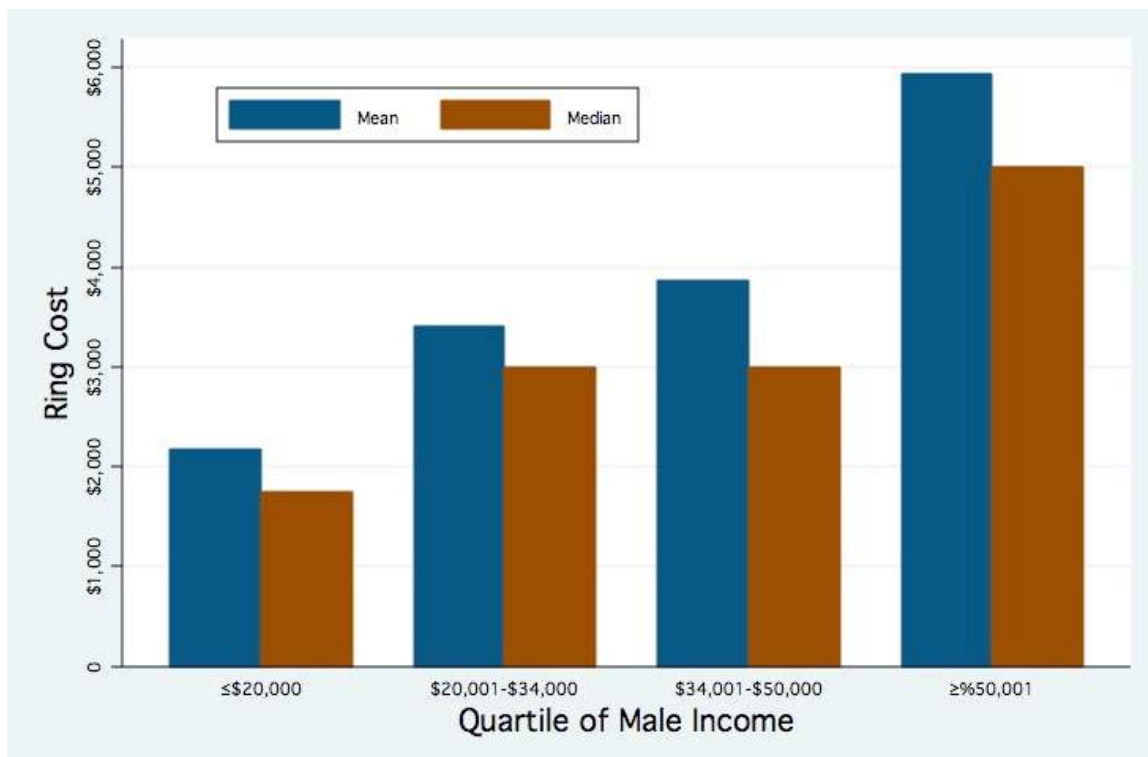


Figure 3.2: Mean and Median Absolute Ring Cost by Male Income Quartile

One-way t-tests in the predicted direction of lower absolute ring cost for lower-earning men show statistically significant differences in mean ring cost between the first and second income quartiles (mean=\$-1035.52, SE=\$517.14, $t=-2.002$, $p=0.025$) and between the third and fourth income quartiles (mean=\$-1949.58, SE=\$1047.74, $t=-1.861$, $p=0.034$), but not between the second and third income quartiles (mean=\$-209.67, SE=\$669.78, $t=-0.313$, $p=.378$). Along with the regression model, these hypothesis tests roughly confirm the results of Prediction 1, that ring cost will be positively associated with male income.

Despite the relationship between ring cost and male income, ring cost may not be an equally clear indicator of income across the wealth spectrum. People without large bodies of data and statistical training are likely to use a simple heuristic rather than a regression coefficient when estimating a man's income based on the cost of an

engagement ring he has purchased. Many people may use the idea, promoted by the diamond industry, that an engagement ring should cost the equivalent of two months' (17%) salary. In 75% of the cases in which a ring was purchased, a prediction based on this rule of thumb would be less than the man's actual income. In 73% of the cases, such a prediction would be more than \$10,000 above or below actual male annual income. In 45% of the cases, it would be more than \$20,000 away from actual male income.

The study did not begin with any predictions about proportional ring cost, but I decided to investigate the relationship between proportional cost and other factors during data analysis. The mean proportional ring cost was greatest for the lowest-earning quartile (20.37% of annual male income) and lowest for the highest-earning quartile (6.62% of annual male income). A two-tailed t-test showed a statistically significant higher mean proportional ring cost for men in the lowest-earning income quartile as compared to men in the second income quartile (mean=8.84%, SE=3.97%, $t=2.227$, $p=.030$). T-tests for the other two pairings of adjacent quartiles were not significant.

If one were to use rings as one's sole source of information regarding male income, one would systematically overestimate the income of poorer males and underestimate the income of wealthier males. As ring costs vary much less than male income, many males of widely disparate financial means will buy rings that cost roughly the same amount despite considerable variations in their incomes. Figure 3.3 depicts mean and median proportional ring cost by quartile of male income.

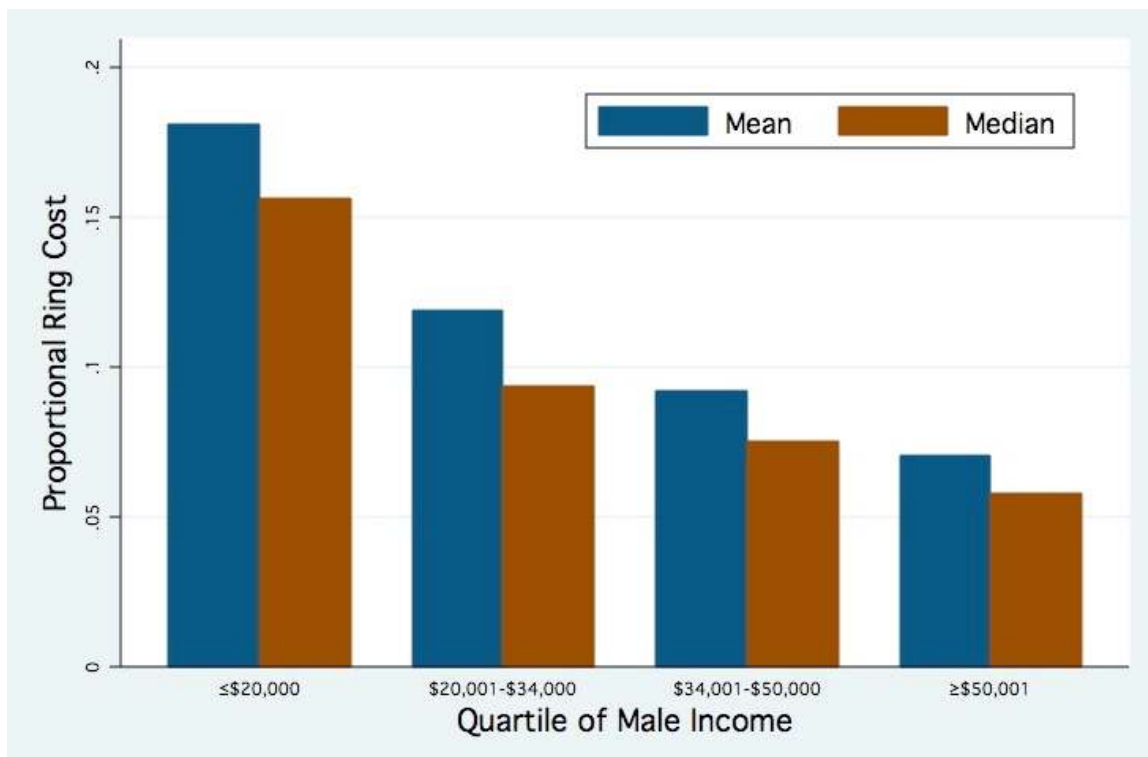


Figure 3.3: Mean and Median Proportional Ring Cost by Male Income Quartile

Given that most courtships last at least a few months and often several years, most American women have ample opportunities to gauge their prospective mates' income level prior to a proposal of marriage. For most of them, a ring would add little new information. If the ring were meant to convey information about the male's income to the female, then the relationship between absolute ring cost and male income could be expected to be strongest when the woman has had the least prior opportunity to gain information about his income, i.e., those courtships that were comparatively brief. To examine this, I split the regression of male income, female income, and female age on ring cost between quartiles of courtship duration. The table below shows the results of the analysis.

	<12 months	12-24 months	25-47 months	≥48 months
Male Income	.056 (.543)**	.110 (.794)***	.026 (.621)***	.034 (.393)
Female Income	.035 (.221)	.047 (.212)	.038 (.228)	.085 (.544)*
Female Age	-122.219 (-.408)	-239.046 (-.430)**	-98.964 (-.212)	-199.257 (-.624)**
Constant	2703.047	4796.247*	3860.359*	5567.735***
Adjusted R²	.221*	.626***	.412***	.302**

* p≤.05, ** p≤.01, *** p≤.001

Table 3.1: Regression of Male Income, Female Income, and Female Age on Ring Cost, presented by Quartile of Courtship Duration

Within the quartile of the shortest courtships prior to a proposal of marriage, those 12 months or less in duration, the model accounts for less variation in ring cost ($F[3,23]=3.45$, $p=.033$, $\text{adj } R^2=.221$ versus $F[3,110]=21.90$, $p<.001$, $\text{adj } R^2=.357$), but the coefficient for male income increases within the first quartile as compared to the full dataset ($\text{coeff}=.056$, $\beta=.543$, $p=.010$ versus $\text{coeff}=.034$, $\beta=.509$, $p<.001$). The strongest results were found in the second quartile, which included courtships from 12 to 24 months in length, wherein the model accounts for 63% of the variance in ring cost ($F[3,21]=14.41$, $p<.001$, $\text{adj } R^2=.626$) and male income is a substantial and highly significant covariant within the model ($\text{coeff}=.110$, $\beta=.794$, $p<.001$). As such, ring cost may not be as useful for estimating male income in the shortest courtships but may be useful in courtships that are briefer than the mean. This finding fails to straightforwardly support Prediction 2 but offers new opportunities for discussion.

To further examine the relationship between ring cost and male income across different courtship durations, I calculated the median and mean proportional ring cost for each quartile of courtship length. Two-tailed t-tests did not show a significant difference in mean ring cost between adjacent quartiles. However, a one-tailed t-test showed a significant difference between the two longest income quartiles in the opposite direction of the prediction, wherein the longest courtships were associated with higher ring cost as

a proportion of male salary ($x=-.069$, $SE=.037$, $t=-1.886$, $p=.032$). Furthermore, in the regression of male income, female income, and female age on ring cost by courtship quartile, male income failed to be a statistically significant covariate within the model only for the longest courtships, those longer than 4 years in duration. Figure 3.4 below shows the mean and median proportional ring cost by quartile of courtship duration.

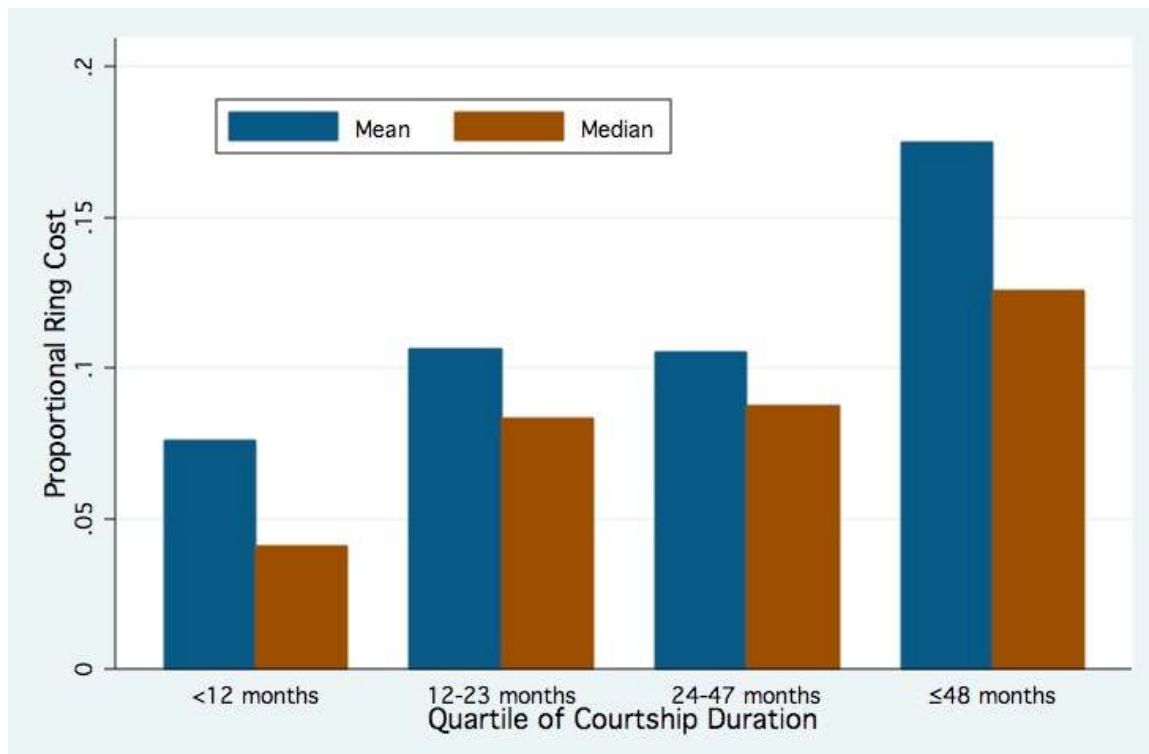


Figure 3.4: Mean and Median Proportional Ring Cost by Courtship Duration Quartile

Because a long courtship is often interpreted as a sign of commitment, high ring cost, either in absolute terms or as a proportion of male income, might be a way for a male to provide a signal of commitment despite a short courtship. Including courtship duration in the regression of male income, female income, and female age on ring cost fails to improve the model ($F[4,107]=16.58$, $p<.001$, $\text{adj } R^2=.360$) and courtship duration is not statistically significant within the model ($\beta=.088$, $p=.252$); the other covariates

remain statistically significant. These findings fail to support Prediction 2.

Borgerhoff Mulder (1988) found that bridewealth payments among the Kipsigis were higher for younger brides. When older men marry younger women, evolutionary theory would predict higher ring expenditures. The regression model for male income, female income, and female age on ring cost remains statistically significant when the difference in age between husbands and wives (scaled husband's age-wife's age) is added as a covariate ($F[4,109]=18.29$, $p<.001$, $\text{adj } R^2=.380$) and age difference is significant within the model ($\beta=-.187$, $p=.027$). However, this finding is in the opposite of the expected direction, with greater age differences between husbands and wives being associated with lower, not greater, ring cost. This may in part be due to the strong association of ring cost and male income. The graph below shows the mean and median male income for marriages where husbands were less than five years older than wives or were younger than wives as compared to marriages where husbands were five years or more older than their wives. This finding continues to support Prediction 3 but does not support a corollary of that prediction, the idea that ring cost would be higher still with increases in the age difference between prospective brides and their suitors.

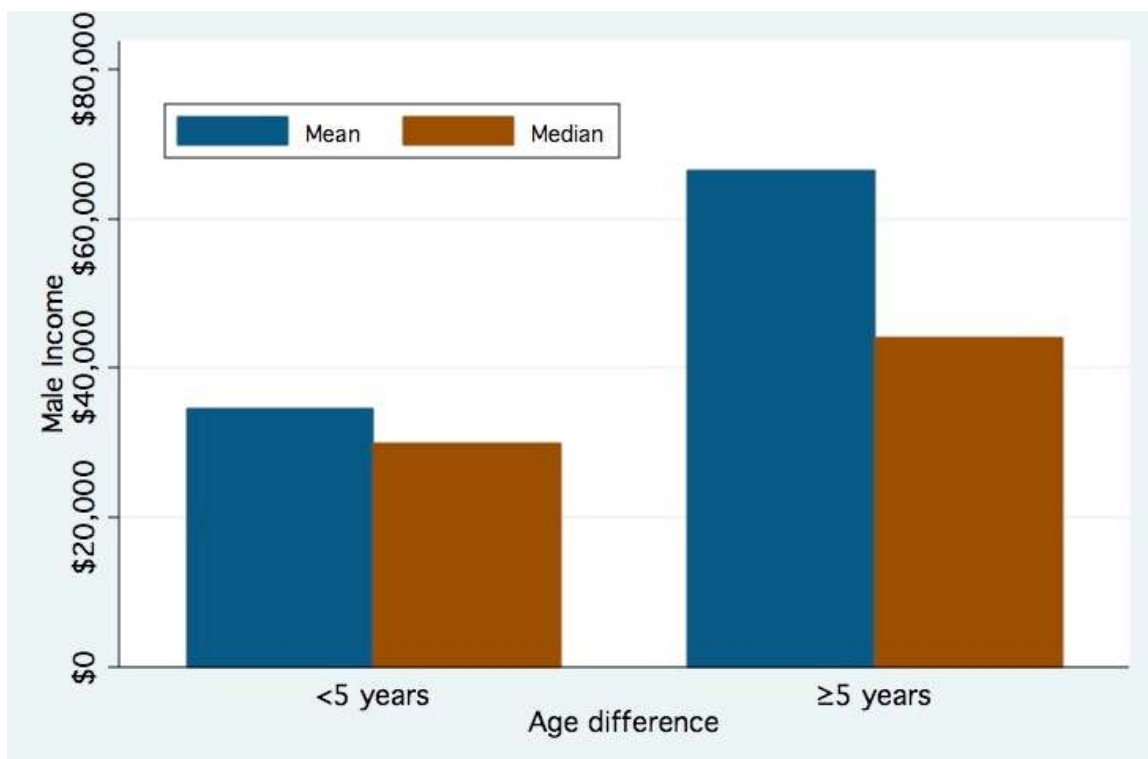


Figure 3.5: Mean and Median Male Income by Age Difference Between Spouses

In response to a preliminary report of these findings, a colleague suggested that younger women may receive more costly rings if younger people are more likely to value what they perceive as traditional weddings, perhaps including a relatively expensive ring. To test this idea, the second round of the survey included questions about the value that the respondent and his or her spouse placed on having a traditional wedding and about how traditional the actual wedding was. This allowed respondents to define “traditional” for themselves and also gave them the opportunity to express a preference for a more or less “untraditional” wedding as well as a more or less traditional one.

Few women (14%) and very few men (3%) expressed even a weak preference for an untraditional wedding. Similarly, few women (15%) and men (6%) attributed such a preference to their spouse. This pattern of responses suggests that there is a scale on this issue that ranges from a strong preference for a traditional wedding to no preference

either way but that seldom extends to a strong preference for untraditional weddings. For that reason, for purposes of analysis I collapsed the few responses that indicated a preference for a nontraditional wedding into the “no preference” category to form a combined category of “no preference for a traditional wedding”.

There is little evidence that the relationship between ring cost and female age is driven by a relationship between age and traditionalness². A regression of both husband’s and wives’ desires for a traditional wedding along with the traditionalness of the wedding on ring cost is not statistically significant ($F[3,116]=1.33$, $p=.269$, $\text{adj } R^2=.008$). Likewise, a regression of both husbands’ and wives’ desires for a traditional wedding along with the traditionalness of the wedding on female age is also not statistically significant ($F[3,107]=.34$, $p=.797$, $\text{adj } R^2=-.018$)³. These findings indicate that traditionalness is unlikely to account for the association of greater ring costs with younger brides.

One interesting finding does emerge when examining responses to these questions by the sex of the person responding to the questionnaire. Women’s responses to the question about how important it was to their spouses to have a traditional wedding correlate significantly with the cost of the ring as a proportion of male income ($F[1,77]=5.93$, $p=.017$, $\text{adj } R^2=.059$; Spearman’s $\rho=.234$, $p=.038$). However, men’s responses to the question about how important it was to them to have a traditional wedding show no such correlation ($F[1,31]=.28$, $p=.602$, $\text{adj } R^2=-.023$; Spearman’s

² The full set of responses, rather than the set filtered for cases where engagement rings were given upon a surprise proposal of marriage or no ring was given, were used for the analysis of questions related to traditionalness. This is because these questions investigate focus upon the ring as a signal rather than as a nuptial gift. This also meaningfully increases the sample size for the analysis, as questions about traditionalness were only asked in Round Two and only 57 surveys were returned that included information about traditionalness where either no ring was given or an engagement ring was given upon a surprise proposal of marriage.

³ Adjusted R^2 is negative due to the very small non-adjusted R^2 value of .009.

$\rho=.086, p=.634$)⁴. This leads to the speculation that women may be interpreting a costly ring as a sign of how much the man values a traditional wedding when the men themselves report no such connection. Thus, in this instance, the ring serves as a false indicator of the man's values, though these data cannot determine whether this is in any way intentional.

11. Discussion

11.1. Costly but worthless gifts

According to biologically-oriented models of gift-giving in courtship, a suitor may bestow one of three different categories of gifts: (1) a cheap gift, with no cost to the donor and no benefit to the recipient; (2) a valuable gift, with a considerable cost to the donor and a considerable benefit to the recipient; or (3) an extravagant gift, with a considerable cost to the donor but no true benefit to the recipient (Sozou & Seymour 2005). From an evolutionary perspective, engagement rings would likely fall into the third category, that of the extravagant gift that requires a substantial investment on the part of the donor but that offers no benefit to the recipient. As such, the signaling value of engagement rings may best be viewed as a case of a "costly but worthless gift" (Sozou & Seymour 2005). Within this view, a gift that is costly to the male but without intrinsic value to the female may signal the male's intention to not desert the relationship. A courtship gift given to a female therefore conveys meaningful information about a male if willingness to provide the gift is correlated with the male attribute of interest, such as commitment. The element of intent is what separates this type of signaling from handicap signaling (Zahavi 1975), wherein the ability to convey the signal is constrained

⁴ Adjusted R^2 is negative due to the very small non-adjusted R^2 value of .009.

by the difficulty or impossibility of faking the signal.

Because engagement rings can be very costly to purchase but provide little intrinsic benefit to the recipient, they may best be interpreted with a costly but worthless model of gift giving. Sozou and Seymour (2005) contrast “extravagant” gifts, which are costly for the male to provide but worthless to the female, with “cheap” ones, which cost the male nothing and are worth nothing to the female, and “valuable” ones, which are costly to the male and worth something to the female. Both extravagant and valuable gifts serve as costly signals of male quality, but extravagant gifts have the added benefit to the male of preventing “gold-digging,” i.e., acceptance of the gift without subsequent mating, by females. Because engagement rings can provide some material benefits to the female if sold, they might fall in the “valuable” category. However, because the amount of money usually obtained through the sale of a ring is unlikely to be much more than the economic and social costs of divorce or a broken engagement, it seems more appropriate to think of them as “extravagant” courtship gifts. This is further complicated by legal consideration of engagement rings as conditional gifts that must be returned to the male upon a broken engagement (Frazier 2001).

In regard to costly but worthless gifts given in courtship, Sozou & Seymour (2005) remark, “If the gift is valuable to the female, the male faces the risk of having the gift accepted by a gold-digging female who will ultimately not have his progeny.” Please note that Sozou and Seymour were writing for an audience of animal behaviorists, not people thinking about engagement rings; however, their point is still germane to the current example. In human courtship, there is the risk that the female may abscond with the ring. However, this is mitigated by the cultural and legal conventions that a woman is

expected to return the ring in the case of a terminated engagement and by the likely emotional baggage that comes with keeping an engagement ring after a romantic dissolution. Frazier (2001) notes,

[A]fter an engagement is broken, the ring, while once given on the glittering promise of betrothal and a token of the parties' commitment to each other, only remains a symbol of lost love and unfulfilled dreams, and unlikely deemed a notable memento for the jilted party (p. 437).

Furthermore, the resale value of diamonds is notoriously poor (Shissler 2006) and it is highly unlikely that a woman would be able to recoup her ex-fiancé's monetary outlay. This further argues against the notion that many women may be inclined to enter into engagements to marry expressly for the purpose of securing a ring, only to later break off the engagement and keep the ring.

