

# **CONSPICUOUS CONSUMPTION AND TESTOSTERONE**

John G. Vongas

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**ABSTRACT: Conspicuous Consumption and Testosterone**

John G. Vongas

This thesis applies evolutionary theory to investigate physiological outcomes of male-based conspicuous consumption. In sexually reproducing species, including humans, males employ ostentatious signals to attract females. Such signals convey their relative social status compared with other suitors and, therefore, their superior reproductive fitness. Hence, signals act as important cues to prospective females who wish to select the most desirable mate. In addition, males who experience changes in their social status demonstrate changes in their androgen levels: elevations in their status trigger testosterone (T) level rises, whereas demotions in their status induce T level drops. The predictions made herein are that T levels should rise in men who engage in sexual signaling via conspicuous consumption (Experiment 1), whereas they should drop in men who witness the conspicuousness of other men (Experiment 2). Experiment 1 had 43 males drive an exotic sports car and an old sedan on isolated highways and on busy downtown streets. As expected, T levels were significantly higher when driving the exotic car, with the lowest levels occurring with the sedan in the downtown condition. In experiment 2, 40 males were each paired with a higher-status male confederate in a focus group whose moderator, either male or female, questioned them on specific consumption activities. Contrary to expectations, T levels significantly increased in the female condition only, suggesting that an interaction with the female overrode any perceived intra-sexual “defeats”. This thesis constitutes a pioneering study in consumer behavior because it is the first one to unite marketing with biology.

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## **DEDICATION**

I dedicate this thesis to my parents; to my father, George, who showed me what self-sacrifice is all about, and to my mother, Lola, who always encouraged me to pursue my destiny with courage even if it involved failure at times.

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## 1. INTRODUCTION

Thorstein Veblen (1857 – 1929) was one of the most original and creative thinkers in the history of American economic thought. He coined the widely used expression “conspicuous consumption” in his 1899 treatise *The Theory of the Leisure Class*, a work that is widely regarded as a seminal inquiry into the origins and motives of the consumption of luxury goods and services. Veblen observed that the possession of money in industrial societies began commanding a greater respect than the once highly esteemed production of goods. He was appalled by the manner in which economics scholars applied their static classical market theories to explain this phenomenon and, inspired by disciplines considered unusual for economists such as anthropology, evolution, and genetics, he described society’s consumption behavior as it evolved from primitive to industrial ways of life. His dissertation began with a brief analysis of hunter-gatherer communities where individuals were obliged to form coalitions with others because such cooperation ensured one’s survival. Collective groups, rather than single individuals, aggressively competed with one another for resources, and an individual’s social status was primarily a function of the reputation of the group into which that individual belonged. Members whose group was known for its resourcefulness were rewarded with high social status and its associated advantages. However, the more successful men in these groups began showcasing their prowess by displaying the results of their fruitful exploits. They began taking personal credit for their accumulated belongings and a system of private property was established. “Booty, trophies of the chase or of the raid, come to be prized as evidence of preeminent force. Aggression becomes the accredited form of action, and booty serves as prima facie evidence of

successful aggression” (Veblen, 1899/1965, p. 17). Veblen noted that, as societies evolved to become more industrialized, wealth replaced aggression as an indicator of one’s standing in society. An individual’s wealth became a legitimate measure of a person’s contribution and value to the community because it was accepted as proof of industrial commitment and effort. “The possession of wealth, which was at the outset valued simply as an evidence of efficiency, becomes, in popular apprehension, itself a meritorious act. Wealth is now itself intrinsically honourable and confers honour on its possessor” (Veblen, 1899/1965, p. 29).

Veblen described two forms by which individuals manifested this superiority of ownership. In the first, wealthy individuals engaged in a great amount of leisure, hence the term “leisure class”. The higher the individual’s standing in society, the more the individual was able to buy time while pursuing non-productive activities such as sport or politics. On the other hand, the lower the individual’s social standing, the less the individual was able to engage in leisure because work became evermore necessary. Leisure was most effective as a display of status when the social group was small and personal acquaintance was strong. However, as society entered an era of industrialization and wealth became distributed among a greater population in late 19<sup>th</sup>-century America, leisure as a waste of both time and effort no longer added to the individual’s social prestige. Thus, conspicuous consumption replaced leisure and became the second form of social status display. More precisely, Veblen defined it as the ostentatious display of wealth by individuals who renounced labor in exchange for wasteful spending and whose goal was to astonish others with their ability to pay lofty prices for prestige products. In much the same way that leisure exhibited the waste of time and effort, conspicuous

consumption illustrated the waste of money and other economic resources. By making comparisons between primitive and modern societies, Veblen argued that wealth did not represent reward for labor and savings as many scholars insisted; rather, it represented predation and exploitation.

Such ideas seemed radical to most of Veblen's academic peers who received his work with apprehension and disdain, suspecting that beneath his message laid a socialist agenda (Mason, 1998; Stahl-Rolf, 2000; Tilman, 2002). Although Veblen was not welcomed into the economic mainstream, he kept urging his fellow scholars to broaden economics by uniting it with other disciplines, notably psychology, sociology, and anthropology (Hamilton, 1989; Jennings & Waller, 1998; Rosenberg, 1963). He criticized the utilitarians for asserting that individuals consumed goods primarily because these goods endowed them with a specific usefulness. Jeremy Bentham (1748 – 1832) and John Stuart Mill (1806 – 1873) were among those who believed that a good's utility was measured in terms of its ability either to produce pleasure or to avoid pain. Veblen argued that such overly simplistic claims did not portray reality because they failed to consider that individuals' relationships with others and their need to secure status also influenced which goods they would purchase. He believed that goods were not only used for their utilitarian value but also as symbols of status and as instruments to achieve a favored outcome. In his essay "Why is Economics Not an Evolutionary Science?", Veblen expresses this position: "The hedonistic conception of man is that of a lightning calculator of pleasures and pains, who oscillates like a homogeneous globule of desire of happiness under the impulse of stimuli that shift him about the area, but leave him intact" (1898/1963, p. 52). His dissenting voice fell mostly on deaf ears in academia, yet it still

managed to convey the message that the Protestant work ethic existed in belief but not in practice (Diggins, 1993). Largely prevalent in the United States during the late 19<sup>th</sup> century, the Protestant ethic was the set of attitudes that encouraged people to work because of the belief that work was good in of itself. According to its principles, members of society were also discouraged from spending large amounts of money for personal luxuries because this led them to idleness and sinfulness. It was believed that these two vices distracted them from their moral obligation both to society and to God. An individual was therefore considered to be more virtuous if he or she was hard working, honest, and thrifty, as opposed to one who was lazy, pleasure seeking, and extravagant. Veblen was convinced that this view was hardly representative of a world yearning to live in excess such as the one found in late 19<sup>th</sup>-century America.

Over a century later, Veblen's observation still resonates today. In advanced societies, the making of money has replaced the making of goods and the price of goods is more valuable than the goods themselves. From the wide array of custom-made jewelry adorning hip-hop entertainers in music videos to the sumptuous *haute couture* garments of Hollywood's elite making front-page headlines, obsession with displaying wealth seems to be a characteristic feature of the culture in industrialized societies. Yet why does there exist a paucity of research on conspicuous consumption among economists and consumer behaviorists alike?

There are several reasons why this investigation would be challenging. First, there are many variables to consider, such as one's personality (e.g., degree of self-indulgence), values, and social class structure. Second, individuals do not willingly admit that they buy certain goods to impress others for the fear of being branded as

superficial. Third, there would be a need to achieve a consensus from individuals either at an equal or at a higher social stratum that the consumption under question is both impressive and acceptable. Finally, it is not unreasonable to assume that economists may consider the social motives underpinning consumer choice to be the responsibility of other behavioral scientists (e.g., sociologists, psychologists). Although each of the arguments above holds true for a multitude of other phenomena that are otherwise successfully studied, their presence has nonetheless posed difficulty for researchers. Despite Veblen's attempt to move beyond mere observation in offering an explanation of consumer behavior, his work on conspicuous consumption was not based on any empirical research. Therefore, developing reliable and valid research methods for investigating this consumption act would lend scientific credibility to the main argument in *The Theory of the Leisure Class*.

The following thesis is an empirical investigation into the nature of male-based conspicuous consumption. By employing Charles Darwin's theory of sexual selection as a theoretical framework, it advances the idea that men's extravagant buying behavior can best be understood by examining the problem that it was designed to solve. Throughout the history of humankind, one specific problem that has been plaguing men universally has been the struggle of securing a high social position. Conspicuous consumption, therefore, is a strategy that enables men to assert their social status with the use of symbols. Cross-cultural research in the biological and social sciences has established that women have a mating preference for high-status men (Buss, 1989a, 1990, 1994; Geary, Vigil, & Byrd-Craven, 2004; Rommel, 2002), and that men exhibit fluctuations in their testosterone levels with changes in their social status (Booth, Shelley, Mazur, Tharp, &



Kittock, 1989; Dabbs, 1990a, 2000; Kemper, 1990; Mazur & Booth, 1998; Sapolsky, 1997; Schultheiss, Campbell, & McClelland, 1999). Establishing a link between testosterone and ostentatiousness will strengthen Veblen's argument that conspicuous consumption, though socially inspired, could have an innate component. In other words, although men might be using wealth in lieu of violence to assert their social standing, the vestiges of their Darwinian heritage still linger. This thesis will focus on the behavior that is manifested exclusively by men, inasmuch as women across all cultures and socioeconomic classes have also been found to conspicuously consume (Brown, 1991). Given that the sexes often have conflicting evolutionary goals, it is plausible to hypothesize that conspicuous consumption among women is driven by a different psychological mechanism than the one found in men, although research is needed to clarify the nature of this behavior's sex-specificity.

This thesis has three main objectives. First, in the spirit of Veblenian scholarship, it will integrate findings from various disciplines to explain the underlying motives for conspicuous consumption in men. Second, it will employ an experimental procedure currently being used in the health sciences to identify whether the concentration of testosterone *increases* in men who are consuming a status symbol. And third, it will try to establish whether the concentration of testosterone *decreases* in men who engage in social interactions with other conspicuously consuming men.

The literature review begins with a synopsis of human evolution and the Darwinian-based discipline, evolutionary psychology. Next, it describes the period in history that gave rise to many psychological mechanisms responsible for much of human behavior seen today. Since this thesis proposes a biological basis for conspicuous

consumption, it is only fitting that it begins by addressing the source (*when* and *where*) and the transmission (*how*) of this neglected phenomenon. It then explains the ultimate purpose of conspicuous consumption (*why*) by demonstrating that women, universally, prefer to mate with resourceful men. It also offers an explanation of social status among humans and it highlights the purpose of conspicuous consumption in furthering men's sexual goals. Status is invariably related with the control of precious resources and there is a plethora of research connecting male status with testosterone, the dependent variable (*what*) under study. Finally, it presents an outline of the physiology of testosterone and its intimate association with social status, and offers many examples from both animal and human studies showing how costly signals serve to communicate male status.

## **2. LITERATURE REVIEW**

### **2.1 Darwinian Theory and Human Evolution**

Published in November 1859, Charles Darwin's monumental book on *The Origin of Species by Means of Natural Selection* explained how the vast diversity of life present on our planet evolved from one or a few simple kinds of organisms (Darwin, 1859/2004). All of the species that exist today arose from earlier species by a process Darwin originally described as "descent with modification," or evolution. Evolution occurs as a genetic change in a population of organisms rather than a change occurring to an individual organism within its lifetime; only populations may evolve through a process known as *natural selection*, which consists of five observations about the natural world. These observations are enumerated, in no particular order, on the following page.

- 1) *Overproduction*: Each species produces more offspring than will survive to maturity.
- 2) *Variation*: Variation among offspring occurs through random genetic mutations.
- 3) *Genetic inheritance*: Mutations that bestow survival benefits to offspring are “selected for” and can be passed on to subsequent progeny.
- 4) *Competition*: Species compete with one another for the limited resources available.
- 5) *Survival to reproduce*: Offspring possessing the most favorable characteristics will be most likely to survive and to reproduce.

Natural selection, therefore, is the process by which specific characteristics of sexually reproducing species evolved due to their survival benefits, resulting in the increase of “favorable genes” and the decrease of “unfavorable genes” within a population. Twelve years later, in 1871, Darwin published another landmark book titled *The Descent of Man and Selection in Relation to Sex* and offered a revolutionary explanation for the mysteries of mating (Darwin, 1871/1890). He argued that an organism’s characteristics having reproductive benefits rather than just survival benefits underwent a separate evolution. He termed this theory *sexual selection* and he explained that it takes on two forms. In one form, members of the same sex compete with one another and the winner achieves greater sexual access to members of the opposite sex. Physical characteristics that help the individual win in contests of this kind, such as greater strength or endurance, evolve because the victors are able to mate frequently and to spread more of their genes. Two stags locking their antlers during fighting is an

example of this form of sexual selection, called intra-sexual competition. In humans, examples of male-male competition extend from innumerable headlines of daily newspapers to countless fictional stories of literary works. A good example is found in “The Knight’s Tale,” the first and longest medieval romance from *The Canterbury Tales* of the 14<sup>th</sup> century English author and poet Geoffrey Chaucer. The story involves two knights, Arcite and Palamon, who both fall in love with Emelye while imprisoned by her brother Theseus, the Duke of Athens. After their eventual release, Theseus arranges a lethal battle between them with the victorious one receiving the hand of Emelye. Once the best friends have become sexual competitors, friendship soon founders and gives way to murderous violence (Barash & Barash, 2005; see also Whissell, 1996 for a good analysis of mate selection in popular women’s fiction). A non-fictional example of intra-sexual competition draws on the work of Faurie, Pontier, and Raymond (2004), who investigated the relationship between involvement in competitive sport and self-reported numbers of sexual partners. They argued that high performance in competitive sports, especially on the part of men, should signal phenotypic quality to members of the opposite sex. After surveying 527 French students (300 males and 227 females) from the universities of Montpellier, Lyon, and Bordeaux, they found that the males who competed in athletics reported significantly greater numbers of sexual partners than those who did not. In addition, they also found that, within the athletes, those who exerted higher levels of performance indicated they had even greater numbers of partners.

In Darwin’s second form of sexual selection, called inter-sexual selection, a member of one sex chooses its mate based on its preference for particular characteristics in that mate. These qualities evolve because those possessing them are chosen more

often as mates, thereby increasing the prevalence of their genes in subsequent generations. Individuals without the desired traits experience greater resistance in the mating arena and their genes have a greater chance of being left behind in evolutionary oblivion. An inferior mate that is not well adapted to present circumstances could ruin an organism's chance of reproductive success. Its offspring may be weak or poorly suited to survive in an unpredictable environment. A superior one, however, will contribute genes that are likely to provide its offspring with a major advantage in the race for survival. A good example of inter-sexual selection is the preference of peahens for peacocks with ornate and symmetrical tails. Peacocks today possess brilliant plumage because, over evolutionary history, peahens preferred to mate with such males. In humans, men strategically display their athletic prowess as part of an arsenal in attracting women (Buss, 1994). Flexing their muscles, showing off their strength by opening jars, playing high-impact sports, and overall bragging about their physical ability are tactics that men employ much more noticeably than women. However, not all men are endowed with brawn and therefore must resort to signaling their attractiveness through other means. For example, men promote their artistic talent as part of an arsenal in attracting women. Pablo Picasso is a good example of how artistic production serves as an indicator of sexual attractiveness. Credited as the most prolific artist by the *Guinness Book of World Records*, Picasso produced 13,500 paintings, 100,000 prints or engravings, 34,000 book illustrations and 300 sculptures and ceramics (for further information, see [www.guinnessworldrecords.com](http://www.guinnessworldrecords.com)). In *The Mating Mind*, evolutionary psychologist Geoffrey Miller relates Picasso's extraordinary output with his sexual appetite, and suggests that it serves as the epitome of Darwin's sexual selection theory in humans:

“The old punk song (by David Bowie) was right about Picasso: *Well, he was only 5’3” but girls could not resist his stare*” (Miller, 2000a, p. 274).

Two critical points need to be clarified at this juncture. First, the desired characteristics sought by each sex in a prospective mate are not only physical but also behavioral. Genetic inheritance is not confined to an organism’s visible anatomical characteristics such as one’s degree of musculature or one’s height. It also includes heritable qualities such as ambition, kindness, creativity, and intelligence (see the seminal work on the evolution of altruism by Trivers, 1971; see also the recent paper by Flinn, Geary, & Ward, 2005 on the evolution of intelligence). Second, the desires of one sex for specific traits in a potential mate can create evolutionary change, either with an increase in the frequency of appealing qualities or with a decrease in the frequency of unappealing qualities. In theory, if *all* women mated with tall men standing at over six feet, then those with heights above six feet would have a clear mating advantage. Over time, the preponderance of tall men in the population would be evident.

In recent years, both natural and sexual selection theories have been used to investigate the human mind in a scientific discipline called evolutionary psychology (Barkow, Cosmides, & Tooby, 1992; Buss, 1996, 1999).

### 2.1.1 Evolutionary Psychology

Darwin believed that natural selection elucidated not only the intricacies of an animal’s body, but also those of its mind. In the manner by which physical organs such as retinas and lungs evolved to solve problems related to human survival and reproduction, a similar selective pressure shaped human behavior. Although he predicted

that psychology would eventually be based on this new foundation (Darwin, 1859/2004), his prophecy has not yet been fully fulfilled. Despite the passage of almost 150 years since *The Origin of Species*, “the study of the human mind is still mostly Darwin-free, often defiantly so” (Pinker, 1997, p. 22). Most contemporary social scientists contend that the human mind is a passive recipient of culture. In other words, proponents of this view consider the human mind to be a blank slate or *tabula rasa* without any influence from its evolutionary inheritance and that human behavior must therefore be the result of environmental control. In recent years, a new scientific discipline named “evolutionary psychology” by anthropologist John Tooby and psychologist Leda Cosmides has been employing Darwinian theory to interpret the human mind as an adaptive toolbox comprised of evolved psychological mechanisms that are modular, specific, and numerous (Tooby & Cosmides, 1992; Symons, 1995). For example, one psychological mechanism present in humans worldwide is the preference for foods rich in sugar or fat content (Burnham & Phelan, 2000; Rozin, 1976). The reason why most people would choose to eat a ripe piece of watermelon instead of a radish is because the former ensures a greater caloric value. Considering the human race was subjected to a scarcity of food throughout most of its evolutionary development, an individual reaped tremendous survival benefits by being gluttonous with such foods. Other examples of psychological mechanisms found universally in humans are: fear of snakes (Marks, 1987); superior female spatial-location memory (Silverman & Eals, 1992); male sexual jealousy (Buss, Larsen, Westen, & Semmelroth, 1992; Daly, Wilson, & Weghorst, 1982; Symons, 1979); male mate preferences for youth, attractiveness, and waist-to-hip ratio (Buss, 1989a, 1989b; Singh, 1993) to the acquisition of language. This list is by no means exhaustive and readers are encouraged to examine the work of anthropologist Donald Brown (1991), titled *Human Universals*, a

compilation of physical and behavioral characteristics that can be considered universal among people of all cultures seen worldwide. These universals are adaptations, i.e., traits that evolved through natural selection or sexual selection to promote one's survival or reproduction. In doing so, they provide humans with the ability to solve particular problems ranging from attracting mates and building coalitions, to securing social status. Such problems are referred to as adaptive problems because they affect reproduction and/or survival. According to Cosmides and Tooby (1987), "natural selection cannot select for behavior per se; it can only select for mechanisms that produce behavior" (p. 281). If evolutionary psychology is meant to objectively identify, describe, and understand psychological mechanisms by expressing the specific adaptive problems they were selectively designed to solve, then when did these psychological mechanisms first appear?

### 2.1.2 The Pleistocene: A Crucial Period in Evolution

Many scientists agree that the Pleistocene was the environmental catalyst responsible for the birth and the development of human psychological mechanisms (Barkow, Cosmides, & Tooby, 1992; Cosmides & Tooby, 1987; Laland & Brown, 2002; Miller, 2000a; Ridley, 1993; Villee, Solomon, Martin, Martin, Berg, & Davis, 1989). Cosmides and Tooby (1987) claim that "the complex architecture of the human psyche can be expected to have assumed approximately modern form during the Pleistocene...and to have undergone only minor modifications since then" (p. 34). Miller also suggests that the Pleistocene is the most crucial geological era for humans because "it included the evolution of all that is distinctively human" (2000a, p. 179).



The Pleistocene is a period beginning roughly two million years ago with the apparition of *Homo habilis* or “skillful man,” until the discovery of agriculture approximately 10,000 years ago. *Homo habilis* had an average cranial capacity of 650 cc, made advances in the use of tools and fire, and was the first of the hominid species to have a sufficient number of characteristics to be placed in the same genus – *Homo* – as modern humans. However, this species ceased to exist 1.5 million years ago when *Homo erectus* or “upright man” emerged and proved to be the missing link between modern humans and their ape-like ancestors. *Homo erectus* migrated out of the temperate African savannah into the harsher Eurasian continent and, consequently, developed clothing for northern climates and more sophisticated weapons for hunting. It experienced an increase in average brain size to 950 cc, and lived approximately until 200,000 years ago with the arrival of *Homo sapiens* or “wise man”. Due to its superior average brain size of approximately 1450 cc, *Homo sapiens* would be heralded as the architect of the agricultural, industrial, and technological revolutions that took place in the period following the Pleistocene. Called the Holocene, it began 10,000 years ago with the advent of agriculture and has since captured all of recordable human history. Humans during this period invented political systems, alphabets, and money. They also traveled to the far-reaching corners of the globe where they multiplied in number. Although the Holocene has been historically essential, it has been evolutionarily insignificant. The survival challenges most humans faced during most of the Holocene were very different from what they were two million years ago, yet the sexual – and hence reproductive – challenges remained very similar and endure still today (Miller 2000a). Food shortages, unsuccessful hunts, tribal warfare, and virulent pathogens

plaguing the majority of early humans are now inexistent in most parts of the world. However, people are still physically attracted to one another as they were thousands of generations ago. They still rejoice at the thought of sharing intimacy with one another, and they experience jealousy and resentment when they are cast aside for someone else. Therefore, the mating arena during the Pleistocene could have been responsible in designing the sex-specific psychological mechanisms in both men and women that influence their mating preferences. Given that humans worldwide share a common ancestry, these preferences are witnessed universally. In other words, men and women display a preference for a common set of specific physical and psychological characteristics in their respective mates, regardless of the cultural context in which they find themselves. One example is men's evolved need to assert their status through public demonstrations of their successful pursuits. This need did not occur randomly but was rather affected by female desire. The next section introduces empirical evidence from several disciplines on the universal preference of women for men who possess social status and resources in an effort to begin addressing the evolutionary basis for men's conspicuous consumption.

### **2.3 Women's Preference for Men with Resources**

Is the commonly held notion that women's attraction to men who possess wealth, or at least a demonstrable capacity to accumulate it, a product of innate biology or learned culture? Simply put, are women genetically predisposed to desiring rich or potentially rich men, or are they simply taught to do so by their surrounding environment? If such behavior were exclusively attributed to learned gender roles, then

one would expect that the social changes having swept the West in the 1960s, such as the women's liberation movement, to have been very influential in molding women's mating preferences. With the widespread use of oral contraceptives allowing women to exercise greater control over their reproductive systems and with legislation in the workforce promoting and defending equal opportunity of the sexes, women are increasingly becoming less dependent on their mates for economic sustainability. In her book *Women and Leadership: A Contextual Perspective* (1996), organizational psychologist Karin Klenke provides an extensive overview of the changes in women's status related to leadership in many spheres. She describes the increasing participation and public profile of women in politics, sports, legal circles, entrepreneurial ventures, education, and health care, and notes that there were many fewer women who achieved prominence within these spheres in the past. Despite these very optimistic social changes, young women nevertheless seem resilient in their mating preference for men who exhibit an obvious capacity to acquire resources. The sexual revolution of the late 1960s and early 1970s failed to change this sex difference, and the following paragraphs will present findings from various studies that support this argument.

Hill (1945), McGinnis (1958), and Hudson and Henze (1969) each covered the female mating preferences in America over three separate decades, the 1940s, 1950s, and 1960s, respectively. Each of them indicated that U.S. female college students valued good financial prospects in potential mates to a significantly greater extent than their male counterparts. Using self-reported measures, they were asked to rate the importance of 18 characteristics in a potential mate or a marriage partner on a scale from "unimportant" or "irrelevant" to "indispensable" during the years 1939, 1956, and 1967,

respectively. The conclusion in each of the replicated studies was that women valued their mates' potential financial success roughly twice as much as did the men. A meta-analysis of research published between 1965 and 1986 revealed the same sex difference (Feingold, 1992). Across studies, Feingold found that three out of four women rated socioeconomic status as more important in a prospective marriage partner than did the average man.

Expanding the research on sex differences in human mate preferences, evolutionary psychologist David Buss carried out the most comprehensive cross-cultural study of this sort in the late 1980s (Buss, 1989a). Using the same 18-item questionnaire as that used by the previous three researchers, he collected data between 1984 and 1989, on 4,601 men and 5,446 women aged 16.96 to 28.71 years, from 37 cultures located on six continents. Results showed that women still valued the financial capacity of potential mates about twice as much as men – across all continents, all racial and religious groups, all political systems (including socialism and communism) and all mating patterns (from monogamy to polygamy) (for a detailed account of the evolutionary perspective on human mating, see Buss & Schmitt, 1993; Shackelford, Schmitt, & Buss, 2005; Townsend, 1989).

