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THREE STUDIES TO INVESTIGATE BIOPSYCHOSOCIAL INFLUENCES ON MARITAL CONFLICT

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THREE STUDIES TO INVESTIGATE BIOPSYCHOSOCIAL INFLUENCES ON
MARITAL CONFLICT

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DISSERTATION

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in Family Sciences in the
College of Agriculture, School of Human and Environmental Sciences
at the University of Kentucky

By
Claire Kimberly

Lexington, Kentucky

Director: Dr. Ronald Werner-Wilson, Professor of Family Sciences

2012

ABSTRACT OF DISSERTATION

THREE STUDIES TO INVESTIGATE BIOPSYCHOSOCIAL INFLUENCES ON
MARITAL CONFLICT

Research is beginning to find a positive and significant relationship between marriage and health. Even though the current literature shows that separation and divorce have strong negative consequences for the mental and physical health of both spouses (Dush & Amato, 2005), the answer to why and how this occurs has yet to be solved.

A comprehensive perspective that could greatly benefit the analysis of this connection is the use of social neuroscientific methods in a biopsychosocial model. By including biological factors, social elements, and psychological variables in analyzing marriages, researchers would be able to further understand both the intra- and interpersonal elements of a relationship and their subsequent influence on marital stability. Thus, the purpose of this dissertation was to use social neuroscientific techniques to provide a comprehensive biological, psychological, and social assessments of couples, and compare that comprehension with marital satisfaction. This was accomplished by performing three studies focused on each section of the model: heart and brain reactions for biological, familial influence for social, and personal definition of love for psychological.

The sample used for the first study involved 20 married couples that were recruited through flyers on the University's campus and through announcements on a website (i.e., Craigslist). The participants came into the Family Interaction Resource Lab located on campus and were instructed to engage in a conflict interaction while being connected to a device used to measure heart and brain waves. The sample used for studies two and three included 635 participants that were recruited through mailouts, emails, and recruitment on a website (i.e., Facebook). These participants completed an online questionnaire using Qualtrics software and were all currently married.

The insights provided by the results helped to (1) advance current knowledge surrounding interpersonal relationships, (2) elucidate on marital conflict for therapists and educators working with couples, (3) expand upon a rarely used research procedure for analyzing relationships, and (4) build upon the extant literature across numerous disciplines.

Claire Kimberly
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Student's Signature
April 25, 2012
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Date

THREE STUDIES TO INVESTIGATE BIOPSYCHOSOCIAL INFLUENCES ON
MARITAL CONFLICT

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CHAPTER I: INTRODUCTION AND CONCEPTUAL APPROACH

Marriage is one of the most important life goals for the vast majority (93%) of Americans (Gallagher & Waite, 2000) yet fewer people are marrying, and divorce rates are increasing throughout the nation (Adams, 2004). Even with the decision to divorce becoming more prevalent, the option to leave the marriage is not one that should be taken lightly. For example, while results indicate that happiness in marriage is a strong predictor for one's well-being (Proulx, Helms, & Buehler, 2007), divorce tends to result in undesirable mental and physical health issues such as depression, chronic physical pain, suicide, violence, homicide, and mortality from diseases (Dush & Amato, 2005; Wang & Amato, 2000; Zheng & Hart, 2002).

In an attempt to understand the challenges that married couples face, researchers have made great strides by forming an innovative system to analyze at-risk marriages. For example, John Gottman (1994) reports that he can predict with 91% accuracy whether a couple's marriage will succeed or fail simply by watching them interact for five minutes. Nonetheless, scholars have recently stated that solely analyzing conflict interactions may be less central—or at least less capable—of explaining relationship outcomes than current theories, research, and interventions have suggested (e.g., Bradbury, Rogge, & Lawrence, 2001; Fincham, 2003). Research is rather showing that frequent conflicts are not necessarily found to be harmful and might actually be critical to marital quality and stability (Bodenmann, 2001; Gottman, 1994; Kurdek, 1996; Pasch & Bradbury, 1998). To overcome these discrepancies in findings, Gottman, Swanson, and Swanson (2002) stated that there is a strong need for more observational studies that quantify patterns during interactions and decipher the bidirectional influence of stress on marriage.

A comprehensive perspective that could greatly benefit the analysis of marital quality is the use of social neuroscientific methods in a biopsychosocial model (Cacioppo & Bernston, 1992; Engel, 1977, 1980). By including biological factors, social elements, and psychological variables in analyzing marriages, researchers would be able to further understand both the intra- and interpersonal elements of a relationship and their subsequent influence on marital stability. Thus, the purpose of this dissertation was to use social neuroscientific techniques to provide a comprehensive biological, psychological, and social assessment of couples, and compare that comprehension with marital satisfaction. This feat was accomplished by performing three studies focused on each section of the model: heart and brain reactions for biological, familial influence for social, and personal definition of love for psychological. To begin, a brief review of the principles of the biopsychosocial model and social neuroscience perspective will be provided.

Conceptual Approach

Theoretical attempts to understand marital conflict have been prominent in academia for decades (e.g., Burgess & Cottrell, 1939; Terman, 1938), but have yet to fully make clear the intricacies of the relationship between marital conflict and satisfaction (Fincham & Beach, 2010). As briefly noted above, this is an undeniable deficiency, as marital satisfaction has been found to be a strong predictor of life fulfillment and well-being (Proulx, Helms, & Buehler, 2007), while divorce tends to result in undesirable mental and physical health consequences (Dush & Amato, 2005; O'Leary & Cano, 2001; Wang & Amato, 2000; Zheng & Hart, 2002). In an effort to address this issue, two innovative approaches to understanding marital quality (i.e., social

neuroscience and biopsychosocial perspective) will be presented and utilized throughout this dissertation.

Biopsychosocial Model

The biopsychosocial perspective is an attempt to understand well-being by looking at the way biological, psychological, and social elements interact with one another. The interconnections between biology and psychology were documented as early as 1929 with Cannon's empirical exploration of the connection between psychological stress and physiological arousal (i.e., homeostasis), though the inclusion of social concepts would not become popular until decades later. Engel's (1977, 1980) innovative work within this perspective emphasized the benefits derived from the simultaneous inclusion of biological considerations, psychological variables, and social context factors with his efforts toward understanding the variations in an individual's health. McDaniel, Hepworth, and Doherty (1992) would further expand upon this model by looking at the variables in not only an arranged hierarchical ordering, but also viewing them as consistently having a reciprocal impact on one another. Biological factors were found to interact with psychological and both were hypothesized to interact with family and other social system factors. This model seems to be a fruitful avenue for further research as it has begun to appear in a variety of areas such as child adjustment (Calkins, 2011), ethnic differences (Debb, Blitz, & Choi, 2009), hypersexual disorders (Samenow, 2010), and pediatric feeding (Berlin, Davies, Lobato, & Silberman, 2009) to name a few.

Of particular relevance to the present study, the biopsychosocial perspective seems to be exceptionally advantageous for understanding marital dynamics. For example, marital distress has been found to increase psychological risk factors such as

depression or anxiety in a nationally representative sample of couples (Whisman, 2007) while genes and physiological processes (e.g., parasympathetic regulation of cardiac output under stress) were found to be influenced by the family environment (Propper et al., 2008). Furthermore, the adoption of a biopsychosocial framework to understand marital quality has been noted as essential to dispelling present misunderstandings about the predictive and independent role of biological or psychological factors in marital satisfaction (Calkins, 2011).

Unfortunately, the utilization of this model results in challenges such as the need for complicated methodology and an increase in cost and time (Amchin, 1991; Moltz, 1993; Wood, 1993). A field that has only recently emerged that is devoted to overcoming the aforementioned challenges is social neuroscience. Particularly relevant to this dissertation, social neuroscience has been extremely beneficial to the understanding of the societal and physiological impact on behavior by "using social and behavioral concepts…to inform and refine theories (Cacioppo, Amaral, Blanchard, Cameron, Carter, et al., 2007, p. 100)."

Social Neuroscience

Research is beginning to show a positive and significant relationship between marriage and health (Hayward & Gorman, 2004; Kaplan & Kronick, 2006; Schoenborn, 2004). For instance, in a study performed on individuals over the age of fifty, married participants reported fewer physician visits, days in nursing homes, and chronic illnesses compared to participants that were widowed (Prigerson, Maciejewski, & Rosenheck, 2000). However, the linear relationship between marital satisfaction and health is difficult to interpret. For example, scholars argue that the supplemental income (Lerman, 2002;

Wood, Goesling, & Avellar, 2007), the increased likelihood of having health insurance (Waite & Gallagher, 2000), or the additional pressure of taking care of oneself (i.e., less risk-taking behaviors; Peters & Liefbroer, 1997) may account for the found relationship between marital satisfaction and health. An overarching paradigm that has attempted to clarify the relationship between human behavior and biological factors is social neuroscience.

History. The foundation of modern affective neuroscience has been attributed to the early workings of Charles Darwin (1872) and William James (1884). These scientists began challenging the philosophies of emotions by introducing the idea that emotional expressions have internal structures, are evolutionary principles contrived for social purposes, and are consequences of the nervous system. Although the term neuroscience has been used for an extended period of time as a definition for classifications in the nervous system, it was not until 1992 that the term social neuroscience was used; Cacioppo and Bernston popularized the phrase as an umbrella term for biological mechanisms that influence social behavior in both humans and animals. In particular, it has been defined as the "study of social networks, the individuals that create them and the neural, hormonal, and genetic mechanisms that allow for their existence (Norman, Cacioppo, & Bernston, 2009, p. 60)." Social neuroscience would later be used to redefine numerous theories and concepts in the behavioral sciences such as the understanding of autistic children (e.g., Dapretto, Davies, Pfiefer, Scott, Sigman, et al., 2006), psychiatric patients (e.g., Frith & Frith, 1999), and stroke victims (e.g., Adolphs, 2001) to name a few.