An important assumption of Sozou and Seymour's (2005) model is that desertion is possible, whether by a male who wants to mate with a female but not invest in her offspring or by a female who wants to obtain resources from a male without reproducing with him. If desertion is difficult, then selection may favor valuable gifts rather than extravagant ones. Like extravagant gifts, valuable gifts would benefit females by signaling male quality, but they would also benefit non-deserting males and females through the resources they provide. Comparing situations that only differ in the ease with which mates can be deserted could test this. Variations in divorce laws among legal jurisdictions may provide such an opportunity. My prediction is that males will spend less on extravagant gifts, including engagement rings, and more on valuable ones (e.g., housing) where divorce is more difficult.

The acceptance of the ring is a signal from the female to the male that she will marry him and will, in many cases, bear his children. This signal is viewed by the

female's social network, including family, friends, and colleagues; defection from the plan carries the opportunity for social sanction. As such, engagement rings are not likely to be sought after by insincere "gold-diggers," unlike some other potential gifts, as the acceptance of an engagement ring brings with it a public acknowledgement and daily reaffirmation of the woman's future commitment, a promise that might be hard to abandon without deleterious reputational repercussions. As such, accepting a ring upon a proposal of marriage indicates female commitment yet to come just as the cost expenditure of the ring signals male commitment already outlaid.

The association between female youth and ring expenditures is consistent with other inquiries into men's mate preferences and with expectations derived from sexual selection theory regarding those preferences (see Schmitt 2005 for review). As female income also has a positive effect on ring cost, this suggest that men in this sample may view female resource control as contributing to female mate value, consistent with Gaulin & Boster's (1990) finding that dowry may reflect female competition for mates. Unfortunately, the current study design cannot differentiate whether the response is driven by the income itself, characteristics associated with income (such as work ethic or a sense of responsibility), or some combination of the two.

Recently, Seymour and Sozou (2009) modeled courtship as a long-term game between females and males of variable quality. The model indicated that lengthy courtship, including the giving of costly but worthless gifts, represents an evolutionarily stable strategy for males to obtain mates and for females to ensure the quality of their suitors. Seymour and Sozou's (2009) model of courtship duration as a signal of commitment complements the finding in this project that proportionately more expensive

rings were associated with lengthier courtship duration.

11.2 Inefficiency of Rings as Signals

Male income is the strongest single predictor of ring cost. While this result is not surprising, the amount of available funds that a man chooses to devote to the purchase of a ring may convey still useful information to his romantic partner. For example, women generally are able to make observations about their suitors' overall spending habits prior to a proposal of marriage. A comparison of the apparent cost of an engagement ring against a man's more general consumption habits may convey information to his prospective wife regarding his willingness and intentions to invest in her and their children. Furthermore, the cost expenditure on an engagement ring is not an unfakeable signal of male resource control. Men who are very wealthy tended to give rings with a greater absolute cost than men of more modest financial means, but lower-income males gave rings that constituted a greater relative proportion of their salaries.

Thin slicing, a cognitive micro-process noted by psychologists (e.g., Albright et al. 1988; Borkenau & Liebler 1992) and popularized by Gladwell (2005), is the idea that observers generate remarkably accurate impressions in very brief social encounters regarding a wide range of different characteristics. In a thin-slicing study, viewers accurately predicted participants' socioeconomic status after viewing brief video clips of casual conversation (Krauss & Keltner 2009). Women's beliefs about their suitors' resource control can begin with thin-slices of early interaction. The length of time spent in courtship, involving not only gifts but also conversations about work and finances, offers a spread of information about the resource control of both parties in the marriage. It is reasonable to presume that a woman already has a strong idea about her suitor's

economic status well before they become betrothed. Moreover, many couples have joint checking accounts, shared mortgages, and other comingled financial affairs during courtship.

This study predicted that ring costs would be higher for the shortest courtships, those less than one year in duration, due to the lesser opportunities for women to learn about the financial resources of their suitors in a brief courtship. This was not the case. However, courtships between one and two years in duration did show the strongest association between ring cost and male income, with approximately 11 cents from each dollar of male yearly salary contributing to the ring cost beyond the effects of any other factors. As the median courtship duration was 24 months and the mean was 32 months, this indicates that ring cost may be a stronger indicator to prospective brides of their husbands' economic prospects where courtship is shorter than average but not exceptionally short. Perhaps very brief courtships are characterized by some other factor, not included in this analysis, that depresses the relationship between ring cost and male income. Two possibilities are that engagements after brief courtships could be precipitated by pregnancy, which may depress ring cost (e.g., Borgerhoff Mulder 1988), or by invigorated feelings in a "rebound" relationship, which may not have an effect on ring cost in either direction. It would have been useful to collect information on pregnancy during courtship, previous children of both parties, and previous relationship history, but questions about such sensitive matters might depress response rate in a survey format.

Proportional ring costs were highest for the longest quartile of courtship duration, contrary to the study predictions. It may be that ring cost as a proportion of male income

is indeed a sign of the male's commitment to the relationship, but that rather than compensating for the lack of other such signs it duplicates existing signals, such as courtship length. Such reinforcement is often a design feature of signal systems because it reduces ambiguity (Bradbury & Vehrencamp 1998). Alternately, high proportional ring costs associated with lengthy courtships may attempt to compensate for a perceived hesitancy on the male's part to embark on a more formalized commitment.

Female age also impacts ring cost, with younger brides receiving more expensive rings when male and female income are both controlled for. This is consistent with evolutionary hypotheses that males value female fertility, for which youth is a direct proxy. Female income, itself another measure of female mate value, is likewise a significant predictor of ring cost. These findings imply that both a woman's potential biological and economic contributions to the family may impact ring cost. The gift of an engagement ring will certainly not "tell" a prospective bride how old she is, but the real association between ring cost and female age may reflect the manifestation of ancient strategies within a contemporary setting.

12. Limitations and Considerations for Future Research

This study was exploratory and limited by the impersonality and brevity of a survey-based methodology. For example, because I obtained the sample from marriage license records, it only includes cases in which the proposal of marriage was accepted and where the marriage actually took place. Ideally, a study like this would also include cases in which suitors proposed marriage and were rejected, including both cases where rings were offered and where they were not. Systematically reaching a representative sample of spurned suitors would be highly improbable given that no widespread registries

of all marriage proposals exist, in contrast to wedding license registries for marriages that have occurred.

The necessarily brief survey design may have increased the response rate (due to lessening the nuisance of completing the survey and by avoiding a number of potentially sensitive or upsetting topics), it limited my investigation to very narrow parameters of mate choice, namely resource control and age. Future studies of gifts given in courtship, especially engagement rings, should seek to include more indicators of mate quality. Conventional indicators in anthropological and psychological research on mate value have included waist-hip ratio (e.g., Singh 1993), fluctuating asymmetry (e.g., van Valen 1962), facial masculinity and femininity (e.g., Perrett et al. 1998), sociosexuality (e.g., Simpson & Gangestad 1991), and other aspects of behavior and personality (e.g., Miller 2000). This would further ground inquiries into the evolution of consumption within the existing sexual selection literature.

One way to investigate the notion of exclusivity, but not true costliness, of gift giving is to discuss social sanctions against one man giving extravagant gifts to multiple females in courtship simultaneously. Outwardly observable gifts may curtail a man's ability to seriously court multiple females at the same time, but time expenditures and statements of commitment may be stronger signals than gifts.

It would also be useful to obtain long-term data about the success and failure rates of marriages along with data about engagement rings. This would allow for an examination of commitment based on marriage length. In addition, future studies of engagement rings as signals should explore the possibilities that such rings may serve as signals to outside parties, including but not limited to romantic rivals. Finally, some of

the issues regarding the interpretations and misinterpretations of engagement rings as signals may be better suited to a methodology relying upon detailed interviews or otherwise more qualitatively rich data rather than a large quantitative survey design.

Chapter 4: Expectations about Spousal Obligations

1. Introduction

Historically, anthropologists have depended largely upon interviews to better understand people's engagement in and interpretation of social phenomena. However, interview data itself can be inaccurate and unreliable. Interview responses may be misleading due to a range of factors, including differing interpretations, discomfort, and reputational concerns. Allan (1980) notes that interview data may not be reliable because interview responses are limited by interviewees' own knowledge and experience and because interviewees may choose to not disclose information that they believe would damage their reputation in others' opinions. Recognizing the shortcomings of interview data, researchers studying human relationships have attempted to assess the reliability of interview data as compared to other means of data collection (Ellis 1947; Walters 1960).

This study takes a quantitative, empirical approach to understanding variation in the content and delivery of interview statements about spousal obligation given by husbands and wives in Utila, one of the Honduran Bay Islands. The experimental element within this study focuses on audience effects, wherein participants' responses to interview questions vary depending upon the interview context. Altering the audience present at the time of the interviews may introduce audience effects, which previous research (Aquilino 1993; Aunger 1994; Cronk 1998; Cronk et al. 2009) has indicated provide a meaningful manipulation in the interpretation of interview data. This study sought to untangle the notions of spousal obligation in a remittance economy by using audience effects to explore the distinctions between individual interview statements and cultural norms. I was particularly interested in sex differences regarding fidelity and

financial obligations and in how those differences might be amplified when individuals were interviewed with a spouse present. Such interviews would provide individuals with an opportunity to communicate expectations about behavior.

Fieldwork for this project was conducted concurrently with research on parent-child relationships (Cronk et al. 2009) and cooperation among dive shop operators (Cronk & Steadman 2002). Cronk et al. (2009) arose from similar hypotheses and used the same experimental framework as the current study.

2. Interviews as Experiments

Nearly three decades ago, Marcus & Cushman (1982) referred to the emergence of experimental ethnographies and addressed the ways that experimental ethnographers seek to improve the accuracy and reliability of interview data. Textualist critiques promote an awareness of the ways in which an ethnography is a constructed object rather than an objective representation of reality. Marcus & Fisher (1986) use the textualist critique to promote the project of “experimental ethnography,” stripping away anthropologists’ claims to authority through the inclusion of multiple voices and historical texts along with the anthropologists’ own autobiographical recollection of the fieldwork process.

Aunger (1995) reviews the history of textualist critique in anthropology and notes that “[b]ecause it is difficult to know whether ethnographic statements are based on anything more than personal impressions, many ethnographies are convincing only to the degree that the ethnographer has mastered rhetoric (as shown by the fact that the most respected ethnographers tend to be the best writers)” (97). Textualists believe that, due to the interpersonal nature of anthropological studies, scientific ethnography is impossible

(Marcus & Clifford 1986). Aunger (1995) and Cronk (1998) both argue against this interpretation, proposing instead that any ethnography that seeks to be scientific must simultaneously address the textualist challenge and adhere to the requirements of scientific inquiry. Cronk (1998) notes that “[s]cience is located not in the methods of data collection, but in the way questions are phrased, ideas are tested, and knowledge claims are made” (325). The textualist critique contributes to anthropological science by illuminating the ways in which ethnography makes scientific inquiry more difficult in anthropology than may have once been thought, thereby giving scientific anthropologists an awareness of impediments (Cronk 1998). Cronk (1998) emphasizes anthropology’s role as a historical science, drawing an analogy between ethnographic text formation processes and archaeological site formation processes, wherein in both cases it is essential for the researcher to understand how his or her data came to be made.

This scientific approach to interviewing is complementary to Briggs's (1986) sociolinguistic attention to interview context as an important element in interviews' construction and interpretation and thereby a crucial factor within analysis. In criticizing researchers' reluctance to view themselves as integral to the interview process, Briggs (1986) notes, "Both our unquestioned faith in the interview and our reluctance to adopt a more sophisticated means of analyzing its findings emerge from the fact that the interview encapsulates our own naive theories of communication and reality" (p 3). Attention to audience effects and other elements of interview context conveys an awareness of interviews as constructed speech acts in which the researcher is not a passive observer but instead affects the data that is produced.

Previous research has shown audience effects in interviews and more general

effects of relationships on communicative processes. Won-Doornick (1985) found that increased closeness of opposite-sex friendship was negatively correlated with reciprocal self-disclosure in communication. Aquilino (1993) found that spouses interviewed together gave qualitatively different interview responses than married individuals interviewed alone, with spouses interviewed together providing more positive assessments of the utility of marriage, higher estimates for their spouse's contribution to housework, and a lower estimate of the possibility of divorce. Allan (1980) advocates interviewing spouses together in sociological research, both because the interaction of the couple during the interview could lead to a fuller discussion and explanation of the subject matter than would be obtained when individuals were interviewed alone and because the interaction of the couple during the interview represents data that could not otherwise easily be collected.

The research in this study largely follows the protocol established in Cronk et al. (2009), which examines audience effects in interviews about remittances and obligations between Utilian parents and adult children. These two studies use data collected in the same field season and with an overlapping subject pool. Major findings from Cronk et al. (2009) support the use of audience effects in interview contexts as an important tool for anthropology. Particularly, Cronk et al. (2009) found that children interviewed in the presence of their parents used a more forceful communicative style than did children interviewed alone when asked about children's financial obligations to their parents but not when asked about other aspects of familial relationships.

3. Ethnographic Background on the Caribbean

As the ethnographic literature on Utila is limited, it may be instructive to consider

Utilian social life within the context of Caribbean culture more broadly. Utilian society differs somewhat from other Caribbean societies due to its history, economy, and geography; nonetheless, the wealth of Caribbean ethnography provides a useful and relevant starting point for a discussion of the Utilian case. In this section, I provide a generalized examination of the Caribbean marriage and family. The next section will provide a more detailed treatment of the specific Utilian fieldsite.

Adult long-term cohabitational relationships in the Caribbean generally take the form of conjugal unions rather than state-recognized marriages. These relationships are usually categorized as non-legal and temporary (Barrow 1996), which may be inaccurate and offensive. Further, as a result of the seemingly “non-legal” nature of most adult sexual unions, a considerable number of children are classified as “illegitimate.” However, it is unclear exactly what a concept such as “illegitimacy” means to the actual people in question when “legitimacy” is only accessible to a small proportion of the population. The notion that a proper family must consist of a legally married, heterosexual adult pair and children of that couple neither derives from the social structure of the Caribbean nor reflects it. Imposition of such an expectation upon Caribbean families clashes with the ways in which life is actually experienced for many Caribbean people.

Traditional views of Caribbean conjugal relationships have characterized such involvements as promiscuous or unstable. In particular, M. G. Smith (1957) takes a decidedly negative view towards relationships among members of the lower class in the Caribbean, characterizing such unions as “brittle, diverse in form and consensual in base” (p. i). Newer research, however, interprets such unions as adaptive and beneficial

(Barrow 1996). While it is ethically problematic and inappropriate to suggest that some family structures are superior to others, it remains that certain legal unions qualify their partners to receive more benefits than other relationships, both explicitly, in terms of greater governmental incentives and implicitly, in terms of greater social acclamation. As such, there are disadvantages that those in common-law marriages or other non-legally married cohabitational relationships face in comparison to their married peers. The ways in which these relationship dynamics and their concordant socio-legal implications affect the lives of those individuals provides one lens through which to view how the meaning of courtship and social relationships is created in the Caribbean.

Even as scholars discuss the Caribbean family, they note that family form is not a homogenous entity. Rather, they note the multitude of familial forms present, both for the Caribbean as a large region and specifically for the societies being examined. Commonalities of these focus upon matrifocality as the primary organizer of Caribbean families and extended or extra-household family units. R. T. Smith (1982) in particular addresses the distinctive role of women, the seemingly scattered pattern of residence, and class distinctions in marital forms found among Caribbean societies.

Beyond comprehensive analyses of Caribbean kinship components, scholars have also attempted to classify and characterize the assorted forms of adult sexual associations and family structure. Evans and Davies (1997:4) delineate four basic forms of Caribbean households: [1] the marital union, wherein the couple is bound in a legally-recognized marriage, [2] the common-law union, in which a couple cohabitates in a non-transient fashion but is not legally bound, [3] the visiting union, wherein the mother still lives within her natal household and [4] the single-parent household, usually with a female

parent. Interestingly, the authors claim that 60% of children in the Anglophone Caribbean are reared by both parents and 30% are raised by their mothers alone; households where fathers are present often begin as visiting unions and later become either common-law unions or legally-recognized marital unions (Evans & Davies 1997; Powell 1986). Family structure varies between different Caribbean societies as well as between classes within the same society. In Saba, a small Anglophone island in the Dutch Antilles, most marriages are legally-recognized and divorce is uncommon (Crane 1971).

The presumed instability of Caribbean family structure meshes conceptually with the inherent social organization envisioned in M. G. Smith's (1965) plural society model (Barrow 1996). In Smith's reckoning, each segment of society, divided ethnically or otherwise, has its own social structure. Within this, each group has its own kinship system and distinctive pattern of interpersonal relationships. As such, marriage would be expected to vary in ways consistent with other characteristics, such as race, class and ethnicity.

The degree to which Caribbean societies are interpreted as matrifocal, matrilineal or matriarchal is contested amongst scholars of the Caribbean. R. T. Smith coined the term "matrifocal" to describe the particular way in which Caribbean people center their family lives around maternal ties (1973). Men in the Caribbean have long been regarded as "marginal," although this is beginning to be called into question. This marginality, if it is an accurate understanding of the role of men in Caribbean society, indubitably impacts the formation and meaning of social relationships between sexual partners and within the associated kin network. Like many social constructs within the Caribbean, male

marginality is enmeshed in class distinctions. Men are traditionally envisioned as more essential to family life among wealthier classes, as such men are more frequently bonded to women through legal marriages and are expected to financially invest in the household. Within the lower classes, males are considered to be more marginal, due to their lower economic status and alleged carousing behavior. However, Alexander argues that the marginality of males is not merely characteristic of the Jamaican lower class but also applies to middle class males as well (1997). As such, male marginality must be approached as an epiphenomenon within the Caribbean, occurring in multiple, if not all, societies, across different class groupings, and having an impact on a multitude of relationships and expectations within social life.

Male marginality derives from the discordance at the juncture of matrifocality and the dominant social ideals of “respectability” and “reputation,” as schematized by Peter Wilson (1969). Wilson proposed a model of reputation and respectability in contrast to the conventional preoccupation with the family and domestic structure within Caribbean ethnography (1969). Both reputation and respectability confer status upon members of the community and are recognized as valued qualities by the society. In Wilson’s envisioning, reputation is essential to understanding interaction within a community, is of greater concern to males than to females, is valued by the lower class, and may represent a rejection of Eurocentric social norms. Conversely, respectability hinges upon the external system, is of greater concern to females than to males, is valued by the upper class and may suggest an attempt to adhere to Eurocentric social norms. Wilson (1969) emphasizes that respectability is an external phenomenon, based on conformity to the values of the total society, whereas reputation is more internally defined and experienced.

The ideals of male reputation, which affirm sexual conquest, carousing, and fraternization on street corners, are at odds with the classical notion of an emotionally devoted father prototype. Further, males appear marginal because they do not economically contribute to the household and family to the degree that males often do in other cultures and because the biases of researchers lead them to classify such men according to those standards (Barrow 1996). Due to this emphasis on financial provisioning in an area that is often characterized by poverty, men who do not support their partners and offspring are interpreted as inessential for the functions and maintenance of family life.

Virility is also a key component of male pride and reputation. According to Miller (1991), calypso music expresses that “the main way a man can fail a woman is by his sexual inadequacy” (p. 332). Men are strongly pressured to perform as stalwart and ardent lovers, losing stature in the eyes of the broader society as well as in the estimation of their partners if they fail to do so. In addition to the focus on virility, gender roles and implications of reputation and respectability may also be seen within the pattern of alcohol-consumption in Rum Bay, Tortula, one of the British Virgin Islands. In the 1970s, male reputation in Rum Bay was said to rest largely on “heavy drinking and carousing,” whereas respectable women were expected to not imbibe at all (Dirks 1972: 573). Similarly, Besson notes that the men of Martha Brae, Jamaica “meet in rum-shop crews for dominoes and drinking” (1993:199).

So, while female respectability is perceived as refined, polite and gentle, male reputation is interpreted as sturdy, boisterous, and assertive. The schema of reputation and respectability dictates that men be virile and women restrained (Wilson 1969). In the

Spanish-speaking Caribbean, the source of *respeto*, defined by Lauria (1964) to mean “a proper attention to the requisites of the ceremonial order of behavior and to the moral aspects of human activities” (p. 56), varies for men from place to place. In some cases, drinking is the primary source of masculine pride, but, in others, fighting ability is associated with manliness. Being an able economic provider also contributes to the estimation of a man’s reputation (Wilson 1969), as well as impacting the degree to which males, in general, are classed as marginal.

While wage-based employment enhances a man’s reputation, it may call a woman’s respectability into question. The notion of feminine respectability is challenged by the economic and social roles women perform outside of the household. When women’s extra-familial employment began to be demographically noted, their role as wives came into question. Along with this transition, women were simultaneously spoken of as “mothers” and as “workers,” but less was written about “wives” in the scholarly literature (Barrow 1996). As such, meeting the essential needs for family subsistence resulted in a loss of status for women, at least insofar as marriage is considered a valued social ideal. At the same time, this external employment lessened the consideration of Caribbean women as wives within the academic canon.

Although female employment contrasts with the social value of femininity, such employment is frequently vital for the family’s economic survival. Yelvington (1996: 317) discusses the ways in which, regardless of a commonly held value of respectability, women have engaged in employment outside of the home. He notes that Caribbean women have historically participated in wage-labor and continue to do so, but that their status in the workplace is often low and their treatment disempowering.

For women of all classes and ethnic backgrounds, motherhood is perceived as a dominant value in the Caribbean. Maternal virtue is a source of considerable pride for many Caribbean mothers and is sought after by women who have not yet given birth. In the broader society, motherhood is also largely regarded as the proper role for women to fulfill. Female identity is strengthened, both in one's own estimation and in the eyes of society, through childbirth (Evans & Davies 1997:4-5). In some areas of the Caribbean, there is considerable pressure to conceive early in life. In rural Jamaica, females are expected to bear children by the age of seventeen and are regarded as "mules" if they have not yet become mothers at that age (Leo-Rhynie 1997: 39). Further, although a woman's respectability may derive largely from marriage, motherhood is also a key route to female increase in social esteem (Besson 1993). As such, low-status women may rise in status by bearing a child, regardless of their involvement with a marriageable man or lack thereof. Coupled with the dominant social value of motherhood comes strong pressure against the use of contraceptives. The stigma against the usage of birth control is largely attributed to biblical exhortations to procreate (Leo-Rhynie 1997). As the Bible instructs women to "be fruitful and multiply" (Genesis 1:28), Caribbean women follow suit. As a result, Caribbean families may be considerably large. It is a common practice for children to be sent to reside with relatives or friends of the family in cases where the mother lacks sufficient financial or personal resources.

Despite the civic emphasis on legal marriage in such places as Jamaica and Cuba (see Smith 1957 and Fernandez 2003), legal marriage might be totally irrelevant to women of the Caribbean due to a supposed dearth of marriageable men. In the mid-Twentieth Century, Clarke (1957) noted that it was improper for a Jamaican man to

propose marriage unless he owned a house, preferably along with some land. Economic stability and a relative level of affluence have been classically considered essential in order for men to be considered marriageable in the Caribbean. This can, in some cases, lead to an acrimonious double standard wherein male and female expectations clash. Barrow notes, “[W]omen view men as secretive, dishonest or devious about money and renege on their duty to support wife and children” (1986: 58). Conversely, males interpret females as “avaricious, materialistic and calculating” (Barrow 1986: 58), focused solely on extracting financial resources. As such, females lament insufficient economic support while males resent the onerous expectations placed upon them.

The availability of wage-based employment, or lack thereof, has a significant impact upon the gender roles and family structure of the Caribbean. In Haiti, men are expected to be breadwinners but employment opportunities for males are limited because the few respectable jobs for men often necessitate start-up capital that men and their families lack. Haitian Women may be domestic workers or laundresses rather than suffering any further loss of status whereas men would be ridiculed for taking up such tasks (Glick-Schiller & Fournon 2001). A woman then often becomes the primary financial provider for her children, as the socially acceptable options for her employment are more numerous and accessible than the ones for her husband, if she has one.