Women's universal emphasis on the economic aptitude of their preferred mates has been shown in other studies. Kenrick, Sadalla, Groth, and Trost (1990) asked American college men and women to indicate a "minimum percentile value" on a list of traits they considered to be acceptable in their potential mates. For example, a mate who is graded at the 60<sup>th</sup> percentile on the trait of intelligence signifies that this individual would surpass 60% of the other prospective mates in intelligence. Results showed that

male respondents considered the 40<sup>th</sup> percentile to be sufficient for earning capacity in their female mates, whereas the female respondents indicated their minimal threshold for a mate on earning capacity to be the 70<sup>th</sup> percentile. The study also demonstrated that women exhibit higher standards from their prospective mates on earning capability in both short-term and long-term mating contexts.

Other researchers used “lonely hearts” advertisements in personal columns in order to study female mate choice. This methodology was much less intrusive than direct questioning and was not tainted by the potential for social desirability biases found in primary data collection. Greenlees and McGrew (1994) tested 13 hypotheses in order to determine whether mating preferences would be congruent with evolutionary theory. Heterosexual advertisements in personals columns were chosen randomly from 22 issues of the *Private Eye*, a nationally circulated British magazine with a readership of about 729,000 between July 1987 and December 1989. After a rigorous screening process, 703 men and 297 women “were coded either dichotomously, i.e., attribute present or absent, or by the frequency of descriptors of certain traits that were mentioned in the advertisements” (p. 64). Results showed that women actively sought cues of their potential mates’ ability to acquire resources and their willingness to share them to a greater extent than did men. This represented one of three women surveyed as opposed to one of nine men surveyed.

These conclusions coincided with those of Wiederman (1993) who analyzed 1,111 personal ads from 630 men and 481 women in three Ohio-based periodicals: the *Toledo Blade*, *Ohio Personals*, and the *Cleveland Plain Dealer*. Results showed that the men were more than three times as likely as the women to offer information on their

financial resources as a means of attracting their mates. In addition, the women were more than ten times as likely as the men to request that their potential mates possess financial resources. Finally, the women were also about twice as likely to indicate a preference for mates who possess qualities that are considered as prerequisites to resource attainment. This preference of women for resourceful men is not confined exclusively to Western societies. In an entirely different cultural milieu, Oda (2001) found that Japanese women were 31 times more likely than Japanese men to explicitly seek financial security in a prospective long-term partner, with 9.4% of surveyed women displaying a preference for this trait as compared with only 0.3% of men (see Hatfield & Sprecher, 1995, for an evaluation of women's preferences in marital partners in Japan, Russia, and the U.S; see also Khallad, 2005, for a description of women's mating preferences in Jordan).

More recently, other researchers have documented how women make cost-benefit tradeoffs from a list of important mating characteristics. Previous studies had participants rate several traits one at a time, and this method did little to expose the tradeoffs normally made when people select mates. Li, Bailey, Kenrick, and Linsenmeier (2002) explicitly studied such mating tradeoffs by making the economic distinction between mate preferences that were either necessities or luxuries. They hypothesized that the two sexes would act similarly in first ensuring sufficient "necessary traits" in potential mating partners before considering less crucial "luxury traits". However, they claimed that the two sexes would differ in evolutionarily predictable ways. Whereas women would regard annual income to be a necessity, men would deem physical attractiveness to be a necessity. Seventy-one participants, 37 women and 34 men were

given a list of the ten most frequently mentioned mating characteristics: creativity, friendliness/sociability, intelligence, work ethic, physical attractiveness, interesting personality, romance, sense of humor, special non-work related talents, and yearly income. In addition, they were given three separate budgets (low, medium, high), in “mate dollars”, and they were asked to design their ideal mate by allocating mate dollars to each characteristic in each of the three budgetary contexts. In other words, participants were faced with a situation where they had to make compromises on the ten traits depending on how much they could afford. As predicted, women spent more on resource acquisition, and men spent more on physical attractiveness when their options were most constrained in the low-budget condition. These results suggested a sex-specific perception on the characteristics that each sex considered to be a necessity. When budgets increased in the high-budget condition, mate choices were less restricted and there was less spending on these characteristics and more on others, such as creativity. Therefore, women and men differed most when their choices were constrained and, conversely, were more similar in their choices when constraints were relaxed (for a similar study see Waynforth, 2001).

Another series of studies highlighting the value placed on resourcefulness as a male trait involved the deceptive mating strategies most frequently employed by the two sexes. Tooke and Camire (1991) made two evolutionary-based predictions regarding the behavior of men in this respect. First, they predicted that men would report more frequently and effectively the use of deceptive inter-sexual (male – female) signals related to their overall amount of resources. Second, they predicted that men would employ more deceptive intra-sexual (male – male) signals related to their relative

superior status and sexual prowess when comparing themselves with male competitors. The experiment involved one group of 96 women and 40 men (deception frequency study) and a separate group of 72 women and 44 men (deception effectiveness study). Tooke and Camire proposed that “if a male, through deception, is perceived as promiscuous by other males, he may stand an increased chance of also being perceived as controlling a relatively larger share of available resources. Such a male would be in a better position to accrue favors and deferential treatment from other males in his group” (p. 361). Three conclusions emanated from this investigation. First, men were more likely than women to mislead potential partners by depicting themselves as more resourceful than they actually were. Second, they were more likely to deceive their rivals in ways that allowed them to appear more attractive to the opposite sex than they actually were. And third, the deceptive tactics most frequently used by men were rated as being the most effective, suggesting that men are concerned to present themselves as having more of what a female partner is predisposed to want. Benz, Anderson, and Miller (2005) also conducted a study involving the concept of deception as a mating strategy. However, they chose to show how both men and women are keenly aware that the selection criteria used by one sex correspond to the deceptive tactics used by the opposite sex. Sixty-two women and 30 men, all undergraduates (average age, 21) completed a survey on a list of deceptive techniques that would likely be used by each sex. The results showed that men and women predicted that the deception tactic used by each sex would be in an evolutionarily relevant area of mate choice: all of the respondents believed men would attempt to deceive women about their financial status, whereas women would try to deceive men about their physical attractiveness (see also Buss, 1988;



Keenan, Gallup, Goulet, & Kulkarni, 1997; and Schmitt & Buss, 1996, on mate derogation tactics).

Other studies that have addressed female-based mating preferences have explored relationship deal-breakers and patterns of marital dissolution. In a cross-cultural study (1989), anthropologist Laura Betzig found that women cited their mates' failure to provide adequate financial support as being in the top two reasons for divorce. "Inadequate financial support is reported as a cause for divorce in 21 societies and ascribed exclusively to the husband in all but one unspecified case" (p. 664). Interestingly, in none of the societies surveyed did a woman's failure at providing resources constitute grounds for divorce. Additional cross-cultural research has revealed the same circumstance for marital breakups (see Amato & Rogers, 1997; Fisher, 1992; Frayser, 1989).

The relevance of these findings to the argument presented in this thesis is that women have been selected to evaluate a male's ability and willingness to provide economic resources to the pair bond. From an evolutionary perspective, a man's inability to confer resources to his mate should have been a major sex-specific basis for the relationship's termination. "Men who were unable or unwilling to supply these resources negated a criterion on which they were initially selected by women as mates" (Buss, 1994, pp. 177 – 178). Not surprisingly, therefore, high-income men report greater frequency of sex than do low-income men as well as greater numbers of biological children (Geary, 2000; Geary, Vigil, & Byrd-Craven, 2004; Hopcroft, 2006). In describing this universal mating preference among women, there are two inquiries which remain unanswered for the reader. The first question is, how do women's preferred

marriage partners compare to their actual ones? Due to men's mate choice preferences and other female competitors having their own desirable traits, it only makes sense that women's preferred mates are not identical to the ones they actually end up with. Nevertheless, women's *preferred* traits in marriage partners – not the *actual* ones they end up with – capture more clearly the evolved psychological mechanisms that guide reproductive behaviors in humans (Buss, 1996, 1999; Geary, 1998; Geary, Vigil, & Byrd-Craven, 2004; Kenrick, Sadalla, Groth, & Trost, 1990). This is an important point because this thesis posits that men engage in conspicuous consumption because they are driven by the need to appeal to a particular mating preference – resourcefulness – that is shared by all women. Although in reality not all women will be able to mate with highly resourceful men, they nevertheless would prefer to when given the choice. The second question is, how might a man's financial success or his skill in achieving it become a criterion for a woman's mating proclivity if money was invented during a period that played no part in shaping human psychological mechanisms? It seems appropriate to address this query because, as was mentioned earlier, financial currencies saw their birth in the Holocene, not in the Pleistocene. The first crude silver coins were indeed invented around 687 B.C.E. in Lydia, a prosperous kingdom in Asia Minor whose inhabitants, the Lydians, used them to develop a robust economy which lead to the establishment of the first retail shops (Davies, 2002). Although money's invention almost 2,700 years ago represents a time period having little effect in affecting female mate choice in evolutionary terms, merely 90 generations, other forms of crucial resources (e.g., food and shelter) existed since the beginning of mankind. The important point here is that the evolved psychological mechanisms driving and shaping female sexual selection were not

affected by what type of economic resources were used in order to ensure survival and reproduction of the species. Rather, they were affected by the type of mate who was able to provide them consistently in critical times compared with other potential mates. Resources may differ from one society to another and from one chronological period to the next, yet the ability to harness them is an enduring trait that manifests itself irrespective of the cultural and temporal contexts. One such trait seen across all known human societies and considered to be a reliable cue to the control of resources is social status, which has recently become the focus of an investigative surge within economics (Van Kempen, 2003), marketing (Grier & Deshpandé, 2001), biology (Sapolsky, 2004), and psychology (Newman, Sellers, & Josephs, 2005). Social status is widely known to be intimately associated with wealth and conspicuous consumption and, given its scarcity within the academic literature, an in-depth look into the relevant findings on status at this point would seem appropriate.

The following section introduces the concept of social status and provides examples on the extent to which high-status men have held an advantage over lower-status ones across several contexts, such as mating, health, and reciprocity. It then presents numerous findings on the male sex hormone testosterone (T) and its sensitivity to a man's status rises (victory) or drops (defeat) in male-male competition. Finally, it explains how intra-sexual competition and female mate choice – the two basic tenets of Darwin's sexual selection theory – act as ultimate drivers for men's propensity to conspicuously consume.

## **2.4 Social Status: A Cue to Resources**

Wealth has a transitory nature when compared with social status. An individual could accumulate and squander money numerous times in a lifetime whereas achieving a high social position is often irreversible because it features the approval of surrounding peers that persists steadily (Lillard & Reville, 1997). Many scholars agree that human social status is the variation in an individual's power and privilege to control scarce resources that are desired by many (Chagnon, 1979; Chiao, Bordeaux, & Ambady, 2004; Ellis, 1993; Fave, 1980; Matras, 1984; Murphy, 1989; Schmid Mast & Hall, 2004; Van den Berghe, 1980). Others define it as an individual's social ranking based on his or her traits, assets and actions, and there is substantial agreement among peers about the hierarchical position of the particular individual (Jaeger, 2004; Marshall, 1977; Weiss & Fershtman, 1998). Regardless of the interpretation, social status rests on a consensus of opinion within a group where one person alone does not have the power to confer status on another. If each member within the group assessed an individual's social position differently, that individual would have no social status at all. A man of high social status expects to be treated favorably by other individuals with whom he might engage in social and economic interactions. This treatment can take many forms, such as the transfer of market (e.g., property) or non-market (e.g., marriage) goods, transfer of authority (e.g., leadership), modified behavior (e.g., cooperation), and symbolic acts (e.g., respect, trust) (Ellis, 1992; Weiss & Fershtman, 1998). These social rewards entice the individual to strive for a higher social position through group affiliation, investments in assets, or other status-seeking behaviors, including conspicuous consumption (Brown, 1991). Therefore, the greater a man's social status, the greater is his ability not only to control resources

across many situations but also to benefit from important social interactions.

Former U.S. Secretary of State and Nobel Peace Prize laureate Henry Kissinger once remarked that power is the most potent aphrodisiac. Similarly to earning capacity, men's social status is an important consideration in women's choices of and preferences for mating and marriage partners (Buss, 1989a; 1994). An elevated status in men is a prerequisite to attracting the most desirable mates in monogamous cultures worldwide (Borgenhoff Mulder, 1988; Taylor & Glenn, 1976) and, in polygynous ones, with attracting the greatest number of mates (Betzig, 1986). In her book *Despotism and Differential Reproduction* (1986), Betzig noted that "power, prestige, and privileged access to resources should be sought, not as ends in themselves, but as prerequisites to procreation" (p. 2). She studied 186 existing societies taken from a cross-cultural sample that featured remnants of an earlier mode of living. Also included in her work was data on hierarchy and despotism in the six early civilizations of Babylon, Egypt, Aztec Mexico, Inca Peru, India, and China. Humans living in industrial countries are exposed to very different conditions from those found in the Pleistocene, hence investigating traditional patterns of life provides additional clues to the evolution of status-seeking behavior. Betzig hypothesized that greater hierarchical power should predict one's access to a greater number of sexual partners because of its potential to skew conflict resolution in favor of the despot. Her conclusion was starkly in line with Darwinian theory. Although the markers of social status varied somewhat from one culture to the next, from the Mbuti pygmies found in the Democratic Republic of the Congo to the Aleut Eskimo in Western Alaska, higher-status men had greater wealth and greater numbers of mating partners.

Another example of the advantageousness of high-status men in the context of mating occurred in a late European medieval practice called *jus primae noctis*, or “right of the first night”, whereby the lord of a governing estate shared the wedding bed with his peasants' brides. The lords promulgated this symbolic and humiliating gesture as a means of demonstrating their power and superiority over their dependent peasants in the fifteenth century (Wettlaufer, 2000). It seems that this ritual was prevalent elsewhere in time and place, from the ancient empires of Babylon, Greece, and Rome to the more contemporary regions of India, Hawaii, and South America. Widely used for the achievement and maintenance of status and as a means of ensuring first sexual access to nubile females, this power display behavior appears to have been a key feature of males who lived in groups where intense intra-sexual competition determined their reproductive prospects.

High social status affords men with numerous other benefits that are not directly related to mating. For example, men that wield social influence have reported having better health for themselves as well as for their children (Buss, 1994; Geary, Vigil, & Byrd-Craven, 2004). Robert Sapolsky, a neuroendocrinologist who has studied the influence of social hierarchy on primate health, has concluded that low-ranking individuals are more likely to experience psychological stressors (e.g., lack of control, depression) and cardiovascular disease (e.g., atherosclerosis, lower levels of “good” HDL cholesterol) than those of higher rank (Sapolsky, 2004; see also Marmot 2004). The works of Geary (2000) and Adler et al. (1994) have demonstrated that these health benefits extend to the children of high-status men across several cultures. They demonstrated that these children have lower mortality rates than the children of low-

status men and, even in cultures in which mortality rates are low, they benefit in terms of improved psychological and physical health, as well as longevity into adulthood.

High-status men are also more likely to obtain help when they solicit it than lower-status ones. Goodman and Gareis (1993) applied the "wrong number technique", where a male caller telephoned 120 subjects and pretended to have reached a wrong number while using his last dime in a pay phone. Posing as either a lawyer or a gas station attendant, the caller then asked the subjects to phone his workplace – described as either a law office or a gas station – in order to deliver the message that he would be late. Results showed that when the requester was perceived to be in the low-status occupation, he received significantly less help than in the high-status one or even in the control condition where no information about the caller's job title was given to the subjects.

In another study, McElroy and Morrow (1994) analyzed solicitations aimed at raising money for charitable organizations. An individual requesting funds for charity who was portrayed as having high status by dressing in formal attire was granted more money compared with one who was clothed informally. Furthermore, funds were significantly higher when the higher-status confederate was placed near the subject at about a distance of no more than 25 to 30 centimeters. When the confederate had a lower-status appearance, the reverse effect was observed: being close led to a significant decrease in gifts. The researchers concluded that people seem to tolerate the invasion of their private space more likely when the invader is of higher status.

Other studies that have dealt with behavioral effects of apparent social status have found that status is associated with an individual's integrity. Bickman (1971) manipulated the apparent occupational status of requesters by varying their attire. Male

confederates, dressed as either white-collar or blue-collar workers, purposely left a dime in a phone booth and returned to ask subsequent users if they had found it. One might have expected subjects to assume that blue-collar workers would have had a greater need for the dime and hence would have been more likely to give them the dime. Results showed that the subjects returned the dimes to 77% of the high-status requesters and to only 38% of the low-status requesters (see also a study on the effects of a potential partner's costume on mate selection by Townsend & Levy, 1990).

Doob and Gross (1968) examined the role of social status as associated with automobiles and aggressive driving behaviors. They hypothesized that high-status individuals would be more likely to commit sanctions toward low-status ones when driving their cars. They argued that the fear of retaliation from a high-status individual would prevent a low-status one from engaging in aggressive behavior as measured by the degree of honking. By blocking a road with a high- or a low-status car and measuring horn latency (i.e., the length of time it takes a driver to sound the horn), the number of beeps, and the duration of the beeps, Doob and Gross produced an approximate measure of the aggression shown towards drivers of cars of varying status. Overall, their results showed that people have less patience and more aggression towards low-status vehicles.

Studies possessing far more important social implications have reported that deviant behavior is less likely to be negatively sanctioned when it is performed by high-status versus low-status individuals. Chambliss (1973) studied two groups of delinquent boys, one with a higher social status than the other. In terms of the absolute number of illegal acts, the high-status boys were more felonious. However, they were perceived as "sowing their wild oats" and were rarely disciplined, whereas the low-status boys were



seen as criminals and were frequently in trouble with school officials and with the police. Each of these examples illustrates that men not only form status hierarchies when observed in groups, but they also reap tangible benefits from their high social positions.

## **2.5 Social Status and Testosterone**

Over thirty years ago, researchers established that there existed a clear association between the sex hormone testosterone (T) and men who attained high status through the use of aggression (Archer, 1976; Gray, 1971; Maccoby & Jacklin, 1974). Aggression may have served as an effective means for attaining status in primitive forms of human existence, but its application in the contemporary world is usually met with punitive consequences for the aggressor. Therefore, it is useful to distinguish between dominant individuals and aggressive ones. Aggressive individuals are characterized as those who intend to inflict physical injury on other members, whereas dominant individuals seek to achieve or maintain high status over others through non-violent means. Despite this major difference in the behavior of aggressive and dominant individuals, their measured T levels have been found to be similar. Research conducted on male prisoners by Ehrenkranz, Bliss, and Sheard (1974) showed that dominant male prisoners had T levels that were statistically equal to those found in aggressive prisoners ( $8.36 \pm 2.36 \mu\text{g/ml}$  versus  $10.10 \pm 2.29 \mu\text{g/ml}$ ), suggesting that social dominance has replaced violent aggression as a means of securing status in industrialized human societies. Sociologist Allan Mazur proposed a biosocial model of status among humans (1985), and explained that the link between dominance and T is bidirectional. First, any changes in T accompany changes in behavior, such that rising T levels facilitate the attempts to

achieve a high status; conversely, decreasing T levels hinder such attempts. Second, the causality works in the reverse direction, with changes in dominance eliciting changes in T levels. Successful attempts to achieve or maintain status seem to increase T levels while defeats seem to decrease them. In order to test for this effect among humans, numerous studies placed male participants in competitive situations where some gained status while others lost it. As predicted, T rose in winners and fell in losers.

The next section discusses briefly the physiology of T and provides numerous examples highlighting how its levels change in men who either gain or lose social status. The thesis's conceptual development and experimental procedure ensue thereafter.

### 2.5.1 The Physiology of Testosterone

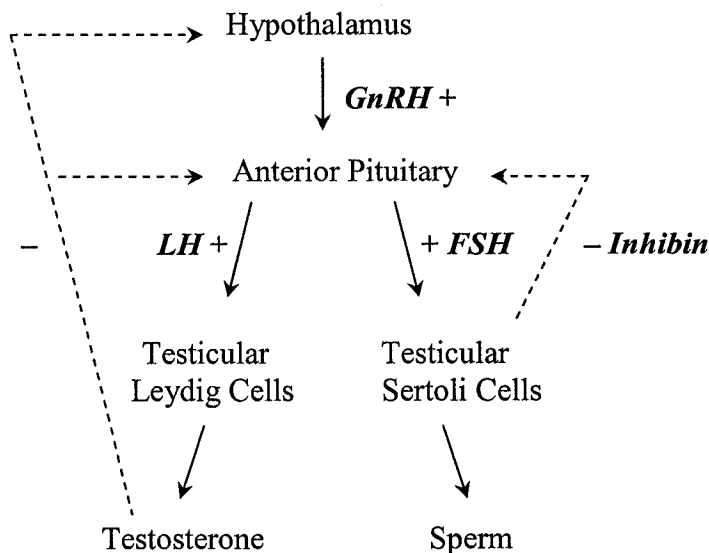
Testosterone (T) is the major male sex hormone produced by the testes. It is a 19-carbon molecule derived from cholesterol and a precursor to 17 $\beta$ -estradiol, the predominant estrogen found in women (Vander, Sherman, & Luciano, 2001; Winters, 2004). Approximately 97% of T is bound to three proteins in the blood: 45% is bound to sex hormone binding globulin, 50% is bound to albumin, and 1 to 2% is bound to cortisol-binding globulin. In its bounded form, T is inactive in that it produces no observable effect in the body. About 3 to 4%, however, is freely circulating and this is the portion of T that is truly responsible for most of its widely known behavioral effects including aggression and dominance (Rada, Kellner, & Winslow, 1976; for a full account of the physiology of T, see Nieschlag, Behre, & Nieschlag, 2004). This "free" form of T is present in saliva, and nearly all of the studies concerning T measurements in male participants derive from salivary samples. Monitoring steroid hormones in saliva rather

than in more invasive ways, such as in urine or in blood specimens, has several well-documented advantages for scientists.

First, T concentrations in saliva correlate highly with those in blood (Baxendale & James, 1984; Navarro, Juan, & Bonnin, 1986; Vittek, L'Hommedieu, Gordon, Rappaport, & Southren, 1985; Walker, Riad-Fahmy, & Read, 1978; Wang, Plymate, Nieschlag, & Paulsen, 1981). Therefore, they are a good measure of the amount of total T found in the body. Second, the measurement of T levels through saliva is a mature diagnostic tool with a long history of reliability in social and psychological studies. A plethora of reports exists over the last 30 years on the commonplace measurement of salivary T in behavioral studies (Baxendale & James, 1984; Dabbs, 1990c, 1991, 1992, 1993; Dawes, 1974; James & Baxendale, 1984; Lipson & Ellison 1989; Navazesh, 1993; Read, 1993; Schurmeyer & Nieschlag, 1984; Swift, 1984; Vittek, L'Hommedieu, Gordon, Rappaport, & Southren, 1985). Third, participants are less reluctant to provide saliva in comparison to blood or other bodily fluids because it is easy to collect, taking less than one minute and requiring no medical assistance. Fourth, saliva is easily frozen and stored in conventional freezers of domestic refrigerators at minus 20 degrees Celsius, and has been shown to be resilient even in the event of freezer breakdown (Dabbs, 1990c). Finally, and most importantly, salivary T is the component of total T found in the body that is responsible for human behavior (for a comprehensive list of the advantages of assessing hormones in saliva, see also Kirschbaum, Read, & Hellhammer, 1992). Figure 1 on the following page shows the biochemistry of the production and regulation of T. Similarly to many other hormones, T communicates with the brain through a feedback loop

comprised of the hypothalamus and the anterior pituitary – both located in the brain – and the testes.

**Figure 1: The Hypothalamic-Pituitary-Gonadal Axis Feedback Loop**



(Adapted from Vander, A. J., Sherman J. H., & Luciano, D. S. (2001). *Human physiology: The mechanisms of body function* (8th ed.). Boston, MA: McGraw-Hill).

Forming the hypothalamic-pituitary-gonadal axis, these three glands are responsible for the secretion of hormones that initiate the production of T and sperm. First, the hypothalamus sends gonadotropin-releasing hormone (GnRH) to the anterior pituitary as a signal to produce either luteinizing hormone (LH) or follicle-stimulating hormone (FSH). LH incites the testicular Leydig cells to secrete T, and a rising concentration of T in the bloodstream resends a message to the upper brain centres to temporarily halt GnRH and LH production. In a similar sequence of events, FSH

prompts the testicular Sertoli cells to make sperm. These testicular cells also produce a hormone called inhibin that temporarily signals the anterior pituitary to stop making FSH.

Contrary to the impression of some that T is produced by the body in abundance, it is actually made in extremely small amounts. Normal men have approximately 10 nanograms of T per milliliter of blood that is equivalent to about 1/100,000 gram per liter of blood (Nieschlag & Wickings, 1981). In saliva, free T has a concentration of about 1/100 that of total T found in blood (Dabbs, 1991; Dabbs et al., 1995; Wang, Plymate, Nieschlag, & Paulsen, 1981). Men have chronic baseline or basal T levels that are attributed to both genetics and the environment (Bernstein, Rose, & Gordon, 1974; Meikle, Stringham, Bishop, & West, 1988). Studies of monozygotic twins have shown that approximately 40% of the variation in basal T levels between individuals is the result of environmental factors (Meikle, Bishop, Stringham, & West, 1987; see also Bribiescas, 1998). During puberty, boys experience rapidly rising T levels between the ages of 12 and 20 (Mazur, 1983) and, progressively over time, men experience a decline in their T levels (Bremner, Vitiello, & Prinz, 1983; Dabbs, 1990b).

Men's T levels are also influenced by a circadian rhythm, which is roughly a 24-hour cycle in the physiological processes of several mammalian species, including humans. Table 1 on the following page shows how mean T levels are the highest during the early morning hours and undergo a gradual drop over the course of the day, with the acronyms "SD" and "N" indicating the standard deviation in the sample and the sample size at different times in the day, respectively. As shown in Table 1, men's T levels were the highest at 7:00 a.m. compared to their levels taken at subsequent times in the day. By 10:00 p.m. in the evening, their T levels had dropped to nearly 50% of their initial levels.