This method of studying and understanding the relationship between biology, social interactions, and individual differences poses numerous challenges to researchers due to the inherent complexity of biological and social systems, and the need for multiple levels of analysis (e.g., individual, familial, and social contexts). Nonetheless, family researchers can no longer ignore the multiple factors that intervene between genetic and behavioral phenomena. To evolve theoretical, empirical, and clinical efforts in the family sciences, it is necessary for the field to account for the complex interplay between biological, psychological, and social facets.

Purpose Statement

Marriages are becoming an increasingly popular topic of research; articles with the word "marriage" in their title have increased by approximately 48% in the last decade (Fincham & Beach, 2010). However, the breadth and scope of marital research makes it difficult to develop a true analysis of marital change. Rodrigues, Hall, and Fincham (2006) stated that the "first step in integrating existing research and exploring mechanisms is to define the relationship between intrapersonal (sociodemographic and individual difference) variables and relationship-process variables (p. 33)." Since social neuroscience is ideal for bridging concepts and findings across multiple levels of organization and analysis (Norman, Cacioppo, & Bernston, 2009), the present study attempted to overcome the challenges mentioned above by using a multi-method approach to analyze the characteristics of marital satisfaction. In particular, an attempt was made to advance current marital research (e.g., looking at known demographical influences) by utilizing multiple conceptual models (e.g., attribution, multigenerational, social exchange, etc.), providing a holistic analysis of marital conflict (i.e.,

biopsychosocial), and expanding upon past and present methodological techniques (i.e., questionnaires, observation, and physiological analysis). The purpose of the present study included: (1) advancing current knowledge surrounding interpersonal relationships, (2) elucidating marital conflict for therapists and educators working with couples, (3) expanding upon a rarely used research procedure for analyzing relationships, and (4) building upon the extant literature across numerous disciplines.

Dissertation Format

Chapter two will be a literature review focused on the research surrounding marital dysfunction; it will be dedicated to providing a general review on marital research for each particular study will have literature principally relevant to its portion. The following three studies will explore the relationship between marital satisfaction by incorporating biological, psychological, and social factors. Utilizing social neuroscientific techniques, the first study will look at the relationship between marital satisfaction, heart rate variability, and asymmetrical brain waves. The second study will focus on the individual's understanding of marital satisfaction by incorporating their definition of love. Study three will complete the biopsychosocial analysis by analyzing the potential connection between family and marital communication (i.e., the social portion). The dissertation will conclude with a summary of the results, limitations, and suggestion of possible topics for future research.

CHAPTER II: INTRODUCTION TO RELEVANT LITERATURE

Noted as the "most spectacular change" since the early 1970s, the understanding of the divorce rate has justifiably caught the interest of many researchers (de Vaus, Qu, & Weston, 2003, p. 258). However, there is ongoing debate regarding how to accurately measure the nation's divorce rate. For example, it has been calculated as a constant percentage over periods of time (Berec & Boukal, 2004; Maxin & Berec, 2009) while others have viewed it as a non-decreasing rate due to the increase of the total population (Castillo-Chavez & Huang, 1995).

Confusion regarding how to calculate the divorce rate seems to be rooted in the need for data to be collected longitudinally; researchers must follow marriages from beginning to end to correctly compute the percentage that ended in divorce. Since most people are interested in the current status (i.e., how many marriages this year will likely end in divorce), researchers will attempt to estimate the number by restricting the analysis to a certain length of time. For example, if 100 couples are married in 2003 and 21 of them divorce by 2013, then the estimated divorce rate would be around 21%. Increasing the complexity, the divorce rate is also influenced by a variety of additional factors— such as individual characteristics, level of education, presence of children, etc. (South & Lloyd, 1995; Wolcott & Hughes, 1999)—that are typically not accounted for in statements highlighting current research.

Regardless of the debate on percentages, researchers seem to agree that the divorce rate in the United States has been steadily increasing. In 1920, one in seven marriages ended in divorce while, forty years later, the rate increased to one in four (Nevid & Rathus, 2005). The U.S. Census Bureau (2008) has estimated that in 1960, 2 for every 1,000 people in the population were divorced; in 1980, this rate increased to 5 for every

1,000 people. At the end of the twentieth century, an estimated 50% of marriages were disrupted by either separation or divorce (Fincham & Beach, 2010). The need for further research on marital conflict is undeniable as the rates of divorce show no signs of declining.

This review will therefore start by focusing on the generally known variables that impact marriages (e.g., level of education, race, etc.). An expansion will then be made on the topic that shows the strongest potential for explaining relationship dissolution: marital communication. Due to its particular impact in marital research, Gottman's four forms of negative communication (i.e., *Four Horsemen*) and his typologies of healthy and unhealthy relationships will be presented. With these variables of interest in mind, Chapter III will then segue into the biopsychosocial analysis of marital conflict.

Biopsychosocial Characteristics of Marital Disruption

Researchers have analyzed both intra- and interpersonal factors to show their impact on the quality of a marriage. A deficiency is particularly noticeable in regards to the biological understanding of marital satisfaction; this is likely due to the challenges of collecting this form of data. Regardless of this limitation, a decade review on the literature surrounding marriage and divorce (Amato, 2010; Fincham & Beach, 2010) found that some of the most commonly studied and successful predictors of marital quality seem to be education, race, parental influence, and marital communication. This section highlights the empirical evidence for each of these factors.

Education

Individuals with less than a high school education are more likely to report lower levels of marital quality than individuals with a high school education or more (Bramlett

& Mosher, 2002; Karney & Bradbury, 2005). A biopsychosocial perspective would support these findings by showing how individuals that continue their education have an opportunity to evolve in an environment conducive to socializing and learning about relationships. The research findings involving level of education and marital quality have not followed a linear pattern over time, though. The divorce rate has declined for college-educated couples since the late 1970s, but has remained essentially the same for couples without college degrees (McLanahan, 2004); thus the simplistic rationale of increased social interaction does not explain the recent variation found with married couples that are college-educated.

Race

On a more psychological and biological note, divorce rates show a tendency to be higher for certain racial groups than others. For example, compared to 42% of non-Hispanic Whites, an estimated 55% of African Americans divorce within the first fifteen years of marriage (Bramlett & Mosher, 2002). These differences have been attributed to African Americans having a higher likelihood of premarital birth, marrying at a younger age, and—on average—having less education (Orbuch, Veroff, Hassan, & Horrocks, 2002; Sweeney & Phillips, 2004). However, this subpopulation has a complex set of social (e.g., historical, economic, and cultural) factors that need to be disentangled before fully understanding these differences.

Hispanics, on the other hand, do tend to have a comparable rate of divorce (42%) to non-Hispanic Whites though variation is found between Hispanic groups (Bramlett & Mosher, 2002). For example, Mexican Americans and immigrants from Central America are less likely to be divorced than Puerto Ricans and Cubans (American Community

Survey, 2007). Supporting the social impact on marriages, differences are also notable between immigration statuses, with those that are born outside of the United States experiencing lower divorce rates than those born as American citizens (Sweeney & Phillips, 2004).

Parental Influence

Research focusing solely on current couple conflict is becoming less prominent and is shifting toward including an individual's experience with conflict before marriage. One common finding is the negative influence of parental divorce on offspring's future marital quality (Amato & Keith, 1991), though some would disagree with the simplicity of this statement (e.g., Plunkett & Henry, 2007). For example, in a seventeen-year longitudinal study that focused on both parental relationship status and the level of parental discord, the researchers found that the offspring's future marital quality tended to be influenced by the parents' use of jealousy, anger, criticizing, and stonewalling techniques (Amato & Booth, 2001). Similarly, Whitton et al.'s (2008) study revealed that hostility in the family-of-origin at the age of fourteen was related to hostility displayed in marital interaction seventeen years later. The question remains, though, as to whether this impact was from the environment the child was reared in (i.e., social) or because of the subsequent heredity of being born by parents that made the decision to divorce (i.e., biological).

Communication

Arguably one of the most consistent findings in marital research, couples' communication has been shown to directly correlate with marital satisfaction. For example, Sanford (2006) found that marital satisfaction and expectations of the

relationship strongly related to the amount of positive and negative communication patterns being used. Johnson et al. (2005) also saw this relationship in his study, where the amounts of positive and negative effects were particularly important for understanding the changes in marital satisfaction over four years. Thus, research suggests a strong correlation between couples experiencing negative relationship outcomes when positive interactions are not outnumbering the negative (e.g., Bradbury & Karney, 2004; Janicki, Karmarck, Shiffman, & Gwaltney, 2006). Due to the significant relationship between marital communication and marital quality, more information in this particular area will be presented.

Gottman's Seminal Research on Marriage

Receiving the "Distinguished Research Scientist Award" by the American Association for Marriage and Family Therapy (AAMFT), John Gottman is a noted researcher who has observed and documented more than 2,000 couples to understand how marital communication influences marital stability (*Psychotherapy Networker,* 2007). Although it has come with some debate (DeKay, Greeno, & Houck, 2002; Heyman & Hunt, 2007), his findings have resulted in the ability to predict the permanence of marriages with only 10% error. In particular, he found that the use of four attitudes or *Four Horsemen (*i.e., criticism, contempt, defensiveness, and stonewalling) seemingly forecasted relationship failure with great accuracy (Gottman, 1994).

Negative communication. *Criticism* is the technique of verbally attacking one's partner based on their personality and/or character; this form of communication usually occurs because of the need to convince oneself that the partner is at fault. To avoid criticism, one can learn to communicate more effectively the behavior they are

complaining about and eliminate overgeneralizing terminology (e.g., "always", "every time"). The second technique is classified as *defensiveness* and typically coincides with complaining or criticism. This horseman involves an individual who is not able to place oneself in the partner's position and, thus, unable to view another as the victim. To avoid defensiveness, Gottman (1994) recommends remaining calm, listening to your partner, and responding with empathy.