Relationships, however, are not patterned merely upon mutual expectations and roles ascribed by society. Emotions and social bonds between the involved individuals also play a significant role in both the formation and the maintenance of such relationships, both between conjugal pairs and the family as a whole. For example, Jamaicans view love as powerful and as the basis of marriage, claiming that the choice of

a spouse is open and based upon sentiment, which is “historically derived and culturally meaningful embodied experience” (Douglass 1992: 18). However, most upper class white Jamaicans marry other upper class white Jamaicans (Douglass 1992). As such, marriage appears to be based on the compromise between love and social approval.

Even after a recognized pair bond is established, sexual relationships for members of the pair are not necessarily limited to this pairing. According to R. T. Smith (1987) and Douglass (1992), the dual marriage system allows more options for men than for women, with women being limited often to sequential marital or non-marital relationships whereas men can have such relationships simultaneously. Caribbean women resent male extra-union liaisons because they feel their children suffer as a result of this (Barrow 1986). Conversely, males interpret multiple simultaneous sexual relationships as “natural to a man” (Barrow 1986: 58). This leads to a recapitulation of the traditional virgin/whore double standard, wherein promiscuous men are acclaimed for their virility while their female counterparts are derided (Barrow 1986). As such, men are more likely to have extramarital sexual liaisons than women and such relationships create tensions between spouses and within the family as a whole (Barrow 1986). Philandering is tolerated and even anticipated, but some measure of discretion is expected.

Caribbean male/female relationships have a decidedly sexual undercurrent. Yelvington (1996) offers that “almost all non-kin male-female relationships are defined by men as sexual ones” (p. 318). Flirtations and youthful sexual encounters are frequent throughout the region. A considerable portion of courtship consists of flirting behavior, yet these flirtations may also reflect other factors of social life. Flirting may take place

on the street, in the workplace, in private homes and in public arenas. Yelvington (1996) discusses flirting in Trinidadian factories as both “an idiom for expressing one’s sexuality and sexual desire” and “an instrument for exercising (and resisting) power along various axes and, in the process, for constituting and constructing gendered, ethnic and ‘classed’ identities” (p. 314). As such, flirting is not an isolated phenomenon related to sexuality but is a reflection of social norms and a route to power as well as identity construction. Yelvington likewise considers the manners in which flirting calls attention to the flirter and in which the meaning behind the flirtation is somewhat ambiguous and undefined. He notes the pervasiveness of sexuality and gender relationship in Caribbean social life and advocates that factory flirtation be interpreted with this in mind (Yelvington 1996: 315). He draws a distinct comparison between the display of power and bravado by flirting men and the culturally ascribed value of reputation, as discussed by Wilson (1969). As such, flirtation may factor into the ways in which a man is regarded by his peers and the broader society as well as by the woman with whom he is flirting.

In many ways, Caribbean courtships and marriages exist as products of the region’s particular history, economy and ecology. In other manners, however, mating decisions and behaviors in these tropical locales can be interpreted using the same methods and theoretical underpinnings as can investigations into sexual behavior within other societies, so long as the distinctive elements of the particular Caribbean culture being examined are taken into account.

4. Ethnographic Background of Utila

Utila is the third largest of the Honduran Bay Islands, located in the western Caribbean at 16° 6' 0" N, 86° 54' 0" W. The majority of residents live along the edge of

the water in East Harbor, also known as Utila Town. The inland parts of the island are marshy and heavily populated with mosquitoes. Utila is accessible by a one-hour ferry ride from the city of La Ceiba, Honduras. The local ferry, the Utila Princess, makes two round-trips per day in the high season and either one or two trips daily in the low season. The island may also be reached by private boats or small commercial planes. Inclement weather can prohibit passage between Utila and the mainland for several days.

By the mid-Seventeenth Century, indigenous island inhabitants had been eradicated or relocated off-island in slavery by the Spanish (Lord 1975). Contemporary Utilians are descended from settlers who began arriving in the 1830s from the Cayman Islands and other Caribbean locations. They are primarily of British and African descent (Currin 2002; Lord 1975). Latinos began to emigrate from the Honduran mainland to Utila in the 1970s (Korda et al. 2008). Although the Bay Islands are politically part of Honduras, islanders are ethnically separate from Latino Hondurans, including Spanish-speaking residents of Utila, and consider themselves removed from Honduran society. Utilians refer to Latino residents of the island as “Spanish” and tensions between the ethnic groups flavor social interactions (Currin 2002); there is a degree of social segregation in Utilian commercial establishments between “Spanish” and Anglophone Utilians.

Like the residents of Roatan & Guanaja, Utilians speak Bay Islands English (BIE). Graham (1997) distinguishes between Black BIE, with Afro-Caribbean creole features, and White BIE, with British and Scottish dialectal influences. According to Running et al. (2007), the current population of Utila is approximately 2,500 persons. In contrast, Korda et al. (2008) claim that the current population is approximately 8,000; this

claim is not supported in other literature and is inconsistent with my own observations during a visit to Utila in 2009.

Unlike conjugal relationships in much of the Caribbean, marriages in Utila are usually legal rather than common-law unions, which are referred to on Utila as “shacking up.” Miller (1974) refers to Utilian households as "matrifocal" due to the characteristic frequent absence of men working in the shipping industry. However, Smith (1973) emphasizes that matrifocality is not defined strictly by the physical absence or presence of husbands and fathers. As such, it is possible on Utila to have households that are not matrifocal despite frequent male absence (Lord 1975).

Over the past 180 years, the dominant employment opportunities for Utilians have shifted from work involving fruit exportation to the shipping industry to low-cost tourism (Rose 1904; Lord 1975; Cronk & Steadman 2002). Korda et al. (2008) claim that fishing replaced coconut farming as the staple source of income in the 1960s and has been largely supplanted by tourism, but employment in international shipping or on offshore oil rigs is not taken into account. In keeping with other Caribbean cultures, the contemporary Utilian economy relies heavily on remittances, primarily from men employed by offshore oil rigs and the merchant marine industry (Lord 1975). Characteristically, Utilian men will work away from Utila for the majority of the year, then will spend several months relaxing at home and spending time with family before shipping out again (Lord 1975). The employment prospects for Utilian men allow for a higher standard of living than is available for many families on the mainland, thereby contributing to Utilians' conceptions of themselves as distinct from mainland Hondurans.

While away, men are expected to send money home to support their wives,

children, and other relatives. Considerably less frequently, some women will also leave Utila for work opportunities and send funds home. It is also common for men to partially support their natal households with remittance payments (Cronk et al. 2009).

Employment opportunities within the relatively lucrative shipping industry have emphasized competition, individualism, and consumerism in Utilian society (Currin 2002; Lord 1975). The emphasis on financial provisioning through remittances heavily impacts the romantic and family lives of young to middle-aged Utilian men, as they generally spend the majority of their time away from home for work.

Although the larger Honduran Bay Islands of Roatán and Guanaja had a flourishing tourist economy, tourism on Utila was small-scale at the time that these interviews were conducted. Tourist operations on Utila included guest houses, small inns, restaurants and dive shops, but not elaborate resorts, hotels, or ports of call (see also Cronk & Steadman 2002). Characteristically, tourism on Utila centers around low-cost scuba diving, including trips to observe rare whale sharks. This differs from tourism in much of the Caribbean, which centers around pristine white sand beaches and clear waters. The beaches on Utila are relatively poor, with rocky bottoms, sea grasses, and strewn with garbage from both the Honduran mainland and from limited garbage collection on the island itself.

The Utilian tourism industry has undergone changes since the time of this research. The 2006 enactment of the Zona Libre Turística del Departamanto de las Islas de la Bahía (ZOLITUR) established the Bay Islands as a tax-free zone. Although Utilian businesspeople welcomed ZOLITUR as a way to increase investment, the act has created significant bookkeeping and bureaucratic complications for Utilian entrepreneurs and

residents (Tomczyk 2008). Tomczyk, a Bay Islands journalist, projects that ZOLITUR will benefit the shipping industry but hinder local production, including Utilian & Honduran crafts made for sale in tourist markets (2008). A journalist-documentarian focuses on Utila's romanticized swashbuckling history, describing local characters as modern-day pirates and speculating on Utila's role in the international drug trade (Pachter 2007).

Recent public health research on Utila indicates that residents emphasize a strong interest in promoting the health of young people and a perception of the dangers of drug use. Running et al. (2007) noted general agreement but some discrepancies between interview responses and behavior in an experimental context with Utilian residents. They followed an experimental format where participants were interviewed about community health needs. The dominant themes identified in the interviews were recorded. Participants then allocated funds to a range of community health projects. Some financial resources were allocated to projects that participants did not identify as priorities in the interviews, but the majority of allocations matched the priorities identified in the interviews.

Caribbean societies are characterized by flexibility in social roles, where these are renegotiated between participants over time (Barrow 1986; Carnegie 1982); Utila also exhibits these qualities (Cronk et al. 2009). Engagement in offshore work and the reliance upon the remittance economy can exacerbate and exaggerate these patterns of social role renegotiation by introducing new sources of conflict during extended male absence. Utila's preponderance of legal marriages and primary male economic contributions to households challenge the widespread notions of matrifocality and male

marginality as essential characteristics of the Caribbean. Furthermore, Utilian marriages tend to be stable and long-term, unlike the more fluid and short-term unions found elsewhere in the Caribbean (Lord 1975). Within marriages, males are considered household heads. Lord (1975) noted, "Women act as stewards for absentee males, and...it is the men who are ultimately responsible for their households and women simply stand in for them in their absence" (p. 133). Although a young Utilian wife will often stay in her natal home along with her children for the first years of marriage while her husband is away from the island for work, this pattern enables the husband to earn sufficient funds to establish a new, independent household from the family (Miller 1974). Miller (1974) characterizes this residence pattern as "matrifocal," but it is clearly distinct from the matrifocality characteristic of the rest of the Caribbean and appears to simply indicate a brief matrilocal residence pattern as preliminary to the formation of a new nuclear household. Utilian marital stability is all the more notable for men's considerable absence from the island while engaged in long-distance employment. This makes Utila a particularly well-suited environment to explore the negotiation of social roles and expectations between marital partners (Cronk et al. 2009). The current investigation of spousal interviews builds upon on Cronk et al.'s (2009) work on audience effects between parents and children.

5. Hypothesis and Predictions

This project was designed to test the following general hypothesis: "If the statements made by husbands and wives are influenced by the ongoing negotiation of spousal obligations, then husbands and wives will vary their statements according to the audience provided by the interview context." Specifically, husbands and wives may

attempt to manipulate their spouses by using moral statements to convey expectations about obligations in marriage. This may manifest in both the content and presentation of interview statements.

Derived from the above hypothesis and from general premises of evolutionary approaches to human behavior, I present the following three predictions:

1. Men's responses will focus on women's fidelity.
2. Women's responses will focus on men's resource control.
3. Sex differences in both content and rhetorical domineeringness will be more pronounced among participants interviewed in the presence of their spouses than among individuals interviewed alone.

6. Methods and Materials

Lee Cronk and Shannon Steadman⁵ conducted ethnographic fieldwork among the Utilian population over a period of five months in 1996. Research participants were recruited via snowball-sampling, public advertisements, and door-to-door visits. Although the research question concerned spousal obligation, the study included unmarried, divorced, and widowed individuals in addition to those involved in either legal or common-law marriages. For the purpose of analysis, individuals involved in legal or common-law marriages were considered as "married" and individuals who were single, divorced, or widowed were considered as "not married." Furthermore, I recorded all participants who reported having one or more children as "parents" and those who did not have children as "non-parents." Interviews were conducted concurrently with a similar study to assess audience effects in parent-child interviews, the methods and

⁵ Shannon Steadman was a Texas A&M University undergraduate anthropology student at the time that the interviews were conducted.

results of which are discussed in Cronk et al. (2009).

A total of 133 participants were interviewed either alone or with their spouse. Participants who were interviewed alone were interviewed by a sole researcher, either male (Cronk) or female (Steadman). Both researchers interviewed both male and female participants in the sole interviewee setting. When married couples were interviewed together, both interviewers were present but one interview took the lead role in asking questions; this role alternated between the two interviewers. The interview conditions within this study varied between individuals being interviewed alone and jointly with their spouses; furthermore, the interviews included both same-sex and opposite sex interviewer-interviewee sets. The arrangement of interview type (alone/together) and interviewer (Cronk/Steadman) creates six different interview contexts: man interviewed alone by a man, man interviewed alone by a woman, woman interviewed alone by a man, woman interviewed alone by a woman, couple interviewed together with a man leading the interview, and couple interviewed together with a woman leading the interview. These six contexts result in a total of eight experimental interview conditions: man alone interviewed by male, man alone interviewed by female, female alone interviewed by male, female alone interviewed by female, male interviewed by male in presence of wife, male interviewed by female in presence of wife, female interviewed by male in presence of husband, and female interviewed by female in presence of husband.

Some individuals who were interviewed alone had spouses who were also interviewed alone. Interview participants included 25 husband/wife pairs and 83 individuals who were either unmarried (37) or who were married but did not have a spouse who participated in the study (54). Of the 25 husband/wife pairs, 21 pairs were

interviewed together and 4 pairs were interviewed separately. The list of interview questions is included in Appendix 3.

All interviews were recorded and transcribed as accurately as possible, including disfluencies (e.g., “um” and “uh”) and interjections (e.g., “uh-huh” and “mm-hmm”). A trained independent coder, who had not transcribed the interviews herself and who was not informed about the nature of this study, coded the transcripts of interview responses for content, response length, and rhetorical domineeringness (Rogers-Millar & Millar 1979; Rogers & Farace 1976; Cronk et al. 2009). Rhetorical domineeringness is an indicator of forcefulness in communication style and is seen in cases where an individual attempts to dominate, control, or persuade another in communication. Examples of rhetorical domineeringness include interruptions, denigrations, criticisms, bragging, arguing, and negatively challenging others present (Cronk et al. 2009). Statements that were minimally rhetorically domineering, such as those where the speaker provided only a simple statement of agreement or assent, or where no response was given, were coded as 1. Statements that incorporated a variety of techniques associated with verbal domination were coded as 5. For example, a rhetorical domineeringness code of 5 was assigned to a husband’s interview response in which he interrupted his wife, criticized her for asking him to do work around the home, and asserted, “She don’t understand.” Other statements were coded as 2, 3, or 4 according to their position between minimal and maximal rhetorical domineeringness. To ensure that the criteria remained consistent throughout the time it took to code all of the interviews, the trained coder also re-coded thirteen randomly selected interviews. A comparison of the original and re-coded values for length and rhetorical domineeringness shows that the coding was highly consistent,

with an average scale reliability coefficient of .977. To ensure that the rhetorical domineeringness code was independent of other vocal characteristics, the coder rated rhetorical domineeringness from the written transcripts rather than from the recordings. Vocalics (tone, tempo, volume, and fluency) were coded from the audio recordings but are not used in the analysis for this project.

The analysis includes a number of dichotomously coded variables. Sex is coded 0 for females and 1 for males. Interviewed alone/together is coded 0 for alone and 1 for together. Interviewer sex is coded 0 for female (Steadman) and 1 for male (Cronk). Parenting status is coded 0 for individuals with no children and 1 for individuals with any number of children. All variables described as yes or no questions are coded 0 for no and 1 for yes (e.g., interviewed by opposite sex, give remittances, receive remittances, et cetera). Non-dichotomously coded variables include age (in years), response length (in words), and rhetorical domineeringness (according to the coding rubric). Due to the possibility that interviewers can unintentionally lengthen interviewee responses through their own encouraging interjections (e.g., “mm-hmm”), the coder recorded the number of interjections made by the interviewer during the response to Question 12, which was the control question, and Question 21, which was a question of interest. The mean of interviewer behavior for these two questions was used as a rough measure of interviewer behavior throughout the interview. Because interviewers can unintentionally increase response length through their own encouraging interjections, interviewer behavior was an important covariate for which to control (Cronk et al. 2009). Rhetorical domineeringness and response length (in words) were recorded for questions 5-8, 12, and 17-25. Content was recorded for all of these items with the exception of question 12, which was used as a

control and was unrelated to the hypotheses in this study.

All statistical analysis was conducted using Stata 10.0. Linear regression was used for all analyses of response length and rhetorical domineeringness. For linear regressions, independent variables included sex, age, marital status, parenting status, providing support to others, receiving support from others, interview condition, interviewer sex, being interviewed by an interviewer of the opposite sex, an interaction term for sex and interview condition, and interviewer behavior. For linear regressions on rhetorical domineeringness, I also included response length as an independent variable. Results are reported in tables showing the standardized and unstandardized coefficients along with the associated p-values.

To explore the content of interview responses, first I tabulated the percentage of positive responses for each content variable by male and female respondents, then analyzed all content variables that showed a significant sex difference via logistic regression. This preliminary step allowed me both to simplify reporting by showing the directionality of sex differences and to avoid running numerous detailed models that would not further test the study predictions beyond the information provided by the tabulations. Logistic regression is the most appropriate analytical technique for further exploring sex differences in the content of interview responses, as the content was reducible to dichotomous coding and logistic regression allows for the use of multiple control variables along with the independent covariates of interest in the prediction of a binary outcome. For logistic regressions, independent variables included sex, age, marital status, parenting status, involvement in the remittance economy, interview condition, interviewer sex, an interaction term for sex and interview condition, and

response length for the particular question being addressed. This slight reduction in covariates from those used in the linear regression models reduces the risks of overfitting and of collinearity, both of which can be concerns in logistic regression. When cases were dropped from logistic regression due to an independent variable that was collinear with the dependent variable, a new model was run with that independent variable dropped. Results are presented in tables as odds ratios.

7. Descriptive Statistics

Sixty-eight participants were female and sixty-five were male. Respondents ranged from 17 to 63 years of age, with a mean age of 30 years ($n=127$, $sd=9.933$). Ages were not available for 3 participants; estimated ages were provided by a research collaborator who was familiar with the subjects (Cronk). Discrepancies between those three estimated ages and actual ages are likely to be small and to not impact analysis. Twenty-five participants (19%) were single, 87 (65%) were legally married, 10 (8%) were involved in common law marriages, 1 (1%) was widowed, and 10 (8%) were divorced⁶. The majority of participants in this study were parents, with the majority of participants reporting that they had either one child (30.2%) or two children (23.6%). One couple in the study reported having ten children and 21.9% of respondents had no children.

As remittances and other familial financial support are relevant elements of the Utilian economy, participants were asked about their financial support of others and others' financial support of them. In the sample, 61.2% gave financial support to relatives and 54.8% received financial support from relatives. A substantial minority, 32.3% of respondents, reported both giving and receiving financial support. In addition,

⁶ Percentages do not precisely total 100% due to rounding.

one individual stated that he received money from a lawsuit and another stated that he received financial support from a business partner. One participant stated that he gave money to the prison and another mentioned financial support given to the Church of God.

8. Results

The results of this research are presented both in analyses of the verbosity and rhetorical domineeringness of responses and the content of these responses. A more detailed discussion of interview statements follows the quantitative results.

8.1 Verbosity and Rhetorical Domineeringness in the Full Interviews

I constructed a linear regression model to assess the effects of age, sex, and marital status on verbosity, as represented by the summed total of responses to all interview questions. I further controlled for interviewer sex and an interaction effect between sex and interview type to address sex differences when women are interviewed in the presence of their husbands. The model is highly significant and accounts for about 17% of the variance in total response length ($F[7, 125]=4.87, p<.001, \text{adj } R^2=.170$). Within the model, being interviewed alone or with a spouse was significant ($\beta=-.316, p=.010$), meaning that people interviewed with a spouse present were significantly less verbose than people interviewed alone.

The overarching model is mildly redundant as all individuals interviewed in the presence of a spouse were married. This can be addressed by examining separate models for each of the two interview conditions. The model for total response length among individuals interviewed alone is not statistically significant ($F[5,85]=1.12, p=.355, \text{adj } R^2=.007$), whereas the model for individuals interviewed in the presence of their spouse is statistically significant ($F[4,37], p=.028, \text{adj } R^2=.168$). These split models reflect a

pattern wherein women interviewed in the presence of their spouses spoke much less, on average, than did their husbands ($\beta=.338$, $p=.026$); when women were interviewed alone, there was not a significant sex effect on response length ($\beta=-.180$, $p=.120$). Furthermore, being interviewed by an interviewer of the opposite sex approached statistical significance in the model for participants interviewed with spouses present ($\beta=-.250$, $p=.060$) but not within the model for individuals interviewed alone ($\beta=.040$, $p=.711$). Although this finding is not quite statistically significant at the $p\leq.05$ level, it suggests that response length may be depressed for participants interviewed by an interviewer of the opposite sex in front of their spouse.

I further expanded these models by including several new covariates. Model 2 controls for interview behavior in addition to the covariates controlled for in the previous model. Model 3 includes the variable for interviewer behavior and also controls for two new variables that represent involvement in the remittance industry: one for giving support and one for receiving support in the form of remittances.

Model 2 is statistically significant for the full dataset ($F[8,122]=5.41$, $p<.001$, $\text{adj } R^2=.213$) and individuals interviewed in the presence of a spouse ($F[5,35]=2.99$, $p=.024$, $\text{adj } R^2=.199$) but not for individuals interviewed alone ($F[6,83]=2.10$, $p=.061$, $\text{adj } R^2=.069$). Interviewer behavior is a statistically significant covariant in the full model ($\beta=.248$, $p=.004$) but not in the model for individuals interviewed in the presence of a spouse ($\beta=.248$, $p=.118$). When controlling for interviewer behavior in the model for individuals interviewed in the presence of a spouse, both sex ($\beta=.238$, $p=.064$) and being interviewed by a member of the opposite sex ($\beta=-.267$, $p=.071$) approach statistical significance.

Model 3 is statistically significant for the full dataset ($F[10,112]=5.44$, $p<.001$, $\text{adj } R^2=.267$) and individuals interviewed alone ($F[8,78]=3.08$, $p=.005$, $\text{adj } R^2=.162$), but not for individuals interviewed in the presence of a spouse ($F[7,28]=1.81$, $p=.124$, $\text{adj } R^2=.140$). Within the models, receiving support in the form of remittances is independently statistically significant (Full dataset $\beta=.192$, $p=.032$; interviewed alone $\beta=.238$, $p=.037$) but giving support is not (Full dataset $\beta=.127$, $p=.129$; interviewed alone $\beta=.129$, $p=.239$).

Table 4.1 below shows the result of regression analysis for three models regressing these covariates on response length. The models are displayed first for the full dataset, then for individuals interviewed alone, then for individuals interviewed in the presence of a spouse.