**Table 1: Salivary Testosterone Concentrations at Different Times of Day (in ng/dl)**

	7:00 a.m.	10:00 a.m.	10:30 a.m.	4:00 p.m.	10:00 p.m.
<b>Mean</b>	13.5	11.2	12.0	8.4	7.5
<b>SD</b>	5.4	3.6	4.0	2.9	2.6
<b>N</b>	116	117	58	54	53

(From: Dabbs, J. M., Jr. (1990). Salivary testosterone measurements: reliability across hours, days, and weeks. *Physiology and Behavior*, 48, 83 – 86, p. 84).

Testosterone's primary function is to help differentiate and maintain men's sexual organs from those of women's (Dabbs, 2000; Vander, Sherman, & Luciano 2001). For example, in comparison to women, men develop larger hearts as well as larger skeletal muscles, larger lungs, a higher systolic blood pressure, a greater oxygen-carrying capacity, and a greater power of neutralizing the chemical byproducts of muscular exercise. In short, the pubertal male becomes better adapted for the tasks of hunting, fighting, and manipulating heavy objects, all traits having evolved to either help males survive or combat rivals in courtship (Geary, 1998). Scientific evidence seems to suggest that T is also a conduit to hard work because it helps to boost red blood cell production, allowing a male to generate very high levels of energy (McAdoo, Doering, Kraemer, Dessert, Brodie, & Hamburg, 1978). Other researchers have found that T acts in enhancing men's ability to concentrate on a specific task over a long period of time (Andrew & Rogers, 1972; Broverman, Vogel, Palmer, & Klaiber, 1964; Broverman, Klaiber, Kobayashi, & Vogel, 1968; Klaiber, Broverman, & Vogel, 1971; Waber, 1977). In yet another study, Bahr (1976) suggested that hypogonadal men would be unlikely to

achieve any notable achievement because a chronic, low-level dose of T would render them irritable, indecisive, passive, and physically exhausted.

**Table 2: The Functions of Testosterone in Men**

Differentiation of male reproductive organs and maintenance of their functions
Protein anabolism, bone growth, and cessation of bone growth
Sex drive maintenance
Action on hypothalamus to decrease GnRH (and hence LH, FSH)
Action on pituitary to inhibit LH secretion
Formation of male secondary sex characteristics: <ol style="list-style-type: none"> <li>1. Appearance of both facial and body hair</li> <li>2. Skull thickness</li> <li>3. Deepening of voice, and growth of larynx and vocal cords</li> <li>4. Pronounced muscle development and strength</li> <li>5. Increased energy levels</li> <li>6. Increased sex drive</li> <li>7. Increased competitiveness and status-seeking behavior</li> </ol>

(From Vander, A. J., Sherman, J. H., & Luciano, D. S. (2001). *Human physiology: The mechanisms of body function* (8th ed.). Boston, MA: McGraw-Hill).

Table 2 provides an extensive list of T's functions in men, and describes the male secondary sex characteristics that develop during puberty. The effects of testosterone on male behavior are witnessed also in the case of gender identity. In her book *Sex on the Brain: The Biological Differences Between Men and Women* (1997), Deborah Blum reports that families in some villages of the Dominican Republic carry a gene that leaves newborn boys with undescended testicles and an underdeveloped penis resembling a clitoris. They are raised as girls until puberty, when a cascade of androgens gives them

normal male genitalia, a masculine body, and all of the accompanying male secondary sex characteristics. Called *guevedoces* which means “eggs-at-12” or “testicles-at-12”, these children suddenly switch gender, wear male clothing, and begin to date girls, with apparently little commotion. This example provides an important lesson on how normal T concentrations are crucial for a man’s health and well-being, yet it does not acknowledge how behavior could also affect subsequent T releases. Behavioral endocrinologists study the two-way flow of how hormones alter human behavior and, in turn, how behavior affects hormone production. There has been a recent surge in the effort to understand the different social settings that impact behavior and, consequently, that alter T levels in men. In each of these settings, T levels have been shown to shift in ways predicted by evolutionary theory. The forthcoming section highlights key findings within this research stream.

#### 2.5.2 Human Life Cycle and Testosterone

In recent years, scientific evidence has demonstrated that men experience changes in their T levels at various stages of their lives. When they are seeking to forge a relationship with a prospective mate, they are inevitably competing with other rivals. Hence, one would expect them to be predisposed to conveying their mating desirability through status-related behaviors. Conversely, when they are helping to raise a newborn child, their preoccupations become increasingly centered on parental investment at the expense of their status concerns. In each of these cases, it appears as though nature has designed a mechanism that regulates the appropriate level of T to facilitate a given set of advantageous behaviors. For example, a man’s overall T level will be greater when he is



single, unattached, and looking for a romantic liaison than when he is experiencing parenthood for the very first time. In their research, Roney, Mahler and Maestripieri (2003) assessed the hormonal reactions of young men during brief social encounters with potential female mates. They randomly assigned male undergraduate students to engage in a five-minute conversation with either a young man or a young woman. They found that participants' T levels increased significantly in the female condition only, and that their T change was significantly correlated with the degree to which the female confederates thought they were trying to impress them, either by showing off or by talking about themselves. These ratings, in turn, were highly correlated with the participants' ratings of the female confederates as potential romantic partners. The significant T increase in the female condition provided novel evidence that men may show reactive T increases subsequent to having engaged in social encounters with women. These findings complement studies on T changes in other scenarios, from falling in love (Marazziti & Canale, 2004) and being in a committed relationship (Burnham, Chapman, Gray, McIntyre, Lipson, & Ellison, 2003), to marriage (Booth & Dabbs, 1993), fatherhood (Storey, Walsh, Quinton, & Wynne-Edwards, 2000), and finally divorce (Mazur & Michalek, 1998).

It is widely known that human pair bonding begins with the subjective experience of falling in love, after which it sometimes leads to long-lasting relationships. Marazziti and Canale (2004) were interested in measuring how T levels behaved in individuals who had recently fallen in love. Rather than focusing exclusively on the men's hormonal states, they also evaluated possible T changes in the women. Their sample consisted of two separate and homogeneous groups of 24 participants (12 men and 12 women). Both

sexes were either in the early, romantic phase of a loving relationship or they were in an established, long-term relationship. Results showed that the T levels of male participants who had recently fallen in love were significantly lower than of those who were in a long-lasting relationship ( $4.1 \pm 1.0$  ng/ml versus  $6.8 \pm 2.1$  ng/ml). The female participants, however, experienced the exact reversal of this hormonal change: T levels among the women who had recently fallen in love were significantly higher than those who were in a long-term union ( $1.2 \pm 0.4$  ng/ml versus  $0.6 \pm 0.2$  ng/ml). Marazziti and Canale proposed that falling in love engenders a physiological response that temporarily eliminates some differences between the sexes. Typically masculine features are softened in men while they are enhanced in women, a phenomenon that might express nature's intention of appeasing men's appetite for sexual variety by helping them to focus their energy into raising offspring.

In another study, Burnham et al. (2003) asked 122 male graduates to describe the degree of their involvement in a relationship with a member of the opposite sex. An analysis of salivary samples revealed that men in committed, romantic relationships had 21% lower T levels than men not involved in such relationships. The T levels of both married and unmarried men who were involved in monogamous and romantic relationships did not differ, suggesting that "pair bonding status is the more significant predictor of T levels than is marital status" (p. 119).

Booth and Dabbs (1993) described the relationship between men's T levels and their tendency to marry and, if they do marry, whether they remain so. They stated that although "aggression and dominance behavior are well suited to gathering and amassing resources, and achieving and maintaining status, when unchecked they are not conducive

to the cooperation and mutual support essential to intimate heterosexual relations, especially those of an egalitarian nature” (p. 464). The sample consisted of 4,462 male army veterans of the Vietnam period and was deemed to be representative of the U.S. male population both in terms of race and education. First, they categorized the participants in increasing order according to whether their T levels were measured at two standard deviations ( $\sigma$ ) below the mean; one  $\sigma$  below the mean; at the mean; at one  $\sigma$  above the mean; or at two  $\sigma$  above the mean. Second, they analyzed whether the individuals whose T levels were greater than the mean were characterized by a preponderance of marital problems compared with those who had T levels below the mean. Their results showed that T was positively related to bachelorhood and, if married, to instability across every aspect of marriage, from having affairs to being abusive, and from being separated to being divorced. For example, the highest-T men were about twice as likely as their lowest-T cohorts to have been either unmarried (15% versus 6%) or divorced at least once (49% versus 25%). They were more likely to have separated from their wives because of perceived incompatibility, to have admitted their involvement in extramarital affairs, and to have physically abused their wives. In short, T was reported as having a consistently negative relationship with getting married and remaining so, as well as with numerous indicators of marital success.

Each of the previous studies neglected to test the possibility of whether there exists a lengthier and consistent relationship between a man’s basal T level and his behavior in adulthood. Mazur and Michalek (1998) followed a sample of nearly 2,000 men over a ten-year period. These men were asked to participate in the study on four separate years, specifically in 1982, 1985, 1987, and 1992. At each of those years, they

reported their marital status (married, divorced, separated, widowed, or unmarried) and agreed to have their T levels measured. Results showed that men who were married by 1982 and remained so until 1992 ( $n = 1,336$ ) had the lowest mean T levels across all categories of participants. Those who were unwed during that same time ( $n = 139$ ), including those who had been divorced prior to 1982 and who stayed single until 1992, had the highest mean T levels. Mazur and Michalek concluded that “being married is associated with low T, being single with high T” (p. 321). Moreover, they constructed two T curves over the ten-year span. One curve showed the T levels of 77 men who were divorced in 1982 but who were married and who remained so as of 1992. The other curve showed the T levels of 126 men who were married in 1982 but who had divorced and who remained so as of 1992. Both curves illustrated a striking mirror image. As the years led to marriage or to divorce, the men who were married experienced incremental drops in their T levels, whereas those who were divorced experienced incremental rises, with peaks occurring precisely at the time of the relationship’s dissolution. Perhaps this hormonal shift explains why some men adopt new identities when they re-enter the mating market, including the increased incidence of signaling both to prospective mates and to intra-sexual rivals.

Despite their importance in unravelling some of the mysteries behind men’s social behaviors, none of these studies reported the parental status of their participants. Until very recently, little was known regarding the effect of fatherhood on men’s T levels despite decades of advancement on parental investment in the biological sciences. Today, there exists considerable research illustrating that T levels decrease in new fathers of species who exhibit extensive paternal care, including humans (Berg & Wynne-

Edwards, 2001; Gray, Kahlenberg, Barrett, Lipson, & Ellison, 2002; Storey, Walsh, Quinton, & Wynne-Edwards, 2000). Such a pattern is unobserved in non-paternal species, indicating that a priming mechanism triggers men's T levels to drop in order to provide increasing care for their new offspring and to become less concerned with the pursuit of additional mating or status-seeking opportunities. Storey et al. (2000) measured hormonal concentrations in expectant and new fathers who lived with their partners to determine whether men show hormonal changes often seen in pregnant women. They obtained blood samples from 31 Canadian couples at one of four times before and after the birth of their children: 1) "early prenatal" (16 – 35 weeks prior to birth), 2) "late prenatal" (three weeks prior to birth), 3) "early postnatal" (three weeks after birth), and 4) "late postnatal" (four – seven weeks after birth). The men whose partners had given birth within the previous three weeks had 33% lower T levels compared with those whose wives were due to give birth in three weeks or less. They also found that T levels gradually climbed in the postnatal condition, most likely the body's signal to mobilizing a needed response in the event of possible harm to the newborn child.

The latter examples suggest that men's T levels fluctuate as a function of whether they find themselves in mating or parenting situations. The main hypothesis posited in this thesis, namely that conspicuous consumption could induce changes in men's T levels, appears to be based on sound reasoning because wealth displays are associated with high social status often sought by men to improve their mating opportunities. There are other contexts in which men's T levels vary according to whether they gain or lose social status. The next section presents various such contexts and concludes the literature

review by presenting a set of cases on how men's T levels vary according to their social status, and how grandiose cultural symbols serve as a means to convey important status signals among humans.

### 2.5.3 Social Status Changes and Testosterone

While a man's T level is affected by both genetic and environmental influences, it can also change depending on the type of relationship he forms with another man. Mendoza (1984) stressed that it is the relationship between men that influences each other's T level. Several decades of research indicate that a man's T level varies when his social status changes, rising when he achieves or defends a dominant position, and falling when he is dominated and/or when he experiences a social defeat.

Mazur and Lamb (1980) measured changes in T levels among men as a function of their status in three experiments: an athletic competition, a lottery, and a medical school graduation. In the first study, experienced male tennis players were recruited to compete in doubles tennis matches where the winners would be given \$100 each. Since the participants were all university graduate students earning very little money at the time, this prize was expected to motivate them to compete vigorously with one another. Testosterone measurements taken exactly one hour after the end of the matches showed a significant difference in the pattern of winners and losers when the bouts were clearly decisive. Winners and losers experienced significant increases and decreases in T levels, respectively. However, when the bouts were close, the winners claimed to be dissatisfied with their performance, and as such there were no significant T differences between winners and losers. Both groups showed a "loser pattern", suggesting that a clear

triumph was needed to sufficiently prompt a discernable T response. In their second study, Mazur and Lamb explored what caused the T spikes to occur in the first place. Was it solely the favorable outcome of the tennis matches or was it the effortful means to achieve victory? Study 2, therefore, involved male participants who were either awarded \$100 based on a random lottery draw or who received nothing. The researchers suggested that the men in the study could not claim any personal triumph in the matter or deceive anyone into believing that their sudden fortune was driven by their own effort. Their results showed that T levels measured one hour after the draw were not significantly differentiated into a rising winning pattern versus a dropping loser pattern. One might reasonably suggest that receiving nothing in a lottery should not qualify a participant as a “loser” because such an outcome is expected given the minimal probability of winning in a random draw. Nevertheless, Mazur and Lamb concluded that “the simple differentiation of subjects into winners and losers, through no effort of their own, does not in itself produce testosterone differences” (p. 242). Finally, they investigated how men’s T levels might be affected by ceremonies that mark their passage from low-status to high-status positions. Such rites are commonplace in human society, and graduation from medical school seemed like an ideal scenario because its formal ceremony moves graduates from the low status of student to the prestigious rank of physician. Due to the impracticality of having to interrupt the ceremony in order to carry out the sampling, T levels were measured one day following graduation. The data fully supported the researchers’ hypothesis that graduation causes a rise in T, although it is wholly possible that unobserved rises occurred within one hour of the ceremony’s conclusion.

Booth, Shelley, Mazur, Tharp, and Kittock (1989) explored whether there existed carryover T effects from one athletic bout to the next in an attempt to explain winning and losing streaks often witnessed in competition. In other words, their main question was, "Does the T level of a consistent winner rise higher with each successive win, and does that of a consistent loser continue to drop?" To answer this question, saliva samples were collected throughout a season from the top six players on a men's varsity tennis team. Five-milliliter samples were collected from each player on four separate occasions over the course of six different meets: 1) one day before the match to establish baseline T levels, 2) 15 minutes before the match, 3) immediately after the match, and 4) one or two days after the match. The tennis players were ranked from the first through the sixth seed, and Booth and his colleagues followed them through six meets for a total of 36 cases. They hypothesized that "persistently heightened testosterone would add momentum to a winning streak while depressed testosterone would characterize a slump" (p. 569). The results confirmed their supposition; players whose T levels increased following winning games had heightened pre-match T levels in their forthcoming matches, whereas players whose T levels fell after losses had decreased pre-match T levels in the next matches. The most important finding of this study was the unexpected peak in T levels immediately prior to matches, suggesting that competitors seemed to be equipped with a biological alarm clock that signaled an upcoming contest. Overall, these results lent support to Mazur's biosocial theory that suggests how heightened T levels produce further increases in competitive and dominance behaviors.

Similar results featuring rising T levels have been demonstrated in several other status-seeking, competitive contexts. Elias (1981) studied a group of 15 male college



wrestlers, a convenient sample to analyze due to the consistency of the environmental conditions: each match lasted 8 to 12 minutes, each had a decisive victor, and each was comprised of wrestlers with similar ages, heights, and abilities. Blood samples were drawn at  $t_1 = 10$  minutes before the match,  $t_2 = 10$  minutes after the match, and at  $t_3 = 35$  minutes after the match. The winners boasted a significantly greater percentage change in T concentration compared with the losers from  $t_1$  to  $t_2$ , with T levels dropping for all wrestlers by  $t_3$ . In another study, Salvador, Suay, Martínez-Sanchís, Simon, and Brain (1999) video-recorded the fights of 28 judo contestants and classified their combative behaviors according to specific categories. They then measured the frequency with which the fighters used attacking, counterattacking, defensive, or threatening gestures. They also measured the fighters' pre- and post-match T levels, 10 minutes before and after the fight, and found that a positive relationship existed between T levels and the duration as well as the number of offensive attacks and threats displayed during the fight.

Shifting attention away from individual sports to group-based sports, Edwards, Wetzel, and Wyner (2006) investigated whether an individual's T level correlates with the way in which his status is perceived by his fellow teammates. A group of 21 Emory University intercollegiate male soccer players rated their teammates on a list of competitive skills using a 15-item Player Rating Scale developed for soccer by Wyner (2000). Pre- and post-match T levels, one hour before and 15 minutes after, were measured from a single home match that ended in victory. Thirteen of the 21 men played in the game and their mean differences in T level from pre- to post-match conditions were not only statistically significant, but were also highly correlated with the scores they each received on the Player Rating Scale. In other words, the percentage increase in T

measured for every player after the game was significantly related to his perceived status on the team. The higher the player's status on the team, the greater was the percentage increase in salivary T from his pre- to his post-match level.

Bernhardt, Dabbs, Fielden, and Lutter (1998) showed that significant differences in T level changes also occur among sports fans of athletic teams. In particular, T levels rise in male fans whose team wins and fall in those whose team loses. Bernhardt and his colleagues captured these hormonal fluctuations from the vicarious experiences of European football fans at the 1994 World Cup of Soccer held in the United States. Since they were unable to attend the final game between Brazil and Italy, the researchers recruited 26 loyal male fans (12 Brazilians or of Brazilian descent, and 14 Italians or of Italian descent) in Atlanta who were gathered at two separate establishments to watch the live broadcast on television. They collected saliva samples from each participant at 30 to 10 minutes before the game and again at 15 to 25 minutes after the game. Basking in their team's glory, the Brazilian fans exhibited increases in their T levels following their team's victory whereas the Italian fans saw a drop in theirs. The conclusion of this study is that merely witnessing the victory or the defeat of one's heroes has physiological effects that go beyond just simple changes in mood or self-confidence. Such a finding has important public policy implications, given the numerous violent incidents that are frequently documented by international press agencies following world soccer matches.

Neave and Wolfson (2003) studied a phenomenon known as the "home advantage" to understand whether T plays any role in the consistently superior performance of athletic teams when competing on home ground. The authors hypothesized whether such an advantage could be responsible for causing players' T

levels to rise at significantly higher levels when they played at home versus when playing away. From a sample of 17 male soccer players from the U.K., between the ages of 21 and 35, only ten played on both games at home and away. Hormonal measures revealed that T was significantly higher before the home game ( $\mu = 9.93$  ng/dl,  $\sigma = 1.80$ ) versus the away game ( $\mu = 5.79$  ng/dl,  $\sigma = 1.39$ ). Neave and Wolfson also wanted to find out whether the team's overall T change would be greater after a game against a rival who is considered to be the best in the league as opposed to just an average one. Their results indicated that the team's average T level against the best rival was 14.52 ng/dl whereas it was 11.65 ng/dl against the average one, suggesting that T may act as a combating primer in individuals who anticipate a potentially powerful competitor. (These T levels were considerably greater than the ones in study 1, owing perhaps to age differences in the two samples, seasonality, or other confounds that Neave and Wolfson did not address in their paper).

The examples discussed so far have demonstrated how T levels could drastically rise or drop depending on whether individual athletes, teams, or even team fans experience victory or defeat in athletic competition. These experiments were conducted on individuals in physical sports, leaving unanswered the question of whether T levels also fluctuate across other contexts. The next section addresses this issue by exemplifying how T levels change during chess competition, hostage escapes, and even imprisonment.

Mazur, Booth, and Dabbs (1992) explored the relationship between T and intellectual combat by following 11 players in a regional chess tournament over four rounds in a single day. Salivary samples were collected from each player on several

occasions: one day prior to game day, on the morning of game day, roughly 15 minutes after every round, and one day following game day. There were four winners and seven losers, with the winners having consistently achieved higher post-match T levels that extended until the day after the tournament. In another study, Rahe, Karson, Howard, Rubin, and Poland (1990) sought to investigate the coping strategies and overall mental health of individuals who had succeeded in surviving a major crisis. In their study, they gathered psychological and biological data from the 52 American hostages who had been held in Iran for 444 days from November 1979 through January 1981. The 28 hostages that volunteered to have their salivary T measures taken on the eve of the first day of their release were extremely high (mean = 21.4 ng/dl) compared with those taken from a control group (mean = 4.1 ng/dl), a remarkable five-fold increase. The hostages were widely revered for their ability to beat the odds and to survive this ordeal; this "victory" no doubt helped maintain the hostages' T levels at high levels for up to three days subsequent to their release.

In a study examining how T relates to a severe loss in one's status, Thompson, Dabbs, and Frady (1990) measured T concentrations among prisoners in a shock incarceration program. Modeled after military boot camp, this program allowed convicted first offenders to serve only 12 weeks instead of their normal sentences of several years. The study's participants were 17 adult males whose introduction to prison life was considerably harsher than usual. Upon arrival, after having their possessions confiscated and their hair sheared, they were stripped, showered, and disinfected. This all happened while receiving extremely intense verbal abuse. Once their imprisonment began, they toiled in heavy work that gave them virtually no idle time, they marched

rather than walked, and they were not permitted to speak with correctional officers unless they obtained authorization. Four saliva samples from each inmate were obtained at four-week intervals, beginning from the moment of arrival and ending on the 12<sup>th</sup> week. Individual summary evaluations of inmates' performance over the incarceration period were also obtained from the sergeant in charge. Results showed that two different groups emerged from the program. The first group, composed of 11 inmates, saw a considerable drop in its T levels from a high of about 9 ng/dl upon arrival at the prison to about 5 ng/dl after four weeks. Over the next eight weeks, this group's T levels marginally rose but never surpassed 6 ng/dl. The behavior of this group generally remained roughly the same throughout the entire program. The second group, however, consisted of six inmates whose behavior remarkably improved over the course of the program. These inmates, called "turnarounds", showed T levels that dropped only slightly over the first four weeks from approximately 7 ng/dl to about 6 ng/dl. Over the next three weeks, their T levels rose substantially to almost 9 ng/dl by the 12<sup>th</sup> week. Thompson and her team concluded, "inmates who succeeded best in the program were those who initially dropped less and later increased more in testosterone. Perhaps inmates who initially dropped less had more confidence in their own efficacy and personal dominance and refused to feel defeated" (p. 250).

To summarize these findings, it appears that T levels are sensitive to success and failure in dealing with others, which is consistent with the Darwinian notion that this sex hormone evolved from our ancestors' struggle for dominance. In the studies reported above, males displayed higher T levels after socially valued experiences in which they emerged as the dominant ones over other same-sex competitors. They displayed reduced

T levels after either losing overt competitions or confronting serious status-threatening experiences. This evidence implies that human societies characterized by hierarchical relationships affect male T levels. Consequently, any research wishing to measure men's T levels across varied conditions should treat its participants as individuals whose relationships with other men will be tantamount in affecting the outcome of their hormonal responses.

The argument presented herein is that male conspicuous consumption is a manifestation of one aspect of intra-sexual competition. There are numerous examples, past and present, that highlight the manner in which men consume wasteful goods and services in order to signal both their competitive superiority and their status to those around them. What follows is a brief historical account of men's unrelenting drive to express their social status through a myriad of actions, ranging from the creation of artistic and architectural feats to the consumption of exclusive products.

## **2.6 Conspicuous Consumption and Social Status**

The value humans place on flamboyant displays of artistic craftsmanship is not a novel phenomenon. The exaggerated Hellenistic art (323 – 100 B.C.E.) that departed from the sparse, clean lines of the Classical Era and lasted for centuries after the death of Alexander the Great is a good early example (Cantor, 2005). Two other such examples include the Roman temples and amphitheatres built during the reign of Hadrian (117 – 138 C.E.) and the 'Forbidden City' constructed by Chinese architects during the Ming Dynasty (1368 – 1644 C.E.). For centuries, historians and archaeologists alike were perplexed about the true purpose of the myriad of grandiose monuments, elaborate

staircases, and majestic altars that seemed to far exceed their functionalities (Neiman, 1997). Recently, however, these researchers began applying Darwinian principles in seeking to address the lavish nature of these endeavors. In a series of papers published by the American Anthropological Association titled "Rediscovering Darwin: Evolutionary Theory and Archeological Explanation," many researchers claimed that the energy expended for the making of this lavish material culture often came from other people's labor. Every single example of these extravagant monuments represented the expenditures of resources in assembling and supervising thousands of skilled individuals who quarried, transported, assembled, and carved them. Conspicuous consumption, therefore, on the part of the Greek, Roman, and Chinese elite must have signaled their ability to control the behavior of those doing the work and hence their elevated social status (Barton & Clark, 1997). Looked at differently, these expenditures also represented a diversion of resources that could have been invested directly in benefiting the elite members themselves and their direct kin. The individuals responsible for the creation of these monuments therefore appear to have suffered significant opportunity fitness costs in order to construct them. The term "fitness," unlike the one that describes an individual's physical condition, is a central concept in evolutionary theory and denotes the extent to which an organism is adapted to produce offspring in a particular environment. Scientists argue that it is equal to the proportion of the individual's genes in all the genes of the next generation (Haldane, 1924; Sober, 2001). Therefore, this wasteful allocation of resources is a good example of the irrational nature of conspicuous consumption because it appears to be counter-productive to an organism's goals from a strictly utilitarian/classical

economics perspective. Inasmuch as conspicuous consumption was widely prevalent in ancient times, it is witnessed universally today.