Contempt involves attacking a partner's sense of self by insulting or verbally abusing them, and can include sarcasm, insults, or name-calling. Evaluating one's responses to make sure they do not fall within this realm can eliminate contemptuous behavior. The final of the four horseman, *stonewalling* is defined as someone withdrawing completely from the conflict and can include ignoring, being unresponsive, or emotionally distant. This horseman is considered the most dangerous of the four. To reduce stonewalling techniques, an increase in eye contact and physical gestures would assist in maintaining communication (Gottman, 1994).

The ability to categorize marital interactions provided Gottman a unique opportunity to place numerical values on positive and negative communication. By quantifying the use of the Four Horseman, Gottman would expand his analysis of couple communication by classifying the couples into healthy and unhealthy typologies. The next portion will illuminate these typologies and show how Gottman came to establish them.

Gottman's typologies. Gottman (1993) published an innovative longitudinal study that analyzed couple conflict during a problem solving discussion. From these results, he proposed a *theory of balance* in which the overall ratio of positive to negative

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interactions accounted for the stability of the couples. In particular, satisfied couples were demonstrating a ratio of about five positive interactions for every one negative while unhappy couples demonstrated closer to a one-to-one ratio. Depending on the use of these positive and negative interactions, Gottman proposes three different types of healthy couples: volatiles, validators, and avoiders (see Table 2.1).

Table 2.1. *Visual Depiction of Gottman's Typologies.*

	High Negative	Low Negative
High Positive	Volatile	Validator
Low Positive	Hostile/Detached	Avoiders

Volatile couples use a large amount of both positive and negative communicative techniques while *avoiders*—as the name implies—use a small amount of both. *Validators* typically fall in the middle by using a moderate amount of both forms of communication and has been described as a "companionate" marriage (Gottman, p. 13).

Gottman (1994) also identifies two types of couples that are more likely to engage in an unhealthy and deteriorating form of couple conflict: *hostile* and *hostile/detached*. Hostile couples directly engage in conflict and tend to have at least one partner that is defensive about the issue at hand. Their negative communication may not be clear at first due to the likelihood of one partner being an attentive listener and the possibility of both partners still engaging in affectionate and humorous behaviors during the interaction. The hostile/detached typology includes couples that tend to be emotionally separated and uninvolved with each other. Gottman—and the authors of the survey later being used to interpret these concepts (Holman & Jarvis, 2003)—see the hostile/detached couple as a further deterioration of the hostile couple, which is why the two are typically grouped together as non-regulated couples. This form of couple will display brief episodes of

attack and defensiveness on issues, with contempt and disgust being common techniques displayed. Although negative practices are common with the last two typologies, Gottman would later emphasize the importance of also understanding the handling of conflict in his healthier typologies.

Conflict and typologies. Gottman (1994) furthered his analysis of the typologies by describing in detail their communicative practices used during conflict, and recognizing the possibility that healthy couples can also deteriorate. To begin, a conflict avoider typically emphasizes the positive attributes of the marriage—such as focusing on shared values and topics—in order to minimize the conflict. If similarities on the topic cannot be found, the discussion will either end quickly or the importance of the disagreement is minimized. This method of conflict is why, according to Gottman, other researchers often mistakenly see conflict-avoiders as dysfunctional. However, the lack of positive and negative interactions in their relationship can cause conflict avoiders to feel almost monotonous about their marriage resulting in destructive tendencies. Gottman's research on physiological reactivity to conflict seems to support this statement, with avoiders displaying a great deal of physiological arousal during conflict regardless of their lack of verbal exchange.

Conversely, volatile couples tend to always be emotional during fights, and will intensely make up afterwards; common emotions might include jealousy, protectiveness, and passion. In regards to communicating about disagreements, the presentations of the differing viewpoints are usually positive, but the conversations are likely to end without either partner changing their opinion. As with all of Gottman's typologies, there is some risk of this type becoming a deteriorating relationship. If some negative interactions are

too hurtful to repair, volatile couples would run the risk of using destructive and irresolvable conflict techniques (Gottman, 1994).

The final typology that Gottman characterizes as healthy is the validating couple. During conflicts, partners will validate each other's points of view–even if they disagree—and have a great deal of warmth and "we-ness" in their marriage. Conversations do involve conflict, but there is a lot of ease and calmness in the discussions in which a mutual understanding about the conflict and how to resolve it is formed. The primary risks for validating couples are that their relationships may grow to become more of a friendship than a romance which results in partners becoming increasingly distant. Validating couples can be "particularly vulnerable at major life transitions, such as the transition to parenthood (Gottman, 1994, p. 191)" due to this lack of connection.

Relevance to present investigation. Although Gottman's work has been influential in marital research, challenges are still present in regards to the differentiation of each typology and communicative technique. For example, the latter section revealed how easily healthy couples can deteriorate into becoming unhealthy; the understanding of how and when this occurs is unclear and problematic. By including individual differences, the influence of social factors, and physiological arousal during conflict, it was the hope of this dissertation to elucidate this challenge by bringing clarity to the definition of a positive or negative relationship.

CHAPTER III: STUDY I

As noted in both the social neuroscience and biopsychosocial portion of the literature review, research is beginning to find a positive and significant relationship between marriage and health. Even though the current literature shows that separation and divorce have strong negative consequences for the mental and physical health of both spouses (Dush & Amato, 2005; Wang & Amato, 2000; Zheng & Hart, 2002), the answer to why and how this occurs has yet to be solved. Thus the present study attempted to enhance the current and ubiquitous literature surrounding relationships and health by analyzing both physiological and neurological functions during a conflict interaction between married couples.

This present study's review of relevant literature will first focus on how to measure and understand the body's physical and neural reactions to stress. The next portion will detail the conceptual model being used for the study (i.e., asymmetrical models). A presentation of the study's hypotheses and research questions will then be stated and will conclude with the methods and data analysis.

Relevant Literature for Study I

In an attempt to understand the relationship between physiological mechanisms and individual behavior, the heart has been the most extensively investigated organ (Cacioppo, Berntson, Sheridan, & McClintock, 2000; Verrier & Mittelman, 2000; Armour & Ardell, 2004). One particular form of analysis that has been used to test the relationship between the heart and social behavior has been heart rate variability (HRV; Chandola, Siegrist, & Marmot, 2005; Kuper, Singh-Manoux, Siegrist, & Marmot, 2002; van Vegchel, de Jonge, Bosma, & Schaufeli, 2005). Although in the literature the term

HRV is used for different measurements and techniques regarding heart rate variation data, HRV analysis is generally used to identify the fluctuation in inter-beat intervals between normal heartbeats (Hansen, Johnsen, & Thayer, 2003).

This particular form of analysis was chosen for the present study because HRV has the ability to look at the balance between the two parts of the autonomic nervous system: the *sympathetic* and *parasympathetic* systems. The sympathetic system—also called the fight-or-flight response—generally produces cell-stimulating hormones (e.g., adrenaline) while the parasympathetic is responsible for the "pace-maker" cells that provide rest and relaxation (Levy & Martin, 1979). Thus analyzing an individual's HRV can provide indicators of the participants' psychological state and physiological stress response (Berntson & Cacioppo, 2008) because of its relationship with the sympathetic and parasympathetic systems.

The studies associated with HRV have identified several psychological, emotional, and physical predispositions to mental and physical challenges such as anger, hostility, fear, anxiety, depression, and coronary heart disease (Carney, Blumenthal, Stein, Watkins, Catellier, et al. 2001; Kubzansky & Kawachi, 2000; MacMahon & Lip, 2002; Singh, Kartik, Otsuka, Pella, & Pella, 2002; Joynt, Whellan, & O'Connor, 2004; Smith, Glazer, Ruiz, & Gallo, 2004; Rozanski & Kubzansky, 2005; Stanton, Revenson, & Tennen, 2007). Of particular relevance to the present study, a relationship has been found between human behavior, HRV, and cardiovascular pathology (Hanson, Godaert, Maas, & Meijman, 2001; Hintsanen, et al., 2007; Vrijkotte, van Doornen, & de Geus, 2000) though the findings were limited. For example, perceived expenses in an

interaction have been associated with higher HRV while higher incentive has been related to lower HRV, but only for women (Hintsanen, et al.).

In an attempt to address these concerns, observed HRV during social interactions has also been shown to relate to brain activity (Lane, McRae, Reiman, Chen, Ahern, et al., 2009). For example, studies utilizing bargaining games, cognitive tasks, or deciphering emotional facial expressions have found a relationship between HRV measurements, brain activation, and decision-making practices (Critchley et al., 2003, 2005; Rilling, King-Casas, & Sanfey, 2008; Sanfey, Loewenstein, McClure, & Cohen, 2006). Incorporating both biological and neurological technology is undoubtedly a fruitful field for further analysis as data from such studies "could resolve years or decades of debate that are difficult to resolve with other sorts of experiments (Camerer & Lowewenstein, 2004, p. 38)."