FULL DATASET			
	Model 1	Model 2	Model 3
Sex	156.897 (.165)	171.943 (.179)	140.504 (.151)
Age	.398 (.008)	-.455 (-.009)	1.348 (.029)
Marital status	90.619 (.085)	74.351 (.069)	89.912 (.087)
Int. alone/together	-323.493 (-.316)**	-294.841 (-.286)*	-220.717 (-.216)
Interviewer sex	124.614 (.131)	63.052 (.066)	100.997 (.108)
Int. by opposite sex	-54.048 (-.057)	-19.196 (-.020)	-26.751 (-.029)
Sex * alone/together	182.843 (.140)	119.345 (.092)	171.426 (.130)
Interviewer behavior		38.911 (.248)**	42.902 (.286)***
Give remittances			121.268 (.127)
Receive remittances			179.242 (.192)*
Constant	702.138***	576.515***	294.947
Adjusted R²	.170***	.213***	.267***
INTERVIEWED ALONE			
Sex	159.602 (.180)	171.594 (.192)	156.602 (.183)
Age	-.341 (-.008)	-.669 (-.016)	.565 (.014)
Marital status	115.789 (.128)	96.884 (.107)	124.012 (.142)
Interviewer sex	131.359 (.148)	60.296 (.068)	121.675 (.143)
Int. by opposite sex	35.366 (.040)	84.661 (.095)	57.425 (.067)
Interviewer behavior		40.248 (.280)*	43.361 (.315)**
Give remittances			114.003 (.129)
Receive remittances			205.681 (.238)*
Constant	658.763***	512.239**	226.419
Adjusted R²	.007	.069*	.162**
INTERVIEWED WITH SPOUSE			
Sex	302.090 (.338)*	255.551 (.283)	278.230 (.302)
Age	4.785 (.085)	2.403 (.043)	7.200 (.123)

Interviewer sex	95.514 (.106)	45.351 (.050)	36.719 (.040)
Int. by opposite sex	-250.327 (-.280)	-241.206 (-.267)	-242.138 (-.263)
Interviewer behavior		41.302 (.248)	38.882 (.242)
Give remittances			87.228 (.093)
Receive remittances			99.924 (.108)
Constant	290.702	281.432	49.018
Adjusted R²	.168*	.199*	.140

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.1 Models regressing response length on demographic and interview covariates

Pearson's r for the correlation of sex and rhetorical domineeringness across all questions is .309 ($p < .001$), with men being more domineering in their rhetoric. However, this association is not fully apparent in the models, as response length and rhetorical domineeringness are more closely associated ($r = .550$, $p < .001$). Therefore, I included response length as a control variable in all regressions on rhetorical domineeringness. The construction of the models and other covariates mirror those used above in the models for response length.

Model 1 for the regression of rhetorical domineeringness across all interview questions is statistically significant ($F[8,119] = 8.65$, $p \leq .001$, $\text{adj } R^2 = .325$) and accounts for approximately 32.5% of the variance. Within the model, only response length is independently statistically significant ($\beta = .521$, $p < .001$). The condition of being interviewed alone or in the presence of a spouse approached but did not achieve statistical significance ($\beta = .223$, $p = .063$). The model is also significant when individuals are interviewed alone ($F[6,82] = 3.42$, $p = .005$, $\text{adj } R^2 = .141$), but only response length is statistically significant within the model ($\beta = .379$, $p < .001$).

Model 2 is statistically significant ($F[8,119] = 8.65$, $p \leq .001$, $\text{adj } R^2 = .325$). However, interviewer behavior is not statistically significant within the model ($\beta = .061$, $p = .472$). The model is also statistically significant for individuals interviewed alone

(F[7,80]=2.88, p=.010, adj R²=.131).

Model 3 is statistically significant (F[11,106]=6.30, p<.001, adj R²=.332).

However, neither giving (β =-.083, p=.307) nor receiving remittances (β =-.039, p=.657) is independently statistically significant within the model. The model is also statistically significant for individuals interviewed alone (F[9,75]=2.52, p=.014, adj R²=.140).

FULL DATASET			
	Model 1	Model 2	Model 3
Sex	.109 (.101)	.118 (.108)	.149 (.134)
Age	.006 (.102)	.006 (.102)	.005 (.088)
Marital status	-.167 (-.139)	-.172 (-.143)	-.182 (-.151)
Int. alone/together	.262 (.223)	.272 (.229)	.218 (.177)
Interviewer sex	-.029 (-.027)	-.050 (-.046)	-.094 (-.085)
Int. by opposite sex	-.052 (-.048)	-.042 (-.038)	-.023 (-.020)
Sex * alone/together	.241 (.165)	.240 (.162)	.156 (.102)
Total response length	.0006 (.521)***	.0006 (.505)***	.0007 (.574)***
Interviewer behavior		.011 (.061)	.006 (.032)
Give remittances			-.094 (-.083)
Receive remittances			-.043 (-.039)
Constant	1.285***	1.259***	1.315***
Adjusted R ²	.325***	.322***	.332***
INTERVIEWED ALONE			
Sex	.143 (.144)	.149 (.149)	.203 (.200)
Age	.004 (.089)	.004 (.088)	.003 (.071)
Marital status	-.135 (-.133)	-.133 (-.131)	-.130 (-.126)
Interviewer sex	-.034 (-.035)	-.043 (-.043)	-.076 (-.074)
Int. by opposite sex	.008 (.008)	.018 (.018)	.023 (.023)
Total response length	.0004 (.379)***	.0004 (.372)***	.0005 (.423)***
Interviewer behavior		.004 (.025)	-.001 (-.006)
Give remittances			-.070(-.066)
Receive remittances			.045 (.043)
Constant	1.407***	1.395***	1.384***
Adjusted R ²	.141**	.131**	.140*
INTERVIEWED WITH SPOUSE			
Sex	.217 (.177)	.212 (.171)	.124 (.099)
Age	.009 (.123)	.009 (.122)	.008 (.101)
Interviewer sex	-.054 (-.044)	-.159 (-.127)	-.197 (-.158)
Int. by opposite sex	-.065 (.053)	-.047 (-.038)	-.011 (-.009)
Total response length	.0010 (.716)***	.0009 (.674)***	.0010 (.749)***
Interviewer behavior		.054 (.218)*	.049 (.208)
Give remittances			-.165 (-.131)
Receive remittances			-.160 (-.128)
Constant	.920***	.855***	1.054***
Adjusted R ²	.650***	.684***	.711***

* p \leq .05, ** p \leq .01, *** p \leq .001

Table 4.2 Models regressing rhetorical domineeringness on response length, demographics and interview covariates

Two women interviewed in the presence of their husbands did not speak at all, thus having a response length of zero. If these two cases are dropped from the analysis, both models for response length and rhetorical domineeringness remain significant. I decided to keep these cases in the analysis because I think that their non-response is a meaningful response in itself.

Parenting status was not a significant covariate in any preliminary models for overall rhetorical domineeringness or verbosity, nor was it a covariate of interest with respect to the study predictions. It was not included in these models in the interest of parsimony, but is included in the individual regression analyses for each question.

8.2 Characteristics Sought in Utilian Spouses

I analyzed the data from Questions 5-8, which addressed what Utilian men and women do and should seek in their spouses, to further explore the relationship between rhetorical domineeringness, verbosity, sex, age, and interview condition. For the analysis of these questions, I constructed a model for each question of interest with rhetorical domineeringness as the dependent variable and with the variables identified in Model 3 of the overall rhetorical domineeringness models as independent variables, with two exceptions. I used the response length for each specific question in place of the overall response length for the full interview and I included parenting status, as it could be a relevant consideration in interpreting the analysis for individual questions.

Question 5 asked, “What do you think Utilian men look for in a wife?” The regression for rhetorical domineeringness in response to Question 5 was statistically significant ($F[12,106]=3.40$, $p<.001$, $\text{adj } R^2=.196$) and explained approximately 20% of the variance. Within the model, independently statistically significant covariates were

response length ($\beta=.289$, $p=.003$), being interviewed in the presence of a spouse ($\beta=.313$, $p=.017$), and the interaction effect between sex and being interviewed with a spouse ($\beta=.463$, $p=.001$). More rhetorically domineering responses to Question 5 were thus associated with longer responses, being interviewed in the presence of a spouse, and particularly being a husband who was interviewed in the presence of his wife. Parenting status approached statistical significance in the model ($\beta=-.168$, $p=.091$), with parents giving less rhetorically domineering responses, but this result was not statistically significant.

Question 6 asked, “What do you think they (Utilian men) should look for (in a wife)?” The regression for rhetorical domineeringness in response to Question 6 was statistically significant ($F[12,106]=4.31$, $p<.001$, $\text{adj } R^2=.251$) and explained approximately 25% of the variance. Within the model, independently statistically significant covariates were response length ($\beta=.448$, $p<.001$) and the interaction effect between sex and being interviewed with a spouse ($\beta=.277$, $p=.033$). More rhetorically domineering responses to Question 6 were associated with longer responses and with husbands being interviewed in the presence of their wives. No other covariates approached statistical significance in this model.

Question 7 asked, “What do Utilian women look for in husbands?” The regression for rhetorical domineeringness in response to Question 7 was statistically significant ($F[12,104]=2.42$, $p=.008$, $\text{adj } R^2=.128$) and explained approximately 13% of the variance. Within the model, response length positively associated with rhetorical domineeringness and was the only independently statistically significant covariate ($\beta=.353$, $p=.001$). Interviewer sex approached but did not achieve statistical significance

at the $p \leq .05$ level ($\beta = .163$, $p = .091$).

Question 8 asked, “What do you think (Utilian women) should look for (in husbands)?” The regression for rhetorical domineeringness in response to Question 8 was statistically significant ($F[12,106] = 3.41$, $p < .001$, $\text{adj } R^2 = .197$) and explained approximately 20% of the variance. Within the model, response length is independently predicted by rhetorical domineeringness ($\beta = .436$, $p < .001$) and interviewer sex ($\beta = -.185$, $p = .043$). More rhetorically domineering responses were associated with longer responses and with being interviewed by a woman.

Table 4.3 below provides the coefficients, standardized coefficients (in parentheses), and adjusted R^2 values for the regression models with rhetorical domineeringness as the dependent variable for each of these four test questions.

	Q5	Q6	Q7	Q8
Sex	.022 (.017)	.049 (.037)	.132 (.090)	.135 (.090)
Age	.005 (.086)	.005 (.079)	.008 (.107)	.009 (.114)
Marital status	.058 (.041)	-.062 (-.041)	-.131 (-.080)	-.273 (-.162)
Parenting status	-.255 (-.168)	-.047 (-.029)	-.201 (-.116)	-.007 (-.004)
Int. alone/together	.433 (.313)*	.267 (.182)	-.030 (-.019)	-.013 (-.008)
Interviewer sex	-.059 (-.046)	-.024 (-.018)	-.238 (-.163)	-.276 (-.185)*
Int. by opposite sex	.082 (.064)	-.016 (-.012)	.203 (.139)	.0005 (.0003)
Sex * alone/together	.822 (.463)***	.521 (.277)*	.037 (.018)	.079 (.038)
Interviewer behavior	-.005 (-.024)	.023 (.107)	.031 (.133)	.014 (.059)
Give remittances	.005 (.004)	-.185 (-.134)	.023 (.016)	-.071 (-.046)
Receive remittances	-.076 (-.060)	.006 (.005)	.009 (.006)	-.133 (-.089)
Response length	.004 (.289)***	.007 (.449)***	.006 (.353)***	.009 (.436)***
Constant	1.505***	1.292***	1.250***	1.435***
Adjusted R^2	.196***	.252***	.128**	.197***

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.3 Regression models for the rhetorical domineeringness of responses explaining characteristics sought in spouses

For questions 5-8 regarding what Utilians should or do seek in a spouse, the initial content codes were collapsed into the following categories: (1) statements about the spouse’s morality, (2) statements about the spouse’s domestic abilities, (3) statements about feelings of love or friendship for the spouse, (4) statements reflecting social norms

of getting married and having children, and (5) statements of a spouse's earning potential. Some individuals also made statements regarding other qualities of the spouse, such as their nationality or personality, but these comments were infrequent when compared to the above categories. Interview responses could fall into multiple categories. Also, some individuals did not answer the questions or stated that they did not know what Utilians do or should look for in their spouses. The most frequently provided responses for questions 5 and 6 concerned a wife's morality, domesticity, and statements of love and friendship. The most common responses for questions 7 and 8 concerned a husband's morality, earning capacity, and statements of love and friendship.

Twenty-five percent of interviewees stated that morality is a quality that Utilian men seek in spouses and 20% stated that Utilian men should select their wives based on their morality or trustworthiness. Forty-seven percent cited housekeeping, childcare, or performing other domestic tasks as characteristics that Utilian men sought in their mates and 26% said that Utilian men should value domesticity in a potential mate. Ten percent said that men do marry for love or friendship and 13% said that should be the case.

Twenty percent of interviewees reported that women seek morality, trustworthiness, or sobriety in a potential husband and 32% said that Utilian women should seek these qualities. Fifty-three percent stated that Utilian women seek money and financial resources in a potential husband and 29% reported that women should value resource control in a potential mate. Eight percent reported that women use love & friendship as the basis for choosing a potential spouse and 16% said that should be the case.

To explore the content of interview responses, I first examined whether dominant

themes showed sex differences and audience effects over multiple questions. Cross-tabulations below show the occurrence of any references to women's morality and domesticity across three questions (5, 6, and 18) and the occurrence of any references to men's morality and monetary obligations across three questions (7, 8, and 17). The descriptive results indicate that there were statistically significant sex differences in broad responses to questions about wives' and husbands' moral obligations in marriage, but that there were no statistically significant broad sex differences in responses that emphasized men's financial obligations.

		Morality W		Morality H		Domesticity W		Money H	
		Yes	No	Yes	No	Yes	No	Yes	No
Full Dataset	Women	25%	75%	53%	47%	85%	15%	87%	13%
	Men	51%	49%	25%	75%	92%	8%	83%	17%
	Chi ²	8.386**		11.198***		1.634		.354	
Alone	Women	30%	70%	57%	43%	94%	6%	89%	11%
	Men	55%	45%	34%	66%	93%	7%	86%	14%
	Chi ²	5.728*		4.988*		.007		.192	
With Spouse	Women	14%	86%	43%	57%	67%	33%	81%	19%
	Men	38%	62%	5%	95%	90%	10%	76%	24%
	Chi ²	3.079		8.400**		3.535		.707	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.4 Tabulations for male and female obligations in marriage

As the initial table indicated sex differences in morality-based responses, I constructed a logistic regression model for the presence of a morality-related response to each of Questions 5-8. I also constructed models for responses to Questions 7-8 that emphasized financial provisioning, as these were directly related to the study hypothesis. I did not continue the analysis for responses that emphasized domesticity, as this was neither directly related to the study hypothesis nor identified in the descriptive analysis as a likely source of sex differences in interview responses. The dependent variable for each model was a morality-based response or a response that emphasized financial

provisioning (0=no, 1=yes). The independent variables were sex (0=female, 1=male), age (in years), marital status (0=single/divorced/widowed, 1=married/common-law married), parenting status (0=parent, 1=non-parent), involvement in the remittance economy (0=not involved, 1=involved), interview condition (0=alone, 1=together), interaction between sex and interview condition (0=all others, 1=men interviewed in presence of their spouses), and the rhetorical domineeringness for that question (scale of 1-5). The primary predictor variables of interest were sex and interview type; age, marital status, parenting status, involvement in the remittance economy, and rhetorical domineeringness were included as controls. For models where the interaction effect between sex and interview condition was statistically significant, expanded models were constructed for individuals interviewed alone and individuals interviewed in the presence of a spouse. This same rubric was used for all regression analyses of the content of interview responses in the study, unless otherwise specified.

Of the six models for the content of responses to questions about what Utilians seek in prospective husbands and wives, the only models where a statistically significant interaction effect was found between sex and interview type were for morality-based responses to Question 6, regarding what Utilian men should seek in wives, and for responses to Question 7, regarding what Utilian women do seek in husbands, that emphasized providing financial support. The model for morality-based responses to Question 7 experienced data separation due to no men interviewed in the presence of their wives having indicated that Utilian women do seek moral husbands.

The table presenting the logistic regression results for the content of Questions 5-8 is below. Values within cells of this table are odds ratios when other covariates are

held constant.

	MORALITY				MONEY	
	Q5	Q6	Q7	Q8	Q7	Q8
Sex	1.689	8.053**	.252*	.689	1.274	1.173
Age	.943	.931*	.983	.986	.991	.992
Marital status	.728	.879	2.188	1.577	1.262	1.736
Parenting status	1.806	4.839	1.186	.432	.861	.494
Remit involvement	.817	.832	2.788	1.901	1.387	.834
Int. alone/together	.399	.961	.507	.890	1.000	.531
Interviewer sex	4.152*	4.298*	.961	.740	6.463***	1.520
Sex * alone/together	1.543	.049*	DROPPED	.110	.079*	.135
Rhetoric	2.808*	1.274	1.410	1.093	1.220	.828
Chi-Square	20.02*	26.30**	12.90	16.90	32.61***	12.63

* p≤.05, ** p≤.01, *** p≤.001

Table 4.5 Regression models for content of characteristics sought in spouses

On the basis of these results, I constructed models to examine the audience effects in morality-related responses to Question 6 and responses to Question 7 that focused on financial provisioning. One model was constructed for individuals interviewed alone and another was constructed for spouses interviewed jointly. The same independent variables were used for these models as in the previous set, with the exception of those rendered inapplicable due to the analytic design (interview type, the interaction effect for sex and interview type, and marital status as all couples interviewed jointly were married). Where other covariates resulted in data separation due to collinearity, they were dropped from the both models in the pair and a new set of models was run.

	Q6 MORALITY		Q7 MONEY	
	Alone	Together	Alone	Together
Sex	5.302**	.468	1.555	.064*
Age	.969	.897	.984	1.037
Parenting status	DROPPED	DROPPED	.818	.605
Remit involvement	.686	.340	1.387	.753
Interviewer sex	DROPPED	DROPPED	7.872*	2.368
Rhetoric	1.399	1.117	.870	4.069
Chi-Square	10.44*	1.83	21.40*	13.01*

* p≤.05, ** p≤.01, *** p≤.001

Table 4.6 Regression models for emphasis on morality in wives and financial obligations in husbands, split by interview condition

The response for Question 6 showed a non-statistically significant result in the opposite direction of that predicted by the study hypothesis. This may be due to the small sample size in the interviewed jointly group, as only one male and two females in this interview condition mentioned morality as a trait that Utilian men should seek in wives.

The response for Question 7 showed a statistically-significant sex difference wherein women interviewed in the presence of their husbands were more likely than men interviewed in the presence of their wives to indicate that Utilian women seek husbands who will provide for them financially (OR=.064, $p=.010$; $\text{Chi}^2[9]=20.02$, $p=.043$). This effect was not seen when participants were interviewed alone (OR=1.555, $p=.439$; $\text{Chi}^2[9]=21.40$, $p=.439$).

8.3 Obligations in Marriage

Question 17 asked, “What obligations do you think a husband has in a marriage?” The regression for rhetorical domineeringness in response to Question 18 was statistically significant ($F[12,105]=7.90$, $p<.001$, $\text{adj } R^2=.415$) and explained approximately 42% of the variance. Within the model, the only independently statistically significant covariate was response length ($\beta=.577$, $p<.000$). Covariates that approached statistical significance were parenting status ($\beta=-.158$, $p=.065$), being interviewed in the presence of a spouse ($\beta=.193$, $p=.085$), and the interaction effect between sex and being interviewed with a spouse ($\beta=.213$, $p=.067$). More rhetorically domineering responses to Question 17 were thus associated with longer responses, not being a parent, being interviewed with a spouse present, and husbands being interviewed in the presence of their wives.

Question 18 asked, “What obligations do you think a wife has in a marriage?” The regression for rhetorical domineeringness in response to Question 18 was statistically

significant ($F[12,106]=3.59, p<.001, \text{adj } R^2=.209$) and explained approximately 21% of the variance. Within the model, the only independently statistically significant covariate was response length ($\beta=.423, p<.000$), but parenting status also approached statistical significance ($\beta=-.175, p=.074$). More rhetorically domineering responses to Question 18 were associated with longer responses and not being a parent.

Question 19 asked, “What special obligations do you think husbands and wives have, if any, when men leave (ship out) for long periods of work?” The regression for rhetorical domineeringness in response to Question 19 was statistically significant ($F[12,105]=5.06, p<.001, \text{adj } R^2=.294$) and explained approximately 29% of the variance. Within the model, response length ($\beta=.463, p<.000$), age ($\beta=.193, p=.040$), and the interaction effect between sex and being interviewed in the presence of one’s spouse ($\beta=.304, p=.020$) were all independently statistically significant. Less rhetorically domineering responses to Question 19 were associated with shorter responses, younger participants, and wives who were interviewed in the presence of their husbands.

Question 20 asked, “In particular, do people worry about whether men will send money back or about the faithfulness of either the wife or the husband?” ($F[12,106]=4.08, p<.001, \text{adj } R^2=.239$). Within the model, only response length was independently statistically significant ($\beta=.447, p<.001$), with longer responses being associated with greater rhetorical domineeringness. Being interviewed in the presence of a spouse approached but did not achieve statistical significance ($\beta=.211, p=.090$).

Table 4.7 below provides the coefficients, standardized coefficients, and adjusted R^2 values for the regressions with rhetorical domineeringness as the dependent variable for Questions 17-20.

	Q17	Q18	Q19	Q20
Sex	.092 (.057)	.047 (.033)	.012 (.008)	.268 (.184)
Age	.010 (.126)	.004 (.057)	.014 (.194)*	.002 (.029)
Marital status	.103 (.058)	.072 (.046)	-.007 (-.004)	.020 (.012)
Parenting status	-.300 (-.158)	-.294 (-.175)	.017 (.010)	-.208 (-.120)
Int. alone/together	.337 (.192)	-.084 (-.055)	.276 (.178)	.335 (.221)
Interviewer sex	.035 (.022)	.012 (.008)	.039 (.027)	-.149 (-.103)
Int. by opposite sex	.043 (.027)	-.007 (-.005)	-.080 (-.056)	-.163 (-.112)
Sex * alone/together	.473 (.213)	.186 (.095)	.605 (.304)*	.272 (.134)
Interviewer behavior	-.006 (-.023)	.009 (.039)	-.006 (.024)	.009 (.041)
Give remittances	.072 (.044)	.134 (.093)	-.149 (-.101)	-.049 (-.032)
Receive remittances	-.119 (-.074)	-.108 (-.077)	.087 (.061)	-.045 (-.031)
Response length	.011 (.577)***	.007 (.423)***	.006 (.463)***	.004 (.447)
Constant	1.067***	1.545***	1.072***	1.600***
Adjusted R²	.415***	.209***	.294***	.239***

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.7 Regression models for the rhetorical domineeringness of responses to Questions 17-20

When Utilians were asked directly what spouses' obligations are in a marriage, sex differences and audience effects in the content of interview responses were not as apparent. The dominant responses were that husbands' obligations included financial provisioning, assistance with domestic chores, fidelity, and the fulfillment of the social norms of being a husband and father. The dominant responses for a wife's obligations in marriage were her role in domestic tasks, particularly housekeeping and childcare, fidelity, and fulfillment of the social norms of being a wife and mother.

In the set of participants interviewed jointly with spouses, no individuals, male or female, indicated that husbands or wives are obligated to be faithful in marriage. As such, I did not use regression analysis to examine audience effects for these questions. I constructed a simpler model for both Question 17 and Question 18 with fidelity-based responses as the dependent variable and sex, age, marital status, parenting status, interviewer sex, rhetorical domineeringness, and involvement in the remittance economy as dependent variables. None of the models were statistically significant with all seven independent variables included (Husband's fidelity $\chi^2(7)=11.46$, $p=.120$; Wife's

fidelity $\text{Chi}^2(7)=2.85$, $p=.899$; Husband's money $\text{Chi}^2(7)=11.09$, $p=.135$), although marital status was significant within the model for husband's fidelity, with unmarried individuals being more likely than married individuals to state that fidelity is a husband's obligation in marriage ($\text{OR}=.083$, $p=.035$). None of the models indicated a statistically significant sex difference in statements regarding husbands' and wives' obligations in marriage.

Table 4.8 below presents the odds ratios for indicating that male fidelity, female fidelity, or male resource provisioning are husbands' and wives' obligations in marriage.

	Husband's fidelity	Wife's fidelity	Husband's money
Sex	.349	1.604	1.012
Age	.967	1.018	.970
Marital status	.083*	.748	2.374
Parenting status	.771	.443	.845
Remit involvement	.754	1.086	.348
Interviewer sex	.933	.314	2.112
Rhetoric	.710	.676	1.671
Chi ²	11.46	2.85	11.09

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.8: Logistic regression for dominant themes regarding husbands' and wives' obligations in marriage

The interviewers asked participants what concerns Utilians have when men ship out for long periods of time: the husband's fidelity, the wife's fidelity, or the husband's obligations to send money home. Respondents were free to give multiple concerns and 47 did (35%). The table below shows cross-tabulations for concerns when men ship out, first for the full dataset and then for the subsets of participants interviewed alone and participants interviewed in the presence of a spouse.