Despite the notion that Western marketers are exporting their culture to less developed nations, Güliz and Belk (1996) found that consumers in the less affluent world choose to appropriate aspects of Western products in order to fit their own cultural contexts. They would parade their social position by consuming Western goods without necessarily adopting Western values. For example, the Congolese have access to an inexpensive locally bottled Coke and to a pricier variety that is imported from Holland. Status-conscious men, however, will set themselves apart from the “average man” and will communicate their social position by displaying the imported can on the dashboard of their cars. Güliz and Belk believe these individuals consume such a product for an altogether different reason from those in the West: the satisfaction gained in the creation of a more prestigious self.

Luxury goods are becoming increasingly alluring worldwide, and consumer demand for them is so rampant that it has spawned a lucrative business in fake prestigious brands. Van Kempen (2003) offered several examples of deceptive status signaling as a means of dispelling the widely held belief that only snobbish, middle-class consumers are motivated to purchase goods for status reasons. Citing the work of Cooper (2001), he describes how a large percentage of drivers in Santiago, Chile, who were ticketed by police for using their mobile phones while in motion were actually using toy phones, some of which were made of wood. Other drivers sacrifice their comfort by shutting all of their car windows on scorching summer days to give the impression that they are privileged to have air conditioning. Still, others make a habit of dressing in their



finest garments to go shopping at upscale supermarkets where they fill their carts with the most expensive items, flaunt them in front of everyone, and discreetly abandon them right before proceeding to the cash register. According to the World Economic Forum (WEF), a Geneva-based independent organization committed to improving the world's state of affairs by engaging leaders in partnerships for shaping global, regional, and industry agendas, counterfeit luxury goods comprised between 7% and 9% of total world trade in 2003, corresponding to approximately US \$450 billion (for more information, see <http://www.weforum.org/en/index.htm>). Such illegal trade can be found everywhere, from Hong Kong's Stanley Market and London's Oxford Street to New York City's Canal Street. The Internet is also fuelling this growth by fast becoming an ideal forum through which fake luxury goods are traded due to low setup and overhead costs and, more importantly, to anonymity. Envisional Limited, a British software company that specializes in monitoring intellectual property infringements over the Internet, reported a 900% increase in the number of emails peddling counterfeit Rolex watches during the 2004 Christmas season as compared to the previous year (for more information, see [http://www.envisional.com/about\\_us/](http://www.envisional.com/about_us/)). Consumer accessibility to luxurious goods has also been rapidly increasing through legal means. Brands that once catered to the rich are now targeted to a mass audience, an example of which is Costco's foray in the marketing of Bordeaux vintage in the United States. In their book *Trading Up: The New American Luxury*, Silverstein and Fiske (2003) show how American companies have been engaging in the oxymoronic business of mass elitism, making the claim that every American is willing to pay more for something, whether it is bread, lipstick, wine, golf clubs or underwear. They attribute this phenomenon to consumers' current state of heightened

emotionalism, not because these consumers are endowed with any biological need to strive for status – a central premise of the current thesis. Reruns of the HBO hit series *Sex and the City* often depict affluent and powerful men from Wall Street who congregate at chic establishments like “The World Bar” in one of Donald Trump’s towers after a hectic day at work. These individuals are routinely seen bragging about spending hundreds of dollars for a pair of Manolo Blahnik® stiletto pumps as a gift to their lover or even for a bottle of Louis Roederer Cristal® champagne. Another perhaps unusual example stemming from a personal travel experience in Romania featured the lifestyle of a prosperous gypsy family. The family’s patriarch had built an opulent mansion in a very exclusive neighborhood of Bucharest because he wished to assert his economic ascent in spite of discrimination from his more refined non-gypsy business partners. However, the man chose instead to have his family reside inside their traditional caravan located on the front lawn of their new mansion. Although his manifest motive was to keep with the centuries-old lifestyle of his gypsy ancestry, one could reasonably interpret that his latent motive was to insinuate to onlookers that his wealth was so abundant that he could not be bothered with petty belongings such as a palatial residence. A final example includes the ostentatiousness frequently seen at wedding celebrations where families of the newlyweds find it opportune to demonstrate their monetary success to invited guests. Lavish reception halls adorned with decorative ornaments and abundant buffet tables suggest that costly wastefulness is a measure of pecuniary superiority that would be indeed difficult to fake by someone without the necessary means.

Many people would argue that the seemingly irrational obsession with trying to match the affluent lifestyle of one's acquaintances (i.e., “keeping up with the Joneses”) is

due to cultural pressures from the social constructions of Hollywood movies or advertising campaigns. However, this thesis contends that the desire to conspicuously consume is an adaptation whose mechanism could be thought of as similar to the “irrational” behavior that characterizes individuals who risk their lives in altruistic acts or in thrill-seeking sports. Each of these behaviors carries with it a cost that has the ability to handicap its host. In conspicuous consumption, one’s wealth bears the cost of the displayed goods. In altruism and sensation seeking, one’s life bears the cost of the courageous acts. Costly signaling theory is the last section in the literature review and a novel area of research that tries to understand the underlying motives for these “expensive” behaviors. It is instrumental for a complete understanding of an evolutionary-based explication of conspicuous consumption.

#### 2.6.1 Costly Signaling in Mammals Including Humans

Biologists George Williams and William Hamilton, and naturalist Alfred Russel Wallace have argued that mate choice favors the display of cues indicating a mate's unobservable genotypic quality (e.g., disease resistance), and its observable phenotypic quality (e.g., physical strength) (Miller, 1999b; see also Cronin, 1991; Andersson, 1994). However, this idea of mate choice failed to explain how some traits that seemed to actually *hinder* an organism’s survival were actually selected for by evolution. Zoologist Amotz Zahavi struggled to understand the reason why many animal species often produce extravagant signals – physiological or behavioral – that render them vulnerable to predation. For example, why does the Indian peacock have such a large and beautiful iridescent blue-green colored tail? Why does the Thomson’s gazelle in Africa’s

Serengeti plains hop high into the air when it first spots an approaching predator? Why does the Arabian babbler, a bird species living in groups of three to 12 in the Arabian and Sinai deserts, act as a sentinel for its group that also includes non-relatives? The peacock's tail is not only lengthy and heavy, but it also requires an exorbitant amount of energy to grow and to maintain. These attributes could not benefit the peacock when pursued by a predator, for the latter would easily spot his bright tail and expect that its weight would drag him down. The gazelle's peculiar hopping, called "stotting," enables the animal to bounce stiff-legged so that all four legs land on the ground together. Although one could argue that this action gives it a better view of a looming predator, it nevertheless seems to work against the gazelle's welfare because it affords the lioness or the cheetah additional time to approach. The Arabian babbler, when acting as a sentinel, also puts its life in peril because it deliberately mobs a predator that tries to attack the collective group. This altruistic behavior extends further to include the feeding of chicks that are not its own offspring, without any apparent expectation of receiving anything in return. To answer these questions, Zahavi (1975) proposed that these physical and behavioral traits are extravagances that signal the hosts' superior fitness to other individuals, especially prospective mates. In other words, a very effective way for a male to reliably showcase his genetic quality during courtship is to display a signal that is too costly for a low-quality imitator to fake. Consequently, only those males in the very best condition could afford such "handicaps" and still manage to emerge unscathed from imminent danger. Zahavi named this phenomenon the *Handicap Principle* because the incredible cost of the signal handicaps its sender in some important way. The receiver of the signal, on the other hand, will be convinced of the signal's trustworthiness only if it is

extravagantly wasteful and difficult to mimic. He concluded the following: “An individual with a well developed sexually selected character, is an individual which has survived a test. A female which could discriminate a male possessing a sexually selected character, from one without it, can discriminate between a male which has passed a test and one which has not been tested. Females which select males with the most developed characters can be sure that they have selected from among the best genotypes of the male population” (Zahavi, 1975, p. 207; see also Zahavi & Zahavi, 1997).

Men do not act in the same ways as peacocks, gazelles, or babblers, yet they flaunt their defined musculature to potential mates in fitness clubs, they try to maintain their composure during terrorist attacks, and they risk their lives to save children from burning orphanages. Although these characteristics may have evolved as sexually selected indicators of physical attractiveness, maturity, and courage, the list does not end here. Numerous researchers have extended the breadth of human signals to also include cultural displays like art and music. For example, Tooby and Cosmides have written that “culture is the manufactured product of evolved psychological mechanisms situated in individuals living in groups. Culture and human social behavior is complexly variable, but not because the human mind is a social product, a blank slate, or an externally programmed general-purpose computer, lacking a richly defined evolved structure” (1992, p. 24). Geoffrey Miller advanced this evolutionary argument further with his cultural courtship model, arguing that culture ought to be considered as a fruitful domain for a myriad of courtship behaviors in which individuals try to attract and retain sexual partners (1999b, 2000a). Good examples are narrating humorous tales, driving expensive sports cars, expressing strong political values, graduating with honors from university,

and playing melodious guitar tunes. Each of these five indicators magnifies the perceivable differences between individuals and makes apparent the heritable differences that exist between them in verbal confidence, wealth, dominance, work ethic and musical creativity, respectively. For example, driving a Ferrari is certainly not an efficient mode of transportation for several reasons. It cannot be driven in snowy conditions or on rough terrain; it receives very poor gas mileage; it can only be serviced in very few specialized locations; it usually accommodates only one passenger; and it is very expensive to insure and to maintain. However, driving a Ferrari is a very efficient indicator of wealth. It is visibly and acoustically discernable from a distance, and it immediately conveys the message that its driver must be wealthy since most men, on average, would be unable to afford merely leasing one for a limited time period. This illustration highlights an important point. Through their excessive and lurid displays of wealth, Ferrari owners signal to onlookers that they are able to bear substantial financial costs. Therefore, their ability to overcome such a heavy burden with ease helps to reinforce their perceived social status. Miller encourages scientists to undertake future research in costly signaling theory. “Many empirical methods have been developed to test whether a particular trait is a sexually-selected indicator, but these methods have almost never been applied in studies of human culture” (Miller, 1999b, p. 75). If there is a biological basis for flaunting one’s wealth, then it might very well be that a man’s flashy Ferrari acts in much the same way as an Indian peacock’s flashy tail (for greater detail on the application of animal signaling theory to human phenomena, see Cronk, 2005).

The preceding section completes the literature review. Several concepts from evolutionary theory were used in explaining that contemporary human behavior stems

from the survival and reproductive obstacles that our ancestors had to surmount during the Pleistocene. In the words of one organizational behavior scholar, “you can take the person out of the Stone Age, but you can’t take the Stone Age out of the person” (Nicholson, 1998, p. 135). Findings from biology, anthropology, sociology, evolutionary psychology, and marketing were synthesized in order to shed light on conspicuous consumption as it applies to men. First, numerous examples were offered to show the universal female preference for resourceful and high-status men. Second, a plethora of examples confirmed how status helps men to overcome their same-sex opponents in the mating arena, either by elevating their social position through the acquisition of resources or through the obtaining of helpful cooperation from others. Third, several advances were presented on the involvement of the sex hormone testosterone during male-male competition in social status contests. Finally, costly signaling theory was used to illustrate how cultural behaviors, including conspicuous consumption, could be seen as biological adaptations having similar design features to other heritable behaviors. The next section introduces the hypotheses, the experimental design, and the results obtained in each of two experiments.

### **3. CONCEPTUAL DEVELOPMENT & HYPOTHESES: EXPERIMENT 1**

The main question posed in Experiment 1 is whether men experience a rise in their T levels after consuming a product widely understood to be a status symbol. Participants’ T levels are the dependent variable. The product representing conspicuous consumption as well as the environment in which the product is consumed are the independent variables. Before proceeding with the hypotheses and the experimental

design, each of these two independent variables is described in greater detail in the following paragraphs.

### **3.1 Type of Car as an Independent Variable**

Several reasons justify the use of an exotic automobile in studying conspicuous consumption as opposed to other products. First, a vehicle is often considered to be the second most expensive item purchased in one's lifetime after a home. Second, asking male participants to drive an automobile, especially a sports car, as part of a market research study would likely be met with little resistance. Finally, luxury aficionados and marketing scholars alike often refer to expensive cars when describing every successful man's consideration set of status symbols. Hirsch (1976) categorized automobiles as *positional goods* because they represent an observable source of status that are interpreted as a signal of ability, as compared with unobservable ones such as health insurance (see also Frank, 1985). Schindler and Holbrook (2003) referred to the centrality of the automobile in explaining gender differences in consumer preferences, and suggested that a biological drive might be responsible for this male obsession with cars, "Many young men use automobiles for dating and may therefore tend to associate their cars with intense feelings related to eroticism and sexual conquest" (p. 281). Other researchers have found that boys tend to play with toy cars more than girls (Luria & Herzog, 1991), and that both boys and young men could recall and recognize automobile brands more accurately than their female counterparts (Davies & Robertson, 1993). Men are more sensitive to automotive consumption symbolism (Belk, Bahn, & Mayer, 1982) and they show a greater tendency than women to use cars to enhance self-expression and feelings



of self-efficacy (Farrow & Brissing, 1990). Men also have been found to score significantly higher than women on an Automobile Involvement Index designed by Bloch and Bruce (1984), and have been found to be more likely to browse in automobile dealer showrooms (Bloch & Richins, 1983). A more recent study by Belk (2004) explored the symbolic nature of automobiles in a sample of 40 American men and assessed the positive and negative effects of their “automobile-eroticism” on their lives and on the lives of other family members. The study involved depth interviews and observations of men who exhibited extreme identification with automobiles at four *concours d’élégance* and two automotive show competitions. Belk arrived at the following conclusions. First, men use their cars to advertise their wealth, “in the traditional equation, men offer (and women seek) wealth and power in dating while women offer (and men seek) youth, beauty, and sex” (pp. 273 – 274) (for further reading on men’s willingness to signal their economic capability through their cars, see Belk & Coon, 1991; Hirschman, 1987). Second, men appear to anthropomorphize their cars; they feed them, they bathe them, they observe their age, and they nurse them during breakdowns. In short, men consider their cars as extensions of themselves (see also Belk, 1988). Third, they believe that owning the right car bestows on them a potent sexual charm that makes them irresistible to women (see Lane & Sternberg, 1985 for a related discussion on how damage to a man’s vehicle can represent castration). Psychologists Peter Marsh and Peter Collett studied American popular culture in order to unravel some clues on the hidden motivations and fantasies of automobile drivers. In their book *Driving Passion: The Psychology of the Car* (1986), they provide an exhaustive list of stories that exemplify the relationship between fancy cars and male sexual prowess. For example, rock and roll

pioneer Chuck Berry released the hit single “Maybellene” in 1955 about a man’s struggle to win back a girl named Maybellene who ran off with a high-class gentleman. The song begins and ends in a high-speed chase between the hero’s Ford and the villain’s Cadillac. Another example featured the best-selling book *The Insolent Chariots*, in which John Keats condemned U.S. auto stylists for appealing to consumers’ deeply buried emotional needs, rather than their rational needs for efficiency and safety. Keats claims, “Automobiles were not marketed as reliable machines for reasonable men to use, but as illusory symbols of sex, speed, wealth, and power for daydreaming nitwits to buy” (p. 97). According to Marsh and Collett, male drivers regard their vehicles not only as status symbols, but also as important means where self-expression, adventure, escape, romance, and sex have the opportunity to come to fruition.

In order to determine whether their T level changes are caused by the sports car, the male participants in Experiment 1 were each asked to also drive an inexpensive family sedan (details about the models of both cars are described in the Materials and Methods section). Therefore, the two levels of the independent variable “automobile” are the high-priced sports car, and the low-priced family sedan.

### **3.2 Type of Driving Environment as an Independent Variable**

Since costly signaling requires an audience to view the signal, the environment in which the conspicuous consumption takes place is also an independent variable. It is believed that the satisfaction derived from conspicuous consumption stems from the audience’s reaction to the wealth exhibited by the consumer rather than to the attributes of the good (Mason, 1981; Veblen, 1899/1965). For a good to infer high status, it is

mandatory that an audience witnesses and agrees on the authentic qualities that make it so, since a conspicuous good signifies one that is eye-catching. When Veblen coined the term “conspicuous consumption”, he emphasized that consumption of the leisure class be done in full public view. He stated, “In order to gain and to hold the esteem of men it is not sufficient merely to possess wealth or power. The wealth or power must be put in evidence, for esteem is awarded only on evidence” (p. 36). Therefore, without having the approval of viewers to fuel their self-aggrandizement, the conspicuously consuming males will have no incentive to put on a show. Veblen also noted that wealth displays are seen primarily in urban centers because individuals cannot rely on their reputation to influence others to the same extent as those living in rural areas. The inhabitants of small rural communities are sufficiently knowledgeable of each others’ belongings or social standing. City dwellers, on the other hand, must resort to a language of visible symbols that enable them to convey their social status and to anticipate the degree to which they receive deference from their peers. Veblen suggested, “Conspicuous consumption claims a relatively larger portion of the income of the urban than of the rural population. The result is that, in order to keep up a decent appearance, the former habitually live hand-to-mouth to a greater extent than the latter” (1899/1965, p. 87). In order to assess the participants’ T level changes that stem from having an audience acknowledge their conspicuous consumption, the participants were asked to drive their automobiles in two separate environments. Therefore, these represent the two levels of the independent variable “environment” and they are: 1) an isolated highway having a negligible audience, and 2) a city’s downtown streets having a significant audience. The model to be tested in Experiment 1 is shown in Figure 2 on the following page.

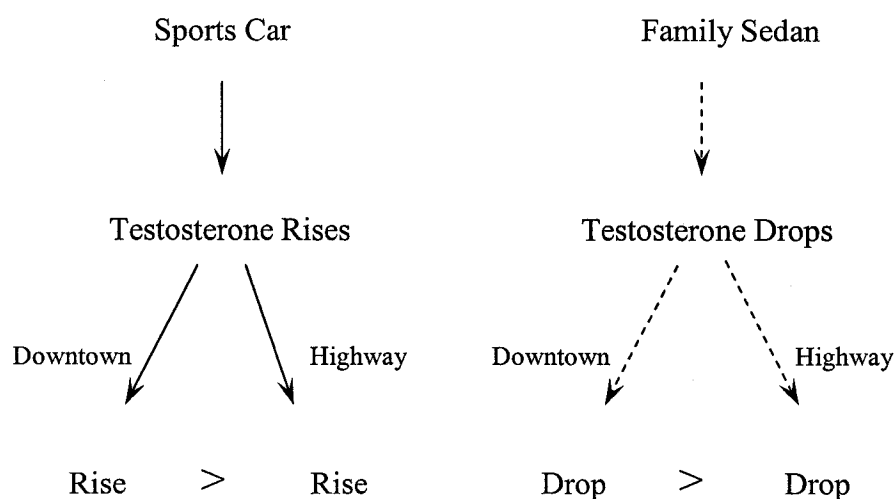
**Figure 2: Model for Experiment 1**

Figure 2 illustrates how men's T levels are predicted to behave when they engage in conspicuous consumption in two separate environments. It also shows how men's T levels are expected to behave when conspicuous consumption is replaced by the consumption of a much less conspicuous product, again, in each of the two environments. In biology, the environment in which males of certain species gather for the purposes of competitive mating display is called a *lek*, from the Swedish term *leka*, i.e., "to play". Hence, the downtown condition will be termed the lek, and the highway condition will be termed the non-lek.

The four posited hypotheses are:

H1a: Testosterone levels should rise significantly in men who engage in the consumption of a new and expensive sports car.

H1b: The rise in testosterone when driving the expensive car in the lek will be greater than that when driving it in the non-lek.

H2a: Testosterone levels should decrease significantly in men who engage in the consumption of an old and inexpensive sedan.

H2b: The decrease in testosterone when driving the sedan in the lek will be greater than when driving it in the non-lek.

#### **4. METHODOLOGY: EXPERIMENT 1**

##### **4.1 Materials and Methods**

There are many advantages to measuring variations in hormone levels when studying human behavior. First, hormonal changes match the ebb and flow of social behavior which moves at its own pace, often uncorrelated with cognition (Dabbs, 1992). Humans make instantaneous decisions about whether they like or dislike other persons, but the majority of their daily social interactions do not have such an instant quality about them. Their anxiety increases slowly as they approach a novel social setting, and their anticipation of a heated conflict and its effects may last for a lengthy period of time. Hormonal measures are therefore conceptually appealing in the study of much of human behavior. Second, hormonal measurements are robust because their slower nature compared with the rapidity of neuronal measurements prevent them from being affected by fast-moving error signals. Third, participants come into contact with relatively simple equipment and they provide biological samples that can be easily stored for subsequent

analysis in a laboratory. Fourth, there have been recent advances in technology that allow participants to carry out their duties without being restricted in any way during the data collection process.

Saliva samples were collected from participants who were asked to drive both an expensive sports car and an old family sedan on the highway and in the city centre. Each participant had his T level collected before and after his consumption experience with both automobiles. The sports car was chosen based on its prohibitive price, its limited distributorship, and its high degree of conspicuousness. Fulfilling these criteria was a 2006 Porsche 911 Carrera 4S Cabriolet estimated to be worth over \$US 150,000 and obtained from Express Car Exotics, a Montreal-based company that leases exotic automobiles to the public (see both lateral and posterior pictures in Appendix I). The family sedan was a 1990 Toyota Camry wagon with a mileage of over 300,000 km (pictures of this car are featured in Appendix I).

Five-milliliter plastic sterile tubes with attached caps were used to collect and to store the participants' saliva. During the collection process, every participant was asked to deposit at least 2 ml of saliva into each tube; an amount less than 2 ml might prove insufficient in yielding the necessary concentration of freely circulating T. Although studies have employed the use of a cotton swab as an aid in collecting saliva, this was specifically discouraged here since cotton possesses an inherent quality that artificially inflates T measures (Dabbs, 1991). The tubes were collected individually from each participant and they were temporarily stored in the freezer of a refrigerator situated on the premises where the participants met with John Vongas, the M.Sc. student who conducted the research and who wrote this thesis (Room FB-213 of Concordia University's

Faubourg Building, located at 1600 Saint-Catherine Street West in Montreal, Quebec). At the end of each collection day, they were transferred to a domestic freezer at the researcher's home until Experiment 1 was complete. The researcher then transported the samples by car inside a cooler filled with ice to the laboratory of biologist Dr. Katherine E. Wynne-Edwards at Queen's University, located in the Biosciences Complex at 116 Barrie Street in Kingston, Ontario. Lea Bond, research assistant to Dr. Wynne-Edwards, carried out the T concentration measures using the salivary T enzyme immunoassay kit and protocol provided by Salimetrics LLC (for a full description of the protocol see the company's website at [www.salimetrics.com](http://www.salimetrics.com), and locate the catalog # 1-1402/1-1412, 96-well kit).

#### **4.2 Design**

A 2 (sports car, family sedan) X 2 (highway, downtown) within-subjects design exposed each male participant to all four conditions to control against extraneous variables. In addition, to control for any carryover effects, half of the participants were requested to begin the experiment by driving the sports car, while the other half by driving the family sedan. No one other than the participants was present inside the cars during the driving exercise, in order to minimize additional variability and to attempt at creating an ecologically valid scenario. All of the participants drove their cars on the highway, i.e., the non-lek, before proceeding to the downtown streets, i.e., the lek. This is shown in Table 3 on the following page.

**Table 3: Driving Sequences in Experiment 1**

Sequence A	Sequence B
<p>(Sports car, highway)</p> <p>↓</p> <p>(Sports car, downtown)</p> <p>↓</p> <p>(Family sedan, highway)</p> <p>↓</p> <p>(Family sedan, downtown)</p>	<p>(Family sedan, highway)</p> <p>↓</p> <p>(Family sedan, downtown)</p> <p>↓</p> <p>(Sports car, highway)</p> <p>↓</p> <p>(Sports car, downtown)</p>

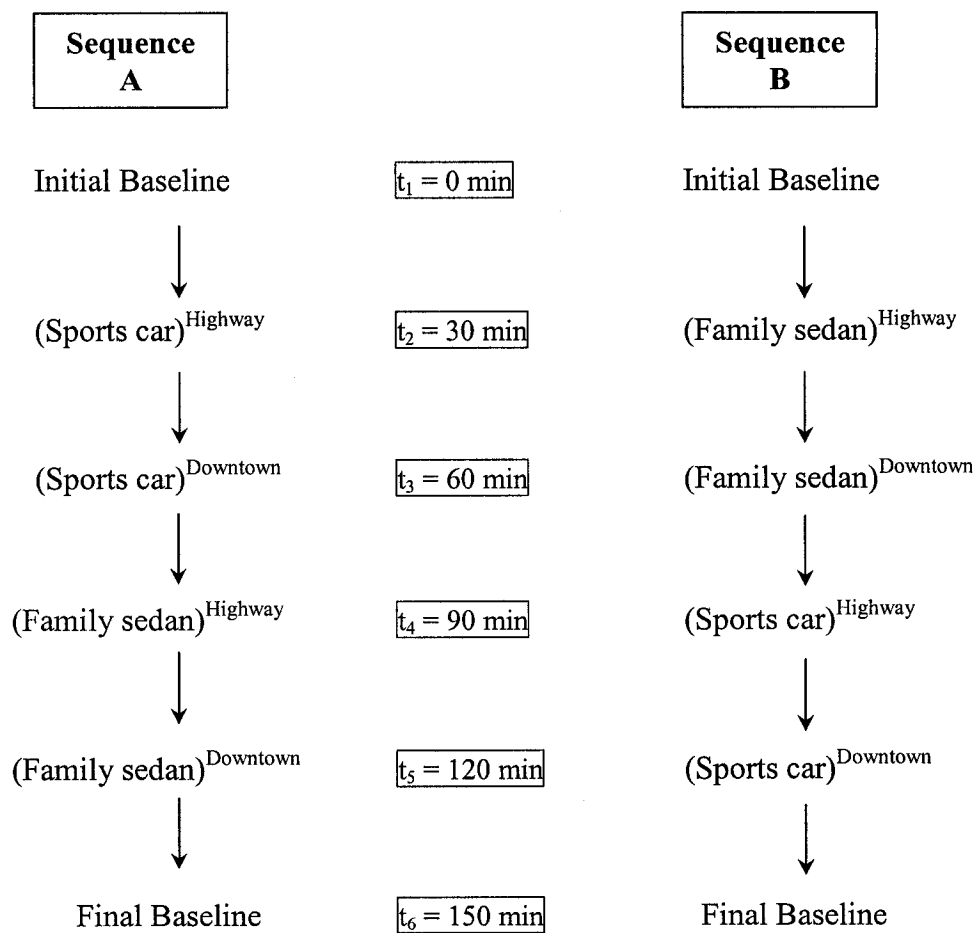
The two driving sequences were implemented for two main reasons. First, this allowed for the efficient use of the sports car by having two participants go through the experiment at any given time, thus minimizing leasing costs. The idea was to keep both cars operational at all times by having the participants switch cars halfway through the experiment. The second reason, as mentioned previously, was to minimize carryover effects by assigning half of the participants with the task of starting with the sports car. Although there are 24 possible sequences (i.e.,  $4! = 4 \times 3 \times 2 \times 1$ ), segregating the sports car conditions from the family sedan conditions was the most reasonable manner to test the posited hypotheses.