Neurological Perspective

Understanding the brain. Anatomically, the brain is generally divided into three portions (see Figure 3.1): the *brain stem*, the *cerebellum*, and the *cerebrum*. The cerebrum is further subdivided into the frontal, parietal, temporal, and occipital lobes. The *frontal lobes* are generally recognized as being involved in producing certain emotional states, speech production (i.e., Broca's area), and motor functions. The *temporal lobes* are associated with visual and auditory recognition, audition, and perceptual aspects of language (i.e., comprehension). The *parietal cortex* is mainly linked with visual and sensorimotor processing while the *occipital lobes* are directly related to vision (Kolb & Whishaw, 1980; Mishkin, 1979; Posner, Walker, Friedrich, & Rafal, 1984).
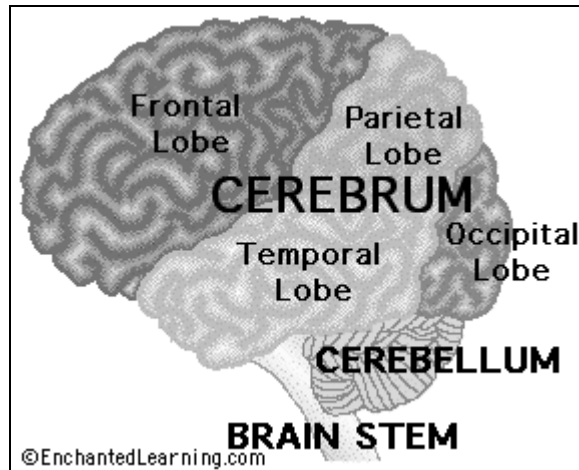
Figure 3.1. The basic subdivisions of the brain. Adapted from "Structure and Function of the Human Brain," by Enchanted Learning, 2010. Available at http://www.enchantedlearning.com/subjects/anatomy/brain/Structure.shtml

In social neuroscientific studies, the prefrontal region of the brain seems particularly relevant due to its input from both the outside world and all subjective sensory modalities. Accordingly, the analysis of this portion of the brain has been referred to as the "chief executive" of navigating the social world (Goldberg, 2001, p. 2; Stuss & Levine, 2002; Stuss, Picton, & Alexander, 2001).

Measuring the brain. Understanding the workings of the brain can be done by using numerous forms of technology. A Computer Axial Tomography (CAT or CT) scan combines multiple x-ray images from different viewpoints to provide a picture of the brain at a singular moment in time, but gives no information regarding the processes within the brain (Cedars-Sinai, 2011). Similarly, a Magnetic Resonance Imaging (MRI) scan produces a picture from one moment in time, but uses powerful magnets and radio frequency pulses to form the image. A functional MRI (fMRI) or PET scan is an expansion upon the MRI and provides real-time images by looking at the blood flow in the brain during activities (Fischetti, 2011). These techniques can cost anywhere from

$700 to $7000 to use and can be extremely time-consuming for both the researcher and the participant (Brandt, 2007; Cedars-Sinai; Fischetti).

Conversely, using an electroencephalography (EEG) to measure the electrical activity produced from the brain is both noninvasive and inexpensive; the measurement is easily obtained on the scalp's surface due to tissue between the scalp and neurons acting as a natural volume conductor. The synchronous activity of multiple neurons in the brain produces electrical voltages. Depending on where the reaction occurs on the cell, these *action* or *postsynaptic* potentials are picked up by metal electrodes and conductive media (Niedermeyer & da Silva, 1993). The resulting data is typically sinusoidal wave patterns that are measured from peak to peak (i.e., in µV) in amplitude and in frequency (i.e., in Hz). These frequencies are further categorized—though the differentiation is slightly unclear—into five ranges: the deep slow range of *delta* (1-4 Hz), the drowsiness wave of *theta* (5-7 Hz), the "relaxed wakefulness" of *alpha* (8-13 Hz), the alert attentiveness of *beta* (13-20 or 30 Hz), and the active wave of *gamma* (36-44 Hz; Pilgreen, 1995). Although it was only 80 years ago that the first research article on human brain electrical activity was published (i.e., Berger, 1929), research using EEG to analyze emotions has been stated as "one of the most promising and fertile [areas] in the field (Cacioppo, 2004, p. 236)."

Brain waves. In analyzing the waves in the prefrontal brain, over 70 studies have examined the relationship between emotions and asymmetrical waves (i.e., differences in waves between the left and right hemisphere of the brain; Coan & Allen, 2004). The research surrounding frontal asymmetry has been noted to fall within three general categories: (1) EEG changes when exposed to an emotionally evocative event, (2)

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relationship between behavioral traits and resting EEG, and (3) resting EEG compared to emotion-eliciting events (Harmon-Jones, 2004). In particular, research has shown consistent findings regarding asymmetry and the alpha frequency band (i.e., 8-13 Hz) with alpha power being inversely related to regional brain activity in numerous studies (e.g., Davidson et al., 1990; Robinson & Downhill, 1995).

Frontal asymmetry has also been shown to relate to particular emotional and physical health benefits such as heightened immune system and estimating risks for emotion-related disorders (Harmon-Jones, 2004; Pizzagalli, 2007). In particular, multiple researchers have found that greater activity in the left frontal cortical region correlate with both psychologically and physically healthier individuals (e.g., Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Oatley & Jenkins, 1996). For example, resting frontal asymmetrical activity has shown a relationship to depression with depressed individuals showing less left than right frontal cortical activity (Baehr, Rosenfeld, & Baehr, 1997; Gotlib, Ranganath, & Rosenfeld, 1998). However, the relationship between heightened left frontal activity and health benefits is not entirely clear; individuals that score high in approach motivation and have greater left relative frontal activity may also be manic (Harmon-Jones, Abramson, Sigelman, Bohlig, Hogan, et al., 2002; Meyer, Johnson, & Winters, 2001), angry (Harmon-Jones, 2003), and at a greater risk for cardiovascular problems (James, Hartnett, & Kalsbeck, 1983). In an attempt to clarify the connection between frontal asymmetry and emotionality, EEG researchers have formed three similar—yet distinct—theoretical models.

Conceptual Model for Study I

According to Davidson (1993, 2004), the literature surrounding asymmetry in the frontal cortical region of the brain can be organized into three conceptual models: *valence*, *motivational*, and *valenced motivational*. The first model—valence—includes literature that looks at the expression of positive and negative emotions while motivational focuses on the intention of using approach and withdrawal-related actions. Not surprisingly, the valenced motivational model includes understanding the possible relationship between positive/negative emotions and approach/withdrawal intentions.

Valence

Literature using the valence model sees activation in the left frontal cortical region, when compared to the right, as being involved in expressions and experiences of positive emotions while right frontal cortical activation parallels with negative emotions (e.g., Gotlib, Ranganath, & Rosenfeld, 1998; Heller & Nitshke, 1998); research in social neuroscience has generally fallen within this framework (Harmon-Jones, 2003). For example, depression is typically seen with increased relative right activity (Allen, Iacono, Depue, & Arbisi, 1993; Gotlib et al., 1998) while the effect of happiness-inducing tasks has shown the opposite findings (Waldstein, Kop, Schmidt, Haufler, Kratz et al., 2000). Participants with left frontal activation during rest also showed similar activation to positively valenced events, such as pictures of appetizing desserts (Gable & Harmon-Jones, 2008), the assurance of rewards (Sobotka, Davidson, & Senulis, 1992), and hearing emotionally positive adjectives (Cacioppo & Petty, 1980).

However, due to some inconsistencies in findings such as the lack of a relationship between two negative emotions (i.e., anger and anxiety; Zinner, Brodish,

Devine, & Harmon-Jones, 2008), researchers are beginning to incorporate the concepts of motivational principles (e.g., approach and withdrawal) to understand the resulting data from asymmetrical brain waves (Davidson, Jackson, & Kalin, 2000; Harmon- Jones & Allen, 1998; Wiedemann, Pauli, Dengler, Lutzenberger, Birbaumer, et al., 1999). It is hypothesized that the willingness to approach a situation would be consistent with an increase in the left frontal cortical activity while emotions such as panic and fear might decrease left frontal cortical activity, resulting in a withdrawal from the environment; this concept has been termed by Davidson (1993; 1998a; 1998b) as the *motivational direction model of emotion*.

Motivational Direction

The motivational direction model states that relatively greater left frontal activity parallels with approach or behavioral activation tendencies while relatively greater right frontal activity occurs with avoidance or withdrawal inclinations (Allen, Harmon-Jones, & Cavender, 2001; Coan & Allen, 2003). In fact, the right prefrontal cortical region of the brain arguably includes specialized neural substrates to motivate withdrawal/avoidance behaviors (Davidson, 1995; Davidson, Pizzagalli, & Nitschke, 2009; Nitschke, Heller, & Miller, 2000). However, many of these studies have used resting frontal asymmetrical activity (Amodio, Shah, Sigelman, Brazy, & Harmon-Jones, 2004; Harmon-Jones, 2003), which causes limitations in regards to causal inferences (i.e., using only correlations). Nonetheless, theorists are beginning to extend the model's generalizability by connecting positive emotions to approach motivation and negative emotions to withdrawal motivation (Harmon-Jones; Watson, 2000).

Valenced Motivation

The valenced motivation model sees the left frontal cortical region as being involved in the expression and experience of positive, approach-related emotions and the right frontal cortical region as being involved in the expression and experience of negative, withdrawal-related emotions (Cacioppo, Tassinary, & Bernston, 2007; Davidson, 1993, 2004). Unfortunately, the resulting studies analyzing this relationship have produced nebulous results. For example, researchers have inaccurately portrayed frontal EEG asymmetry as causing a particular emotional state regardless of the statistical test being used (e.g., correlations; Allen, Harmon-Jones, & Cavender, 2001; Cacioppo, 2004). Carver and Harmon-Jones (2009) state that this tendency is likely due to studies "confound[ing] motivational direction with affective valence (p. 186)." To clarify the relationship between motivation and valence, one must isolate a case where affective valence could be separated from motivational direction.

One posed solution to solve this dilemma has been to further our understanding of an emotion that seems to contradict the above relationship: anger (Carmon & Harmon-Jones, 2009). Anger is a relatively unique emotion in that it is typically associated with a negative valence and yet tends to fall within an approach rather than avoidance inclination (see Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001; Watson, Wiese, Vaidya, & Tellegen, 1999). By expounding upon the evidence surrounding this unique emotion, we will be able to bring more clarity to the meaning of hemispheric dominance.