Full Dataset		Wife's Fidelity		Husband's Fidelity		Money	
		Yes	No	Yes	No	Yes	No
	Women	62%	38%	65%	35%	38%	62%
	Men	66%	34%	63%	37%	37%	63%
	Chi²	.174		.038		.003	
Alone							
	Women	67%	33%	68%	32%	41%	59%
	Men	73%	27%	65%	34%	42%	58%
	Chi²	.332		.034		.014	
With Spouse							
	Women	50%	50%	58%	42%	25%	75%
	Men	50%	50%	58%	42%	25%	75%
	Chi²	.000		.000		.000	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.9 Cross-tabulations for concerns when men ship out for long periods

The table demonstrates that there were no statistically significant sex differences in audience response across any category. I constructed t-tests for the proportion differences in two groups to determine whether there was any effect of being interviewed alone or jointly with one's spouse for all three outcomes. The t-tests for interview condition in concerns about husbands' fidelity or whether money will be sent home were not significant (Husbands' Fidelity $z = .720$, $p(2\text{-tailed}) = .472$; Money $z = 1.314$, $p(2\text{-tailed}) = .189$). A two-way t-test for the difference in proportions for responses about women's fidelity was not statistically significant ($z = 1.817$, $p(2\text{-tailed}) = .069$), but a one-way test was statistically significant ($z = 1.817$, $p(2\text{-tailed}) = .035$). However, this difference was in the opposite direction of study predictions, with interview statements made in the presence of a spouse being less likely to emphasize concerns about a woman's fidelity when her husband ships off to sea. There was no sex difference in this response.

Although the cross-tabulations above imply complete agreement when husbands and wives were interviewed jointly in response to concerns when men ship out, this is a mathematical oddity. Review of the actual husband-wife pairs shows several points of

divergence in response to this question. These include both cases where only one spouse provided a response and two cases where spouses disagreed over whether Utilians were concerned about fidelity or finances when men shipped out.

8.4 Assignment of Blame and Response to Infidelity

Question 21 asked, “If there is a problem with faithfulness in a marriage, who is to blame—the man, the woman, the person inside the marriage, or the outside man or woman?” The regression for rhetorical domineeringness in response to Question 21 was statistically significant ($F[12,106]=3.19$, $p<.001$, $\text{adj } R^2=.182$) and explained approximately 18% of the variance. Within the model, response length ($\beta=.376$, $p<.000$) and being interviewed by a member of the opposite sex ($\beta=-.225$, $p=.011$) were independent statistically significant. Covariates that approached statistical significance were marital status ($\beta=-.175$, $p=.096$) and being interviewed in the presence of a spouse ($\beta=.215$, $p=.098$). More rhetorically domineering responses to Question 21 were thus associated with longer responses, being interviewed by a member of the same sex, being single, and being interviewed in front of one’s spouse.

Question 22 asked, “What do you think is the right way for a man to deal with an unfaithful wife and her outside man?” The regression for rhetorical domineeringness in response to Question 22 was statistically significant ($F[12,104]=3.55$, $p<.001$, $\text{adj } R^2=.209$) and explained approximately 21% of the variance. Only response length was statistically significant within the model ($\beta=.448$, $p<.001$); no other covariates approached statistical significance.

Question 23 asked, “What is the right way for a woman to deal with an unfaithful husband and his outside woman?” The regression for rhetorical domineeringness in

response to Question 23 was statistically significant ($F[12,106]=3.19, p<.001, \text{adj } R^2=.182$) and explained approximately 18% of the variance. Only response length was statistically significant within the model ($\beta=.483, p<.001$); no other covariates approached statistical significance.

The table with the regression models of rhetorical domineeringness in response to Questions 21-23 appears below.

	Q21	Q22	Q23
Sex	.002 (.001)	.198 (.117)	.144 (.082)
Age	.004 (.044)	.006 (.070)	.007 (.081)
Marital status	-.340 (-.175)	-.163 (-.086)	-.154 (-.078)
Parenting status	-.101 (-.049)	-.145 (-.071)	-.234 (-.112)
Int. alone/together	.404 (.215)	.102 (.055)	.357 (.188)
Interviewer sex	.064 (.038)	.023 (.013)	-.061 (-.035)
Int. by opposite sex	-.387 (-.225)*	-.192 (-.113)	-.158 (-.090)
Sex * alone/together	.386 (.161)	.012 (.005)	.110 (.045)
Interviewer behavior	.013 (.048)	.026 (.097)	.031 (.110)
Give remittances	-.034 (-.019)	-.009 (-.005)	-.113 (-.063)
Receive remittances	-.057 (-.033)	-.117 (-.069)	-.110 (-.063)
Response length	.005 (.376)***	.006 (.448)***	.006 (.484)***
Constant	1.983***	1.585***	1.608***
Adjusted R²	.178***	.209***	.182***

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.10 Regression models for the rhetorical domineeringness of responses to Questions 21-23

When asked to assign fault in the case of infidelity, 24% of respondents said that more than one party was at fault. This proportion held equivalent between sexes, with 25% of men and 24% of women attributing blame to more than one source. The majority of respondents assigned at least part of the blame to the individual in the marriage who had been sexually unfaithful, with 60% of Utilians blaming the unfaithful husband and 64% blaming an unfaithful wife. A smaller but still significant proportion blamed the outside party involved in the affair, with 15% blaming an outside man and 23% blaming an outside woman. A smaller percentage blamed the member of the married couple who had not been involved in an affair, with 8% blaming the husband of an unfaithful wife

and 7% blaming the wife of an unfaithful husband.

I constructed crosstabulations to begin to examine patterns of blame in the case of infidelity with regard to sex differences and interview condition. The table of results is presented below.

Full Dataset		Unfaithful Husband		Unfaithful Wife		Outside Woman		Outside Man		Faithful Husband		Faithful Wife	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	Women	54%	46%	60%	40%	19%	81%	10%	90%	4%	96%	9%	92%
	Men	66%	34%	68%	32%	26%	74%	20%	80%	11%	89%	5%	95%
	Chi²	1.912		.789		.942		.177		1.932		.933	
Alone													
	Women	58%	43%	64%	36%	19%	81%	11%	89%	4%	86%	13%	87%
	Men	61%	39%	66%	34%	27%	72%	20%	80%	7%	93%	2%	98%
	Chi²	.145		.043		.845		1.682		.288		3.524	
With Spouse													
	Women	53%	47%	52%	48%	19%	81%	10%	90%	5%	95%	0%	100%
	Men	76%	24%	71%	29%	24%	76%	19%	81%	19%	81%	90%	10%
	Chi²	3.635		1.615		.141		.778		2.043		2.100	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.11 Cross-tabulations of blame in the case of infidelity by gender across interview conditions

The table illustrates the relative homogeneity of responses in the dataset, with wide agreement between sexes and across interview conditions. Within the subset of individuals interviewed in the presence of a spouse, the tabulation for blaming an unfaithful husband showed a sex difference that approached statistical significance but failed to become significant at the $p \leq .05$ level ($\text{Chi}^2(1)=3.635$, $p=.057$); in this case, men more frequently volunteered that an unfaithful husband was to blame in the case of an affair.

8.5. Response to Unmet Obligations

Question 24 was presented as follows, “Sometimes, of course, people do not live up to their obligations, whether because of unfaithfulness, or because of a man not providing for his family, or a woman not taking care of her kids, or whatever. How do

you think a husband should handle it when his wife doesn't live up to her expectations?"

The regression for rhetorical domineeringness in response to Question 24 was statistically significant ($F[12,106]=3.41$, $p<.001$, $\text{adj } R^2=.197$) and explained approximately 20% of the variance. Within the model, independently statistically significant covariates were response length ($\beta=.423$, $p<.001$) and age ($\beta=.207$, $p=.038$). Parenting status ($\beta=-.360$, $p=.072$) and being interviewed in the presence of a spouse ($\beta=.232$, $p=.072$) approached but did not achieve statistical significance. More rhetorically domineering responses to Question 24 were associated with longer responses, older interviewees, non-parents, and individuals interviewed in the presence of a spouse.

Table 4.12 below provides the coefficients, standardized coefficients, and R^2 values for Questions 24 and 25.

	Q24	Q25
Sex	.014 (.008)	.205 (.121)
Age	.017 (.038)*	.015 (.176)
Marital status	-.113 (-.061)	-.031 (-.016)
Parenting status	-.360 (-.183)	-.242 (-.120)
Int. alone/together	.417 (.232)	.269 (.146)
Interviewer sex	-.011 (-.007)	-.120 (-.071)
Int. by opposite sex	-.073 (-.044)	-.153 (-.091)
Sex * alone/together	.388 (.169)	.206 (.087)
Interviewer behavior	.003 (.012)	.024 (.090)
Give remittances	.015 (.009)	-.140 (-.081)
Receive remittances	-.223 (-.135)	-.096 (-.057)
Response length	.007 (.422)***	.006 (.357)***
Constant	1.509***	1.443***
Adjusted R^2	.197***	.130***

* $p\leq.05$, ** $p\leq.01$, *** $p\leq.001$

Table 4.12 Regression models for the rhetorical domineeringness of responses to Questions 21-23

Dominant responses to Questions 24 and 25 indicated that the appropriate reaction to unmet obligations was to talk or to divorce. As some respondents indicated other solutions and some participants stated that both talking and seeking a divorce could be an appropriate response to unmet obligations, I explored the associations between the

two dominant responses and sex, split by interview condition.

Full Dataset	Wife Does Not Meet Obligations				Husband Does Not Meet Obligations			
	Talk		Divorce		Talk		Divorce	
	Yes	No	Yes	No	Yes	No	Yes	No
Women	44%	56%	59%	41%	52%	48%	48%	52%
Men	68%	32%	53%	47%	48%	52%	52%	48%
Chi ²	1.802		1.804		.131		.134	
Alone	Wife Does Not Meet Obligations				Husband Does Not Meet Obligations			
	Talk		Divorce		Talk		Divorce	
	Yes	No	Yes	No	Yes	No	Yes	No
Women	33%	67%	48%	52%	47%	52%	59%	41%
Men	21%	79%	62%	38%	44%	56%	61%	39%
Chi ²	1.497		1.730		.125		.047	
With Spouse	Wife Does Not Meet Obligations				Husband Does Not Meet Obligations			
	Talk		Divorce		Talk		Divorce	
	Yes	No	Yes	No	Yes	No	Yes	No
Women	83%	17%	17%	83%	61%	39%	19%	81%
Men	55%	45%	35%	65%	58%	42%	29%	71%
Chi ²	2.669		1.247		.040		.510	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.13 Cross-tabulations for the content of responses to questions about husbands' and wives' unmet obligations

The table of cross-tabulations and associated Chi-Square values does not show a statistically significant sex difference in the absence of other covariates. However, the apparent effect of interview condition on responses about unmet obligations led me to construct regression models to view the contributing factors more clearly.

	Wife Does Not Meet Obligations		Husband Does Not Meet Obligations	
	Talk	Divorce	Talk	Divorce
Sex	.656	1.679	.995	1.052
Age	.954	1.013	.962	1.010
Marital status	1.545	.591	1.113	.476
Parenting status	.939	1.701	.904	1.380
Remit involvement	.861	1.186	1.071	.745
Int. alone/together	19.692**	.115	1.901	.135*
Interviewer sex	1.424	1.071	.793	.878
Sex * alone/together	.214	2.460	1.056	1.753
Rhetoric	1.099	.939	1.071	.752
Chi ²	26.10**		16.10	
			7.43	
			20.70*	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.14 Regression models for the content of responses to questions about husbands' and wives' unmet obligations

The result of the regression models confirms an interview condition effect for the content of responses to Questions 24 and 25. When all other covariates were held

constant, participants interviewed jointly with their spouses were substantially more likely than participants interviewed alone to emphasize talking as a response to a wife's unmet obligations (OR=19.692, $p=.010$) and to not emphasize divorce as a response to a husband's unmet obligations (OR=.135, $p=.019$). There was no sex difference and no other covariates were statistically significant in either model.

8.6. Utilian Weddings

Question 12 asked, "What are Utilian weddings like?" This was intended as a control question, as the details of Utilian wedding traditions and practice were unrelated to the study hypothesis and responses were not predicted to exhibit sex differences or audience effects. The regression for rhetorical domineeringness in response to Question 6 was statistically significant ($F[12,106]=2.81$, $p=.002$, $\text{adj } R^2=.155$) and explained approximately 16% of the variance. Within the model, independently statistically significant covariates were response length ($\beta=.387$, $p<.001$) and being interviewed with a spouse ($\beta=.351$, $p=.008$). Less rhetorically domineering responses to Question 12 were associated with briefer responses and with being interviewed in the presence of their husbands. The interaction effect between sex and being interviewed with a spouse approached but did not achieve statistical significance at the $p\leq.05$ level ($\beta=.231$, $p=.093$).

Table 4.15 provides the coefficients, standardized coefficients, and R^2 values for the test question about Utilian weddings.

	Q12		
Sex	-.005 (-.003)	Sex * alone/together	.522 (.231)
Age	.004 (.056)	Interviewer behavior	.019 (.075)
Marital status	.065 (.036)	Give remittances	-.107 (-.064)
Parenting status	-.239 (-.123)	Receive remittances	-.142 (-.088)
Int. alone/together	.619 (.351)*	Response length	.006 (.387)***
Interviewer sex	-.078 (-.048)	Constant	1.458***
Int. by opposite sex	-.052 (-.032)	Adjusted R ²	.155**

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4.15 Regression models for the rhetorical domineeringness of responses to a test question about Utilian weddings

4.5 Elaborations on and Digressions from Dominant Themes

Interviewees' responses both elaborated on the major themes identified in the quantitative analysis and digressed from these themes. The following discussion illuminates the statements that interviewees offered regarding major characteristics sought in spouses and considerations in marriage, as well as reflections on Utilian social life, generational shifts, and race relations.

Many interviewees emphasized the importance of men sending money home to their spouses. One woman asserted what she saw as the appropriateness of this practice, noting, "It takes a woman's sense to know what to do with the money." A different interviewee offered an opposing viewpoint on familial money management, mentioning that she knows one Utilian man who sends his earnings to a family friend; his wife has to request funds from the friend rather than having direct access to it herself. A male interviewee emphasized that women prioritize their husbands' roles as providers above wanting to spend time together, saying,

"That's all they want, you know. Their husband comes off o' the ship - they go out an' see Africa, an' Nigeria, Venezuela, Columbia, Mexico, Egypt, Dubai...an' the husband comes home there, an' they can be home two weeks, before they want them to go back again!"

Extending this notion further, some interviewees indicated that male provisioning

superseded male fidelity in relationships. One woman noted the following about other Utilian women:

“When their husbands leaving they’re a little worried but in a way they’re happy ‘cause they know their life’ll be better. Most of ‘em around here like to just say ‘Oh, I don’t care if my husband is unfaithful as long as the money comes to me,’ you know.”

She then continued to state that it would “cause a big scandal” if these husbands provided money to other women, reinforcing the view that male provisioning of resources was a greater concern in Utilian social life than was male sexual fidelity.

Of course, not all respondents claimed that resource provisioning was the most substantial obligation of men in marriage. One Utilian man interviewed alone indicated that Utilian women look for husbands that they can control:

“Well, I mean they, I’d say the women look for...I’ll honestly say they look for a man so they can handle - a man that they, that, you know, that’ll look up to them - that’s why most o’ the womens around here - they want to, they want to be the boss, you know, they wanna run things.”

Both male and female respondents noted that tending to the house and family were the province of Utilian women, as reflected in the quantitative results for expectations of domesticity. One man notes that Utilian men seek domestic wives: “A housewife that takes care of the house, cooks a man meal a husband meal, see that he get clean, clothes get clean, and you know, I suppose a companion like our sex maybe.”

Another Utilian man interviewed alone gave this explanation for the emphasis on domesticity in Utilian men’s search for wives:

“In Utila, mostly men look for...for women that...well, hou, housewives. You know? Take care of the kids, and...make sure that dinner is ready, and...the clothes is clean, and the house is clean, and...you know? Probably on the mainland, umm,...you got...umm,...women get opportunities to go to school, and to university, and to get an education, and...they feel more, umm, independent. You know? But, umm, here on Utila that’s like...umm,...men...the majority of the Utila men is

like...they just want a housewife. You know?"

A female interviewee summed up the heavy obligations felt by Utilian women when she responded to the interviewer's question, "What's the obligations of the wives?" with, simply, "Everything." Tied in with these expectations that women tend to children and the household were interview statements that women did not and should not hold jobs outside of the home; that women working was not "the Utilian way." One man joked during the interview,

"...you can't say to her "Mon, cook me something!" because she could look at you and tell you "Mon, I don't have to work," yell at *you*...The man...if the man...the man could be the boss, he supposed to take care of his business, so...if she work, now...I can't make her do somethin'...she can throw in my face, [we]'ll...probably she could make more money than me... But in Utila, the woman stays home and the husband work[s]...so, he pays all the bills, anything concernin' money line, he makes it, so...I suppose a woman looks at that and say[s] "Well, he takin' care of me in all aspects...I will hold on to this man!"

Some interview responses offered glimpses into changes that the island has undergone during the interviewees' lifetimes. One man noted a generational change on the island with men prioritizing attractive brides above domestic ones:

"Today... it's pretty difficult to say today. We, you know, guys are my age, we always looked to girl that we knew would be responsible in the home. Nice, decent wife, um, caring. Today, I don't know I think most of the boys just fall in love and because the girl looks good. Most- because I see a lot of it goes on... they marry and the girls, they don't know how to fry egg, a lot of them, and you got a lot that can do a lot because the parents have taught them a lot, you know. But most of the boys I think are just looking for looks right now."

Another interviewee noted a generational difference in courtship expectation by young couples' parents, saying,

"Well, uh, now...go to the house an' date her to the house an all that, you know. You go present yourself to the parents an' say, you get consent from them. You have to visit the house an all that, you know? You get consent: 'Yeah, you can visit the house,' an' then, you know....But, now they're very, very few that do it."

Some Utilians credit the tourism industry for improving marital life. One interviewee remarked, “Families now that is stay together, because they’re in the tourism business. And...they earn their money here. But before, no one was here. None of the husbands was home.” Due to the relatively small population of Utila and tendency for Utilians to find romantic partners on the island, the pool of potential datable and marriageable partners is limited. One participant remarks on how Utilians find their mates: “Mostly we grow up together, we go to school together, an’ that’s it. We’re born together—we don’t have to meet!” One man, who stated that he would only divorce his wife if she had been sexually unfaithful, attributes the success of Utilian marriages to the couples’ childhood acquaintance: “We all grew up together. And so, I guess that’s...you know, because you’re friends for so long, an’ you know each other so good, an’ it’s easier to forgive.” One man notes his personal objection to divorce and belief that he is obligated to work towards a stronger marriage in times of trouble:

“Well, I mean, um, when you get married, make a promise, you know, make a vow, then you have to live up to your own part. An’ instead of ignore...you should, um, you should be able to forgive, an’ try your best, because what the Lord’s joined together is til death separate us. I mean, you must support one another in sickness and poorness and anything. If you get rich, an’ you go poor, well you still obligated the same way, not because I turned poor, turn against my wife, an’ so, I think that we always should have that, you know, between us--be able to forgive. If you not doin’ your obligation, well get together, talk it over, and say, ‘Hey, but you promised me this an’ this, an’...just try it, you know, because...it’s not good for us to divorce, you know, because she’s not doin’ her obligations because I come in here, I’m come from my work, an’ it’s not, dinner isn’t cooked on the stove, so I should tell her ‘I’m leaving you! I’m tired of this!’ No, my plan here is to talk to her, set her down an’ say ‘Hey’ an’ you work it through an’ forgive her, just try an’ get this organized. That’s the whole thing--be organized.”

Utilian racial relations impacted interviewees’ statements about mixed-race couples, whether between a Utilian and a “Spanish” or between White and Black Utilians. One man offered the following personal explanation:

“Well, the majority of Utilians, they really look for Utilians. And um, very seldom do you find a Utilian married to a Spanish woman. I was married to a Spanish woman—half Spaniard—that was the mistake of my life. The majority of people here look for Utilians to marry.”

Several interviewees discussed a recent wedding where the father and brother of the bride refused to attend the ceremony because the bride was a White Utilian and the groom was considered Black. Coached in terms of an insider/outsider dynamic, several interviewees mentioned romantic relationships, sexual liaisons, and marriages between Utilians and tourists from the United States and elsewhere. Interviewees also noted differences between marriages on Utila and neighboring islands. One woman, interviewed in the presence of her husband, remarked, “In Roatan...men don’t send the money to the brides.” She further elaborated that Roatan men spend their money on gold jewelry for themselves instead of supporting their wives and families.

Dress may also be a relevant signal in Utilian social life. Several respondents saw shoes in particular as a marker of male respectability. One interviewee noted, “Any time a Utilian—A Utilian, Utilian you see him walking up and down the street barefoot; no ambition....No ambition. You seldom make anything out of anyone...any Utilian who’s going around barefeet.”

Morality and community reputation were reasons that interviewees gave for avoiding divorces, with one man noting that the divorce rate was low because women don’t “want to get...scandalized...They don’t want to get their names in the street.” This contrasts with other proffered explanations that the low divorce rate on Utila is due to the cost, about 5000 lempira (approximately US\$389 in 1996). An emphasis on morality was also noted in the negative statements that multiple interviewees made about “shacking-up,” including the statement by one woman that cohabitation is “what’s

ruining Utila right now.” Another woman discussed “shacking up” as socially sanctioned only under certain circumstances, stating that it’s rare among Utilian women but more common for Utilian men and outside women. That same interviewee continues to affirm what she sees as the sensibility of the practice, noting,

“For me, it’s not like it’s a wrong thing to do. In a way it’s good because maybe before you marry the person you’d like to live with them and know what they’re like before you get into - make this big step to marrying and, you know. ‘Cause if you’s just living together you can always like, leave whenever you think things are not right or something, you know.”

Additionally, affairs were seen as more socially acceptable for men than for women, with one respondent noting, for example, that having an affair makes a Utilian man “famous” but a woman “dirt.” This harkens back to Wilson’s (1969) conceptualization of reputation and respectability among Caribbean peoples. As participants were not directly asked if men were socially permitted to have affairs while women were not, this could not be examined quantitatively beyond reviewing the findings more generally regarding male and female obligations in marriage, but it does point to a sexual double-standard whereby men are not subject to the same social strictures that constrain female behavior.

10. Discussion

Results for this study were both mixed and modest. Interview responses reinforced Utila’s separateness from other Caribbean societies, noting the greater relative role for men in Utilian society as providers and emphasizing morality as an important character trait in both spouses. The heavy emphasis on female domesticity among statements from both male and female interviewees evokes images of mid-Twentieth Century small-town America, albeit with a decidedly island cast. It also, however, congrues nicely with the idea that within the Caribbean, men and women inhabit different

social spheres, with women characterized as tenders of the home and family whereas men are expected to engage more fully with the outside world (e.g., Smith 1962).

Across the full interview and within the regression models for each individual question, the greatest independent predictor of rhetorical domineeringness is response length. This suggests that longer responses may be characterized by more opportunities to make a rhetorically domineering statement rather than by obsequious verbosity. Hypothetically, longer statements could be indicative of someone being meek and unassertive, such as by using twenty words to convey an idea that could be succinctly stated in three words instead. Because response length was so significant of a predictor of rhetorical domineeringness, it was a necessary control in all regression models for individual question, even though it was not directly related to study predictions.

The statistically significant results for rhetorical domineeringness in the test question about Utilian weddings complicate an attempt to examine audience effects in the test questions. Question 12, concerning Utilian weddings, showed a statistically significant audience effect between individuals interviewed alone and those interviewed in the presence of a spouse; the interaction effect of sex and age approached statistical significance, with women interviewed in the presence of their spouses being less rhetorically domineering than other respondees. Within the regression, the size of the coefficient for that interaction effect roughly cancels out the increase in rhetorical domineeringness in individuals interviewed in the presence of a spouse, thus emphasizing that the result shows a sex difference with husbands interviewed in the presence of their wives being more rhetorically domineering than other interviewees.