The driving time in each of the treatments lasted 30 minutes, a time long enough to elicit T level changes according to many of the biosocial studies covered in the



literature review section (Mazur & Lamb, 1980; Roney, Mahler, & Maestripieri, 2003). Therefore, the participants drove both cars for a total of two hours and provided saliva samples after each driving experience. Figure 3 presents the times at which participants provided their saliva samples from the moment they began the experiment.

**Figure 3: Saliva Collection Times in Experiment 1**



Once the driving was completed, each participant was required to rest for another 30 minutes and to provide a final saliva sample. “Humans (unlike lab animals) seem to arrive at the laboratory in different hormonal states that are influenced by personality.

Thus, the first sample is not a baseline because the initial social encounter with the experimenter is a differential stressor that has had its effect before the subject walks through the door. The final sample is therefore a better indicator of true baseline for that individual than sample 1” (K. E. Wynne-Edwards, personal communication, October 31, 2005). As shown in Figure 3, each participant deposited his first saliva sample into a vial upon arrival, at  $t_1 = 0$  min., before beginning the driving sequence either with the sports car or with the family sedan. The first sample measured each participant’s T level prior to experimentation. The second sample, at  $t_2 = 30$  min., measured how his T level responded to the consumption activity in the first treatment. Similarly, samples collected at  $t_3$ ,  $t_4$ , and  $t_5$  measured the predicted T changes after the participants were exposed to the subsequent three treatments. Finally, a sample taken after the experiment was concluded, at  $t_6 = 150$  min., gauged the participants’ baseline T levels again.

### **4.3 Participants**

Experiment 1 was initially scheduled over two consecutive weekends in October 2006 (Saturdays and Sundays, October 7, 8, 14, and 15), with the goal of having ten participants tested each day for a total of 40 participants. However, three additional participants were added for a total of 43 male participants in Experiment 1. The following reasons describe why more were added. First, one participant was expelled halfway through the study for unruly behavior whilst in the sports car; on his return in the sports car from the downtown environment, the researcher noticed that he had picked up a friend who was in the passenger seat next to him. Given the researcher’s insistence about the conditions of the driving sessions, among which driving alone was one, this

participant was immediately expelled. Second, another participant experienced great difficulty in putting the Porsche into gear. He was unable to drive manually even though he had stated otherwise, therefore, he was also expelled. Third, another participant was only able to complete half of the driving session because damage to the sports car's clutch left him stranded on the highway. And fourth, because of the latter's predicament, the one that was next in line to drive was unable to participate in the experiment. Consequently, more participants were needed and Experiment 1 was postponed until the weekend of October 28 and 29 (the researcher arranged for the car to be transported to a Porsche dealer in Laval, Quebec, had the parts shipped from Germany and the U.S., and re-collected data on October 28 and 29). Therefore, Experiment 1 took place over five days (October 7, 8, 14, 28, and 29) with a total of 39 male participants. These were randomly selected from a group of male heterosexual students from Concordia University, Dawson College, and McGill University. The researcher obtained permission from Professors at each of these Montreal institutions prior to visiting their classrooms from which he personally recruited the participants. Heterosexual men were selected because the consumption behavior under study is linked to female mate choice. This was established through survey questioning prior to the driving session on the day of experimentation (see Appendix I for the complete survey; a more detailed account of the rationale for employing such a survey is described below). Several precautionary measures were taken during the recruitment process. The participants were told to abstain from smoking at least one hour prior to experimentation as tobacco use affects salivary T level concentrations (Attia, el-Dakhly, Halawa, Ragab, & Mossa, 1989). They were also asked to refrain from consuming alcohol on the day of the experiment because

ethanol interferes with T concentrations (Lindman, Järvinen, & Vidjeskog, 1987) and, more importantly, driving under its influence is both illegal and hazardous. Finally, participants were asked to avoid all types of sexual stimuli on the day of experimentation as visual and auditory sexual cues affect T concentrations (Dabbs & Mohammed, 1992; Dabbs, 1997; LaFerla, Anderson, & Schalch, 1978; Morris, Udry, Kahn-Dawood, & Dawood, 1987; Redouté, Stoléro, Grégoire, Costes, Cinotti, Lavenne, et al., 2000; Swift, 1984). The participants were told that the objective of the study was to understand whether men experience differential stress levels depending on whether they drive expensive or inexpensive cars. They were informed that saliva samples were needed because the researchers' objective was to quantify their stress levels as measured by the concentration of the stress hormone *cortisol* across four separate consumption conditions. In line with ethical guidelines involving the use of humans as research subjects, all participants were fully informed *a posteriori* as to the true purpose of the study.

The participants' samples were coded according to a specific nomenclature. Drivers in sequence A were asked to deposit their samples in six vials from *nA1* to *nA6* successively, where *n* represents the participant from 1 to 20, "A" is his sequence, and "1 – 6" corresponds to each of his six samples. For example, 15A5 is the sample taken at  $t_5$  belonging to the 15<sup>th</sup> driver along sequence A. The drivers along sequence B were provided with vials in the order *nB1* to *nB6*, where "B" simply represents that particular sequence. On the day of the experiment, participants were told to present themselves at the receptionist area of Concordia University's Centre for Continuing Education, located on the first floor of the Faubourg Building at 1600 Saint-Catherine Street West. Two participants were asked to present themselves at this location at the following

appointment times: 11:00 a.m., 1:00 p.m., 3:00 p.m., 5:00 p.m., and 7:00 p.m. Testing was conducted during these times because T levels are the most variable in the early hours of the day whereas T levels are more stable during early evenings (Dabbs, 1991; Storey, Walsh, Quinton, & Wynne-Edwards, 2000). After greeting each of them, the researcher escorted one participant to room FB-121, and the other to room FB-123, where they each provided their first saliva sample and signed their consent forms in seclusion.

In addition to the consent forms, information on the participants' degree of materialism and automobile involvement was collected because one might expect participants who score high on both of these two measures to be more likely to exhibit a rise in their T levels after consuming a luxury good in public. In order to measure these two constructs, Richins and Dawson's (1992) 18-item Material Values Scale and Bloch and Bruce's (1984) 12-item Automobile Involvement Index were embedded in a questionnaire that all participants filled out along with their consent forms prior to driving. Whereas Richins and Dawson's scale measures the importance that an individual ascribes to the ownership and acquisition of material goods in achieving his life's goals, Bloch and Bruce's scale encapsulates some of the main dimensions that describe an individual's involvement with automobiles (see also Richins, 2004, for a revised 15-item Material Values Scale).

Finally, the survey collected information about key variables that might affect participants' T levels in a particular manner that could be valuable for further exploratory analyses. For example, they were asked to describe whether they had recently been involved in a violent fight, whether they had recently been promoted at work or had won at an athletic competition, and whether they were currently involved in a committed

relationship (the survey also asks for demographic data; again, see Appendix I for additional details).

Once the participant was ready to begin driving, the researcher led him to a car that was parked outside and instructed him to follow the road maps included in his consent form (see Appendix I for the consent form, and for the road map's exact directions). This was done on an individual basis in order to eliminate any possible contact between the participants that might otherwise affect their T levels. Each participant was reminded to respect the driving laws at all times, and to return in one hour after driving uninterrupted for 60 minutes across both the lek and non-lek. Respecting the time constraints was particularly stressed so as to ensure that the automobile switch would take place efficiently. Each driver was also provided with two vials into which he deposited 2 ml of saliva after driving the assigned car in each of the two environments. For example, the  $n$ th participant designated along sequence A was given vials  $nA2$  and  $nA3$  to take with him while driving the sports car. He deposited saliva inside  $nA2$  after his 30-minute session on the highway, and inside  $nA3$  after his next 30-minute session on the downtown streets. Similarly, the  $n$ th participant along sequence B was given vials  $nB2$  and  $nB3$  to take with him while driving the family sedan, dropping his saliva into each vial according to the same logic. Approximately one hour into the experiment, the participants returned to their original location where the participant who commenced with the new sports car was now relegated to the old family sedan, and the one who began with the family sedan was upgraded to the sports car. Much attention was exercised such that all drivers commenced the experiment at roughly the same time so as to minimize the waiting time between automobile switches. When this did occur, the driver was politely

asked to wait, alone, in a nearby public parking space outside the Faubourg building until his car returned. In every case where this happened, the driver never waited for more than approximately five minutes. Prior to switching their cars and driving off again, the participants handed over their second and third samples which were immediately stored inside the freezer. Each participant then repeated his driving experience and provided new saliva samples in the fourth and fifth vials (*nA4*, *nA5* and *nB4*, *nB5*). It should be noted that the participants were not chaperoned during their driving sessions. Hence, there was no guarantee that they followed their prescribed routes. However, when they were escorted out of both of their vehicles, they were asked by the research whether they had complied with the driving guidelines, and they responded affirmatively. After the driving experiment was complete, the two participants were asked to rest for an additional 30 minutes, separately in their initial rooms, at which time they provided a final saliva sample. Therefore, in Experiment 1, each of the 39 participants provided six saliva samples for a total of 234 samples.

## **5. RESULTS: EXPERIMENT 1**

In all, 43 men participated in Experiment 1. However, since four men were eliminated during their driving sessions, a total of 39 men had their saliva analyzed for T concentrations. Of this total, only the data from 30 participants were included in the analysis. Testosterone measures from nine participants were excluded for two reasons. First, the saliva samples belonging to eight participants were contaminated with blood. This arises whenever blood leaks into the oral mucosa from injury or from poor oral hygiene. Since T is bound to a protein in the blood, measuring T levels in tainted saliva

yields inflated T measures (Kivlighan, Granger, Schwartz, Nelson, Curran, & Shirtcliff, 2004; Kivlighan, Granger, & Schwartz, 2005; see also Schwartz & Granger, 2004). Moreover, it becomes difficult to distinguish between T that is “bound” from the one that is “free” when the concentration of blood in the saliva is greater than 0.75 mg/dl. Therefore, a participant’s T measure was considered to be valid for analysis if it met at least one of two criteria: 1) The saliva sample had to report a blood concentration at or below 0.75 mg/dl; 2) in the event where blood contamination was greater than 0.75 mg/dl, the participant’s six saliva samples had to have no more than three samples (or 50% of samples) with a blood concentration above 0.75 mg/dl. The experts with whom the researcher consulted for guidance were Dr. Katherine Wynne-Edwards and Ms. Lea Bond of the Biology laboratory at Queen’s University, Ms. Eve Schwartz of Salimetrics LLC, and Dr. Douglas Granger of the Behavioral Endocrinology laboratory at Pennsylvania State University. The following is an excerpt from an email correspondence the researcher had with Dr. Granger regarding blood contamination issues: “If you could rule out an injury or event that would be capable of causing bleeding, and there is no reason to think that riding in a vehicle of this type (i.e., Porsche) would cause your gums to bleed, then it might be possible to dismiss the Transferrin (i.e., blood contamination) data” (February 13, 2007).

Second, one participant’s saliva samples were also excluded from the analysis because he had been experiencing a disruption in his normal sleeping pattern. The participant disclosed that he was a devout Muslim who was observing the religious rites associated with the holy month of Ramadan, which coincided with the data collection (October 2006). Since a plethora of research findings have revealed that individuals’



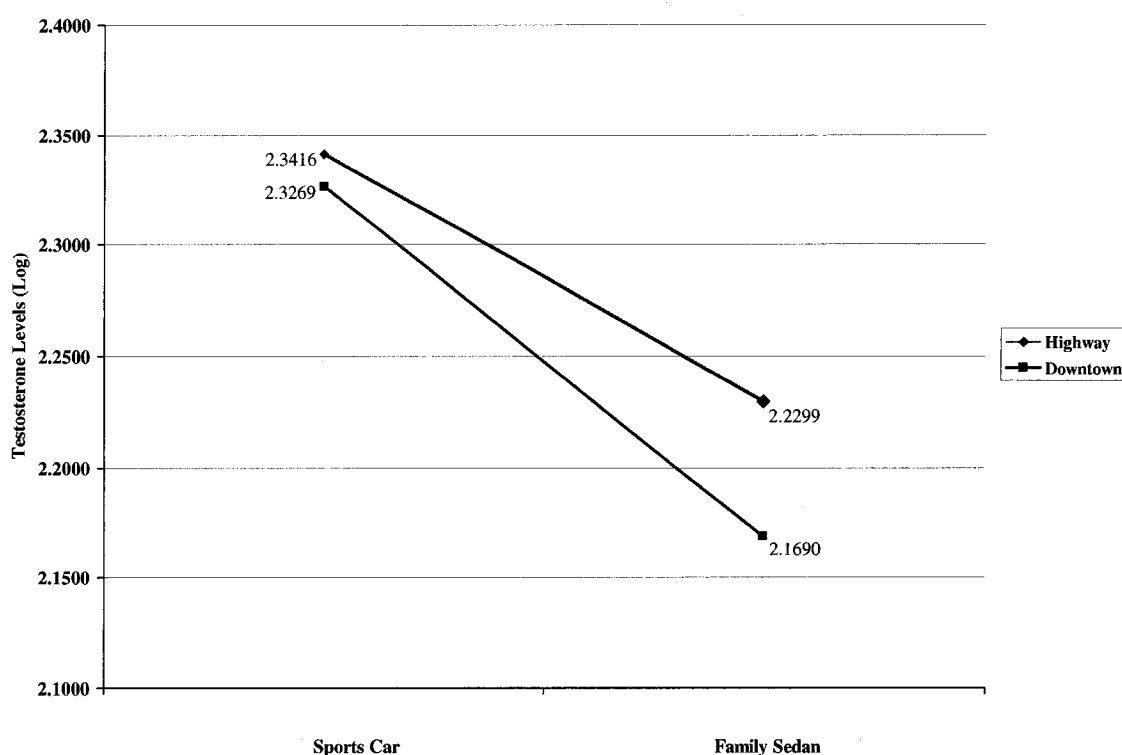
circadian rhythms are affected during Ramadan by the eating of meals at night (Bahammam, 2006) and the deprivation of rapid-eye-movement sleep (Luboshitzky, Herer, Levi, Shen-Orr, & Lavie, 1999), there was sufficient reason to exclude this participant from Experiment 1.

Prior to conducting any analysis, the raw T measures reported from the 30 eligible participants were plotted on a two-dimensional graph to verify whether they satisfied the criteria for a normal distribution ("raw" T levels were measured in picograms (pg) per milliliter of saliva, where 1 picogram equals 1/1,000,000,000,000 of a gram). The result was a skewed distribution curve. Additional skewness and kurtosis tests were carried out in SPSS. These results are seen in Tables 4 and 5 in Appendix II. When testing for normality, values of both (skewness/standard error) and (kurtosis/ standard error) were computed for the raw T data. In almost all cases, the raw data displayed values outside of the normality range between -2 and +2 (from UITS Center for Statistical and Mathematical Computing, "Testing Normality," retrieved August 9, 2007 from <http://www.indiana.edu/~statmath>). Thus, the participants' T concentrations were log transformed to avoid violating the assumptions inherent in parametric statistics and committing either Type I (overestimation) or Type II (underestimation) errors. Consequently, a normal bell-shaped curve was obtained. Logarithmic transformations are commonly used in research studies that seek to measure hormonal levels in men, particularly T (see Henriksen & Michalek, 1996; Shimon, Lubina, Gorfine, & Ilany, 2006; Svartberg, Jenssen, Sundsfjord, & Jorde, 2004).

## 5.1 Testosterone Means

Means for the testosterone levels were computed for each of the four experimental conditions. This is shown in Figure 4.

**Figure 4: Mean Testosterone Levels in Experiment 1**



As expected, the participants had greater mean T levels in both of the sports car conditions compared with the family sedan conditions. First, the participants' T levels were greater overall when they drove the exotic sports car compared with their levels when they drove the family sedan ( $\mu_{SC} = 2.3242 \pm 0.0327$  versus  $\mu_{FS} = 2.1992 \pm 0.0305$ ,  $t\text{-stat} = 7.84$ ,  $df = 29$ ,  $p < 0.001$ ). Second, there was a significant difference between their T levels measured in the sports car versus those measured in the family sedan, both on the isolated highway ( $\mu_{SC} = 2.3416 \pm 0.2087$  versus  $\mu_{FS} = 2.2299 \pm 0.1777$ ,  $t\text{-stat} =$

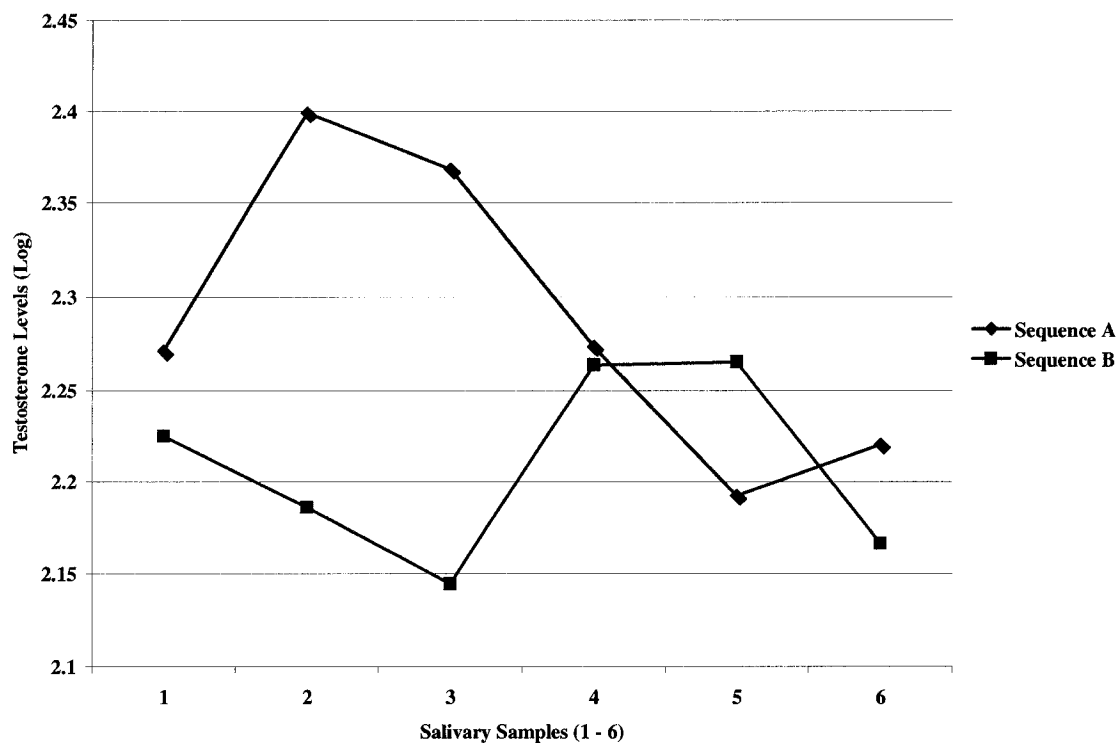
4.12,  $df = 29$ ,  $p < 0.001$ ) and on the busy downtown streets ( $\mu_{SC} = 2.3269 \pm 0.1988$  versus  $\mu_{FS} = 2.1690 \pm 0.1720$ ,  $t\text{-stat} = 5.98$ ,  $df = 29$ ,  $p < 0.001$ ). Third, there was a significant difference between their T levels when they drove the family sedan in the highway and downtown conditions ( $\mu_{FS,H} = 2.2299 \pm 0.1777$  versus  $\mu_{FS,D} = 2.1690 \pm 0.1720$ ,  $t\text{-stat} = 3.56$ ,  $df = 29$ ,  $p < 0.001$ ). Contrary to predictions, there was no significant difference between the participants' T levels when they drove the sports car in the highway and downtown conditions ( $\mu_{SC,H} = 2.3416 \pm 0.2087$  versus  $\mu_{SC,D} = 2.3269$ ,  $t\text{-stat} = 0.89$ ,  $df = 29$ ,  $p > 0.100$ ).

## 5.2 Order Effects

Seventeen participants began Experiment 1 by driving the sports car, while 13 commenced with the family sedan. To test for differences between the two groups' T levels arising from order effects, ANOVA tests were computed and the results are displayed in Table 6 of Appendix II. An order effect occurs whenever participants' measures on the dependent variable (hormonal T levels) are affected by the order in which they experience the conditions of the independent variables (type of car and type of driving environment). For example, the participants might have experienced a larger T level change in the case where they drove the sports car at the beginning of the driving experiment when they had no idea of the type of car they would be driving. A potent stimulus such as that of a new Porsche might have elicited a T level surge at the outset of the experiment rather than when the participants anticipated what was to come. There were no significant differences between the groups' T levels in four of the six conditions: 1) in the initial baseline ( $\mu_1 = 2.2562 \pm 0.2118$ ,  $F\text{-value} = 0.926$ ,  $df = 29$ ,  $p = 0.344$ ); 2) in

the family sedan on the highway ( $\mu_4 = 2.2299 \pm 0.1777$ ,  $F\text{-value} = 2.026$ ,  $df = 29$ ,  $p = 0.166$ ); 3) in the family sedan, downtown ( $\mu_5 = 2.1690 \pm 0.1720$ ,  $F\text{-value} = 0.932$ ,  $df = 29$ ,  $p = 0.343$ ); and 4) in the final baseline ( $\mu_6 = 2.1932 \pm 0.1594$ ,  $F\text{-value} = 1.148$ ,  $df = 29$ ,  $p = 0.293$ ). There was a significant main effect for order between the two groups in the sports car, both on the highway ( $\mu_2 = 2.3416 \pm 0.2087$ ,  $F\text{-value} = 4.971$ ,  $df = 29$ ,  $p = 0.034$ ), and downtown ( $\mu_3 = 2.3269 \pm 0.1988$ ,  $F\text{-value} = 3.645$ ,  $df = 29$ ,  $p = 0.067$ ). Figure 5, shown below, represents the log-transformed data of the T means for both groups in sequences A and B over time.

**Figure 5: Total Average Testosterone Level Changes Over Time**



As seen in Figure 5, the curves depicting the participants in each of the two sequences show a mirror-image in their T level changes over the course of the experiment. This supports H1a and H2a. In other words, T levels rose in men who drove a new and expensive sports car (H1a), whereas they dropped in men who drove an old and inexpensive sedan (H2a). Additional ANOVA tests were performed to ascertain whether these increases and decreases in T levels were significant, i.e., to test H1b and H2b.

### 5.3 Repeated-Measures ANOVA

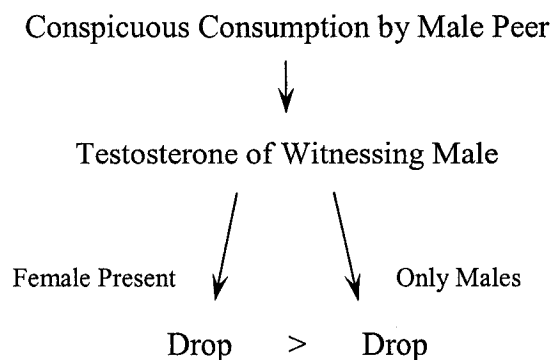
A 2 (car) X 2 (driving environment) repeated-measures ANOVA was carried out on the log transformed data. Results are shown in Table 7 of Appendix II as an SPSS statistical output. The first objective of this analysis was to determine whether each factor had a significant effect on the participants' T levels. The second was to gauge whether there was an interactive effect between the type of car and the type of driving environment. The results demonstrated that the car type had a statistically significant effect on participants' T levels ( $\mu_{SC} = 2.3242 \pm 0.0327$  versus  $\mu_{FS} = 2.1992 \pm 0.0305$ ,  $t\text{-stat} = 7.84$ ,  $F\text{-value} = 29.830$ ,  $df = 29$ ,  $p = 0.000$ ), as did the environment in which the cars were driven in ( $\mu_H = 2.2807 \pm 0.0355$  versus  $\mu_D = 2.2427 \pm 0.0349$ ,  $t\text{-stat} = 3.12$ ,  $F\text{-value} = 8.400$ ,  $df = 29$ ,  $p = 0.007$ ). Finally, the interaction between the car and the environment was significant ( $F\text{-value} = 4.346$ ,  $df = 29$ ,  $p = 0.046$ ). Therefore, Experiment 1 resulted in significant main effects for the type of car that was used to assess participants' T levels, in addition to the type of environment where the driving took place.