Understanding Anger

The intricacies of an emotion such as anger provide definitional dilemmas. Some researchers have suggested that anger is simply a reaction to an external agent's action of preventing someone from a desired goal (Berkowitz, 1993; Berkowitz & Harmon-Jones, 2004; Depue & Zald, 1993) while others believe that it is not the prevention of the goal that causes the emotion, but rather the violation of standards to retrieve that goal (Ortony, Clore, & Collins, 1988). In an attempt to clarify the definition, researchers have focused on the emotional valence associated with anger; this has also resulted in challenges. Anger can be viewed as negative when considering the conditions that evoked the emotion, but can also be considered positive when looking at the adaptive consequences. For example, if a spouse approaches their partner with anger due to their technique in disciplining their child, should it be considered a negative emotion if it resulted in a positive conclusion for the child's well-being? Furthermore, anger could be subjectively viewed as a positive emotion when considering such examples as sadists or masochists.

Recent scholars are tending to agree that individuals perceive anger as a negative emotion; it is the action associated with anger that is nebulous, not the valence (e.g., Harmon-Jones, 2003; Zinner, Brodish, Devine, & Harmon-Jones, 2008). For example, early researchers have suggested that offensive anger results in an urge to attack or approach the cause of the emotion while defensive aggression results in fear and a tendency to withdraw from the situation (Blanchard & Blanchard, 1984; Lagerspetz, 1969; Moyer, 1976). More current research has progressed this supposition by including the expectancy of success or the perceived task's difficulty (Brehm & Self, 1989; Wright & Kirby, 2001). For example, Stein and Levine (1989, 1990, 1999) stated that an

unpleasant situation would give rise to anger and approach-motivation when there is the perceived ability to eliminate the disagreeable circumstances and attain the wanted goal. Thus when anger is created and the individual feels that they can alter the situation, then motivational intensity should be high and vice versa. This progression in understanding has also been called the *coping potential* (Lazarus, 1991).

Coping potential. A coping potential is how persons appraise the possible outcome of the situation (Lazarus, 1991); thus if something can be done to resolve the circumstances, then an active and negative emotion (i.e., anger) would occur. In a similar condition—but without the feeling that the situation can be resolved—a negative and passive emotion, like sadness, would take place. Harmon-Jones (2003) has expanded the concept of coping potential by including Wortman and Brehm's *reactance theory* (1975).

Rather than just the outcome of the situation depicting the individual's emotive response, the ability to control the situation and the significance of it can also influence one's valence and motivation. According to this supposition, situations that are seen as controllable and important will increase proactive emotions. However, if the situation has become uncontrollable—which could be a reaction to trying to solve the dilemma over time—the reaction will be negative and withdrawal will occur. For example, a study by Harmon-Jones et al. (2003) provided participants with an action-possible condition (i.e., college tuition might be increased in the future) and an action-impossible condition (i.e., college tuition will be increased regardless of participants' actions). An increase in relative left frontal activity was seen during the action-possible condition, but not during the action-impossible; this occurred regardless of self-reported anger. The results therefore suggest that the feeling of being in control of the situation influences relative

left frontal activity, but not angry feelings (Harmon-Jones et al.). Since the motivation and valance associated with anger is a subjective experience and difficult for researchers to quantify, this might clarify why literature has had inconsistencies in regards to the connection between positivity and approach in "anger-inducing" experiments (e.g., Harmon-Jones & Sigelman, 2001; Harmon-Jones, 2003).

Relevance to present investigation. To fully understand the neurological activity underlying emotional processes, we must differentiate between emotional valence and motivational intensity (Harmon-Jones, Gable, & Peterson, 2009). Using asymmetrical metrics is ideal for this challenge due to its ability to control for individual differences (e.g., skull differences), its consistency in scoring high on internal and test-retest reliability (Allen, Coan, & Nazarian, 2004; Tomarken, Davidson, Wheeler, & Kinney, 1992), and its capacity to increase statistical power (Coan & Allen, 2004). Furthermore, studying anger is particularly useful due to its unique ability to separate affective valence from motivational direction (Harmon-Jones & Sigelman, 2001). The present study therefore attempted to differentiate between valence and motivation by analyzing marital communicative patterns that were used in conflict.

Research Hypotheses for Study I

Physiological Perspective

In an effort to further increase the understanding of the social variables in this analysis, the present study will attempt to supplement the existing HRV literature by analyzing the influence of previous interactions on satisfaction during marital conflict. A majority of the literature tends to not acknowledge the influence of prior exchanges on the observed behaviors during conflict. This is particularly relevant due to the impact

prior conversations can have on both psychological and physiological well-being (Carstensen, Gottman, & Levenson, 1995; Driver & Gottman, 2004). For example, Driver and Gottman report that daily playful bids—such as good-natured teasing—contributed to the emotional impact of later conflict discussions. Yuan et al. (2010) suggest that the prior use of humor, enthusiasm, and affection with one's partner tended to decrease the physiological arousal produced by conflict interactions. In an attempt to include biological mechanisms (i.e., HRV) and social factors (i.e., influence of previous interactions) in the understanding of marital satisfaction, the following research question and hypotheses were formed:

RQ1: What is the relationship between HRV and Gottman's Four Horsemen?

H1: Marital satisfaction will relate to HRV during the conflict interaction.

H2: During conflict interactions, couples who previously engaged in day-to-day interactions will have significantly increased HRV compared with those that had affective interactions.

H3: The use of Gottman's Four Horsemen will account for a large variance in HRV during a conflict interaction.

H4: Gottman's Four Horsemen, HRV, and the type of first interaction will have predictive power of marital satisfaction.

Neurological Perspective

As noted previously, the use of Gottman's Four Horseman (i.e., criticism, contempt, defensiveness, and stonewalling) are considered to be communicative techniques evoking from an anger-ridden situation, but not all are seen as approach motivated. The practice of stonewalling (i.e., withdrawing from the interaction) is unique

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in that it is a reaction to frustration, but lacks the behavior typically associated with anger. By integrating social neuroscientific methods and biopsychosocial factors, the following research question (RQ) and hypotheses (H) were also posed:

RQ2: What is the impact of Gottman's Four Horsemen on alpha asymmetry in the frontal cortical region of the brain?

H5: Participants showing contempt during a conflict with their spouse will show relatively higher left frontal cortical activity.

H6: Participants showing criticism during a conflict with their spouse will show relatively higher left frontal cortical activity.

H7: Participants engaged in withdrawal techniques during a conflict with their spouse will show relatively higher right frontal cortical activity.

H8: Marital satisfaction will positively correlate with relatively higher left frontal cortical activity.

Method for Study I

Recruitment

Research participants included 20 married couples recruited through flyers on a southeastern college's campus and through announcements on Craigslist during the spring of 2011. Participants were all over the age of 18 and no restrictions were placed on race, ethnicity, sexual orientation, and/or level of relationship satisfaction. Each data collection period lasted between an hour and a half to two hours. To assist in recruitment, participants were given $50.

Sample

Due to some challenges (e.g., lost data, missing questionnaire in packet), the resulting valid data of thirty-five participants included more males than females (19 versus 16). A majority of the participants were Caucasian (82.9%), followed by Asian (11.4%), and African American (5.7%). The average age was a little under 33 years with the youngest being 22 and the oldest 68 ($SD = 10.29$). There was a wide range of household incomes with 22.9% stating that they were either in the $10,000-19,000 range or $30,000-39,999 range. Another quarter of the participants fell in the $40,000-59,999 range while the remaining 10% had either $0-9,999 or $80,000 or more household income. Over a third of the participants stated that they were Protestants (34.3%), 40% were divided between Catholicism and "Other", while the remaining 9% were either Jewish or "None." The average years that the participants had known their spouses was 9.6 (*Min.* = 2, *Max.* = 33, *SD* = 7.24) while the mean for years married was 6.74 (*Min.* = 1.00, *Max.* = 27.00, *SD* = 6.39).

Table 3.1. *Demographics of Participants in Lab* (*n* = 35)

Variable	% (#)
Gender	
Female	45.7 (16)
Male	54.3 (19)
Religious Affiliation	
Protestant	34.3 (12)
Catholic	20.0 (7)
Jewish	5.7 (2)
None	2.9 (1)
Other	20.0 (7)
Ethnicity	
Caucasian	82.9 (29)
African American	5.7 (2)
Asian	11.4 (4)
Total Household Income	
$0-9,999	5.7 (2)
$10,000-19,999	22.9 (8)

Table 3.1. *(continued)*

Variable	% (#)
$10,000-19,999	22.9 (8)
$20,000-29,999	8.6 (3)
$30,000-39,999	22.9 (8)
$40,000-49,999	14.3 (5)
$50,000-59,999	11.4 (4)
$60,000-69,999	2.9 (1)
$70,000-79,999	5.7 (2)
$80,000 or above	5.7 (2)

	Mean	Min.	Max	SD
Years Married	6.74	1.00	27.00	6.39
Known Spouse	9.60	2.00	33.00	7.24
Age	32.60	22.00	68.00	10.29

Procedure

The general method for this portion of the dissertation is similar to the existing literature surrounding Gottman and Levenson's work (e.g., Gottman, 1994; Levenson & Ekman, 2002) with the additional element of neurological analysis. After obtaining consent, each participant was escorted to a separate room to independently complete self-report assessment instruments. In addition, each person was asked to identify a problem area in the relationship; these areas were used as the discussion for the problem-solving portion of the study.

After completing the self-report material, lab assistants connected electrodes to each participant to measure physiological and neurological arousal. Recordings were then made individually for each of the following situations for future comparisons: baseline, stress test, and recovery. Baseline was performed by asking the participants to relax with their eyes open and then closed. The stress test involved a list of colors appearing on a monitor written in a color contrary to the word. The participants were asked to state the

color of the word rather than read the name of the color in a limited amount of time. Recovery was then analyzed by asking the participants to relax a few minutes after their stress test.