The regression of rhetorical domineeringness for several test questions showed a

more pronounced and statistically significant interaction effect than the control question, thereby providing evidence for a depressive effect in rhetorical domineeringness for wives interviewed in the presence of their husbands. These included Question 5, regarding characteristics that are sought in wives; Question 6, regarding characteristics that should be sought in wives; and Question 19, regarding special obligations that husbands and wives have when men ship out for long periods of work. Question 17, involving obligations husbands have in marriage, also showed an interaction effect that approached but did not achieve statistical significance at the $p \leq .05$ level. Being interviewed in the presence of a spouse approached statistical significance for Question 20, Question 21, and Question 24, but the interaction effect did not approach statistical significance for these models. Overall, these findings provide partial support for Prediction Three, that sex differences in the presentation of interview responses will be amplified when individuals are interviewed in the presence of a spouse rather than interviewed alone. In the three models where the interaction effect was independently statistically significant, husbands interviewed in the presence of their wives spoke with more forceful rhetoric than did other interviewees. Given that the topics of these questions were related to desirable characteristics of wives and obligations that husbands and wives have when men are absent from the island, this increased rhetorical domineeringness may indicate an attempt to assert dominance. Perhaps husbands' increased forcefulness in responding these questions may be an attention-drawing technique to signal their seriousness and firmness about the topics to their wives.

Interviewer sex was statistically significant as a predictor of rhetorical domineeringness in the regression for Question 8, regarding characteristics that should be

sought in husbands, and approached statistical significance in the regression for Question 7, regarding characteristics that are sought in husbands. For these models, being interviewed by the male interviewer was associated with less rhetorically domineering responses. Being interviewed by the opposite sex was statistically significant in the regression for Question 21, regarding blame in the case of infidelity. However, any attempts to decipher the effect of interviewer sex or of being interviewed by the opposite sex are complicated by the distinctions in age and status between the male interviewer (35 years old, professor) and the female interviewer (25 years old, student). While these findings are not directly germane to the stated predictions of the study, they suggest interesting considerations in deciphering gender relations on Utila and for constructing experimental interview design.

Several statistically significant effects emerged for demographic variables in some test questions as compared to the control question. Parenting status approached statistical significance in the regressions on rhetorical domineeringness for Question 5, Question 17, Question 18, and Question 24. In these models, being a parent was associated with providing a less rhetorically domineering response. Age was statistically significant in the regression on rhetorical domineeringness for Question 19 and Question 24; it also approached statistical significance in the regression for Question 25. In these models, older respondents were associated with more rhetorically domineering responses. Marital status approached statistical significance for the regression on rhetorical domineeringness for Question 21, with married individuals providing less domineering responses. None of these results are directly relevant to the study hypothesis, although the marital effect in Question 21 is interesting given the social role renegotiation

characteristic of Utila and of the Caribbean in general. It is curious that married individuals would offer less rhetorically domineering responses to a question about the assignation of blame in the case of infidelity, perhaps indicative of a less harshly judgmental, more nuanced perspective developed during marriage. Any such interpretation, however, is speculative and should further consider that the effect was not statistically significant at the $p \leq .05$ level.

Consistent with evolutionary predictions, men did place a higher emphasis on women's morality, but both sexes were generally in agreement about spousal expectations overall. Across multiple questions (5, 6, 18), the greater emphasis on female morality among male interviewees than female interviewees was statistically significant both in the full dataset, and among the subset of individuals interviewed alone, but only approached statistical significance in the subset of individuals interviewed jointly with spouses. In a regression model that accounted for the impact of other covariates, this sex difference was also statistically significant for Question 6, which asked what characteristics Utilian men should seek in wives, both for the full dataset, and for the subset of individuals interviewed alone, but is reversed and not statistically significant for the subset of individuals interviewed jointly with spouses. These findings support Prediction 1 while failing to support Prediction 3. Notably, both men and women emphasized the importance of domesticity as a trait in wives to a greater extent than female morality. There was no sex difference in responses and the finding was outside of the scope of the evolutionary hypotheses of the study, but it is interesting as an articulation of island values.

Across multiple questions (7, 8, 17), more women than men stated that financial

provisioning was a male obligation in marriage, but this result was not statistically significant. However, this effect was statistically significant within the subgroup of individuals interviewed in the presence of their spouses in a logistic regression of responses to Question 7, which asked what characteristics Utilian women seek in husbands. Wives were more likely than their husbands to report that Utilian women look for signs of resource control in potential spouses. This finding supports both Prediction 2 and Prediction 3.

Across multiple questions, there was an observed sex difference in statements that women should and do seek moral husbands, with more women than men stating that morality was an important characteristic in husbands. This was also replicated in the regression model for Question 7, regarding what characteristics Utilian women do seek in spouses, where women were substantially more likely than men to report that Utilian women seek moral husbands; however, the model as a whole was not statistically significant, due in part to the large number of covariates. This finding is likewise outside of the scope of the evolutionary hypotheses that motivated this study but is consistent with the social conservativeness and non-matrifocal households that distinguish Utila from other Caribbean locales.

Interestingly, in response to direct questions about obligations in marriage, no men or women interviewed in the presence of their spouses indicated that fidelity was an obligation in marriage. This finding does not support Prediction 3. However, it may in part be due to the fact that the responses given related to acts that were expected in marriage (e.g., obligations for wives to tend to the home, obligations for husbands to be financial providers) rather than acts that were verboten (e.g., obligations to not have an

affair). Alternately, it may relate to the high degree of harmony signaled in joint interviews, also seen in the greater tendency to suggest reconciliation than separation in response to unmet obligations in marriage.

The responses to Question 20, related to concerns when men ship out, provided evidence counter to Prediction 3. Individuals interviewed in the presence of a spouse were less, not more, likely than individuals interviewed alone to state that women's fidelity is a concern when their husbands ship out to sea; there was no sex difference in the response.

Utilians interviewed jointly with their spouses were substantially more likely than Utilians interviewed alone to focus on reconciliation in response to unmet obligations in marriage. This took the form of more frequently stating that a husband should talk with a wife when she failed to meet expectations and less frequently stating that a woman should divorce her husband when he fails to meet his obligations in marriage. The sex difference in these responses was not statistically significant. This is not directly related to the study predictions but is an interesting finding of an audience effect within the experimental interview setting and is consistent with Aquilino's (1993) finding that spouses interviewed together provide more positive assessments of marriage and predict a lower likelihood of divorce.

11. Limitations and Directions for Future Research

The study is limited by its sample size. Although the 133 research participants represent around 7% of the total population of Utila⁷, the subsample of people interviewed in the presence of their spouses was quite small, at only 42 individuals. Of

⁷ Given that the study was restricted to adult English-speaking Utilians, the study reached an even larger proportion of the eligible subject population.

these 42 people, two women declined to give any responses for any of the questions and a greater number of individuals declined to give responses for selected questions. Given this relatively small sample size, the statistically significant effects within the study are impressive. However, it is important to note that each of the predictions were supported by the analysis for only a portion of all total possible opportunities. This is not surprising given the inherent messiness of semi-structured interviews and the wide range of possible responses that interviewees could provide.

It would have been useful to collect information about the participants' own experiences with infidelity, but asking such sensitive questions would have introduced excessive discomfort into the interviews. Furthermore, asking such questions with the spouse present would be prohibitively ethically problematic, and thus would not be compatible with the experimental context and exploration of audience effects that motivated this study. Although some participants did spontaneously disclose information about their personal affairs and marital struggles, and also gossiped about the infidelities of others, this information was not addressed in the study protocol or collected systematically.

The shorter total response length for individuals interviewed in the presence of a spouse may be partially attributable to the sheer constraint of having another person also contribute to the response. This is in contrast to Allan (1980), which argues that spouses interviewed together may provide a greater quantity of data through verbal interplay and prompting.

Logistic regression is the most appropriate analysis technique for the content of research questions and available data, but a significant limitation is that missing values

for the dependent variable cause cases to be dropped from the analysis and that any covariate that perfectly predicts the value of the independent variable is also dropped from analysis. To resolve this problem, which would otherwise result in a drastically reduced sample size, any covariate that was collinear with the dependent variable was not included in the analysis. This masks the true effect of the independent variable and causes the model to seem less significant than it would have been were the perfectly predictive covariate able to be included. This is a particular complication for the subset of individuals interviewed in the presence of a spouse, as this group was already a small subset of the full dataset. It is possible that this study would have found more significant results with a larger total sample and greater number of individuals interviewed in the presence of a spouse, which would have allowed for greater variation in responses.

Utila has undergone social and economic changes since the time when the initial data for this study was collected in 1996. Major changes include an increase in construction on the island (largely to support the tourist economy), a more recent slump in tourism (despite an overall increase in the industry) due to the struggle of the global economy and Honduran political strife, and recovery from Hurricane Mitch in 1998. Most notably, Utilians report that more men stay on the island now than in the mid-1990s, due to the greater number of jobs in tourism and construction. According to reports from island residents during a visit I made in 2009, more young couples are “shacking up” outside of marriage and there is a greater incidence of sexual encounters between island residents and dive tourists, presented by older island residents as a tongue-clucking refrain about “kids today.” Future research on Utila could attempt to investigate how the greater male residence on island may have impacted island courtship

and marital life.

Chapter 5: Conclusion

Writing about the position of science in the Twenty-First Century and expressing his hopes for its elevation within the Obama administration, Overbye (2009: D1) notes,

Science is not a monument of received Truth but something people do to look for truth. That endeavor, which has transformed the world in the past few centuries, does indeed teach values. Those values, among others, are honesty, doubt, respect for evidence, openness, and tolerance and indeed hunger for opposing points of view....Nobody appeared in a cloud of smoke and taught scientists these virtues. This behavior simply evolved because it worked.

It is in this spirit of inquiry, exploration, and accountability that I have embarked upon this dissertation. In committing to this scientific examination of romantic relationships, through the testing of evolutionary hypotheses and the acknowledgment of the limitations inherent in quantifying human behavior, I have attempted to better understand the operations of signaling theory in contemporary human courtship and the ways in which it can be appropriately applied.

This dissertation has been an interdisciplinary enterprise. Although it is grounded in evolution and behavior studies, itself a multidisciplinary mesh of anthropology, psychology, and biology, it also pulled from ethology, sociology, economics, law, non-evolutionary subdisciplines of anthropology and psychology, and other areas of study. As such, it has contributed to a purpose of seeking greater breadth and interconnectedness in scholarship, rather than towards a narrower and narrower compartmentalization of knowledge. Cronk (2005) notes,

The fact that costly signaling theory is common to both the social and biological sciences is more than just a curiosity. It also highlights the generality of signal design problems, whether they are solved by engineers, advertisers, or natural selection, and creates opportunities for fruitful exchanges of insights across disciplines (p. 610).

With an eye toward this broad applicability of signaling theory, I have striven in this

dissertation to communicate across contexts, use accessible language, and rightfully acknowledge the contributions of disciplines outside of my own to the growing body of work in courtship signaling.

The three projects that comprise this dissertation contribute to a larger research program that uses animal signaling theory to examine human cultural phenomena from an evolutionary perspective (Cronk 1995, 1999). It is thus theoretically grounded in sexual selection theory (Darwin 1871; Bateman 1948; Trivers 1972) and signaling theory (Bradbury & Vehrencamp 1998; Maynard Smith & Harper 2003). Furthermore, the work on women's facial features contributes to research on perception (e.g., Perrett et al. 1998a, 1998b), the work on engagement rings contributes to the growing body of literature on the evolution of consumption (see Saad 2007), and the work with Utilian men and women contributes to the study of audience effects in response to experimental interviews (e.g., Aunger 1994, 1995; Cronk et al. 2009).

The following table provides a brief review of the characteristics examined in this dissertation, the signal form to which I have classed them, and the support for their role in human courtship signaling.

Characteristic	Signal Form	Support/Argument
Female facial appearance	Cue	Maynard Smith & Harper (2003) discuss facial FA in humans as a cue. It seems unlikely that facial appearance evolved for the <i>purpose</i> of signaling testosterone load (or sociosexuality) in women as opposed to simply reflecting it.
Engagement ring costs	Inefficient signal	Tightness between cost and income not as straightforward as would be needed to reliably signal resource control; may still serve as a signal of commitment, warning to potential suitors, or reflection of mate value.

Characteristic	Signal Form	Support/Argument
Content of interview responses	Minimal-cost signal	Language itself is symbolic and representational. Content of interview responses varies by context; confers minimal cost on the sender; and is beneficial in terms of increasing shared information about expectations. The interview context provides an opportunity for spousal communication.
Rhetorical domineeringness	Minimal-cost signal	Rhetorical domineeringness can be turned on & off, varies by situation, and confers minimal cost on the sender.

Table 5.1: Characteristics studied and their roles as signals or cues.

In my examination of female facial features as cues, I attempted to address whether discriminable features of women's faces might convey meaningful information about their mate value. Previous investigations established a relationship between facial features and testosterone exposure (Penton-Voak & Chen 2004) and explored associations between facial masculinity and attractiveness (e.g., Perrett et al. 1998a, 1998b). I found that female facial masculinity was modestly predicted by jaw width, departures from eye roundness, and proportion of the face comprised of the chin. This result provides support to the validity of using viewer-rated masculinity as a proxy for phenotypic facial masculinity. I further found that the proportion of the face comprised of the chin is a modest but statistically significant predictor of sociosexuality score. The chin may thus function as a cue to sociosexual attitudes and behavior that are also believed to be due, in part, to the effects of testosterone. Prospective romantic partners may use this information to gauge their compatibility and romantic prospects. Eye shape is modestly associated with attractiveness as both a short- and long-term mate. SOI is independently associated with perceived trustworthiness when all facial feature measurements and proportions are controlled for, suggesting that prospective mates may perceive a facial cue, related either to sociosexual orientation itself or to some other

feature associated with sociosexuality, that impacts mate preferences. In total, men may be able to accurately assess some behavioral and health-related traits from distinct features of women's faces. Such detection can occur at the time of initial acquaintance, prior to significant opportunities to learn about such information through either conversation or other indicators. The subconscious interpretation of such information could help guide and gauge early courtship behaviors, possibly involving screening potential partners for compatible relationship aims.

In my examination of engagement rings as inefficient but financially costly signals, fitting Sozou and Seymour's (2005) formulation of a costly but worthless gift, I determined that the strongest predictor of engagement ring cost was male income. Although the cost of a ring might convey little new information to a woman about her long-term suitor's financial prospects, the relationship between his consumption pattern in general and the cost of the engagement ring that he offers might give his prospective bride valuable information about his willingness to commit to the relationship. Consistent with evolutionary predictions and previous work on bridewealth correlates (Borgerhoff Mulder 1988), I also found that female age predicts engagement ring expenditures, with younger brides receiving more costly rings. Female income, itself another measure of female mate value, likewise significantly predicts engagement ring cost, with higher-earning females receiving more expensive rings. Ring cost may thus be affected by a woman's potential biological and economic contributions to her household. Contrary to my initial predictions, I found a negative association between courtship length and ring cost as a proportion of male income. This may indicate that ring cost signals male commitment through replicating the existing signal of a lengthy courtship,

rather than compensating for any lack of knowledge about a man's financial status or the seriousness of his intentions.

In my examination of spousal obligations communicated through interview statements, I determined that Utilian men and women generally agreed upon expectations in marriage. Consistent with evolutionary hypotheses, men more frequently emphasized wives' morality than did women; however, they emphasized domestic tasks to a greater degree. When couples were interviewed jointly, women were more likely than their husbands to report that Utilian women seek financial resources from their spouses. The rhetoric used in joint interviews varied by question, but several questions of interest showed a more pronounced and statistically significant interaction effect than the control question, demonstrating that wives were less rhetorically forceful in the presence of their husbands. In response to three questions related to female obligations and characteristics, husbands interviewed in the presence of their wives spoke with more forceful rhetoric than did other interviewees. This increased rhetorical domineeringness may indicate an attempt for husbands to assert dominance either over their wives or in the presence of their wives. All three study predictions—men's emphasis on women's morality, women's emphasis on male resource control, and audience effects that amplified these sex differences—were supported by portions of the data. Although these results are modest, which is not surprising given the richness of interview data and the associated difficulties inherent in quantifying it, they do point towards the usefulness of experimental interview techniques in eliciting audience effects to provide information beyond and complementary to that expressed in the interview responses themselves.

These projects contribute to a fuller understanding of the uses and limitations of

signaling theory. The work on women's facial features underscores the importance of cue detection in early courtship. The study of engagement rings illuminates the usefulness of signals of both consumption and commitment within a liminal courtship phase. The work on statements made by Utilian spouses examines the use of signals in verbal communication within a long-established relationships. All three projects examine the importance of experimental design in studying signal processes. The investigation into audience effects in interviews among Utilian men and women, along with a similar investigation into audience effects in interviews among Utilian parents and adult children (Cronk et al. 2009), more explicitly investigates the usefulness and limitations of using the experimental design itself to elicit signals, rather than assessing signals or cues already present.

The focus within this inquiry on signals that are not conventionally "costly" is intentional. It is my position that the application of handicaps and other costly signals in explaining human courtship behavior, especially in regard to financial expenditures, has been exaggerated. In a side note within his seminal paper on handicap signaling, Zahavi (1975) argues, "[I]t is obvious that males which do not invest in parental care can spend more to pass the test of quality" (p. 208), citing Trivers (1972) and Selander (1972). I remain unconvinced of the obviousness of this premise. Although there is a necessary linkage between a handicap signal and the underlying quality conveyed and a separate link between parental investment and somatic or material resources, these investments may occur at different times, especially in humans, and do not necessarily tap into the same quality. In one recent experimental inquiry based upon costly signaling theory, Iredale et al. (2008) claim that male gifts to charity made in the presence of women

following an experimental game may represent a costly form of mating effort. However, the experimental condition only awarded funds (up to £24) at random to 6 participants out of 90 and asked all participants what portion of funds they would like donated to an anonymous charity. Iredale et al. (2008) do not clarify whether they considered generous offers to be signals of resource control, consideration, or some other desirable trait, nor does the offer of money possibly won—rather than earned—seem to represent any true costliness on the part of the giver, despite the statement, “Since the money participants chose to donate was earned rather than given to them free by the experimenter, any donations to charity were considered costly” (p. 389). Experimental games played for profit do not represent the same sort of costliness as a person’s resources earned by toil as part of regular subsistence, nor is the monetary value given sufficient to entail a significant survival cost for the subject population.

This dissertation further attempts to establish courtship signaling within a broader field of signals involved in human mate choice and investment behaviors. In particular, it has conceptualized courtship as a process invoking signals of different types and levels along the progression of time. As the field of human courtship signaling broadens, a greater usage of ethological methods would enhance the depth of study. Future work should also include broader, richer studies of interactions between signaler and receiver, or co-signalers and co-receivers, as multiple signals may be sent and received simultaneously by communicating parties. Greater examination of outside parties, including kin and potential rivals, should also be incorporated for a richer understanding of the roles of signaling within human romantic relationships. It would further be useful to examine signals of the same forms at different times, such as signals of resource

control or fertility within a committed, exclusive relationship, even though these sorts of signals are not hypothesized to be as temporally relevant as the signals examined during this project. A longitudinal project involving signals transmitted at different courtship phases within the same couples would be immensely useful, but such an inquiry in Western societies is greatly complicated by difficulties in recruiting participants at very early courtship phases (e.g., first or second dates), the frequency of courtship dissolution, and high geographic mobility of subjects during the prime age range between emancipation from their parents' households and establishment of their own families. Such an examination might be better suited to a society with more formalized courtship rules and lower geographic mobility, but where a good degree of both male and female romantic partner choice is socially tolerated.

Examining sexual selection and sex differences in human behavior from an evolutionary perspective is far from politically neutral (see Alcock 2001; Vandermassen 2005) and numbers feminists among both its critics (e.g., Fausto-Sterling 1997) and defenders (e.g., Hrdy 1981; Zuk 2003; Vandermassen 2004, 2005). Responding to more than a century of feminist critique of Darwinian principles, Vandermassen (2004: 14-15) posits, "[E]volutionary knowledge can be used in a liberating way, to argue for social equality between the sexes." I make no grandiose claims that this specific dissertation is a tool to combat sexism. But I do concur with Vandermassen's larger position that the scientific and evolutionarily-based study of sex differences can, and perhaps should, contribute to social goods. Knowing more about sex differences, including their evolutionary basis, can lead to a more responsive and just social policy, from better ensuring women's employment opportunities to reproductive choice (reviewed in

Vandermassen 2005). It is not my agenda to forge such applications—my aim in this work has been strictly to apply the scientific method to test specific hypotheses related to courtship signaling—but I appreciate the worth of such interpretations and applications.

Finally, this dissertation attempts to offer an examination of the uses and limitations of signaling theory itself as applied to contemporary human behavior. One of the most important lessons in the study of evolution and human behavior is that human behavior is itself highly plastic, malleable, and subject to both individual differences in temperament and environmental influences. As such, no full explanation of any human behavioral phenomenon can be accurately spun from a purely adaptive, evolutionary perspective that does not also consider a role for culture. It is only with broad strokes that we can see general tendencies in behavior among and within populations, not within specific individuals. Some academics and members of the general public consider humans to be wholly apart from non-human animals, distinguished by a broad *mélange* of cultural traits. Certainly, there is some credence to the idea that culture is a grand adaptive coup that enables humans to exploit a wide variety of ecological niches and to distance our species, as well as others, from the environment in which our behavioral suites evolved. Nonetheless, humans are still subject to selective pressures, such as finding mates and surviving, even in this novel environment of humans' own creation. Signaling theory, developed from the work of animal ethologists and theoretical biologists, provides a useful tool for deciphering the ways in which humans evaluate, forge, and reinforce social relationships, and thus the means by which we navigate our social world.

Appendix One: Sociosexuality Orientation Inventory

(Simpson & Gangestad 1991)

Instructions: Please answer the following questions honestly. Your responses are guaranteed to be **totally confidential**. For the questions dealing with behavior, **write** your answers in the blank spaces provided.

1. With how many different partners have you had sex (sexual intercourse) within the past year?

2. With how many different partners have you had sex (sexual intercourse) in your lifetime?

3. How many different partners do you foresee yourself having sex with during the next five years? (Please give a specific, realistic estimate).

4. With how many different partners have you had sex on one and only one occasion?

5. How often do you fantasize about having sex with someone other than your current dating partner? (Circle one).
 - 1). never
 - 2). once every two or three months
 - 3). once a month
 - 4). once every two weeks
 - 5). once a week
 - 6). a few times each week
 - 7). nearly every day
 - 8). at least once a day
6. Sex without love is OK. 1 2 3 4 5 6 7 8 9

I strongly disagree

I strongly agree

7. I can imagine myself being comfortable and enjoying "casual" sex with different partners.

1 2 3 4 5 6 7 8 9

I strongly disagree

I strongly agree

8. I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her.

1 2 3 4 5 6 7 8 9

I strongly disagree

I strongly agree

Appendix Two: Engagement Ring Questionnaire

The Rutgers Engagement Ring Survey

Please fill out this survey to the best of your ability. Please answer these questions with reference to your current or most recent marriage. Where questions ask for monetary values, please give the best estimate that you can. *Please do not consult with your spouse about your answers.*

Today's date: _____ (Month/Day/Year)

Your age: _____ years

Your spouse's age: _____ years

Please indicate your gender: Male Female

Are you now married?

Yes No Yes, but my spouse and I are separated

Date of separation: _____ (Month/Day/Year)

If you are not now married, what was the reason for the termination of the marriage?

Divorce Annulment Death of spouse I have never been married

Date of termination of marriage: _____ (Month/Day/Year)

What was the date of your wedding? _____ (Month/Day/Year)

How long did you date your spouse before becoming engaged?

_____ years _____ months

Who first proposed marriage?

I first proposed marriage. My spouse first proposed marriage.

On what date was marriage first proposed? _____ (Month/Day/Year)

How important was it to you to have either a traditional or untraditional wedding?