## 6. CONCEPTUAL DEVELOPMENT & HYPOTHESES: EXPERIMENT 2

Experiment 1 did not address whether predictable changes occur in the T levels of men who are subjected to the flashy consumption displays of other men. Experiment 2 tackled this question by creating a social interaction that was intended to capture this scenario. The interaction was in the form of a small focus group whose moderator asked a series of alternating questions to two male participants about their consumption expenditures. The focus group discussion sought to determine how a man's T levels would fluctuate when he was in the presence of another man who showed no reservation in flaunting his wealth. The only study linking consumption with male lekking behavior *in situ* was that of Lycett and Dunbar (2000), who chose the traditional British pub as an appropriate setting for collecting data. In their research, Lycett and Dunbar observed young patrons inside a Liverpool pub and discovered that the men used their mobile phones in very distinctive ways than women. Whereas the women generally kept their phones in their purses and retrieved these only as needed, the men clearly wanted everyone else to know that they owned cell phones by placing them conspicuously on the bar counter or on the table. In addition to handling their phone more frequently than did women (e.g., verifying the battery's charge level), the men spent a considerably greater amount of time with their mobile phones as the ratio of men-to-women increased. In other words, the men appeared to be strutting more vigorously in front of females as the number of competing same-sex suitors increased. In light of the importance that women's presence plays in triggering competition amongst men, Experiment 2 employed two focus groups, each of which employed a male or female moderator respectively.

Figure 6 schematically represents the prediction to be tested in Experiment 2, after which two additional hypotheses are posited.

**Figure 6: Model for Experiment 2**



H3a: Men who witness the conspicuous consumption of a high-status male confederate will experience significant drops in their testosterone levels.

H3b: The drop in testosterone will be greater when the moderator is a woman as compared to when the moderator is a man.

## **7. METHODOLOGY: EXPERIMENT 2**

### **7.1 Materials and Methods**

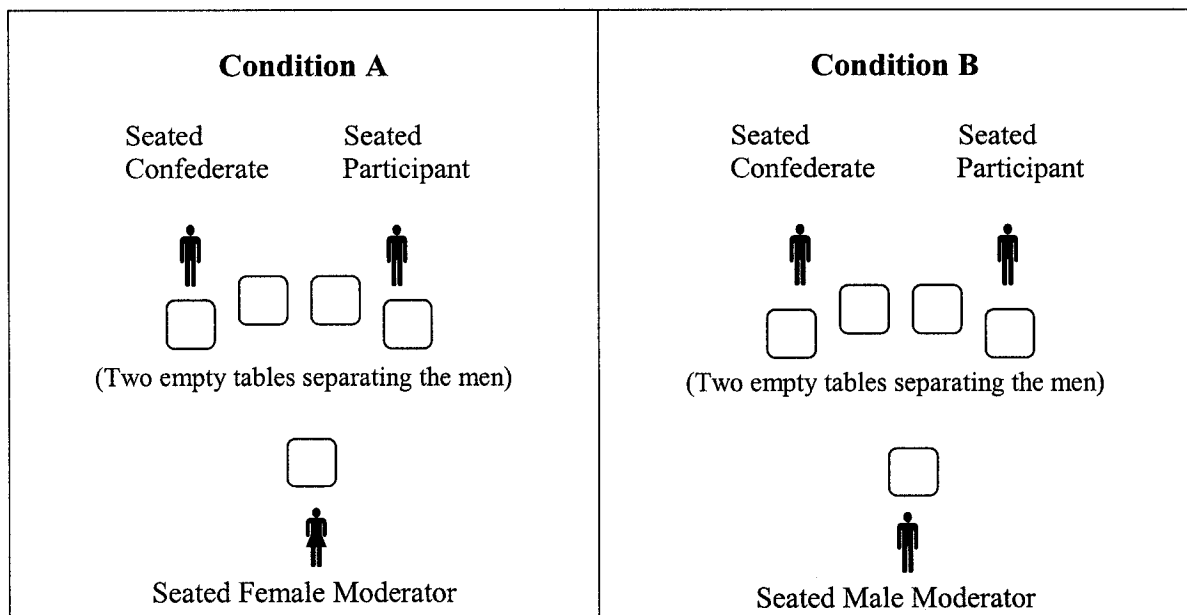
This second study involved each participant in a 30-minute focus group discussion where he was asked to describe some of his personal belongings (goods and services) in the last twelve months. As described previously, positional goods and services include memberships to exclusive clubs, expensive automobiles, dining

reservations at trendy restaurants, high-end fashion and jewelry namely items that are considered to reveal one's rank in society (Hirsch, 1976). All of the specific questions asked by the moderators are located in the discussion guide seen in Appendix III. Questions ranged from the type, location, and market value of one's residence, to one's current automobile(s), holiday destinations, personal grooming activities (e.g., massages), gifts to significant others, and even the amount of cash held in one's possession at the time of the discussion.

## **7.2 Design**

A between-subjects design exposed 20 participants each to one of two treatments (either male or female moderator). In addition to the moderators, a male confederate posing as a conspicuous consumer was employed throughout the experiment. The male confederate was dressed in exactly the same way in both conditions. He was assigned a set of scripted responses that he memorized prior to the start of the experiment. His italicized answers are highlighted for each of the questions posed by the moderator in the questionnaire seen in Appendix III. The design of Experiment 2 is shown in Figure 7 on the following page.



**Figure 7: Design of Experiment 2**

These responses were chosen specifically because they represent a sufficiently high degree of conspicuous consumption for a man in his early 30s (the age of the confederate and its relation to that of the participant is an important element in this social interaction, to be discussed in the forthcoming paragraph). As shown in Figure 7, both the participant and the confederate were seated behind separate desks in a semi-circular fashion facing the moderator. Two additional desks were used to separate them from each other. The seating arrangements were carried out in this manner for two main reasons. First, a man's height has long been associated with social status (Park & Buunk, 2006; Pawlowski, Dunbar, & Lipowicz, 2000; Wilson, 1968). By assigning the participant and the confederate to specific seating positions, the effect of the latter's height as a possible extraneous variable could be mitigated. Second, this organization prevented the participant and the confederate from facing each other. Experts who study non-verbal

forms of behavior in human communication have reported that a sudden face-to-face interaction between two men who are not acquainted with one another elicits a confrontational mechanism that primes them for competition (Knapp & Hall, 2002; Manusov, 2005). Hence, these seating positions were designed to prevent T fluctuations resulting from an anticipated challenge.

Three points remain unaddressed. First, the participant in each of the two conditions was roughly the same age as the 32-year old confederate. A one-sample t-test showed that the average age of the participants was indeed the same as that of the confederate ( $\mu = 28.5 \text{ years} \pm 3.7826$ ;  $t\text{-stat} = -5.85$ ;  $df = 39$ ;  $p = 4.156$ ). Similarly to height, age is also related to social status, with older men being considered as possessing a higher social status than younger ones (Berger, Cohen, & Zelditch, 1972; Buss, 1995; Lynn, Le, & Sherwyn, 1998; Mazur, 1985; Pawlowski & Koziel, 2002). A considerably older man is expected to have greater discretionary income, and consequently, the means to afford luxury. Cross-cultural studies have shown that women generally prefer to mate with older men (Buss, 1989a; Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002). Therefore, the participant might not perceive a much older confederate as a relevant rival because he has simply had many more years and opportunities from which to amass resources. In such cases, the participant might dismiss the social exchange by simply walking away reassured that his future also promises to be fruitful. The drive that occurs within individuals who look to outside images in order to evaluate their own opinions and abilities, known formally as social comparison theory, was first proposed by psychologist Leon Festinger. Whenever these images included other people, Festinger suggested that the evaluators rely particularly on images that are both obtainable and realistic (1954).

Therefore, the tendency to compare oneself with another person decreases as the differences between the two individuals become more divergent. For this reason, the confederate's persona was crafted so as not to be too dissimilar from that of the participant's (for a thorough analysis of social comparison theory and research, see Suls' and Wheeler's (2000) comprehensive handbook).

The second point that requires addressing is the confederate's apparel. Given his proclivity to engage in ostentatious consumption, the confederate was asked to dress in a semi-formal manner (see picture in Appendix III). Expensive and formal clothing has been shown to be an important cue related to status (Anderson, John, Keltner, & Kring, 2001; Barnes & Sternberg, 1989; Guéguen, 2002; McElroy & Morrow, 1994). However, unlike height or age, apparel is a manifestation of conspicuous consumption.

The third and final point relates to the main criteria used in selecting the focus group moderators and the male confederate, respectively. The male moderator is a certified occupational therapist whose job consists of interviewing patients in order to develop tailored rehabilitation programs. The female moderator is a human resources recruiter who spends her professional time interviewing job seekers and matching them with prospective employers. The male confederate had received training in the performing arts (theatre) and had taken several acting classes in the past, which made him a good candidate considering that he was required to employ a certain degree of deception. Neither the confederate nor the moderators were informed of the posited hypothesis in Experiment 2. Moderators were also given strict guidelines on how to behave during the focus group discussions. They were advised to keep the discussion to a 30-minute limit, and were asked to focus the discussions away from tangential points

that might have been raised by the participants. They were also asked to pose each question *first* to the participant before proceeding to ask the same question to the confederate. This was done to prevent the participants from knowing the confederate's response in advance and, hence to be tempted to inflate their own responses as a reactionary measure. Third, they were expected to remain maximally professional and objective throughout the study, focusing solely on their task and not initiating any contact that would be deemed personal in nature, neither with each participant nor with the confederate. Pictures of the two moderators can be seen in Appendix III.

### 7.3 Participants

As in Experiment 1, the participants were informed that the purpose of the study was to measure men's differential stress levels from saliva (i.e., *cortisol*) following a focus group discussion of their purchases within the last year. They were told that several of the questions that they would have to address were personal in nature, and that consumers could be prone to experiencing a degree of perceived risk when discussing their personal belongings in the presence of others. The participants were advised that the researchers were interested in measuring consumers' level of risk through the stress hormone cortisol.

The participants were 40 single heterosexual male students, aged between 23 and 37 years ( $\mu = 28.5 \text{ years} \pm 3.7826$ ) recruited from Concordia University's Centre for Continuing Education in Montreal, Quebec, all of whom were unaware of the true purpose of the study. To minimize any extraneous causes that might affect their T levels, the participants were asked to avoid consuming tobacco products, alcohol, and

pornographic material at least one hour prior to experimentation. The 40 participants were randomly divided into four groups of 10 participants, and each group was tested on the following four weekend days in 2006: December 2, 3, 16, and 17. The lag between the two weekends was due to a deficiency in the number of participants recruited. Hence, the data collection was delayed for one week in order to ensure that a sufficient number of participants were scheduled. Each participant provided three saliva samples: one prior to the focus group discussion, one immediately after, and one 30 minutes thereafter. Thus, the 40 participants provided a total of 120 salivary assays.

Each of the ten participants scheduled for a given day met with the researcher in room FB-213 of Concordia's Faubourg Building according to the following appointment times: 11:00 a.m., 11:30 a.m., 12:00 p.m., 12:30 p.m., 1:00 p.m., 1:30 p.m., 2:00 p.m., 2:30 p.m., 3:00 p.m., or 3:30 p.m. Testing was conducted during these times because T levels are the most variable in the early hours of the day, whereas they are more stable in the later afternoon (Dabbs, 1991; Storey, Walsh, Quinton, & Wynne-Edwards, 2000). This particular room was chosen because it is equipped with comfortable furniture and a refrigerator, making it convenient for collecting and storing the initial saliva samples prior to ushering the participants to the focus group discussion.

Immediately upon arrival, the participants were asked to provide their first saliva sample ( $t_1$ ) after which they were each escorted to room FB-135 on the first floor. There, they were greeted by either the male or the female moderator, and they were introduced to the seated confederate who appeared to have arrived in advance. Each moderator politely asked the participants to sit at a designated desk to their right (refer back to Figure 7). The researcher then informed the participant and the confederate that he

would return in precisely 30 minutes to escort them back to room FB-213. Once the researcher closed the door, the moderator reiterated that the study's goal was to measure whether men experience varying stress levels when discussing their purchases of consumer goods and services in group settings. After receiving an approving nod from each of the participants to continue, the moderators directed their first question to the participant, after which they proceeded to ask the very same question to the confederate. This sequential order was carried out in precisely the same manner throughout the entire 30-minute interview. The questions spanned a wide array of consumer choices, such as dwellings, automobiles, holidays, restaurants, performing arts (opera, theatre, concerts, and plays), clothing, and gifts. There were three instances when the participants were asked to show a tangible product: 1) approximately 10 minutes into the discussion, the moderator asked to borrow a pen because his/hers had run out of ink; 2) midway through the discussion when the participants were asked to show their wrist watches; and 3) at the end of the discussion when the participants were asked to show how much cash they had on hand. Once the 30 minutes had elapsed, the moderators concluded the interview, thanked each of the participants for their time, and notified me by mobile phone that they had finished. Prior to guiding the participant out of the room, the researcher notified the confederate that he was going to return promptly in order to get him as well. This gesture was repeated for all participants throughout Experiment 2 in order to reassure them that the confederate was required to go through the same procedure void of any special treatment. Upon returning in room FB-213, the researcher asked the participant to provide a second saliva sample (at  $t_2 = 30$  minutes), and asked him to remain seated, and alone, inside the room for an additional 30 minutes at which time he provided his final

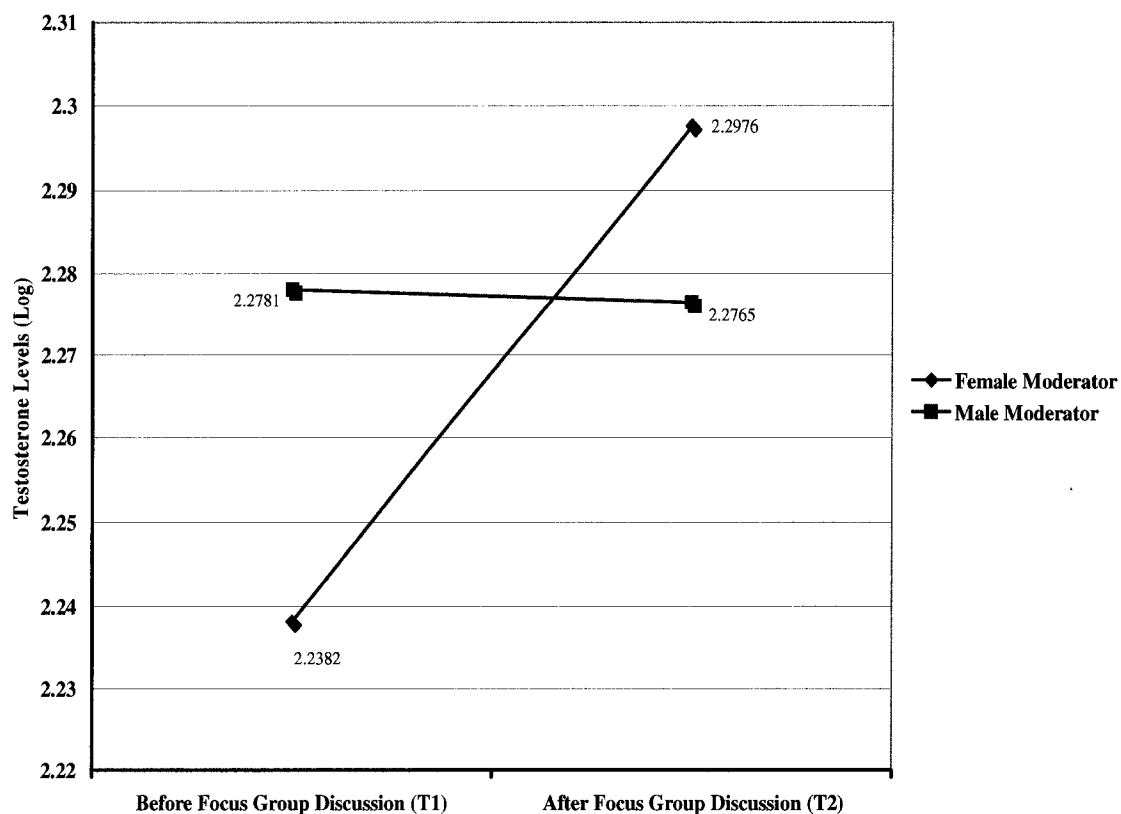
saliva sample ( $t_3 = 60$  minutes). Thus, every participant produced three saliva samples for a total of 120. Apart from the researcher, confederate, and moderators, no one else came into contact with the participants to control for social interactions that might have an influence on T levels.

## **8. RESULTS: EXPERIMENT 2**

Thirty-four data sets, 17 in each of the two conditions, were retained for analysis, out of 40 in total, because six participants had unacceptable concentrations of blood in their saliva samples. Prior to conducting the statistical analyses, and as in Experiment 1, the raw T levels were converted into their logarithmic values to ensure normality of the data. Again, the reports for skewness and kurtosis for both the raw data and the log-transformed data are shown in Tables 8 and 9, respectively, of Appendix II. Experiment 2 employed a between-subjects design, therefore a one-way ANOVA was conducted to determine whether the moderator's sex had any significant effect on the participants' T levels, and whether this effect would occur in the predicted direction namely downward (and moreso when in the presence of the female moderator). The following section begins by discussing the participants' mean T levels in each of the two conditions (female versus male moderator) prior to proceeding to the ANOVA results.

### **8.1 Testosterone Means**

The participants' mean T levels were plotted both before and after the focus group discussion, for each of the two experimental conditions. This is shown in Figure 8 on the next page.

**Figure 8: Mean Testosterone Levels in Experiment 2**

As is shown in the figure, the T levels at T<sub>1</sub> correspond to those measured before the participants were subjected to the focus group discussion (i.e., at 0 minutes). This is the first baseline T measure. The T levels measured immediately after the discussion are those at T<sub>2</sub> = 30 minutes. Finally, the T levels measured 30 minutes following T<sub>2</sub> correspond to the second baseline measure (i.e., at T<sub>3</sub> = 60 minutes). The second baseline measure was not considered to be a relevant one in the statistical analysis because, unlike in Experiment 1, the time difference between the two baseline measures (T<sub>1</sub> and T<sub>3</sub>) was only one hour – a time period too short to cause any natural variation in the men's T levels (Dabbs, 1990; Nieschlag, Behre, & Nieschlag, 2004). A *t*-test established this to



be indeed the case ( $\mu_{T1} = 2.2581$  versus  $\mu_{T3} = 2.2619$ ,  $p > 0.05$ ) and, for this reason,  $T_3$  was not taken into account in the comparison between the pre- and post-experimental conditions. A similar analysis was not conducted for Experiment 1 because the time between the first and second baselines was nearly three times that in Experiment 2, i.e., a time period long enough to cause a natural variation in the participants' T levels.

There was no significant difference in mean T levels between the two groups at  $T_1$  ( $\mu_M = 2.2781 \pm 0.1618$  versus  $\mu_F = 2.2382 \pm 0.1534$ ,  $t\text{-stat} = -1.06$ ,  $F\text{-value} = 0.544$ ,  $df = 33$ ,  $p = 0.466$ ). In addition, there was no significant difference in mean T levels between the two groups at  $T_2$  ( $\mu_M = 2.2765 \pm 0.1498$  versus  $\mu_F = 2.2976 \pm 0.1857$ ,  $t\text{-stat} = 0.49$ ,  $F\text{-value} = 0.132$ ,  $df = 33$ ,  $p = 0.718$ ). However, a significant difference in mean T levels from  $T_1$  to  $T_2$  was observed for the group exposed to the female moderator ( $\mu_{FT1} = 2.2382 \pm 0.1534$  versus  $\mu_{FT2} = 2.2976 \pm 0.1857$ ,  $t\text{-stat} = 0.49$ ,  $df = 16$ ,  $p = 0.023$ ), whereas no significant difference was recorded from  $T_1$  to  $T_2$  for the group exposed to the male moderator ( $\mu_{MT1} = 2.2781 \pm 0.1618$  versus  $\mu_{MT2} = 2.2765 \pm 0.1498$ ,  $t\text{-stat} = 0.13$ ,  $df = 16$ ,  $p = 0.451$ ).

## 8.2 One-Way ANOVA

An ANOVA was carried out to determine whether the two groups exhibited a significant difference between their pre-experimental (Log  $T_1$ ) and post-experimental levels (Log  $T_2$ ), or Log  $T_2 - \text{Log } T_1$  (Table 10 and Table 11 of Appendix IV highlight the results from this analysis and provide the relevant descriptive statistics, respectively). Although the T levels from both groups showed no significant differences when they were compared at  $T_1$  ( $p > 0.05$  and  $F = 0.769$ ) and  $T_2$  ( $p > 0.05$  and  $F = 0.132$ ), the

*change* in T levels between the groups from T<sub>1</sub> to T<sub>2</sub> was significantly different ( $\Delta\mu_F = 0.0594 \pm 0.1131$ ,  $\Delta\mu_M = -0.0015 \pm 0.0505$ ,  $t\text{-stat} = -1.84$ ,  $F\text{-value} = 5.632$ ,  $df = 33$ ,  $p = 0.051$ ). This T level change occurred in the opposite direction from the predicted one; instead of dropping, participants' T levels increased significantly in the female condition.

The forthcoming discussion section summarizes the findings in each of the two experiments, and elucidates some conceivable reasons why the participants' T levels behaved the way they did.

## 9. DISCUSSION

This thesis constitutes the first ever study in marketing to link consumer behavior with physiological outcomes by measuring a specific hormonal change in men across a myriad of consumption settings. Research has shown that males of sexually reproducing species, including humans, congregate in populated areas and employ ostentatious signals to communicate their status in order to attract potential female mates. It has also been shown that men's testosterone (T) levels rise with an increase in their social status and drop with a corresponding decrease in status.

In Experiment 1, male participants drove an expensive sports car and an inexpensive family sedan – two products possessing different degrees of ostentatiousness – on an isolated highway and on busy downtown streets. Requiring the participants to drive the two cars in each of the two environments rests on the premise that an “approving” or a “disapproving” audience could have a differential effect on the men's T levels. Four hypotheses were posited in Experiment 1, the first two of which were related to the consumption of the sports car. Men's T levels were predicted to increase

significantly when driving a very luxurious sports car (H1a), and this T-level increase was expected to be greater when the sports car was driven on visible downtown streets as opposed to being driven on a desolate highway (H1b). The second two hypotheses related to the consumption of the family sedan. Contrary to H1a, men's T levels were expected to decrease significantly when driving an old family sedan (H2a), and this T-level decrease was anticipated to be greater when the driving occurred in the busy city centre as opposed to the isolated highway (H2b).

The results from Experiment 1 supported the predictions made in H1a, H2a, and H2b, whereas they did not support the one made in H1b. As such, participants' T levels rose markedly when they drove the exotic sports car (H1a) and dropped when they drove the old family sedan (H2a). These results complement the scientific findings on male T level fluctuations across varying social status contexts that were highlighted in the literature review. Endowing the men with a car that only a minority of successful and privileged individuals could afford prompted their T levels to rise significantly, thus demonstrating that conspicuous consumption could potentially elicit biological responses. Furthermore, as predicted, the participants' T levels declined significantly when they drove the family sedan in full public view compared to when they drove it on the secluded highway (H2b). Having the men experience a drastic change of fortune where their modest possessions now signaled their relegation to a lower status was sufficient enough to influence their T levels to move in the opposite direction. The reason why the men's T levels dropped significantly when they drove the old sedan in the city centre could be because this environment is considered to be more socially competitive than a remote highway. In other words, the social risk brought on by the numerous individuals

who were present to bear witness to the men's meager consumption and to scrutinize their social standing triggered a decrease in their T levels. Contrary to expectations, however, the men did not show any significant difference in their T levels when driving the sports car in both environments (H1b). It is possible that the sports car, a new and luxurious Porsche 911 valued at approximately \$150,000, was a potent stimulus that rendered the men indifferent about whether they drove it in one environment versus another. Second, research has demonstrated that mood acts as a moderator in status-influenced T-level changes (Mazur & Lamb, 1980; McAdoo, Doering, Kraemer, Dessert, Brodie, & Hamburg, 1978). It is therefore plausible that the men's mood remained unchanged when they altered their driving of the sports car from one environment to the next. No data was collected on the men's response to the sports car's flamboyance nor on their moods before and after the driving sessions; such information would have lent additional support for the conclusions made regarding the causes of T level fluctuations.

Experiment 2 investigated how men's T levels responded to the ostentatious consumption as exhibited by other men. Research from numerous disciplines has shown that women have a universal preference for mating with high-status men. Other research has demonstrated that men experience drops in their T levels when they are relegated to a lower social status. In Experiment 2, male participants were each paired with a higher-status male confederate in a focus group whose moderator – either a male or a female – questioned them on specific consumption activities. Two hypotheses were proposed. The first one posited that men who witness the conspicuous consumption of a high-status male confederate will experience significant drops in their T levels (H3a). The second posited that the drop in their T levels will be greater when the moderator is a woman as

compared to when the moderator is a man (H3b). The rationale for these hypotheses was based on the notion that status symbols such as an expensive watch or a car could be used by men as competitive cues in mate attraction. Instead of derogating a competitor's ability to acquire precious resources by suggesting his lack of work ethic or ambition, one possible tactic would be to outdo him in wealth in the presence of a member of the opposite sex.