After the individual analysis, participants were brought back together and asked to participate in a baseline discussion where they either talked about their day or what first attracted them to each other for 10-minutes. The decision of the topic was determined at random prior to the participants coming to the lab. Next, the couple was asked to participate in two 10-minute problem-solving discussions where one problem selected by each person was discussed. Whose problem was discussed first was determined by a coin flip. If they chose the same topic, they were asked to choose an additional one. At the end of both discussions, the lab assistants removed the electrodes and provided an opportunity for the participants to ask any additional questions.

Measuring heart rate variability. The NeXus-32 (Mind Media, The Netherlands) was used and included 24 channels of EEG data (true DC), SCP (slow cortical potential), and 8 channels for all auxiliary modalities. The device measures 2048 Hz at 24-bit resolution. To assist making the participants feel more comfortable during their interaction, the two channels to measure heart rate were placed on each of the participant's wrists rather than on their chests.

The data chosen to present for HRV was based on those most commonly reported within the literature (e.g., Nunan, Sandercock, & Brodie, 2010; Randall, Bhattacharyya, & Steptoe, 2009). To begin, the magnitude of power for HRV was divided into two major bands: a low-frequency component (LF; 0.04–0.15Hz) and a high-frequency component (HF; 0.15–0.4Hz). *HF* is known to reflect parasympathetic nerve activity while *LF* relates

to both sympathetic and parasympathetic nerve activities (Berger, Saul, & Cohen, 1989;

Montano et al., 1994). The HF amplitude is therefore considered an index of

parasympathetic nervous function and *LF/HF* amplitude (LF/HF) is a marker of relative

sympathetic activity (Pagani et al., 1986; Malliani, Pagani, Lombardi, & Cerutti, 1991).

As recommended by the North American Society of Pacing and Electrophysiology

(1996), the following time-domain variables were also computed due to their robustness:

number of pairs of adjacent *NN* (i.e., normal-to-normal) intervals differing by more than

50 ms (*pNN50*), mean NN, *SDNN* (i.e., standard deviation of normal-to-normal intervals),

and *RMSSD* (i.e., root mean square of successive differences between NN intervals). The

average of the above factors were calculated for the problem solving interaction and since

measures of HRV are typically skewed, all were presented as natural logarithms (a

technique similar to other studies; e.g., Brumborg, Johnsen, Pallesen, Molde, Mentzoni,

et al., 2010; Nunan, Sandercock, & Brodie, 2010; Stein, Barzilary, Chaves, Domitrovich,

& Gottdiener, 2009).

Measuring electrical brain activity. In addition, participant were fitted with an

EEG electrode cap that included Ag/AgCL electrodes manufactured by Medi Factory

(Nieuwkoop, The Netherlands) and 21 channels of EEG. The ground electrode was

located in the cap on the midline between the frontal pole and the frontal site. The

reference electrode was located on the cap at the left and right mastoid, so that off-line

linked-ears reference could be computed. Vertical and horizontal eye movements (EOG)

were also recorded to provide reference information to artifact the EEG. All electrode

impedances were under 25,000 Ω and were identified by their relationship between the

cerebral cortex and placement of each electrode (see Figure 3.2). For example, even

numbers referred to the right hemisphere and odd numbers referred to the left while the

letters correspond to each lobe (e.g., "F" – Frontal lobe, "T" – Temporal lobe, etc.;

Harmon-Jones & Peterson, 2009).
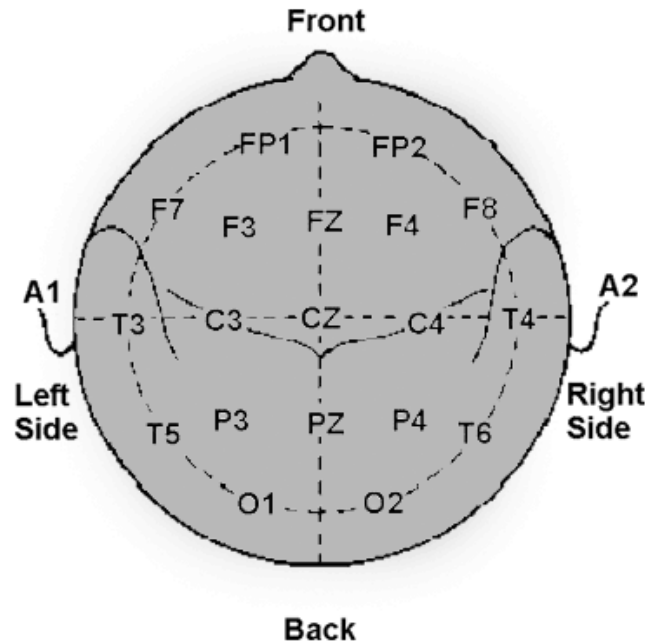
Figure 3.2. International 10-20 system of electrode placement. Adapted from
    "Brain Imaging in Substance Abuse," by M. J. Kaufman, 2000, p. 2.
    Totowa, NJ: Humana Press Inc.

EEG data was gathered on the specific frequency bands delta (1-4 Hz), theta (4-8

Hz), alpha (8-13 Hz), beta (13-20 Hz) and gamma (>20 Hz) due to the prominence of

these bands in EEG research surrounding psychological and behavioral outcomes

(Harmon-Jones & Peterson, 2009). With the aforementioned studies supporting the

relationship between alpha waves in the frontal lobes and emotions, the present study

focused on the measurement of alpha bands at the following sites: Fp1, Fp2, F3, F4, F7,

and F8. Electrode locations were selected to provide symmetrical coverage of the scalp

with an emphasis on anterior sites. In particular, brain lateralization was analyzed by

assessing the following comparisons: FP1/FP2, F3/F4, and F7/F8.

Data was exported from the proprietary NeXus software to Neuroguide, a software package that provides semi-automatic artifact rejection (30 seconds of artifact free data must be identified) with the capability to provide manual editing. Neuroguide also features comparative databases that include lifespan (birth to age 82) norms, a database of mild traumatic brain injured (TBI) patients, and a database of learning disabled children. For this study, comparisons were made with the normative sample.

Alpha asymmetry. An alpha asymmetry index was calculated for each spouse using data from the aforementioned locations. The procedure to calculate alpha asymmetry is well-established in the literature: natural log right minus natural log left (ln R alpha – ln L alpha; Coan & Allen, 2004). There are several advantages to calculating an asymmetry index: (1) control individual differences in skull thickness, (2) make statistical tests more sensitive by reducing number of contrasts and increasing statistical power, (3) adopt an efficient analytic tool (especially if hemispheric analyses are included), (4) conceptually simplify certain analyses, (5) and calculate alpha asymmetry difference scores that tend to show high internal consistency and acceptable test-retest reliability (Coan & Allen). Alpha power tends to be inversely associated with activation in the waking EEG (Davidson, Jackson, & Larson, 2000; Harmon-Jones & Peterson, 2009), so a positive number represents greater left-hemisphere activity.

Measuring communicative techniques. At the conclusion of gathering data for the study, three undergraduate students were recruited to analyze the recorded conflict interactions. The coders went through an hour-long training on Gottman's concepts with a particular emphasis on the Four Horsemen. The coders then viewed and assessed each of the problem-solving discussions by utilizing the same coding procedure that was used

by Waldinger, Schulz, Hauser, Allen, and Crowell's (2004) research on marital couples. Thus the first conflict interaction was divided into 30s increments in which the coders completed a questionnaire each time; this resulted in sixty questionnaires per couple.

Results for Study I

Preliminary Analysis

The coding from the video analysis was first tested for inter-rater reliability. Similar to Waldinger et al.'s (2004) study, Pearson correlations were calculated between all possible pairs of coders on each variable for each 30-s segment of coded videotape. Preparing for the analysis, it was noticed that the means were positively skewed. Since this finding is similar to Waldinger's study, the same power transformation used in their study ($2x^{2/3}$) was performed to improve the accuracy of the statistical techniques. After the transformation, the mean interrater correlation and Cronbach alpha for each variable were calculated to derive a measure of the reliability of the composite scores for each of the 19 coded variables. Table 3.2 shows the mean intensities for each of the variables averaged over the 20 epochs for the 10-min problem-solving discussion, the average correlation between the three coders after the transformation ($2x^{2/3}$), and the resulting interrater reliability score.

Table 3.2. *Means and Reliability of 19 Emotion Variables.*

Emotion variable	Intensity of Expression		Average correlation between coders[a]	Interrater reliability of composite scores[a]
	M	*SD*		
Defensive	2.4	1.1	.34	.54
Critical	2.7	1.2	.68	.82
Affectionate	3.3	1.2	.57	.79
Angry	1.4	1.3	.28	.48
Distress	.8	.9	.47	.51
Sad	1.2	1.0	.14	.26

Table 3.2. (*continued*)

Emotion variable	Intensity of Expression		Average correlation between coders[a]	Interrater reliability of composite scores[a]
	M	*SD*		
Warm	3.3	1.2	.60	.81
Tense/anxious	2.3	1.3	.24	.53
Irritable	2.2	1.4	.43	.70
Humorous	2.7	3.1	.50	.75
Acknowledges partner's perspective	4.5	1.5	.68	.87
Withdrawn	.7	1.7	.86	.94
Contemptuous	.9	1.6	.70	.85
Interested in understanding partner	5.0	1.6	.59	.81
Fearful	.6	.7	.40	.30
Domineering	.8	1.1	.22	.10
Belligerent	.6	1.0	.08	.04
Tuned in to partner's feelings	4.6	1.6	.72	.88

[a] Data transformed with the $2x^{2/3}$ formula.

Although some concerns of agreement with the coders were seen (e.g., "domineering" and "belligerent" resulted in $r < .15$), the variables of interest in the present study showed strong interrater reliability and average correlation. For example, *contemptuous* produced a Cronbach alpha of .85 with average correlation between coders of .70. *Withdrawn*, or Gottman's stonewall, showed an impressing high alpha of .94 with average correlation of .86. The final Horseman—combined due to the similarities of defensiveness and criticism (Holman & Jarvis, 2003)—*critical* resulted in an average of .68 by the three coders and an alpha of .82.