- Having a traditional wedding was very important to me.
- Having a traditional wedding was somewhat important to me.
- The style of the wedding was not important to me.
- Having an untraditional wedding was somewhat important to me.
- Having an untraditional wedding was very important to me.

How important was it to your spouse to have either a traditional or untraditional wedding?

- Having a traditional wedding was very important to my spouse.
- Having a traditional wedding was somewhat important to my spouse.
- The style of the wedding was not important to my spouse.
- Having an untraditional wedding was somewhat important to my spouse.
- Having an untraditional wedding was very important to my spouse.

How traditional or untraditional was your wedding?

- Very traditional
- Somewhat traditional
- Neither traditional nor untraditional
- Somewhat untraditional
- Very untraditional

If an engagement ring was given to the woman, did it include one or more diamonds?

- Yes, it did include one or more diamonds.
- No, it did not include any diamonds.
- No engagement ring was given.

If an engagement ring was given to the woman, was it given at the time of the proposal or at some other time?

- At the time of the proposal
- At another time:
- No engagement ring was given

If an engagement ring was given to the woman, was she involved in the selection of the ring?

- Yes, she was involved. No, she was not involved. No engagement ring was given.

If an engagement ring was given to the woman, please indicate its approximate cost. If the ring was purchased for you, please answer this question based on your judgment of the cost of the ring. Please do not ask your spouse about the cost of the ring.

Approximate cost of the engagement ring: \$ _____

Please estimate what percentage of the cost of the ring was paid for out of your spouse's funds, out of your funds, and out of funds that you and your spouse shared at the time the ring was purchased.

_____% paid for out of your funds

_____% paid for out of your spouse's funds

_____% paid for out of funds that you and your spouse shared when the ring was purchased

What was your annual income when the engagement began? \$ _____

What was your spouse's annual income when the engagement began? \$ _____

Is this your first marriage? Yes No

Is this your spouse's first marriage? Yes No

Thank you for completing this survey! Please put it in the enclosed return envelope and drop in a mailbox. If you would like to be entered into the drawing for Target gift certificates or receive a copy of this study when it is complete, please fill out the enclosed postcard and put it in the mail.

Appendix 3: Interview Questions Asked about Expectations in Marriage

The following questions were asked of all participants:

1. How old are Utilians when they get married?
2. How old do you think they should be?
3. How do Utilians meet their husbands and wives?
4. After you meet someone you are interested in, what is the courtship and dating process like that leads up to marriage?
5. What do you think Utilian men look for in a wife?
6. What do you think they should look for?
7. What do you think Utilian women look for in a husband?
8. What do you think they should look for?
9. Are parents involved in decisions about marriage?
10. Do you think they should be?
11. What do you think they look for in sons-in-law and daughters-in-law?
12. What are Utilian weddings like?
13. What do you think they should be like?
14. Are common-law marriages (“shacking up”) common on Utila?
15. Do Utilians find them acceptable, or not?
16. What do you think of them?
17. What obligations do you think a husband has in a marriage?
18. What obligations do you think a wife has in a marriage?
19. What special obligations do you think husbands and wives have, if any, when men leave (“ship out”) for long periods of work?

20. In particular, do people worry about whether men will send money back or about the faithfulness of either the wife or the husband?
21. If there is a problem with faithfulness in a marriage, who is to blame—the man, the woman, the person inside the marriage, or the outside man or woman?
22. What do you think is the right way for a man to deal with an unfaithful wife and her outside man?
23. What is the right way for a woman to deal with an unfaithful husband and his outside woman?
24. Sometimes, of course, people do not live up to their obligations, whether because of unfaithfulness, or because of a man not providing for his family, or a woman not taking care of her kids, or whatever. How do you think a husband should handle it when his wife doesn't live up to her obligations?
25. And how should a wife handle it when her husband doesn't live up to his obligations?
26. Even though the last few questions have been about problems in marriage, Utilians actually have a much lower divorce rate than Americans. Do you have any explanation for the low Utilian divorce rate? How do Utilians solve their marital problems without resorting to divorce very often?
27. Do you have anything to add on this topic before we finish up?

References Cited

- Albright, L., Kenny, D. A., & Malloy, T. E. (1988). Consensus of personality judgments at zero acquaintance. *Journal of Personality & Social Psychology, 55*, 387-395.
- Alcock, J. (2001). *The Triumph of Sociobiology*. Oxford: Oxford University Press.
- Alexander, J. (1977). The role of the male in the middle-class Jamaican family: A comparative perspective. *Journal of Comparative Family Studies, 8*, 369-389.
- Allan, G. (1980). A note on interviewing spouses together. *Journal of Marriage and the Family, 42*, 205-210.
- Ambady, N., & Rosenthal, R. (1992). Thin slices of expressive behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological Bulletin, 111*, 256-274.
- Ambler, T., & Hollier, E. A. (2004). The waste in advertising is the part that works. *Journal of Advertising Research, 44*(4), 375-389.
- Andersson, M. (1994). *Sexual Selection*. Princeton, NJ: Princeton University Press.
- Andersson, M., & Iwasa, Y. (1996). Sexual selection. *Trends in Ecology and Evolution, 11*, 53-58.
- Andrews, P. W., Gangestad, S. W., Miller, G. F., Haselton, M. G., Thornhill, R., & Neale, M. C. (2008). Sex differences in detecting sexual infidelity: Results of a maximum likelihood method for analyzing the sensitivity of sex differences to underreporting. *Human Nature, 19*, 347-373.
- Aquilino, W. S. (1993). Effects of spouse presence during the interview on survey responses concerning marriage. *Public Opinion Quarterly, 57*, 358-376.
- Aronow v. Silver, 538 A.2d 851 (N.J. Super. Ct. Ch. Div. 1987).
- Aunger, R. (1994). Sources of variation in ethnographic interview data: The case of food avoidances in the Ituri forest, Zaire. *Ethnology, 33*, 65-99.
- Aunger, R. (1995). On ethnography: Storytelling or science? *Current Anthropology, 36*, 97-130.
- Axelrod, R. (1984). *The Evolution of Cooperation*. New York: Basic Books.
- Baird, D. (1986). Keep Your Hands to Yourself. [Recorded by Georgia Satellites.] On *Georgia Satellites*. Elektra.

- Barrow, C. (1996). *Family in the Caribbean: Themes and Perspectives*. Kingston: Ian Randle Publishers.
- Barta, W. D. & Kiene, S. M. (2005). Motivations for infidelity in heterosexual dating couples: The roles of gender, personality differences, and sociosexual orientation. *Journal of Social and Personal Relationships*, 22, 339-360.
- Bateman, A. J. (1948). Intra-sexual selection in *Drosophila*. *Heredity*, 2, 349-368.
- Baumeister, R., & Vohs, K. (2004). Sexual economics: Sex as female resource for social exchange in heterosexual interactions. *Personality and Social Psychology Review*, 8, 339-363.
- Bell, D. (1998). Wealth transfers occasioned by marriage: A comparative reconsideration. In *Kinship, Networks, and Exchange*. Eds. Schweizer, T., & White, D. R. (series: Structural Analysis in the Social Sciences; series ed. Granovetter, M.). Cambridge: Cambridge University Press. p. 187-209.
- Besson, J. (1993). Reputation and respectability reconsidered: A new perspective on Afro-Caribbean peasant women. In *Women and Change in the Caribbean: A Pan-Caribbean Perspective*. Ed. J. Momsen. London: James Currey. 15-37.
- Bhattacharya, U. & Dittmar, A. (2004). Costless versus costly signaling in capital markets: Theory and Evidence. *Paper presented at FIRS Conference on Banking, Insurance and Intermediation in Capri in May 2004*.
- Bjorntorp, P. (1988). The association between obesity, adipose tissue distribution and disease. *Acta Medica Scandinavica*, 723 (Suppl.), 121-134.
- Blumberg, H. H., Fuller, C., & Hare, A. P. (1974). Response rates in postal surveys. *Public Opinion Quarterly*, 38, 113-123.
- Boothroyd, L. G., Jones, B. C., Burt, D. M., DeBruine, L. M., Perrett, D. I. (2008). Facial correlates of sociosexuality. *Evolution and Human Behavior*, 29, 211-218.
- Borkenau, P., & Liebler, A. (1992). Trait inferences: Sources of validity at zero acquaintance. *Journal of Personality and Social Psychology*, 62, 645-657.
- Borgerhoff Mulder, M. (1988). Kipsigis bridewealth payments. In *Human Reproductive Behaviour: A Darwinian Perspective*. Eds. L. L. Betzig, M. Borgerhoff Mulder and P. W. Turke. Cambridge: Cambridge University Press. 65-82.
- Bourque, L. B., & Fielder, E. P. (1995). *How to conduct self-administered and mail surveys*. Thousand Oaks, CA: Sage.

- Bradbury, J. W., & Vehrencamp, S. L. (1998). *Principles of animal communication*. Sunderland, MA: Sinauer.
- Briggs, C. L. (1986). *Learning How to Ask: A Sociolinguistic Appraisal of the Role of the Interview in Social Science Research*. Cambridge: Cambridge University Press.
- Brinig, M. F. (1990). Rings and promises. *Journal of Law, Economics, and Organization*, 6, 203-215.
- Brown, W. M., Cronk, L., Grochow, K., Jacobson, A., Liu, K., Popovic, Z., & Trivers, R. (2005). Dance reveals symmetry especially in young men. *Nature*, 438, 1148-1150.
- Bukstel, L. H., Roeder, G. D., Kilmann, P. R., Laughlin, J., & Sotile, W. M. (1978). Projected extramarital sexual involvement in unmarried college students. *Journal of Marriage and the Family*, 40, 337-340.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, 12, 1-39.
- Buss, D. M., & Barnes, M. (1986). Preferences in human mate selection. *Journal of Personality and Social Psychology*, 50, 559-570.
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, 100, 204-232.
- Camerer, C. (1988). Gifts as economic signals and social symbols. *American Journal of Sociology*, 94, S180-S214.
- Campbell, L., Cronk, L., Simpson, J. A., Milroy, A., Wigington, T., and Wilson, C. L. (2004). Do women's faces honestly signal long-term mate quality to men? Paper presented at the annual meeting of the International Society for Human Ethology, Ghent, Belgium.
- Campbell, L., Cronk, L., Simpson, J. A., Milroy, A., Wilson, C. L., & Dunham, B. (2009). The association between men's ratings of women as desirable long-term mates and individual differences in women's sexual attitudes and behaviors. *Personality and Individual Differences*, 46, 509-513.
- Carnegie, C. V. (1982). Strategic flexibility in the West Indies: The social psychology of Caribbean migration. *Caribbean Review*, 2, 10-13, 54.
- Caro, T. M. (1986). The functions of stotting in Thompson's gazelles. *Animal Behaviour*, 34, 663-684.

- Cashdan, E. (1995). Hormones, sex, and status in women. *Hormones and Behavior*, 29, 354-366.
- Chapman, T., Bangham, J., Vinti, G., Seifried, B., Lung, O., et al. (2003). The sex peptide of *Drosophila melanogaster*: Female post-mating responses analyzed by using RNA interference. *Proceedings of the National Academy of Sciences USA*, 100, 9923–9928.
- Chapman, T., Liddle, L. F., Kalb, J. M., Wolfner, M. F., Partridge, L. (1995). Cost of mating in *Drosophila melanogaster* females is mediated by male accessory gland products. *Nature*, 373, 241–244.
- Cherlin, A. J. (2004). The deinstitutionalization of American marriage. *Journal of Marriage and Family*, 66, 848, 861.
- Cherlin, A. J. (2009). *The Marriage Go-Round: The State of Marriage and the Family in America Today*. New York: Random House.
- Clark, A. P. (2004). Self-perceived attractiveness and masculinization predict women's sociosexuality. *Evolution and Human Behavior*, 25, 113-124.
- Clarke, E. (1957). *My Mother Who Fathered Me: a study of the family in three selected communities in Jamaica*. London: George Allen and Unwin.
- Clutton-Brock, T. (2009). Sexual selection in females. *Animal Behaviour*, 77, 3-11.
- Clutton-Brock, T. H., & Albon, S. D. (1979). The roaring of red deer and the evolution of sexual advertisement. *Behaviour*, 69, 145-170.
- Cosmides, L. & Tooby, J. (1992). Cognitive adaptations for social exchange. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The Adapted Mind: Evolutionary Psychology and The Generation of Culture* (pp. 163-228). New York: Oxford University Press.
- Crane, J. G. (1971). *Educated to Emigrate: The Social Organization of Saba*. Assen: Van Gorcum.
- Cronk, L. (1995). Is there a role for culture in human behavioral ecology? *Evolution and Human Behavior*, 16, 181-205.
- Cronk, L. (1998). Ethnographic text formation processes. *Social Science Information*, 37, 321-349.
- Cronk, L. (1999). *That complex whole: Culture and the evolution of human behavior*. Boulder, CO: Westview Press.

- Cronk, L. (2005). The application of animal signaling theory to human phenomena: Some thoughts and clarifications. *Social Science Information/Information sur les Sciences Sociales*, 44, 603-620.
- Cronk, L., & Dunham, B. (2007). Amounts spent on engagement rings reflect aspects of male and female mate quality. *Human Nature*, 18, 329-333.
- Cronk, L., Gerkey, D., & Irons, W. 2009. Interviews as experiments: Using audience effects to examine social relationships. *Field Methods*, 21, 331-346.
- Cronk, L., & Steadman, S. (2002). Tourists as a common-pool resource: A study of dive shops on Utila, Honduras. In *Economic Development: An Anthropological Approach*. Eds. Cohen, J. & Dannhaeuser, N. 51-68. Volume 19 of the Society for Economic Anthropology Monographs. Walnut Creek, CA: Altamira Press.
- Cunningham, M. R. (1986). Measuring the physical in physical attractiveness: Quasi-experiments on the sociobiology of female facial beauty. *Journal of Personality and Social Psychology*, 68, 261-279.
- Cunningham, M. R., Roberts, A. R., Barbee, A. P., Druen, P. B., & Wu, C. H. (1995). Their ideas of beauty are, on the whole, the same as ours: Consistency and variability in the cross-cultural perception of female physical attractiveness. *Journal of Personality and Social Psychology*, 68, 261-279.
- Currin, F. H. (2002). *Transformation of paradise: Geographical perspectives on tourism development of a small Caribbean island (Utila, Honduras)*. M.A. thesis, Department of Geography and Anthropology, Louisiana State University.
- Daas, K. L. (2005). Women, weddings, and popular culture: An intertextual analysis of college women's negotiation of the wedding-industrial complex. PhD dissertation, University of Nebraska--Lincoln.
- Daly, M., & Wilson, M. (1988). *Homicide*. Hawthorne, NY: Aldine de Gruyter.
- Darwin, C. (1859). *On the Origin of Species*. London: Murray.
- Darwin, C. (1871). *The Descent of Man, and Selection in Relation to Sex*. New York: Hurst.
- Davis, S. (2000). Testosterone and sexual desire in women. *Journal of Sex Education and Therapy*, 25, 25-32.
- Dawkins, R. (1976). *The Selfish Gene*. Oxford: Oxford University Press.
- Dirks, R. (1972). "Networks, Groups, and Adaptation in an Afro-Caribbean Community." *Man*, 7, 565-585.

- Domb, L. G., & Pagel, M. (2001). Sexual swellings advertise female quality in wild baboons. *Nature*, *410*, 204-206.
- Douglass, L. (1992). *The Power of Sentiment*. Boulder: Westview Press.
- Dunham, B. Forthcoming. The role for signaling theory and receiver psychology in marketing. In *Evolutionary Psychology in the Business Sciences*. Ed. Saad, G. Springer.
- Ellis, A. (1947). Questionnaire versus interview methods in the study of human love relationships. *American Sociological Review*, *12*, 541-553.
- Evans, H., & Davies, R. (1997). Overview Issues in Childhood Socialization in the Caribbean. In *Caribbean Families: Diversity Among Ethnic Groups*. Eds. Roopnarine, J. L. and J. Brown. Greenwich: Ablex Publishing Corporation. 1-24.
- Farkas, L.G. (1981). *Anthropometric facial proportions in medicine*. Springfield: Charles C. Thomas.
- Fausto-Sterling, A. (1997). Feminism and behavioral evolution: A taxonomy. In *Feminism and Evolutionary Biology: Boundaries, Intersections, and Frontiers*. Ed. Gowaty, P. New York: Chapman & Hall. p. 174-189.
- Fedoraka, K. M., Zuk, M., & Mousseau, T. A. (2005). Natural selection drives the link between male immune function and reproductive potential. *Canadian Journal of Zoology*, *83*, 1012-1014.
- Feldman, S., & Cauffman, E. (1999). Your cheatin' heart: Attitudes, behaviours, and correlates of sexual betrayal in late adolescents. *Journal of Research on Adolescence*, *9*, 227-252.
- Fernandez, S. J. (2003). Cultural Summary: Cubans. Human Relations Area Files. (Located in the HRAF Archive).
- Fink, B., Grammer, K., & Matts, P. J. (2006). Visible skin color distribution plays a role in the perception of age, attractiveness, and health in female faces. *Evolution and Human Behavior*, *27*, 433-442.
- Fink, B., Grammer, K., & Thornhill, R. (2001). Human (*Homo sapiens*) facial attractiveness in relation to skin texture and color. *Journal of Comparative Psychology*, *115*, 92-99.
- Fink, B., & Matts, P. J. (2008). The effects of skin color distribution and topography cues on the perception of female facial age and health. *Journal of the European Academy of Dermatology and Venerology*, *22*, 493-498.

- Fink, B., & Penton-Voak, I. S. (2002). Evolutionary psychology of facial attractiveness. *Current Directions in Psychological Science, 11*, 154-158.
- Fisher, H. (1995). The nature and evolution of romantic love. *Romantic Passion: A Universal Experience?* Ed. Jankowiak, W. New York: Columbia University Press.
- Fisher, H. (1998). Lust, attraction, and attachment in mammalian reproduction. *Human Nature, 9*, 23-52.
- Fisher, R. A. (1930). *The Genetical Theory of Natural Selection*. Oxford: Clarendon Press.
- Fitzgerald, J. J. (1996). *Peirce's Theory of Signs as Foundation for Pragmatism*. The Hague: Mouton & Co.
- Fitzgibbon, C. D., & Fanshawe, J. H. (1988). Stotting in Thompson's Gazelles: An honest signal of condition. *Behavioral Ecology and Sociobiology, 23*, 69-74.
- Folsted, I., & Karter, A. (1992). Parasites, bright males and the innumo-competence handicap. *American Naturalist, 139*, 603-622.
- Fortunado, L., Holden, C., & Mace, R. (2006). From bridewealth to dowry? A Bayesian estimation of ancestral states of marriage transfers in Indo-European groups. *Human Nature, 17*, 355-376.
- Frank, R. (1988). *Passions within reason*. New York: W. W. Norton.
- Franklin County Probate Court. (2009). Marriage License Information. <http://www.franklincountyohio.gov/probate/departments/marriage.cfm> Accessed 2/20/09 at 6:08 pm.
- Frazier, B. (2001). Engagement rings as conditional gifts. *Journal of the American Academy of Matrimonial Lawyers, 17*, 419-439.
- Gangestad, S. W., & Simpson, J. A. (1990). Toward an evolutionary history of female sociosexual variation. *Journal of Personality Special Issue: Biological foundations of personality: Evolution, behavioral genetics, and psychophysiology, 58*, 69-96.
- Gangestad, S. W., & Thornhill, R. (2003). Facial masculinity and fluctuating asymmetry. *Evolution and Human Behavior, 24*, 231-241.
- Gaulin, S. J. C. & Boster, J. S. (1990). Dowry as female competition. *American Anthropology, 92*, 994-1005.

- Geary, D. C. (2000). Evolution and proximate expression of human paternal investment. *Psychological Bulletin*, *126*, 55-77.
- Genesis. *King James Version Study Bible*. 1:28.
- Getty, T. (1998). Reliable signaling need not be a handicap. *Animal Behaviour*, *56*, 253-255.
- Gladwell, M. (2005). *Blink: The Science of Thinking Without Thinking*. New York: Back Bay Books.
- Glick Schiller, N. and G. E. Fournon. (2001). *Georges Woke Up Laughing: Long-Distance Nationalism and the Search for Home*. Durham: Duke University Press.
- Grafen, A. (1990). Biological signals as handicaps. *Journal of Theoretical Biology*, *144*, 517-546.
- Graham, W. R. (1997). *Bay Islands English: Linguistic contact and convergence in the Western Caribbean*. Ph.D. dissertation submitted to the University of Florida.
- Guilford, T., & Dawkins, M. S. (1991). Receiver psychology and the evolution of animal signals. *Animal Behaviour*, *42*, 1-14.
- Gustavsson, L., Johnson, J. I., Uller, T. (2008). Mixed support for sexual selection theories of mate preferences in the Swedish population. *Evolutionary Psychology*, *6*, 575-585.
- Halpern, C. T., Udry, J. R., & Suchidran, C. (1997). Testosterone predicts initiation of coitus in adolescent females. *Psychosomatic Medicine*, *59*, 161-171.
- Hamilton, W. D. (1990). Mate choice near or far. *American Naturalist*, *30*, 341-352.
- Hamilton, W. D., & Zuk, M. (1982). Heritable fitness and bright birds: A role for parasites? *Science*, *218*, 384-387.
- Hasson, O. (1994). Cheating signals. *Journal of Theoretical Biology*, *167*, 223-238.
- Hasson, O. (1997). Toward a general theory of biological signaling. *Journal of Theoretical Biology*, *185*, 139-156.
- Hooper, P., & Miller, G. (2008). Mutual mate choice can drive costly signaling even under perfect monogamy. *Adaptive Behavior*, *16*, 53-70.
- Howard, V. (2003). A "Real Man's ring": Gender and the invention of tradition. *Journal of Social History*, *36*, 837-856.

- Howard, V. (2006). *Brides, Inc.: American Weddings and the Business of Tradition*. Philadelphia: University of Pennsylvania Press.
- Hrdy, S. (1981). *The Woman That Never Evolved*. Cambridge: Harvard University Press.
- Huber, B. A. (2005). Sexual selection research on spiders: Progress and biases. *Biological Reviews*, 80, 363–385.
- Hugill, N., Fink, B., & Neave, N. (2010). The role of human body movement in mate selection. *Evolutionary Psychology*, 8, 66-89.
- Iredale, W., van Vugt, M., & Dunbar, R. (2008). Showing off in humans: Male generosity as a mating signal. *Evolutionary Psychology*, 6, 386-392.
- Jackson, J. J., & Kirkpatrick, L. A. (2007). The structure and measurement of human mating strategies: Toward a multidimensional model of sociosexuality. *Evolution and Human Behavior*, 28, 382-391.
- Jasienska, G., Ziomkiewicz, A., Ellison, P. T., Lipson, S. F., & Thune, I. (2004). Large breasts and narrow waists indicate reproductive potential in women. *Proceedings of the Royal Society of London, B*, 271, 1213-1217.
- John, J. L. (1997). The Hamilton-Zuk theory and initial test: An examination of some parasitological criticisms. *Journal of Theoretical Biology*, 27, 1269-1288.
- Johnstone, R. A. (1997). The evolution of animal signals. In *Behavioural Ecology: An Evolutionary Approach*. 2nd edition. Eds. Krebs, J. R. & Davies, N. B. Sunderland, MA: Sinauer. 155-178.
- Johnstone, R. A., & Grafen, A. (1993). Dishonesty and the handicap principle. *Animal Behaviour*, 46, 759-764.
- Keating, C. F., & Doyle, J. (2002). The faces of desirable mates and dates contain mixed social status cues. *Journal of Experimental Social Psychology*, 38, 414-424.
- Kenrick, D T., Sundie, J. M., Nicastle, L. D., & Stone, G. O. (2001). Can one ever be too wealthy or too chaste? Searching for nonlinearities in mate judgment. *Journal of Personality and Social Psychology*, 80, 462-471.
- Kimmeldorf, M., Dunham, B., & McCullough, M. Unpublished manuscript. Gift-giving as signaling.
- Kinsey, A. C., Pomeroy, W. B., Martin, C. E., & Gebhard, P. H. (1953). *Sexual Behavior in the Human Female*. Philadelphia: W. B. Saunders Co.