The results from Experiment 2 did not support either of the two hypotheses. First, the participants' T levels did not drop significantly when they were asked by either moderator to describe their belongings. Following the focus group discussion, their T levels decreased insignificantly in the case of the male moderator, whereas their T levels increased significantly in the case of the female moderator. Several reasons may explain these findings. First, the phenomenon whereby men's T levels remain unchanged in the context of groups composed exclusively of males support the relationship between social structure and T as documented in lower primates (Kemper, 1990). When male monkeys are grouped collectively in the absence of females, their desire to establish social hierarchies appears to be less pronounced than when females are present. Consequently, their T levels do not demonstrate the same degree of volatility. Second, human males have been shown to experience surges in their T levels following brief interactions with a female, particularly when the latter was rated as being sexually attractive (Roney, Mahler, Maestriperi, 2003). Experiment 2 did not measure the participants' perceptions regarding the female moderator's attractiveness. Thus, to suggest that their T levels rose on the basis of mate attraction is an assumption. It is possible that the participants might have been attempting to compete with the conspicuous consumer during the group

discussion. For example, during an instance where participants were asked to describe what they considered to be the most expensive gift they had ever purchased for a woman, one participant declared that his gift was an apartment in Moscow, Russia. Such a response, whether true or not, suggests that there were moments when the participants appeared to be fighting “toe-to-toe” with the confederate. However, this is another assumption that cannot be supported empirically because Experiment 2 did not record whether the participants believed the authenticity of the confederate. Another, and perhaps more astute, assumption for the null effects in Experiment 2 might have been due to the strength of the manipulation, i.e., the confederate’s social status. It may be possible that the confederate did not “intimidate” the participants because they perceived him as lying outside of their relevant social group of comparison. Whether, in fact, the participants included the confederate within their reference groups would have shed added light on the disappointing results obtained in Experiment 2.

The implications of these findings and concluding remarks are discussed in the following section.

## **10. CONCLUSIONS AND IMPLICATIONS**

The findings reported in this thesis support the premise that men experience physiological changes when they engage in displays of wealth. In particular, the results from Experiment 1 demonstrate that signals of social status can be potent instruments that elicit increases in male testosterone levels. One important contribution of such a discovery is that the ostentatious symbols need not belong to the men who use them in order to draw hormonal changes. The mere act of deceiving surrounding peers that a

luxurious product widely known to be prohibitively expensive belongs to them may be enough to cause the men to experience significant T-level shifts.

The fact that men experience hormonal changes whenever they engage in conspicuous consumption may have some noteworthy implications for marketers and for policy makers alike. First, product managers may wish to rethink whether consumers' need for wasteful extravagance as a signal in showcasing one's status could be reconciled with the pressing need to care for the environment. Such concerns have prompted consumers to question whether lavish and uneconomical vehicles (e.g., Hummer<sup>®</sup> made by General Motors) might be redesigned to house an alternative energy supply in the near future. Information from online automotive forums have suggested otherwise. For example, Hummer's<sup>®</sup> Marketing Manager, Susan Docherty, has stated that General Motors is hesitant in commercializing a hybrid model (for a transcript of the interview, see <http://www.edmunds.com/insideline/do/Features/articleId=106536>, as accessed on September 14, 2007). In light of Xu's and Schwarz's finding that consumers expect a more pleasant hedonic experience in driving a luxury car than an economy car (2006), a product development decision such as the one taken by General Motors will undoubtedly undermine current efforts to save the environment. This problem is further exacerbated if one considers the findings from medical research that demonstrate how rising T levels have positive effects on mood (Booth, Johnson, & Granger, 1999). Perhaps it is futile to hope that humans will voluntarily turn down the opportunity to purchase luxurious goods for the sake of the environment. However, equipped with added proof of how consumers are biological beings whose rationality is sometimes obscured by selfish pursuits, product managers may wish to rethink their strategic plans.

Second, policy experts and social workers might want to reflect on how emotionally volatile some men can become when they suddenly lose their financial stability. In his book *Heroes, Rogues, and Lovers: Testosterone and Behavior* (2000), Dabbs describes how men's T levels behave after they sustain a major defeat. He offers a good example of how a loss of employment could suddenly elicit a significant decline in men's T levels: when Boeing announced a massive layoff to its airline workers in the Northwestern U.S. in the 1990s, there were reports of an increased incidence of impotence in the affected geographical area. In some instances, however, a temporary loss of income could even prompt some men to commit suicide. There is probably no other defeat as extreme as suicide, and men who have been hospitalized after near-fatal attempts had unusually low T levels. Gustavsson, Träskman-Bendz, Higley, and Westrin (2003) recruited male patients following a suicide attempt in order to investigate whether T exerted a possible influence. Results showed that the suicide victims' T levels were lower than those found in normal healthy controls, and it was suggested that psychological stress is associated with lowered T levels in males (for an in-depth account of the relationship between stress and T, see Christiansen, Knussman, & Couwenbergs, 1985; Singer & Zumoff, 1992). Complementing these findings are those from evolutionary psychology suggesting that male suicide is often triggered by a loss in one's economic status. Saad (2007a) recently tested some evolutionary-based hypotheses on the sex-specific causes of suicide worldwide. Using data from the World Health Organization and the World Bank, he found a negative correlation between male-to-female suicide ratios and average per capita Gross National Income (GNI). In other words, as economic conditions deteriorate, the ratio of male-to-female victims becomes



evermore greater, particularly among the age groups that are income earners. If material possessions serve as a proxy measure of one's social status, then losing these suddenly might prompt some men to employ the most maladaptive coping mechanism, namely committing suicide.

The results stemming from Experiment 2 ran contrary to expectations. Men's T levels did not drop significantly in either context, i.e., male and female moderator situations. Their T levels remain largely unchanged in the case of the male moderator and they increased significantly in the case of the female moderator. Several interpretations that have not been discussed thus far may explain these findings. First, it could be that half-hour discussions, even as elaborate as the ones featured in Experiment 2, may not be sufficiently powerful in establishing any rank differences in the men. The confederate and the participants were each asked to showcase three tangible goods in their possession: a pen, a watch, and cash on hand. The confederate responded to these queries by offering to show his Montblanc<sup>™</sup> pen, his Breitling<sup>™</sup> watch, and over four hundred dollars in available cash. As mentioned previously, perhaps these stimuli were so outlandishly conspicuous that participants did not consider the confederate as a "true" competitor. Thus, their T levels did not yield any significant effects. Another possible explanation is that the participants were not asked whether they actually recognized the goods being shown. Having participants who were unaware of the monetary value or the exclusivity of these products – in addition to the ones in the rest of the script – would have thwarted the study's expectations.

The final section summarizes the thesis's limitations and offers a glance of future research avenues that scholars may wish to pursue in their effort to converge marketing with the biological sciences.

## **11. LIMITATIONS AND FUTURE RESEARCH**

Several limitations impacted the research carried out herein. First, in Experiment 1, greater care should have been employed in the screening of male participants. A more rigorous selection process that carefully assessed the maturity of candidates could have been implemented without compromising the need for a probability sample. Second, since blood contamination was a major culprit in limiting the number of candidates whose T levels were included in the analysis, additional care should have been exercised in selecting participants with good dental hygiene. Granger, Cicchetti, Rogosch, Hibell, Teisl, and Flores (2007) report that poor oral health is most prevalent among minority (Gilbert, Shah, Shelton, Heft, Bradford, & Chavers, 2002) and lower socioeconomic status populations (Chavers, Gilbert, & Shelton, 2002). Hence, future research employing the use of salivary T measures ought to record candidates' classification along these lines in order to facilitate the interpretation of results. Third, although the participants were permitted to drive both cars alone, the researcher could have monitored the odometer following each of their runs, a procedure that would have allowed him to record precisely how far they drove. Finally, added time should have been granted to the participants on each of the four driving conditions. For example, instead of half-hour intervals, one-hour intervals would have been more appropriate in yielding the predicted effects, perhaps due to lengthier "wash-out" periods.

Experiment 2 was also fraught with limitations. First, the manner in which the participant was brought into the focus group could have biased his impression of the confederate's integrity. Had the confederate been introduced to the group *first*, then perhaps it would not have seemed as though he was purposely "planted" there to embarrass the participant. Second, the physical attractiveness of both moderators was not assessed prior to experimentation. Although the participants were all heterosexual, it would have perhaps been more appropriate to employ two moderators of equal attractiveness from an experimental point of view. If this was not possible, then a post-hoc study using participants in a snowball sample should have been conducted to demonstrate how the female moderator scored on attractiveness as compared to her male counterpart. Third, the participants were not tested prior to the focus group discussions on whether they were knowledgeable about the rare goods and services that the confederate was describing or even whether they perceived themselves as being materialistic. Moreover, the participants could have surmised that these possessions were fake. Therefore, there would not have been much point in recruiting a "high-status" confederate if the participants could not recognize or believe that his possessions were costlier than theirs. Fourth, the confederate should have been endowed with less opulent goods. The script that depicted his belongings may have been beyond a reasonable limit in terms of luxury. As such, the participants may have considered the confederate as being irrelevant to their social reference group, thereby rendering them less sensitive to image perceptions than if the confederate was of the same social class.

Despite these limitations, this research constitutes a pioneering investigation into the physiological outcomes of conspicuous consumption. It is part of a larger research

stream carried out in recent years by marketing scholars Gad Saad and Tripat Gill wherein they applied evolutionary psychology to understanding various consumption phenomena (Saad & Gill, 2000; 2001a; 2001b; 2003). This thesis lends empirical support to Saad's recent treatise (2007b), *The Evolutionary Bases of Consumption*, which is the first book ever to comprehensively elucidate the Darwinian processes involved in consumer behavior and to call for a theory that unifies the disparate research disciplines of marketing. More broadly, it proposes a new avenue of scholarship by demonstrating that specific biological changes occur in humans across various consumption settings. Furthermore, such changes are believed to possess the proverbial key that promises to unlock several of the ultimate explanations in consumer behavior for which social forces have failed to clarify.

To conclude, a quote from Saad (2007b) best describes this objective, "Each of the important domains defining our human existence is a manifestation of the evolutionary forces that have shaped our common humanity. To the extent that consumption is the nexus where many of these evolutionarily relevant domains meet, it would seem impossible to investigate accurately and fully consumption phenomena void of any Darwinian-based and biologically inspired theorizing. *Homo consumericus* has evolved via the same Darwinian forces that have shaped all other living organisms" (p. 276).

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## APPENDIX I

### CONSENT FORM: EXPERIMENT 1

I, \_\_\_\_\_, agree to participate in a research study conducted by John Vongas and Dr. Gad Saad of Concordia University's John Molson School of Business (1455 de Maisonneuve Street West, GM 300-29, Montreal, Quebec, H3G 1M8; email: j\_vongas@jmsb.concordia.ca).

#### A. Purpose

I have been informed that the purpose of the study is to find whether *cortisol*, a hormone that measures anxiety, rises or drops whenever a man drives two types of cars.

#### B. Procedures

- When arriving at your appointment location, you will provide an initial saliva sample of about 2 ml into a sterilized vial that will be stored in a freezer.
- You will then drive two cars in two separate environments (highway and downtown).
- Each driving session lasts for 30 minutes. DO NOT EXCEED THE DRIVING TIME.
- **After each driving scenario**, you will provide a 2-ml saliva sample (instructions to follow). All samples will be sent to a qualified laboratory at Queen's University.
- On the **highway condition**, you will drive along the following route:
  - 1- Go SOUTH on Guy St. and turn RIGHT on René-Lévesque Blvd;
  - 2- Turn LEFT and get into highway 20 (going WEST);
  - 3- Continue until you reach highway 13 which runs NORTH-SOUTH;
  - 4- Go North (toward the island of Laval) until you reach the first exit;
  - 5- Turn RIGHT on the first exit, and proceed along the signs that will guide you back to the 13 South;
  - 6- Get onto the 13 South, take the exit toward the 20 EAST;
  - 7- Come back to original spot on Guy St.
- In the **downtown condition**, you will drive along the following route:
  - 1- Exit parking lot, turn LEFT onto Guy St. and go until St. Catherine St.
  - 2- Turn RIGHT on Sainte-Catherine St.
  - 3- Turn LEFT on Bishop St.
  - 4- Turn RIGHT on Sherbrooke St.

- 5- Turn RIGHT on Crescent St.
- 6- Turn LEFT on Sainte-Catherine St.
- 7- Turn LEFT on Saint-Laurent Blvd. (the Main)
- 8- Turn LEFT on Pine Ave. (or Avenue Des Pins)
- 9- Turn LEFT on Saint-Urbain St.
- 10- Turn RIGHT on Milton Ave.
- 11- Turn LEFT on Park Ave. (or Avenue du Parc)
- 12- Turn RIGHT on Sherbrooke St.
- 13- Turn LEFT on McGill College Ave.
- 14- Turn LEFT on Sainte-Catherine St.
- 15- Turn LEFT on University St.
- 16- Turn LEFT on Maisonneuve St.
- 17- Turn LEFT on Crescent St.
- 18- Turn RIGHT on René-Lévesque Blvd.
- 19- Turn RIGHT on Guy St.
- 20- Turn LEFT into Faubourg Building parking lot (**END OF DRIVING**).

- Once the driving is completed, please remain on site for an additional 30 minutes, after which you will provide a final 2-ml saliva sample (for a total of six (6) samples).

***Concerned with safety issues while driving the vehicle?***

You will be driving alone. In order to minimize the likelihood of a car accident, it is important that you respect the speed limits and the provincial driving rules and regulations at all times.

***Concerned with confidentiality?***

Your cortisol levels will be kept confidential at all times. The researcher has numerically labeled the vials used to collect the saliva so that your name does not appear anywhere. Your name will also be kept secret from the lab technicians at Queen's university as they will only receive the coded vials.

**C. Consent of Participation**

I am free to discontinue my participation at any time without consequence. My identity will also be kept strictly confidential. The researcher will not disclose any of my personal information, neither in the thesis defense nor in any subsequent publications. I have also shown proof of a valid driver's license and I agree to respect the speed limits.

Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

*If you have any questions regarding any aspect of this research project, please contact Adela Reid, Compliance Officer, Office of Research at Adela.Reid@Concordia.ca or by telephone at (514) 848-2424 extension 7481.*

## SURVEY FOR EXPERIMENT 1

I, \_\_\_\_\_, agree to participate in a program of research conducted by John Vongas and Dr. Gad Saad of Concordia University's John Molson School of Business (1455 de Maisonneuve Street West, GM 300-29, Montreal, Quebec, H3G 1M8; email: j\_vongas@jmsb.concordia.ca).

### ***A/ PLEASE ANSWER QUESTIONS 1–18 BY CIRCLING YOUR ANSWER FOR EACH:***

- 1. I admire people who own expensive homes, cars, and clothes.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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- 2. Some of the most important achievements in life include acquiring material possessions.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

- 3. I don't place much emphasis on the amount of material objects people own as a sign of success.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

- 4. The things I own say a lot about how well I'm doing in life.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**5. I like to own things that impress people.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**6. I don't pay much attention to the material objects other people own.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**7. I usually buy only the things I need.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**8. I try to keep my life simple, as far as possessions are concerned.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**9. The things I own aren't all that important to me.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**10. I enjoy spending money on things that aren't practical.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**11. Buying things gives me a lot of pleasure.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-------------------	-------	---------	----------	----------------------

**12. I like a lot of luxury in my life.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-------------------	-------	---------	----------	----------------------

**13. I put less emphasis on material things than most people I know.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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**14. I have all the things I really need to enjoy life.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-------------------	-------	---------	----------	----------------------

**15. My life would be better if I owned certain things I don't have.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-------------------	-------	---------	----------	----------------------

**16. I wouldn't be any happier if I owned nicer things.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-------------------	-------	---------	----------	----------------------

**17. I'd be happier if I could afford to buy more things.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

**18. It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

***B/ ANSWER QUESTIONS 19–30 BY CHECKING (✓) YOUR ANSWER FOR EACH:***

**Owning my car allows me to:**

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
<b>19. Go places when and where I want.</b>					
<b>20. Meet new people.</b>					
<b>21. Stand out from the crowd.</b>					
<b>22. Relax and unwind.</b>					
<b>23. Be more popular with members of the opposite sex.</b>					
<b>24. Impress other people.</b>					
<b>25. Express my personality.</b>					

(Cont.)					
Owning my car allows me to:	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
26. Have good times and fun.					
27. Show others how successful I am.					
28. Take pride in something I own.					
29. Avoid being bored.					
30. Influence other people.					

***C/ ANSWER QUESTIONS 31–40 BY CHECKING (✓) YOUR ANSWER FOR EACH and/or PROVIDING CLARIFICATION:***

31. Have you been involved in a violent fight?    Yes \_\_\_\_    No \_\_\_\_

32. If yes, how long ago was this fight? \_\_\_\_\_

33. Have you had an athletic victory, as an individual or with a team?

Yes \_\_\_\_    No \_\_\_\_

34. If yes, how long ago was this victory? \_\_\_\_\_

35. Have you ever received a significant promotion at work?    Yes \_\_\_\_    No \_\_\_\_

36. If yes, how long ago was this promotion? \_\_\_\_\_

37. At the present time, I am not involved in a relationship *of any sort* with a woman.    Yes \_\_\_\_    No \_\_\_\_



38. How long ago was your last relationship with a woman? \_\_\_\_\_

39. You are \_\_\_\_ years old.

40. At the present time, are you on any medication (prescribed or over-the-counter)? Yes \_\_\_\_ No \_\_\_\_

41. Do you have any medical conditions? Yes \_\_\_\_ No \_\_\_\_

42. If yes, please describe briefly:

\_\_\_\_\_

43. If you have one or more brothers or sisters, how many of them are:

- a. Older than you? \_\_\_\_
- b. Younger than you? \_\_\_\_
- c. I am the only child. (Circle this if it applies to you)

44. At the present time, what is your profession? \_\_\_\_\_

45. At the present time, what is your income level? (Circle answer)

- a. \$0 – \$25,000 \_\_\_\_
- b. > \$25,000 – \$40,000 \_\_\_\_
- c. > \$40,000 – \$60,000 \_\_\_\_
- d. > \$60,000 – \$80,000 \_\_\_\_
- e. > \$80,000 \_\_\_\_

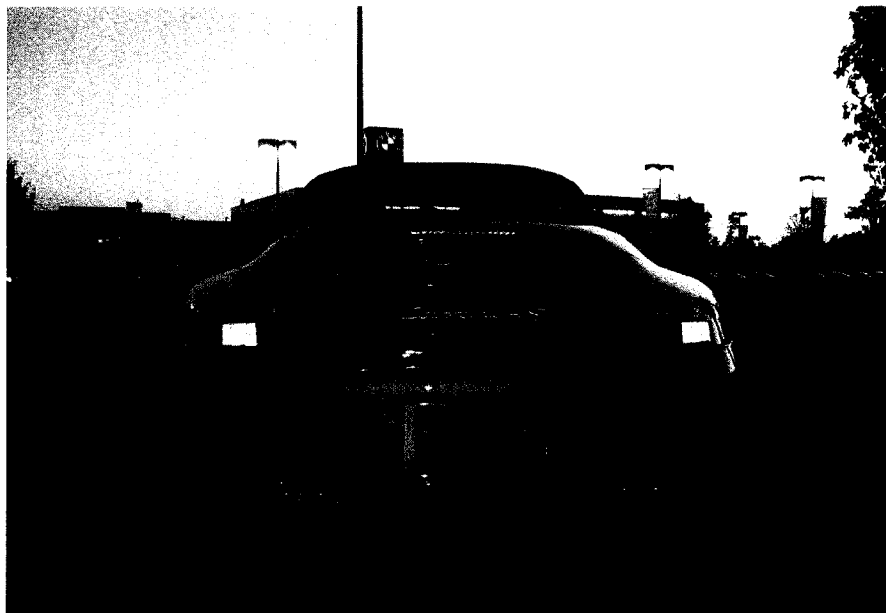
46. My sexual orientation is: Heterosexual \_\_\_\_ Homosexual \_\_\_\_ Other \_\_\_\_

Thank you!

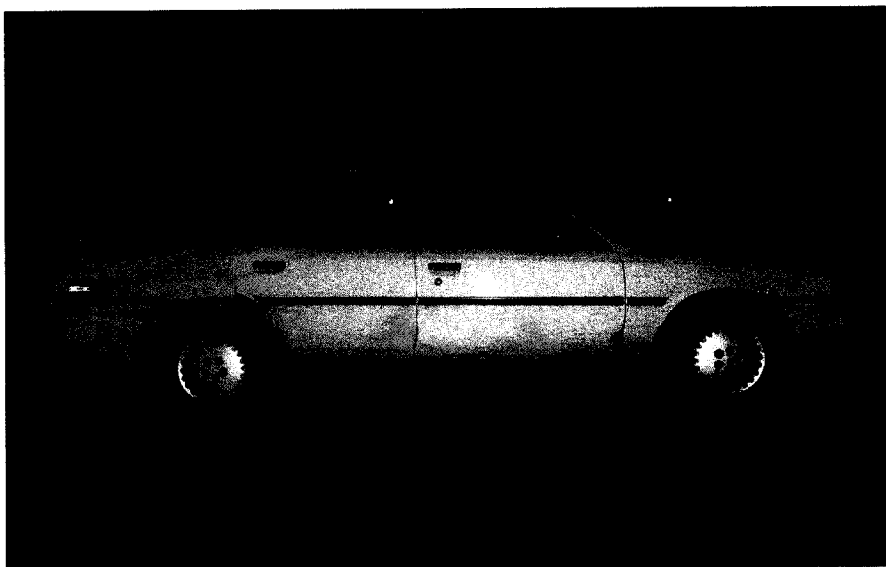
*If you have any questions regarding any aspect of this research project, please contact Adela Reid, Compliance Officer, Office of Research at Adela.Reid@Concordia.ca or by telephone at (514) 848-2424 extension 7481.*



**Sports Car:** Lateral view of 2006 Porsche 911 Carrera 4S Cabriolet



**Sports Car:** Posterior view of 2006 Porsche 911 Carrera 4S Cabriolet



**Family Sedan:** Lateral view of 1990 Toyota Camry Wagon DX



**Family Sedan:** Posterior view of 1990 Toyota Camry Wagon DX

## APPENDIX II

**Table 4: Skewness, Kurtosis, & Associated Standard Errors for Raw Data (EXP 1)**

		e1. Sample 1	e2. Sample 2	e3. Sample 3	e4. Sample 4	e5. Sample 5	e6. Sample 6
N	Valid	30	30	30	30	29	30
	Missing	0	0	0	0	1	0
Skewness		1.678	2.032	2.263	1.016	.989	.761
Std. Error		.427	.427	.427	.427	.434	.427
Skewness							
Kurtosis		2.481	4.866	6.662	1.114	.960	.255
Std. Error		.833	.833	.833	.833	.845	.833
Kurtosis							

**Table 5: Skewness, Kurtosis, & Associated Standard Errors for Log Data (EXP 1)**

		Log_e1. Log Data	Log_e2. Log Data	Log_e3. Log Data	Log_e4. Log Data	Log_e5. Log Data	Log_e6. Log Data
N	Valid	30	30	30	30	29	30
	Missing	0	0	0	0	1	0
Skewness		.511	.657	.790	.140	.154	.027
Std. Err.		.427	.427	.427	.427	.434	.427
Skewness							
Kurtosis		.266	.569	.701	-.720	-.652	-.641
Std. Err.		.833	.833	.833	.833	.845	.833
Kurtosis							

**Table 6: ANOVA Test for Order Effects (EXP 1)**

		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
<b>Sample 1</b> <b>Initial Baseline</b>	Between Groups	.042	1	.042	.926	<b>0.344</b>
	Within Groups	1.259	28	.045		
	Total	1.300	29			
<b>Sample 2</b> <b>(Sports Car, Highway)</b>	Between Groups	.190	1	.190	4.971	<b>0.034</b>
	Within Groups	1.073	28	.038		
	Total	1.263	29			
<b>Sample 3</b> <b>(Sports Car, Downtown)</b>	Between Groups	.132	1	.132	3.645	<b>0.067</b>
	Within Groups	1.014	28	.036		
	Total	1.146	29			
<b>Sample 4</b> <b>(Family Sedan, Highway)</b>	Between Groups	.062	1	.062	2.026	<b>0.166</b>
	Within Groups	.854	28	.031		
	Total	.916	29			
<b>Sample 5</b> <b>(Family Sedan, Downtown)</b>	Between Groups	.028	1	.028	.932	<b>0.343</b>
	Within Groups	.801	27	.030		
	Total	.829	28			
<b>Sample 6</b> <b>Final Baseline</b>	Between Groups	.029	1	.029	1.148	<b>0.293</b>
	Within Groups	.708	28	.025		
	Total	.737	29			

**Table 7: ANOVA Test of Within-Subjects Effects (EXP 1)**

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
<b>Car</b>	Sphericity Assumed	.539	1	.539	29.830	.000
	Greenhouse- Geisser	.539	1.000	.539	29.830	.000
	Huynh-Feldt	.539	1.000	.539	29.830	.000
	Lower-bound	.539	1.000	.539	29.830	.000
Error (car)	Sphericity Assumed	.524	29	.018		
	Greenhouse- Geisser	.524	29.000	.018		
	Huynh-Feldt	.524	29.000	.018		
	Lower-bound	.524	29.000	.018		
<b>Env</b>	Sphericity Assumed	.041	1	.041	8.400	.007
	Greenhouse- Geisser	.041	1.000	.041	8.400	.007
	Huynh-Feldt	.041	1.000	.041	8.400	.007
	Lower-bound	.041	1.000	.041	8.400	.007
Error (env)	Sphericity Assumed	.142	29	.005		
	Greenhouse- Geisser	.142	29.000	.005		
	Huynh-Feldt	.142	29.000	.005		
	Lower-bound	.142	29.000	.005		
<b>car * env</b>	Sphericity Assumed	.015	1	.015	4.346	.046
	Greenhouse- Geisser	.015	1.000	.015	4.346	.046
	Huynh-Feldt	.015	1.000	.015	4.346	.046
	Lower-bound	.015	1.000	.015	4.346	.046
Error (car*env)	Sphericity Assumed	.100	29	.003		
	Greenhouse- Geisser	.100	29.000	.003		
	Huynh-Feldt	.100	29.000	.003		
	Lower-bound	.100	29.000	.003		

**Table 8: Skewness, Kurtosis, & Associated Standard Errors for Raw Data (EXP 2)**

		f1. Sample 1	f2. Sample 2	f3. Sample 3
<b>N</b>	<b>Valid</b>	34	34	34
	<b>Missing</b>	0	0	0
<b>Skewness</b>		1.858	1.675	1.305
<b>Std. Error of Skewness</b>		.403	.403	.403
<b>Kurtosis</b>		4.491	3.140	1.691
<b>Std. Error of Kurtosis</b>		.788	.788	.788

**Table 9: Skewness, Kurtosis, & Associated Standard Errors for Log Data (EXP 2)**

		j1. log (f1)	j2. log (f2)	j3. log (f3)
<b>N</b>	<b>Valid</b>	34	34	34
	<b>Missing</b>	0	0	0
<b>Skewness</b>		.514	.535	.383
<b>Std. Error of Skewness</b>		.403	.403	.403
<b>Kurtosis</b>		1.017	.510	.259
<b>Std. Error of Kurtosis</b>		.788	.788	.788

## APPENDIX III

### CONSENT FORM FOR EXPERIMENT 2 (FOCUS GROUP)

**Note:** Experiment 2 made use of an oral consent script in accordance with the guidelines for ethical research (see [http://oor.concordia.ca/DOWNLOAD/SPF\\_Mar\\_2006PDF.pdf](http://oor.concordia.ca/DOWNLOAD/SPF_Mar_2006PDF.pdf)). The purpose and procedures of Experiment 2 were expressed verbally to each participant, who was told that he could discontinue his participation at any time.