Physiological Analysis

As a reminder, the following frequency domain variables were computed for HRV: VLF (power between the limits .003 and .04 Hz), LF (power between the limits

0.04 and 0.15Hz), and HF (power in the range .15 to .40 Hz). In addition, the number of

pairs of adjacent NN (i.e., normal-to-normal) intervals differing by more than 50 ms

(pNN50), mean NN, SDNN (standard deviation of normal-to-normal intervals), and

RMSSD (i.e., root mean square of successive differences between NN intervals) were

included. Averages were formed during the first conflict interaction and transformed with

natural log due to the prominence of this conversion in HRV literature.

H1: Marital satisfaction will relate to HRV during the conflict interaction.

To answer the first hypothesis, a Pearson correlation matrix was computed with the HRV

data produced during the first problem solving interaction and *RDASTotal*. Mean scores,

standard deviations, correlation coefficients (*r*), and p-values are presented in Table 3.3.

Table 3.3. *Pearson Correlation Matrix between RDAS and HRV Variables*

Variables	Mean	SD	RDAS Total	
			Correlation Coefficient	*p*-values
Average normal-to-normal intervals of heartbeats (NN)	6.24	.17	.12	.58
Standard deviation of NN (*SDNN*)	4.98	.34	.07	.76
Root mean square of successive differences between NN (*RMSSD*)	5.04	.32	.04	.86

Table 3.3. (*continued*)

Variables	Mean	SD	RDAS Total Correlation Coefficient	*p*-values
Percentage of NN differing by more than 50 ms (*pNN50*)	4.31	.20	-.13	.57
Total spectral power of all NN intervals between limits of .003 and .04 Hz (*VLF*)	8.30	1.13	.09	.68
Total spectral power of all NN intervals between limits of 0.04 and 0.15 Hz (*LF*)	9.67	.84	.15	.50
Total spectral power of all NN intervals between limits of .15 to .40 Hz (*HF*)	9.48	.77	.05	.82
Ratio of low to high frequency power (*LF/HF*)	.18	.38	.24	.27

No significant findings were seen between HRV and marital satisfaction, though some noteworthy relationships were found. A negative relationship resulted from the comparison between *pNN50* and marital satisfaction, which questions the relation between normal intervals between heartbeats and marital satisfaction; the finding was too small to justify any conclusions, though. The largest relationship that was found with marital satisfaction was with the ratio of LF and HF (i.e., $r = .24$). This finding alludes to a relationship between the sympathetic nervous system and positive feelings about the marriage.

> H2: During conflict interactions, couples who previously engaged in day-to-day interactions will have significantly increased HRV compared with those that had affective interactions.

To test H2, an independent samples t-test was performed where the type of interaction was the independent variable and the HRV variables were the dependent. Mean difference, 95% confidence interval, Cohen's d, and p-value are presented in Table 3.4.

Table 3.4. *Independent T-Tests Between Type of Interaction and HRV Variables*

Variables	Mean Difference	Cohen's d	p-value	95% CI Lower	95% CI Upper
Average normal-to-normal intervals of heartbeats (NN)	.10	.08	.21	-.06	.25
Standard deviation of NN (*SDNN*)	.16	.05	.33	-.17	.48
Root mean square of successive differences between NN (*RMSSD*)	.12	.03	.41	-.18	.43
Percentage of NN differing by more than 50 ms (*pNN50*)	-.06	.02	.58	-.25	.14
Total spectral power of all NN intervals between limits of .003 and .04 Hz (*VLF*)	.87	.13	.09	-.16	1.90
Total spectral power of all NN intervals between limits of 0.04 and 0.15 Hz (*LF*)	.42	.06	.29	-.38	1.22
Total spectral power of all NN intervals between limits of .15 to .40 Hz (*HF*)	.07	.00	.85	-.69	.82
Ratio of low to high frequency power (*LF/HF*)	.38	.22	.03	.05	.70

Even with the small sample size, the relationship between *LF/HF* and marital satisfaction resulted in a significant difference when comparing the type of interaction engaged in prior to the problem solving discussion. However, the magnitude of the difference in means (i.e., eta^2) produced a small effect (i.e., .22). Thus the sympathetic activity seemed to be influenced by whether or not a warm or neutral interaction was engaged in prior to the problem-solving discussion though the finding was not extremely large.

H3: Gottman's Four Horsemen will account for a large variance in HRV during a

conflict interaction.

Eight multiple regressions were performed with each HRV as the independent variable

and Gottman's Horseman as dependent variables to assess H3. The adjusted r-squares

and betas are presented in Table 3.5.

Table 3.5. *Multiple Regressions Between Gottman's Four Horsemen and HRV*
Variables

Variables	Adjusted R^2	Beta			*F*
		Criticism	Contempt	Stonewall	
NNMean	.07	.47	.55	.03	.49
SDNN	.05	.47	.23	.21	.63
RMSSD	.05	.54	.41	.10	.63
pNN50	-.11	.27	.06	.07	.25
VLF	.02	.24	.30	.54	.86
LF	.03	.52	.27	.22	.75
HF	.06	.48	.31	.14	.55
LF/HF	-.13	.13	.07	.20	.13

Gottman's Four Horsemen accounted for some variance in HRV with *NNMean, SDNN,*

RMSSD, and *HF* being particularly noticeable (adjusted $R^2 \geq .05$). Resulting r-squares for

the variables *LF/HF* and *pNN50* were negative, though, which alludes to one or more of

the dependent variables used in the model being useless in accounting for variance. When

comparing the contribution of each independent variable in the final model, a similar

pattern of contribution did not seem to reveal itself with all of the HRV variables though

stonewall showed the lowest contribution for six of the eight HRV variables (i.e., not

VLF and *LF/HF*). In general, *criticism* seems to be more of a persistent contributor to

accounting for the variability in HRV variables though this is not consistent enough to

base any assumptions.

H4: Gottman's Four Horsemen, HRV, and the type of first interaction will have

predictive power of marital satisfaction.

To answer the H4, a hierarchical regression model was performed with marital

satisfaction as the dependent variable. The first block comprised of the control variable,

which included the type of first conversation. Due to research supporting the influence of

negative communicative patterns, the second block included Gottman's Four Horsemen

with the final block introducing HRV.

The type of first interaction (i.e., warm or neutral) was entered in Step 1,

explaining .5% of the variance in marital satisfaction. After the entry of Gottman's Four

Horsemen in Step 2, the total variance explained by the model as a whole was 7.7%, F (4,

16) = .34, p = .85. The Gottman techniques explained an additional 7.2% of the variance

in marital satisfaction, after controlling for the type of interaction engaged in prior to the

problem solving discussion, R squared change = .07, F (3, 16) = .42, p = .74. The final

model included the HRV variables' *pNN50, NNMean,* and *LF_HF.* The total variance

explained by the model as a whole was 16.3%, F (7, 13) = .36, p = .91. The HRV

variables explained an additional 9.1% of the variance in marital satisfaction, after

controlling for the type of interaction engaged in prior to the problem solving discussion

and Gottman's Four Horseman, R squared change = .09, F (3, 13) = .45, p = .73.

Neurological Analysis

Due to its prominence in literature (Snyder, Quintana, Sexson, Knott, Haque, et

al., 2008; Zinner, Brodish, Devine, & Harmon-Jones, 2008), alpha asymmetry was

assessed for each spouse by calculating the average of three pairs of frontal sites

(FP1/FP2; F3/F4; F7/F8) for each time frame measured and by using Allen, Coan, and

Nzarian's (2004) well-established equation: log R alpha – log L alpha. Alpha power tends to be inversely associated with activation in the waking EEG (Davidson, Jackson, & Larson, 2000; Harmon-Jones & Peterson, 2009), so a positive number represents greater left-hemisphere activity.

> R2: What is the impact of Gottman's Four Horsemen on alpha asymmetry in the frontal cortical region of the brain?

To observe and understand the relationships between alpha asymmetry and the use of Gottman's Four Horsemen, a Pearson correlation matrix was computed with asymmetrical alpha power and the average of the variables *contemptv, criticismv,* and *stonewallv*. Correlation coefficients (*r*) and *p*-values resulting from these relationships during each time measured (i.e., eyes closed, eyes opened, and the two problem solving interactions) are presented in Tables 3.6-3.9. This was done, in particular, to answer the following hypotheses:

> H5: Participants showing contempt during a conflict with their spouse will show relatively higher left frontal cortical activity.

> H6: Participants showing criticism during a conflict with their spouse will show relatively higher left frontal cortical activity.

> H7: Participants engaged in withdrawal techniques during a conflict with their spouse will show relatively higher right frontal cortical activity.

Table 3.6. *Pearson Correlation between Gottman's Four Horsemen and Alpha Asymmetry during Eyes Opened*

	FP2/FP1		F4/F3		F8/F7	
Variables	*r*	*p*-value	*r*	*p*-value	*r*	*p*-value
Criticism	.424	.090	.272	.291	.315	.234
Contempt	.046	.862	.030	.908	.317	.232
Stonewall	.073	.782	.037	.887	.483	.058

Although not statistically significant with this small sample size, moderate positive relationships were found during eyes open between the use of critical techniques in the Fp2/Fp1 (*r* = .424) positions and with the use of stonewalling techniques in the F8/F7 (*r* = .483) positions. In fact, according to Cohen (1988), the findings from the F8/F7 positions all resulted in moderate positive relationships with Gottman's techniques (contempt: *r* = .317 and criticism: *r* = .315) though not as strong as the aforementioned findings. Overall the correlations were positive alluding to an increase in Gottman's techniques during the problem solving interaction being associated with greater left hemispheric activity when measured during eyes opened.