- Knowles, B., Nash, T., Herell, T., & Stewart, C. (2008). Single Ladies. On “*I am...Sasha Fierce.*” Columbia.
- Kollman, K. (1998). *Outside Lobbying: Public Opinion and Interest Group Strategies*. Princeton, NJ: Princeton University Press.
- Korda, R. C., Hills, J. M., & Gray, T. S. (2008). Fishery decline in Utila: Disentangling the web of governance. *Marine Policy*, 32, 968-979.
- Krakauer, A. H. (2005). Kin selection and cooperative courtship in wild turkeys. *Nature*, 434, 69-72.
- Kraus, M. W., & Keltner, D. (2009). Signs of socioeconomic status: A thin-slicing approach. *Psychological Science*, 20, 99-106.
- Krebs, J. R., & Dawkins, M. S. (1984). Animal signals: Mind-reading and manipulation. In *Behavioural Ecology: An Evolutionary Approach*. 2nd edition. Eds. Krebs, J. R. & Davies, N. B. Sunderland, MA: Sinauer. 380-402.
- Kruger, D. J. (2008). Young adults attempt exchanges in reproductively relevant currencies. *Evolutionary Psychology*, 6, 204-212.
- Lauria, A. 1964. Respeto, relajo and interpersonal relations in Puerto Rico. *Anthropological Quarterly*, 37, 53-67.
- Lee, L., Loewenstein, G., Ariely, D., Hong, J., & Young, J. (2008). If I'm not hot, are you hot or not? Physical-attractiveness evaluations and dating preferences as a function of one's own attractiveness. *Psychological Science*, 19, 669-677.
- Leo-Rhymie, E. A. (1997). Class, Race, and Gender Issues in Child Rearing in the Caribbean. In *Caribbean Families: Diversity Among Ethnic Groups*. Eds. Roopnarine, J. L. and J. Brown. Greenwich: Ablex Publishing Corporation. 25-56.
- Levi-Strauss, C. (1969). *The Elementary Structures of Kinship*. Boston, MA: Beacon.
- Levy, B., Ariely, D., Mazur, N., Chi, W., Lukas, S., Elman, I. (2007). Gender differences in the motivational processing of facial beauty. *Learning and Motivation*, 39, 136-145.
- Li, N. P., Bailey, J. M., Kenrick, D. T., & Lindsemeier, J. A. W. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology*, 82, 947-955.
- Lloyd, G. D. (1977). Genetic and phenotypic models of natural selection. *Journal of Theoretical Biology*, 69, 543-560.

- Lord, D. G. (1975). *Money Order Economy: Remittances in the Island of Utila*. Ph.D. dissertation, University of California at Riverside.
- Lozano, G. A. (2009). Multiple cues in mate selection: The sexual interference hypothesis. *Bioscience Hypothesis*, 2, 37-42.
- Lung, O., Tram, U., Finnerty, C. M., Eipper-Mains, M. A., Kalb, J. M., & Wolfner, M. F. (2002). The *Drosophila melanogaster* seminal fluid protein Acp62F is a protease inhibitor that is toxic upon ectopic expression. *Genetics*, 160, 211-224.
- Malinowski, B. (1922). *Argonauts of the Western Pacific. An account of native enterprise and adventure in the Archipelagoes of Melanesian New Guinea*. London: Routledge & Kegan Paul.
- Manson, J. H., & Wrangham, R. W. (1991). Intergroup aggression in chimpanzees and humans. *Current Anthropology*, 32, 369-390.
- Marchetti, K. (1993). Dark habitats and bright birds illustrate the role of the environment in species divergence. *Nature*, 362, 149-152.
- Marcus, G. E., & Clifford, J. (1985). The making of ethnographic texts: a preliminary report. *Current Anthropology*, 26, 267-271.
- Marcus, G. E., & Cushman, D. (1982). Ethnographies as texts. *Annual Review of Anthropology*, 11, 25-69.
- Marcus, G. E., & Fisher, M. J. (1986). *Anthropology as Cultural Critique*. Chicago: University of Chicago Press.
- Maykovich, M. K. (1976). Attitudes versus behavior in extramarital sexual relations. *Journal of Marriage and the Family*, 38, 693-699.
- Maynard Smith, J. (1956). Fertility, mating behavior and sexual selection in *Drosophila subobscura*. *Journal of Genetics*, 54, 261-279.
- Maynard Smith, J. (1978). Optimization theory in evolution. *Annual Review of Ecology and Systematics*, 9, 31-56.
- Maynard Smith, J., & Harper, D. (2003). *Animal Signals*. Oxford: Oxford University Press.
- Mazur, A., Halpern, C., & Udry, J. R. (1994). Dominant looking male teenagers copulate earlier. *Ethology and Sociobiology*, 15, 87-94.
- McGraw, K. J. (2002). Environmental predictors of geographic variation in human mating preferences. *Ethology*, 108, 303-317.

- McIntire v. Raukhorst, 585 N.E.2d 456, 457 (Ohio Ct. App. 1989).
- Mead, L. S., & Arnold, S. J. (2004). Quantitative genetic models of sexual selection. *Trends in Ecology and Evolution*, *19*, 264-271.
- Meston, C. M. & Frohlich, P. F. (2000). The neurobiology of sexual function. *Archives of General Psychiatry*, *57*, 1012-1030.
- Mikach, S. M., & Bailey, J. M. (1999). What distinguishes women with unusually high numbers of sex partners? *Evolution and Human Behavior*, *20*, 141-150.
- Mill, John Stuart. (1848). *Principles of Political Economy with some of their Applications to Social Philosophy*. Ed. William J. Ashley, 7th ed, 1909. Library of Economics and Liberty. 27 April 2009. <<http://www.econlib.org/library/Mill/mlP.html>>.
- Miller, D. (1991). Absolute Freedom in Trinidad. *Man*, *20*, 323-341.
- Miller, G. (2000). *The mating mind: How sexual choice shaped the evolution of human nature*. New York: Doubleday.
- Miller, W. L. (1974). The etiology of essential hypertension: An anthropological study in Utila, Honduras. Master's Thesis. Wake Forest University: Department of Anthropology.
- Mougeot, F., Arroyo, B. E., & Bretagnolle, V. (2006). Paternity assurance responses to first year and adult male territorial intrusions in a courtship-feeding raptor. *Animal Behavior*, *71*, 101-108.
- Nisbet, I. C. T. (1973). Courtship-feeding, egg-size and breeding success in common terns. *Nature*, *241*, 141-142.
- Overbye, D. (2009). Elevating science, elevating democracy. *New York Times*, January 26, 2009. D1.
- Pachter, G. (2007). Island Mentality. *New Statesman*, *136*, 48-49.
- Pavlicic v. Vogtsberger, 136 A.2d 127 (Pa. 1957).
- Palowski, B., & Dunbar, R. I. M. (1999). Impact of market value on human mate choice decisions. *Proceedings of the Royal Society of London, B*, *266*, 281-285.
- Peirce, C. S. (1931). *Collected Papers of Charles Sanders Peirce. Vol I: Principles of Philosophy*. Cambridge, MA: Harvard University Press.

- Penke, L., Todd, P. M., Lenton, A. P., & Fasolo, B. (2007). How self-assessments can guide human mating decisions. In *Mating Intelligence: New Insights into Intimate Relationships, Human Sexuality, and the Mind's Reproductive System*. Eds. Geher, G. & Miller, G. F. Mahwah: Lawrence Erlbaum. 37-75.
- Penton-Voak, I. S., & Chen, J. Y. (2004). High salivary testosterone is linked to masculine facial appearance in humans.
- Penton-Voak, I. S., Jones, B. C., Little, A. C., Baker, S., Tiddeman, B., Burt, D. M., & Perrett, D. I. (2001). Symmetry, sexual attractiveness in facial proportions and male facial attractiveness. *Proceedings of the Royal Society of London B*, 268, 1617-1623.
- Penton-Voak, I. S., & Perrett, D. I. (2000). Female preference for male faces changes cyclically: Further evidence. *Evolution and Human Behavior*, 21, 39-48.
- Penton-Voak, I. S., Jacobson, A., & Trivers, R. L. (2004). Populational differences in attractiveness ratings of male and females faces: Comparing British and Jamaican samples. *Evolution and Human Behavior*, 25, 355-370.
- Perilloux, H. K. (2004). *Natural variation in human mating strategy and the evolutionary significance of mate choice criteria*. Ph.D. dissertation, University of Pittsburgh.
- Perrett, D. I., Lee, K. J., Penton-Voak, I. S., Rowland, D., Yoshikawa, S., Burt, D. M., Henzi, S. P., Castles, D. L., & Akamatsu, S. (1998a). Effects of sexual dimorphism on facial attractiveness. *Nature*, 399, 741-742.
- Perrett, D. I., Lee, K., Penton-Voak, I., Burt, D. M., Rowland, D., Yoshikawa, S., Henzi, S. P., Castles, D. & Akamatsu, S. (1998b). Sexual dimorphism and facial attractiveness. *Nature*, 394, 884-886.
- Petrie, M. (1994). Improved growth and survival of offspring of peacocks with more elaborate trains. *Nature*, 371, 598-599.
- Plourde, A. M. (2008). The evolution of prestige goods as honest signals of skill and knowledge. *Human Nature*, 19, 374-388.
- Pomiankowski, A., & Iwasa, Y. (1993). Evolution of multiple sexual preferences by Fisher's runaway process of sexual selection. *Proceedings of the Royal Society of London B*, 253, 173-181.
- Pomiankowski, A., & Iwasa, Y. (1998). Runaway ornament diversity caused by Fisherian sexual selection. *Proceedings of the National Academy of Sciences of the United States of America*, 95, 5106-5111.

- Powell, D. (1986). Caribbean women and their response to familial experiences. *Social and Economic Studies*, 35, 83-130.
- Rao, A. (1988). Prestation and progeny: The consolidation of well-being among the Bakkarwal of Jammu and Kashmir (Western Himalayas). *Kinship, Networks, and Exchange*. Eds. Schweizer, T., & White, D. R. (series: Structural Analysis in the Social Sciences; series ed. Granovetter, M.). Cambridge: Cambridge University Press. 210-233.
- Reise, S. K., & Wright, T. M. (1996). Personality traits, Cluster B personality disorders, and sociosexuality. *Journal of Research in Personality*, 30, 128-136.
- Renninger, L. A., Wade, J. T., & Grammer, K. (2004). Getting that female glance: Patterns and consequences of male nonverbal behavior in courtship contexts. *Evolution and Human Behavior*, 25, 416-431.
- Rhodes, G. M., Simmons, L. W., & Peters, M. (2005). Attractiveness and sexual behavior: Does attractiveness enhance mating success? *Evolution and Human Behavior*, 26, 186-201.
- Riechert, S. E. (1984). Games spiders play: III. Cues underlying context-associated changes in agonistic behaviour. *Animal Behaviour*, 32, 1-15.
- Rogers, L. E. & Farace, R. V. (1976). Analysis of relational communication in dyads: New measurement procedures. *Human Communication Research*, 1, 222-239.
- Rogers-Millar, L. E. & Millar, F. E. (1979). Domineeringness & dominance: A transactional view. *Human Communication Research*, 5, 238-246.
- Rosa, A. & Basir, M. (2002). Thin-plate spline analysis of allometry and sexual dimorphism in the human craniofacial complex. *American Journal of Physical Anthropology*, 117, 236-245.
- Rose, R. H. (1904). *Utila: Past and Present*. Dansville, NY: F. A. Owen.
- Rothman, E. K. (1984). *Hands and Hearts: A History of Courtship in America*. New York: Basic Books.
- Running, A., Martin, K., & Tolle, L. W. (2007). An innovative model for conducting a participatory community health assessment. *Journal of Community Health Nursing*, 24, 203-213.
- Rutowski, R. L. (1982). Epigamic selection by males as evidenced by courtship partner preferences in the checkered white butterfly (*Pieris protodice*). *Animal Behaviour*, 30, 108-112.

- Ryan, M. J., & Cummings, M. E. (2005). *Animal Signals* and the overlooked costs of efficacy. *Evolution*, *59*, 1160-1161.
- Saad, G. (2007). *The Evolutionary Basis of Consumption*. Mahweh, NJ: Erlbaum.
- Salamon Deutsch, S., & Deutsch, Y. (2006). OCB as a handicap: An evolutionary psychological perspective. *Journal of Organizational Behavior*, *27*, 185-199.
- Schmitt, D. P. (2005). Fundamentals of human mating strategies. In *Handbook of Human Evolutionary Psychology*. Ed. Buss, D. M. Hoboken, NJ: John Wiley and Sons. 258-291.
- Selander, R. K. (1972). In *Sexual Selection and the Descent of Man*. Ed. Campbell, B. New York: Aldine.
- Scott, I., Swami, V., Josephson, S. C., & Penton-Voak, I. S. (2008). Context-dependent preferences for facial dimorphism in a rural Malaysian population. *Evolution and Human Behavior*, *29*, 289-296.
- Seal, D.W., Agostinelli, G., & Hannett, C.A. (1994). Extradysadic romantic involvement: Moderating effects of sociosexuality and gender. *Sex Roles*, *31*, 1-22.
- Searcy, W. A., & Andersson, M. (1986). Sexual selection and the evolution of song. *Annual Review of Ecology and Systematics*, *17*, 507-533.
- Searcy, W. A., & Nowicki, S. (2005). *The Evolution of Animal Communication: Reliability and Deception in Signaling Systems*. Princeton: Princeton University Press.
- Seger, J., & Trivers, R. (1986). Asymmetry in the evolution of female mating preferences. *Nature*, *819*, 771-773.
- Seymour, R. M., & Sozou, P. D. (2009). Duration of courtship effort as a costly signal. *Journal of Theoretical Biology*, *256*, 1-13.
- Shenk, M. K. (2007). Dowry and public policy in contemporary India: The behavioral ecology of a 'social evil.' *Human Nature*, *18*, 242-263.
- Simpson, J. A., & Gangestad, S. W. (1991). Individual differences in sociosexuality: Evidence for convergent and discriminant validity. *Journal of Personality and Social Psychology*, *60*, 870-883.
- Simpson, J. A., & Gangestad, S. W. (1992). Sociosexuality and romantic partner choice. *Journal of Personality*, *60*, 31-51.

- Simpson, J. A., Wilson, C. L., & Winterheld, H. A. (2004). Sociosexuality and romantic relationships. In *Handbook of sexuality in close relationships*. Eds. Harvey, J.H., Wenzel, A., & Sprecher, S. Mahwah, NJ: Erlbaum. 87-112.
- Singh, B. K., Walton, B. L., & Williams, J. S. (1976). Extramarital sexual permissiveness: Conditions and contingencies. *Journal of Marriage and the Family*, 38, 701-712.
- Singh, D. (1993). Adaptive significance of female physical attractiveness: Role of waist to hip ratio. *Journal of Personality and Social Psychology*, 65, 293-307.
- Singh, D. (2002). Female mate value at a glance: Review of relationship of waist-to-hip ratio to health, fecundity, and attractiveness. *Human Ethology and Evolutionary Psychology*, 23, 81-91.
- Smith, E. A., & Bliege Bird, R. L. (2000). Turtle hunting and tombstone opening: Public generosity as costly signaling. *Evolution and Human Behavior*, 21, 245-261.
- Smith, E. A., & Bliege Bird, R. (2003). Costly signaling and cooperative behavior. In *Moral sentiments and material interests: On the foundations of cooperation in economic life*. Eds. Bowles, S., Boyd, R., Fehr, E., & Gintis, H. Cambridge, MA: The MIT Press.
- Smith, M. G. (1957). Introduction. In *My Mother who Fathered Me*. Ed. E. Clarke. London: George Allen and Unwin Ltd. i-xiv.
- Smith, M. G. (1965). Social and Cultural Pluralism. In *The Plural Society in the British West Indies*. Berkeley: University of California Press. 75-91.
- Smith, R. T. (1973). The Matrifocal Family. In *The Matrifocal Family: Power, Pluralism and Politics*. New York: Routledge. 39-58.
- Smith, R. T. (1982). Family, Social Change, and Social Policy. In *The Matrifocal Family: Power, Pluralism and Politics*. New York: Routledge. 81-100.
- Smith, R. T. (1988). *Kinship and Class in the West Indies: a Genealogical Study of Jamaica and Guyana*. Cambridge: Cambridge University Press.
- Soler, C. M. (2008). The faith of sacrifice: Commitment and cooperation in Candomblé, an Afro-Brazilian religion. Ph.D. Dissertation. Rutgers University.
- Sosis, R. (2001). Costly signaling and torch fishing on Ifaluk atoll. *Evolution and Human Behavior*, 21, 223-244.

- Sosis, R. (2003). Why aren't we all Hutterites? Costly signaling theory and religious behavior. *Human Nature, 14*, 91-127.
- Sozou, P. D., & Seymour, R. M. (2005). Costly but worthless gifts facilitate courtship. *Proceedings of the Royal Society of London, B, 272*, 1877-1884.
- Spence, A. M. (1973). Job market signaling. *Quarterly Journal of Economics, 87*, 355-374.
- Srinivasan, P., & Lee, G. R. (2004). The dowry system in Northern India: Women's attitudes and social change. *Journal of Marriage and Family, 66*, 1108-1117.
- Steinman, J. (1976). Paradise by the Dashboard Light. [Performed by Meatloaf]. On *Bat Out of Hell*. Epic Records.
- Stillman, T. E., & Maner, J. K. (2009). A sharp eye for her SOI: Perception and misperception of female sociosexuality at zero acquaintance. *Evolution and Human Behavior, 30*, 124-130.
- Stirrat, M., & Perrett, D. (2008). Dominance and dinner dates: Who pays the bill? *Poster presented at the 20th annual Human Behavior and Evolution Conference in Kyoto, Japan in June 2008.*
- Swaddle, J. P., & Rierson, G. W. (2002). Testosterone increases perceived dominance but not attractiveness in human males. *Proceedings of the Royal Society of London B, 269*, 2285-2289.
- Sweeney, M. M., & Cancian, M. (2004). The changing importance of white women's economic prospects for assortative mating. *Journal of Marriage and Family, 66*, 1015-1028.
- Tanenbaum, L. (2000). *Slut! Growing up female with a bad reputation*. New York: Harper Collins.
- Thompson, A. P. (1983). Extramarital sex: A review of the research literature. *Journal of Sex Research, 19*, 1-22.
- Thornhill, R., & Gangestad, S. W. (1994). Fluctuating asymmetry and human sexual behavior. *Psychological Science, 5*, 297-302.
- Thornhill, R., & Gangestad, S. W. (2006). Facial sexual dimorphism, developmental stability, and susceptibility to disease in men and women. *Evolution and Human Behavior, 27*, 131-144.
- Thornhill, R., & Grammer, K. (1999). The body and face of woman: One ornament that signals quality? *Evolution and Human Behavior, 20*, 105-120.

- Tomczyk, T. (2008). The ZOLITUR Effect. *Bay Islands Voice*. Volume 6, Issue 9. September 2008. Web edition. <http://www.bayislandsvoice.com/issue-v6-9.htm>. Accessed 12/08/08, 3:28pm.
- Townsend, J. M. (1999). Extraversion, sexual experience, and sexual emotions. *Behavioral and Brain Sciences*, 22, 537.
- Townsend, J. M., Kline, J., & Wasserman, T. H. (1995). Low investment copulation: Sex differences in motivations and emotional reactions. *Ethology and Sociobiology*, 16, 25-51.
- Townsend, J. M., & Wasserman, T. (1997). The perception of sexual attractiveness: Sex differences in variability. *Archives of Sexual Behavior*, 26, 243-268.
- Tregenza, T., Wedell, N., Chapman, T. C. (2006). Sexual conflict: A new paradigm? *Philosophical Transactions of the Royal Society, B*, 361, 229-234.
- Trivers, Robert L. (1972). Parental investment and sexual selection. In *Sexual selection and the descent of man 1871-1971*. Ed. Campbell, B. Chicago: Aldine. 136-179.
- Tushnet, R. (1998). Rules of engagement. *Yale Law Journal*, 107, 2583-2618.
- Udry, J. R., & Billy, J. O. G. (1985). Panel study of transition to intercourse. *Paper presented at annual meeting of the Population Association of America, Boston, MA, March 1985*.
- Udry, J. R., Talbert, L. M., & Morris, N. M. (1986). Biosocial foundations for adolescent female sexuality. *Demography*, 23, 217-230.
- Vahed, K. (1998). The function of nuptial feeding in insects: A review of empirical studies. *Biological Reviews*, 73, 43-78.
- van Anders, S. M., & Hampson, E. (2003). Waist-to-hip ratio is positively associated with bioavailable testosterone in healthy premenopausal women. Unpublished manuscript, University of Western Ontario.
- van Valen, L. (1962). A study of fluctuating asymmetry. *Evolution*, 16, 125-142.
- Vandermassen, G. (2004). Sexual selection: A tale of male bias and feminist denial. *European Journal of Women's Studies*, 11, 9-26.
- Vandermassen, G. (2005). *Who's Afraid of Charles Darwin: Debating Feminism and Evolutionary Theory*.
- Veblen, T. (1899). *The theory of the leisure class*. New York: A. M. Kelley.

- Wade, T. J., Butrie, L. K., & Hoffman, K. M. (2009). Women's direct opening lines are perceived as most effective. *Journal of Personality and Individual Differences*. doi:10.1016/j.paid.2009.02.016
- Walters, J. (1960). Relationship between reliability of responses in family life research and method of data collection. *Marriage and Family Living*, 22, 232-237.
- Weatherhead, P. J., & Robertson, R. J. (1979). Offspring quality and the polygyny threshold: The sexy son hypothesis. *The American Naturalist*, 113, 201-208.
- Weis, D. L., & Slosnerick, M. (1981). Attitudes toward sexual and nonsexual extramarital involvements among a sample of college students. *Journal of Marriage and the Family*, 42, 349-358.
- Wicoff, K. (2006). *I Do But I Don't: Walking Down the Aisle Without Losing Your Mind*. Cambridge, MA: Da Capo Press.
- Wiederman, M. W., & Hurd, C. (1999). Extradyadic involvement during dating. *Journal of Social and Personal Relationships*, 16, 265-274.
- Wiley, R. H. (1983). The evolution of communication: Information and manipulation. In *Communication*. Eds. Halliday, T. R., & Slater, P. J. B. Oxford: Blackwell. p. 82-113.
- Williams, J. (1999). *Unbending Gender: Why Family and Work Conflict and What to Do about It*. Oxford: Oxford University Press.
- Williams, G. C. (1966). *Adaptation and Natural Selection*. Princeton: Princeton University Press.
- Wilson, P. (1969). Reputation and respectability: A suggestion for Caribbean ethnology. *Man*, 4, 70-84.
- Won-Doornink, M. J. (1985). Self-disclosure and reciprocity in conversation: A cross-national study. *Social Psychology Quarterly*, 48, 97-107.
- Veblen, T. (1899). *The Theory of the Leisure Class*. New York: A. M. Kelley.
- Yelvington, K. A. (1996). Flirting in the Factory. *The Journal of the Royal Anthropological Institute*, 2, 313-333.
- Zahavi, A. (1975). Mate selection: A selection for a handicap. *Journal of Theoretical Biology*, 53, 205-214.
- Zahavi, A. (1991). On the definition of sexual selection, Fisher's model and the evolution of waste and of signals in general. *Animal Behavior*, 42, 501-503.

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- Cronk, L., & Dunham, B. (2007). Amounts spent on engagement rings reflect aspects of male and female mate quality. *Human Nature, 18*, 329-333.
- Dunham, B. Forthcoming. The role for signaling theory and receiver psychology in marketing. In *Evolutionary Psychology in the Business Sciences*. Ed. Saad, G. Springer.