#### A. Purpose

I have been informed that the purpose of the research is to investigate whether *cortisol* – a steroid that measures one's anxiety levels – rises or drops in discussions with others about one's consumer purchases over the last two years.

#### B. Procedures

**Time:** The research study will take place over the course of four days during the month of December 2006. You will be asked to make yourself available for 90 minutes in a specified time slot either on Saturday or Sunday, from 11:00 a.m. until 5:00 p.m.

**Place:** You will be asked to meet the researcher inside classroom FB-213 of Concordia University's Faubourg Building, 1600 Saint-Catherine Street West.

#### **Actions:**

- Avoid liquid and food consumption at least 1 hour before arriving to the testing site
- When arriving at your appointment time, you will be asked to provide a saliva sample of about 2 ml into a plastic vial which will be stored in a freezer until the cortisol will be measured by a qualified lab technician at Queen's University (address will be provided upon request). **You will provide two subsequent saliva samples.**
- You will engage in a 30-minute discussion with other people about some of the goods and services you have bought over the course of the last year or so.

#### **Concerned with confidentiality?**

Your cortisol levels will be kept confidential at all times. The researcher, John Vongas, has numerically labeled the vials used to collect the saliva so that your name does not appear anywhere. Only he will know your identity.

*If you have any questions regarding any aspect of this research project, please contact Adela Reid, Compliance Officer, Office of Research at [Adela.Reid@Concordia.ca](mailto:Adela.Reid@Concordia.ca) or by telephone at (514) 848-2424 extension 7481.*



**FOCUS GROUP DISCUSSION GUIDE FOR EXPERIMENT 2**

**In which part of town do you currently live?**

*In downtown Montreal, specifically in the financial district area, 454 de la Gauchetière West, apartment # 704, Montreal, QC.*

**What type of home is it? How long have you had it?**

*It is a loft, and I have been living in it for just over one year.*

**If it is a condo or an apartment, on which floor is it located? What is the view like?**

*It is on the seventh floor, and it overlooks an open charming rectangular courtyard.*

**What year was it built? How many square feet is it? How many rooms does it have?**

*It was built in 2002, but I had done some renovations just before moving in. It is roughly 1,200 square feet designed as a fairly large "warehouse-style" space (no individual rooms).*

**Did you buy it or rent it?**

*I bought it, of course.*

**If it was purchased, what was its approximate value?**

*I bought it for about \$288,000 (tax in) plus the garage at \$35,000. The garage was a deal because it is now worth about \$50,000 (I am told).*

**How much is your rent or mortgage per month? (Approximately)**

*My mortgage is \$1,055.98 per month over 25 years.*

**How much are your monthly condo fees (if any)?**

*\$270.00 per month (or \$0.225/square foot, includes heating and hot water)*

**How much are your property taxes per year?**

*About \$3,750.00 per year, (about \$2900.00 per year in municipal taxes + about \$850.00 per year in school taxes).*

**What type of materials exist in your home (Specify, if possible, the cost of these materials)?**

Floors? *Brazilian exotic hardwood (Sukupira)*

Counters? *Granite counters in the kitchen, marble floors in the kitchen and in the bathrooms*

Bath tubs? *Jacuzzi<sup>®</sup>, Grohe<sup>™</sup> Rainshower<sup>®</sup> with body jets*

**What type of appliances and furniture exist in your home?**

Kitchen Appliances (Refrigerator, oven)? *Sub-Zero 700TF All Freezer, Viking range (induction cooktop and electric oven).*

Television? *Pioneer 60" Widescreen Plasma HDTV.*

Sound System? *Denon (Home Theatre System)*

Leather Couches? *Metamorphose<sup>™</sup> leather sofa from Roche-Bobois.*

**IMPORTANT NOTE TO MODERATORS:**

*Approximately 10 minutes into the discussion, you will ask to borrow a pen from the participants (including confederate) because you will claim that yours ran out of ink. Conveniently, the confederate will immediately lend you his exclusive black resin and platinum Montblanc<sup>™</sup> pen, at which you will say, "Nice pen, it's a Montblanc right?" The confederate then will simply respond, "Right."*

**Do you have a bar or anything resembling it in your residence?**

*Yes, absolutely.*

**What kind of alcoholic beverages do you carry (spirits, beer, wine)?**

*I am an oinophile, a true wine lover. I stock:*

*Sangiovese grape (Brunello di Montalcino from Tuscany, Italy)*

*Riesling grape (Wolfberger from Alsace, France)*

*Syrah grape (Shafer Relentless from Napa Valley, CA)*

*Pinot Noir from the Côte d'Or region of Burgundy (Bourgogne)*

*Cabernet Sauvignon from South Australia mostly (Wolf Blass estates).*

**What is the most expensive bottle in your collection?**

*Louis Roederer Cristal Brut Champagne 1997 at \$452.00*

**Are there any other interesting features (pool, terrace, gym, doorman) in your residence?**

*Heated outdoor Endless Pools® stationary swimming system in a zen-like design on the roof of the building.*

**What type(s) of car(s) or other vehicle(s) have you had in the last two years?  
What year? What model? What color? Horsepower and top speed?**

*2006 Mercedes-Benz CLS 500, Bordeaux Red, 5.0 L, V8 engine, 388 horsepower, top speed is electronically limited to 250 km/hr, 0-100 km/h in 6.0 sec.*

**Is it financed or leased?**

*It is financed.*

**How much was it worth at the time of purchase?**

*Close to \$100,000 CAN taxes included.*

**Where have you been on holiday in the last two years? Outline, for each trip:**

**The country you visited, the year of travel, and the following:**

Countries visited: *Greece (Santorini), Italy (Capri), England (London, Manchester), Tanzania (Serengeti, Gombe National Park), U.S.A. (NYC), Turks and Caicos.*

Hotel, motel, youth hostel, time-share, relative's or friend's home, or whether the trip was aboard a cruise ship: *In Africa, we were on a safari, the other places, I usually stayed at high-end hotels, except for Manhattan where I stay with my cousin who's a doctor and who lives in the West Village near the Hudson River.*

What category did it/they fall under and what were the prices approximately? (Star system: 5-star hotel, etc.): *For sure over three stars. Prices were between US \$300 - \$400 per night in all of the places I mentioned.*

**What leisure activities do you enjoy attending or participating in regularly?**

*(For each, specify how much money you have spent attending the event or participating in it. This list does not have to include venues solely confined to the Montreal area.)*

**Sporting Events:** *Formula One Grand Prix races, International Soccer tournaments, golf and sailing.*

*I am a big F1 racing fan, and I attend the race in Montreal every year.  
I travel a few times a year to Manchester, England, to see United play at Old Trafford.*

**Restaurants:** *Include the name of the restaurant, location, type of cuisine, service level, and entertainment (if any).*

*Normand Laprise's Toqué! Close to my apartment – Modern French cuisine – about \$160 per person with foie gras and wine service (i.e., separate wine with each course, called "souper gastronomique avec dégustation de vin.")*

*Claude Beausoleil's Les Chèvres on Van Horne avenue – Modern French cuisine – about \$100 per person for a similar service.*

*Da Emma in Old Montreal – Italian – about \$90 per person.*

**Musical Productions: Opera, concerts, shows (e.g., Broadway).**

*I have season's tickets to the Opéra de Montréal, valued at about \$1,200.*

**What type of wristwatch are you currently wearing? Can we see it? Indicate make, movement (e.g., oyster perpetual motion), and cost.**

*It's a Breitling, made in Switzerland, called the Colt Super Ocean, it withstands a pressure of up to 1,000 meters, automatic movement, stainless steel with 68 jewels (i.e., "jewels" here signify the frictionless pivots that give the watch its precision).*

*I bought it for about \$3,800 three years ago roughly.*

**Was it a gift or did you buy it yourself?**

*I bought it myself, like I said.*

**How often do you shop for clothing and shoes in one year?**

# times/year for clothing: *About 4 times per year (once per season), or something like that.*

# times/year for shoes: *About the same as for clothing, I usually do these together.*

**Where do you shop for each of the following and what was the most money you spent in each category in the last year alone?**

Suits? *I buy my suits at either Harry Rosen (in Montreal) or at several places in New York City when I visit my cousin. My favorite brand is Gucci and I pay anywhere between \$1,500 and \$2,000*

Shoes? *I either go to Brown's here in Montreal or to several independent boutiques in SoHo. My favorite brand right now is Cesare Paciotti, which is expensive. But I typically buy shoes from anywhere between \$250 and \$500 dollars a pair.*

Jeans? *I only buy Seven or Diesel, usually at about \$250 a pair. These can be found in numerous places throughout Montreal, like at Simons' for example.*

**Specify how often you treat yourself to the following “grooming” activities:**

**Massages?** Specify the location, the number of times frequented per week/month/year, the service level (how many massage therapists at any one time?), and the cost per visit.

*Every two or three months, a licensed masseuse who performs swedish relaxation comes to my apartment, at a cost of about \$300 each time.*

**Hair cuts?** Specify where you get your hair styled, how often, the cost, and what other services are involved (e.g., beverage or manicure while waiting, etc.)

*I get my hair cut about every six to eight weeks at Coiffure Pure inside the Cours Mont-Royal for about \$75.*

**How often do you gamble, if at all? How much do you spend each time? (No need to say how much money you’ve won back.)**

# times/week or month or year: *About 3 times per year, and I spend about \$500 each time. I am not a very good gambler!*

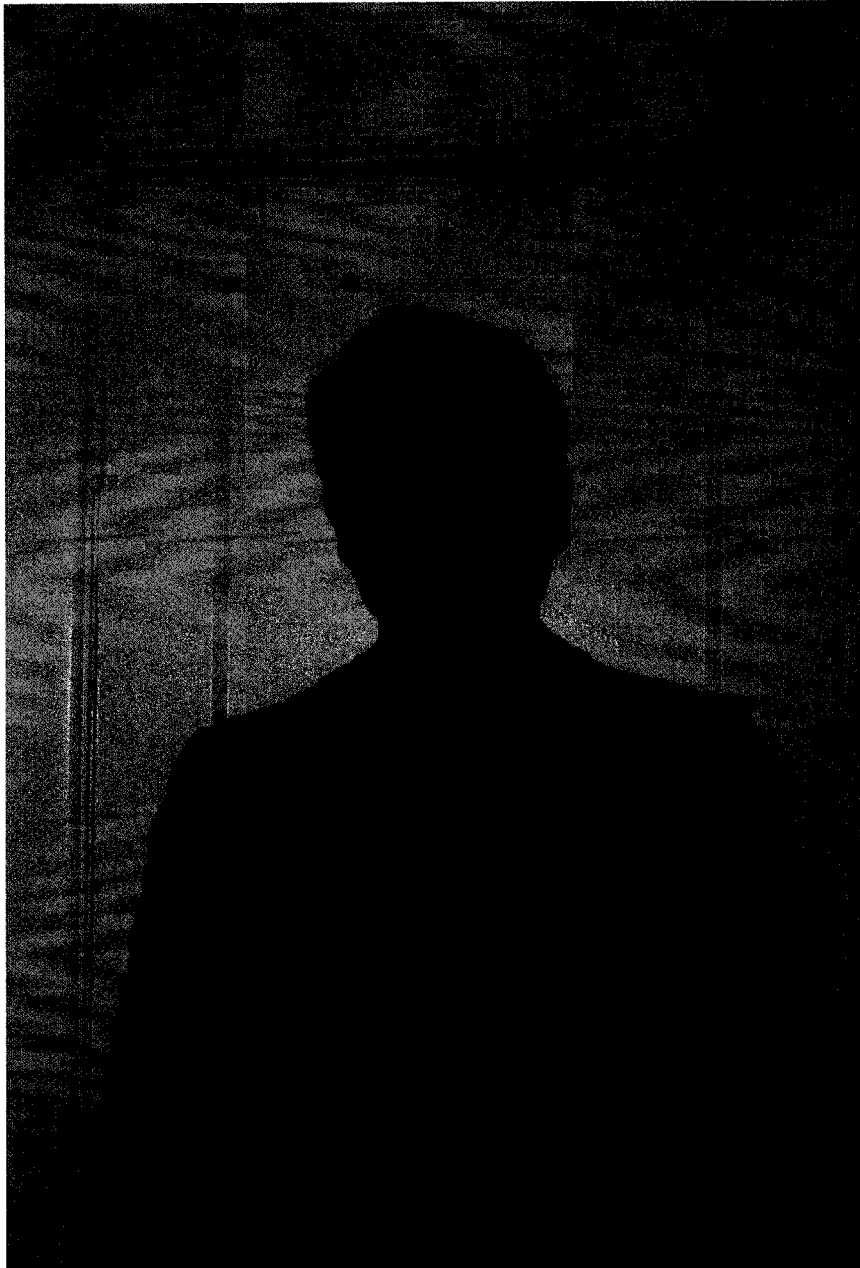
**What was the most expensive item you have purchased for a woman?**

Item description: *Diamond necklace with matching earrings from Cartier in Paris.*

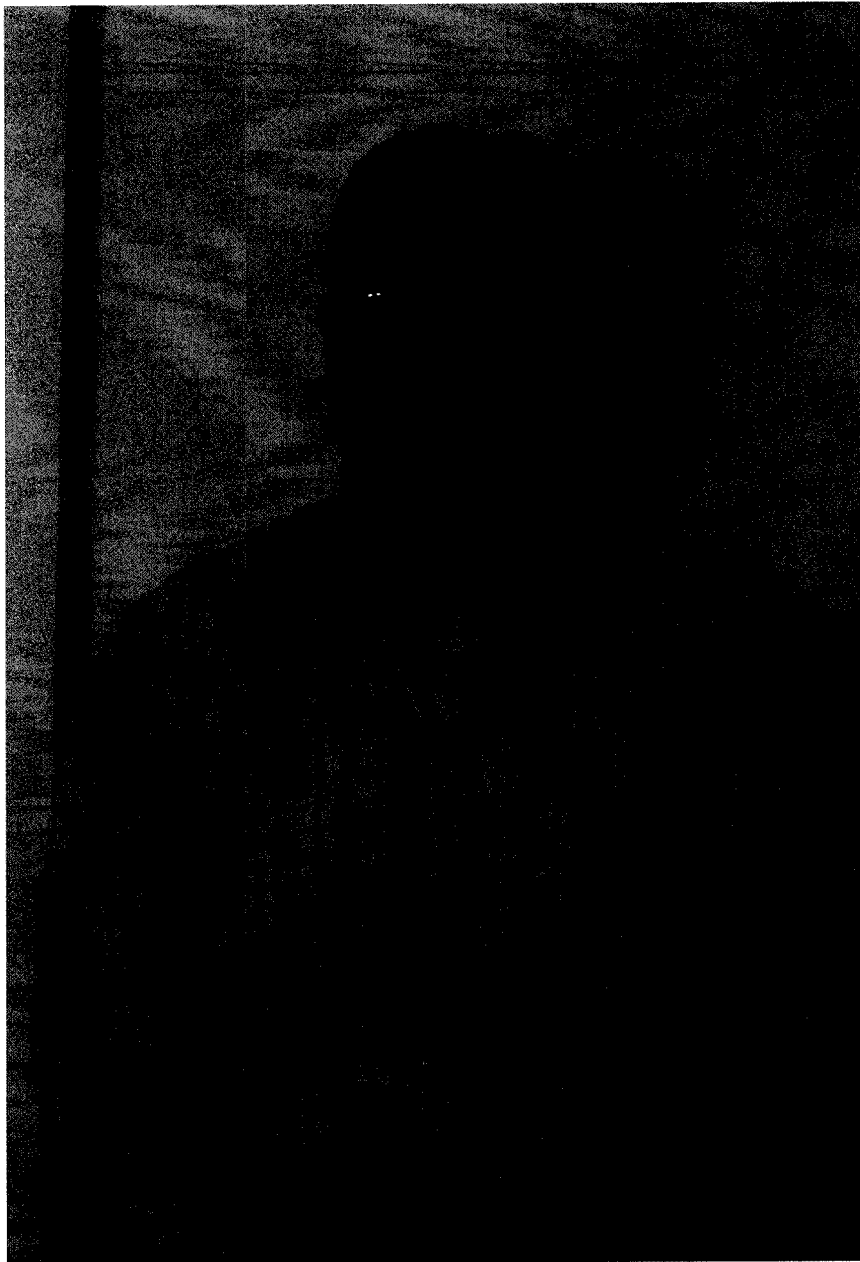
Amount spent: 8,000 euros

**Lastly, how much cash do you typically carry on you at all times? How much money are you currently carrying in your pocket? Please remove all cash found in your pocket and place it on the table.**

*\$CAN 486.27, (24 \$20-dollar bills, a \$5-dollar bill, a \$1-dollar coin, a quarter, and two pennies.)*

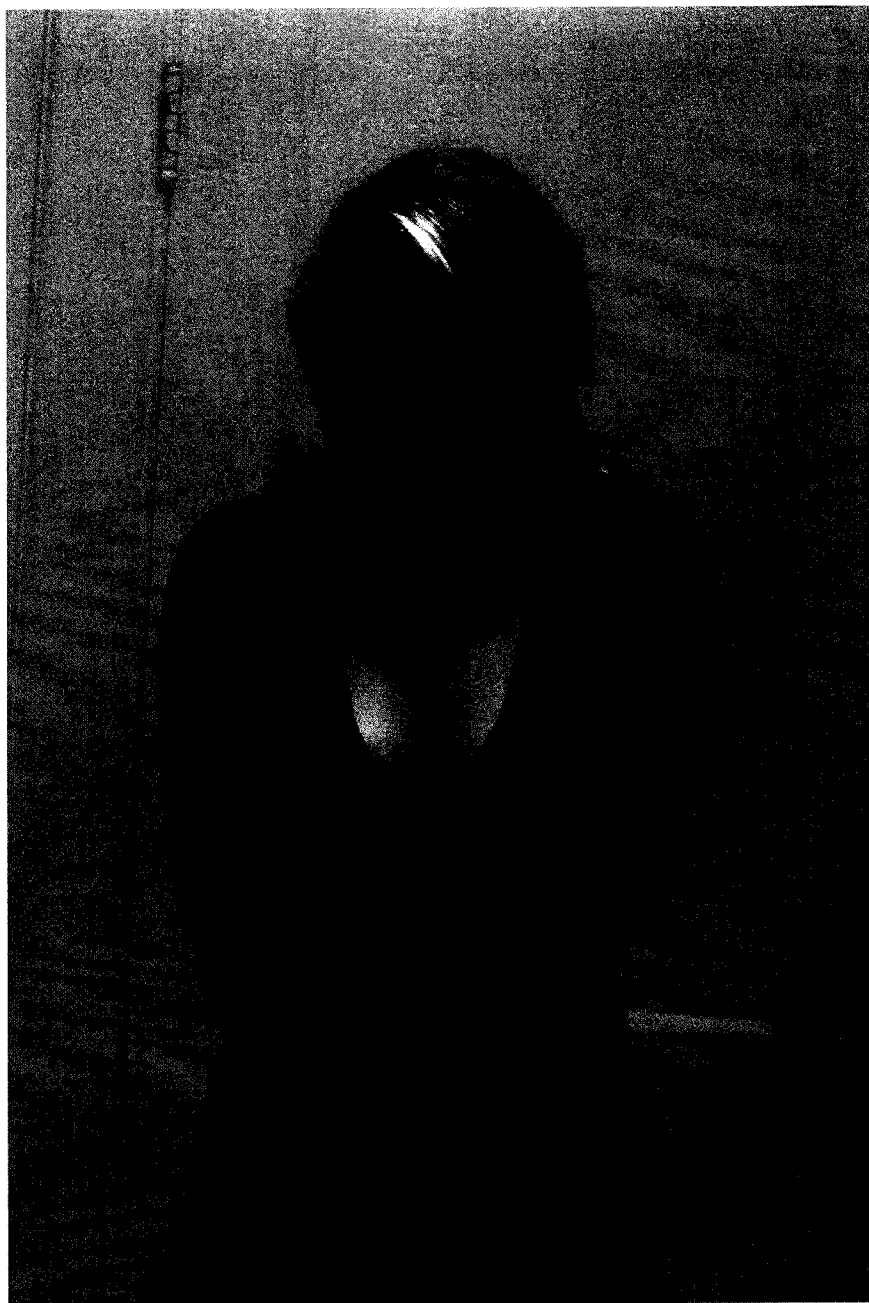


**Male Confederate (EXP 2)**



**Male Moderator (EXP 2)**





**Female Moderator (EXP 2)**

## APPENDIX IV

Table 10: Results from a One-Way ANOVA Test (EXP 2)

		Sum of Squares	df	Mean Square	F	Sig.
Log_T1	Between Groups	0.014	1	0.014	0.544	0.466
	Within Groups	0.796	32	0.025		
	Total	0.809	33			
Log_T2	Between Groups	0.004	1	0.004	0.132	0.718
	Within Groups	0.911	32	0.028		
	Total	0.914	33			
Log T2 - Log T1	Between Groups	0.032	1	0.032	4.115	0.051
	Within Groups	0.246	32	0.008		
	Total	0.277	33			

Table 11: Descriptives for the ANOVA Analysis (EXP 2)

		N	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		MIN	MAX
						Lower Bound	Upper Bound		
Log T <sub>2</sub>	F*	17	2.2976	0.1857	0.0450	2.2021	2.3931	1.96	2.70
	M	17	2.2765	0.1498	0.0363	2.1995	2.3536	2.04	2.65
	Tot	34	2.2871	0.1665	0.0285	2.2290	2.3451	1.96	2.70
Log T <sub>1</sub>	F	17	2.2382	0.1534	0.0372	2.1593	2.3171	1.97	2.53
	M	17	2.2781	0.1618	0.0393	2.1949	2.3613	2.01	2.67
	Tot	34	2.2581	0.1566	0.0269	2.2035	2.3128	1.97	2.67
Log T <sub>2</sub> - Log T <sub>1</sub>	F	17	0.0594	0.1131	0.0274	0.0012	0.1176	-0.11	0.29
	M	17	-0.0015	0.0505	0.0122	-0.0275	0.0244	-0.08	0.10
	Tot	34	0.0289	0.0916	0.0157	-0.0030	0.0609	-0.11	0.29

“F” denotes Female and “M” denotes Male.

## APPENDIX V

### DEBRIEFING FORM FOR EXPERIMENTS 1 and 2

**Note:** Experiments 1 and 2 made use of an oral debriefing script in accordance with the guidelines set forth by Concordia's Human Research Ethics Committee (see the following website: [http://oor.concordia.ca/DOWNLOAD/SPF\\_Mar\\_2006PDF.pdf](http://oor.concordia.ca/DOWNLOAD/SPF_Mar_2006PDF.pdf)). The true purpose of Experiments 1 and 2 were expressed verbally to each potential participant. Moreover, each participant was told that he could discontinue his participation at this time.

"The true purpose of the intended research is not to measure your salivary cortisol level, but rather to measure your testosterone level. Do you accept having your saliva measured for testosterone? This measurement will be carried out by the experienced staff employed at the laboratory of Dr. Katherine E. Wynne-Edwards, Professor of Biology at Queen's University in Kingston, Ontario. Should you have any questions related to any part of this study, please contact me, John Vongas, at \_\_\_\_\_ or by email at \_\_\_\_\_

#### *Concerned with your level of salivary testosterone?*

Before taking part in this study, you should know that 97% of testosterone in the body is bound to a protein in the blood and only about 3% is "free". Saliva contains only the free portion of testosterone and normal salivary testosterone levels for adult males are between 70 and 220 picograms per milliliter (pg/ml). Do not hesitate to contact the researcher, John Vongas, at the coordinates in the previous paragraph approximately one month after submission so that you may obtain your testosterone measurement.

*If you have any questions regarding any aspect of this research project, please contact Adela Reid, Compliance Officer, Office of Research at [Adela.Reid@Concordia.ca](mailto:Adela.Reid@Concordia.ca) or by telephone at (514) 848-2424 extension 7481.*