Table 3.7. *Pearson Correlation between Gottman's Four Horsemen and Alpha Asymmetry during Eyes Closed*

	FP2/FP1		F4/F3		F8/F7	
Variables	*r*	*p*-value	*r*	*p*-value	*r*	*p*-value
Criticism	.511	.036	.438	.079	.419	.094
Contempt	.455	.066	.660	.004	.595	.012
Stonewall	.495	.043	.633	.006	.641	.006

The findings during the eyes closed portion of the study did result in significance. The use of stonewalling techniques during the first conflict interaction related to greater left hemisphere activity for spouses during measurement of eyes closed on all frontal

positions measured (i.e., Fp2/Fp1: $r = .495$, F4/F3: $r = .633$, F8/F7: $r = .641$). Strong to

moderate relationships were also found with all asymmetrical measurements during eyes

closed and observation of critical ($r = .511$, .438, and .419) and contemptuous ($r = .455$,

.660, and .595) behaviors during the first conflict interaction. Once again, this is alluding

to greater left hemispheric activation being related to negative communicative patterns

during problem-solving interactions.

Table 3.8. *Pearson Correlation between Gottman's Four Horsemen and Alpha*
Asymmetry during First Problem Solving Interaction

Variables	FP2/FP1		F4/F3		F8/F7	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
Criticism	.355	.162	.363	.139	-.202	.421
Contempt	.104	.691	.093	.714	-.093	.714
Stonewall	-.152	.561	-.084	.739	-.074	.770

Although not statistically significant with this small sample size, the correlation between

alpha asymmetry during the problem solving interaction and stonewalling techniques

showed a small—but consistent—negative relationship (i.e., $r = -.152$, -.084, -.074).

Conversely, moderate positive relationships were found between criticism and the alpha

asymmetrical scores from the Fp2/Fp1 ($r = .355$) and F4/F3 ($r = .363$) positions which

supports the aforementioned results of greater left hemispheric activity during the use of

Gottman's critical techniques.

Table 3.9. *Pearson Correlation between Gottman's Four Horsemen and Alpha Asymmetry during Second Problem Solving Interaction*

	FP2/FP1		F4/F3		F8/F7	
Variables	*r*	*p*-value	*r*	*p*-value	*r*	*p*-value
Criticism	.466	.051	.222	.375	-.211	.401
Contempt	.357	.146	-.012	.963	-.125	.621
Stonewall	.019	.940	-.209	.406	-.015	.953

Results from the second problem solving interaction were similar to those produced during the first interaction. The measurements from positions F8/F7 showed negative relationships to all of Gottman's Four Horsemen though the relationships were weak (i.e., *criticism*: $r = -.211$, *contempt*: $r = -125$, and *stonewall*: $r = -.015$). The only data that resulted in moderate relationships during this particular time frame were that of *criticism* ($r = .466$) and *contempt* ($r = .357$) in the Fp2/Fp1 positions.

To form a more holistic and subjective interpretation of the marriage, a final Pearson correlation was computed with the results from the self-reported RDAS and alpha asymmetry scores during the first conflict interaction. Correlation coefficients (*r*) and *p*-values are presented in Table 3.10 in an attempt to answer H8.

H8: Marital satisfaction will positively correlate with relatively higher left frontal cortical activity.

Table 3.10. *Pearson Correlation between RDAS Total and Alpha Asymmetry*

Time of Measurement	FP2/FP1		F4/F3		F8/F7	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
Eyes Open	-.570	.017	.354	.149	.174	.504
Eyes Closed	.090	.723	.365	.137	.280	.261
1st Problem Solving	.028	.916	.117	.635	.290	.244
2nd Prob. Solving	.005	.984	.082	.739	.225	.353

There was a strong, negative correlation between *RDASTotal* and Fp2/Fp1, $r = -.570$, $p = .017$, with high levels of marital satisfaction being associated with greater right hemisphere activity during eyes opened. F4/F3 produced moderate positive relationships with asymmetrical activity measured during eyes opened ($r = .354$) and eyes closed ($r = .365$). The measurements at F8/F7 also showed positive relationships with all times measured, though not as strong of a relationship as the aforementioned findings (eyes opened: $r = .174$, eyes closed: $r = .280$, 1st problem solving: $r = .290$, 2nd problem solving: $r = .225$). Thus a majority of the relationships found alluded to greater left hemispheric activity being positively related to marital satisfaction though a surprisingly powerful relationship was seen with Fp2/Fp1 and greater right hemispheric activity during eyes open.

Discussion for Study I

Discussion of Heart Rate Variability

The relationship found in previous research between HRV and human behavior (Hintsanen, Elovainio, Puttonen, Kivimaki, Koskinen, et al., 2007) was generally supported with the present study's results. The use of Gottman's negative communicative techniques accounted for a small, but noteworthy amount of variance in marital

satisfaction. In particular, the use of Gottman's Four Horsemen were revealed to account for some the HRV variables' *NNMean, SDNN, RMSSD,* and *HF* (adjusted $R^2 \geq .05$). Since the *NNMean, SDNN,* and *RMSSD* all measure normal-to-normal heart rate intervals while *HF* measures the parasympathetic system (i.e., includes the "pace-maker" cells that provide rest and relaxation; Aysin & Aysin, 2006), this finding tentatively supports the existing research showing a relationship between health and marital satisfaction (Smith et al., 2004; Rozanski & Kubzansky, 2005; Stanton et al., 2007). This assumption was further shown in the results from the hierarchical regression model used to test H4 where including the HRV variables—after incorporating both the type of previous interaction and Gottman's Horsemen—accounted for an additional 9.1% variance in marital satisfaction.

In addition, this portion of the study did not only focus on the relationship between the biological attributes and marital satisfaction, but also attempted to incorporate the influence of social factors by including the influence of prior conversations with one's spouse. The findings did reveal that having a warm or neutral conversation with one's spouse influences later problem-solving interactions; *LF/HF* resulted in a significant difference between the two groups (*p*-value = .03). However, simply incorporating the type of interaction prior to the problem-solving discussion accounted for very little of the variation in marital satisfaction (i.e., $r^2 = .005$). This further supports the need for incorporating both social and biological factors when attempting to understand the differences between those that are happily married and those that are not.

Discussion of Electrical Brain Activity

In an attempt to further our understanding of the relationship between health and marriage, correlations were performed between marital satisfaction and asymmetrical alpha waves found in the frontal lobe of the brain. Results revealed moderate positive relationships at positions F4/F3 (mid-frontal) during eyes open and closed, but not during the two problem-solving interactions. Similar relationships were found at F8/F7 (lateral frontal alpha), but not during eyes open. Thus left hemispheric activity in the prefrontal lobe had an influential, positive relationship with marital satisfaction, but only during baseline measurements while left hemispheric activity revealed a positive relationship with marital satisfaction for the mid-frontal portion of the brain during both the baseline (i.e., eyes closed) and problem-solving interaction. These findings tentatively suggest that the variation found between alpha waves present in the left hemispheric portion of the brain and marital satisfaction might be impacted by when it is measured. Regardless of the differences, these findings generally support the literature surrounding frontal left hemispheric alpha activation and positive emotions (Davidson, 1995; Davidson, Jackson, & Kalin, 2000).

Conversely, a significant negative relationship was seen with marital satisfaction and the observation of alpha asymmetry while the participants' eyes were closed at the Fp2/Fp1 location. Similar to Harmon-Jones (2004), this finding contradicts the mediation between trait anger and resting left frontal activity. In fact, this result alludes to greater right hemispheric activity being related to marital satisfaction when observed during eyes closed. It should be noted, though, that this result has similar limitation to other studies of only being observed during resting frontal asymmetrical activity (Amodio, et al., 2004).

In regards to the relationship between alpha asymmetry and Gottman's negative communicative techniques, the use of criticism, contempt, and stonewalling resulted in higher left hemispheric activity when measured during eyes open and closed. These findings were so robust that some reached significance even with the small sample size. For example, six of the nine correlations (i.e., between the three sites measured and the three variables of interest) resulted in p-values less than .05 when measured during eyes closed. This seemingly contradicts H7 (i.e., stonewalling being related to greater right hemispheric activity) for it suggests that the later expression and experience of negative communicative techniques relates to higher left hemispheric activity observed during baseline regardless of whether the behavior is approach or withdraw motivated.

Although not as significant of a finding, positive relationships were also found between alpha asymmetry and conflict techniques observed during both of the problem-solving interactions with particular strength found in the Fp2/Fp1 and F4/F3 locations. This supports the aforementioned findings of the use of critical and contemptuous techniques relating to greater left hemispheric activity in the frontal and mid-frontal locations. However, negative results were also found with the asymmetrical data observed during the two problem-solving interactions. These were consistently present at the mid-frontal locations and with the observation of stonewalling techniques (minus the lateral locations during the second problem-solving interaction) thus alluding to higher right hemispheric activity during the act of withdrawing from the situation. Overall, these findings suggest that withdrawal-related emotions relate to higher right hemispheric activity while demand-related emotions relate to higher left hemispheric activity when observed during the conflict interaction.

In general, the findings tended to support the motivational direction model's estimate that relatively left frontal activity parallels with approach-related behaviors and relatively right frontal activity results in withdrawal-related behaviors when measured during the conflict interaction (Coan & Allen, 2003). Conversely, the findings challenged the valenced model's estimation of left frontal activity being associated with positive emotions (Cacioppo, Tassinary, & Bernston, 2007). Rather these results seemed to support the supposition that when an individual feels like they were in an action-possible situation—rather than action-impossible—reveal higher left hemispheric activity regardless of whether or not the emotion present was viewed as positive or negative. This directly parallels with Lazarus' (1991) coping potential and Harmon-Jones, et al.'s (2003) observations of angry feelings.

CHAPTER IV: STUDY II

Challenges associated with understanding the relationship between marital

conflict and satisfaction includes limited attention to the linkage between communication,

individual differences, and relationship outcomes (Schneewind & Gerhard, 2002). In an

attempt to supplement the psychological factors in this biopsychosocial analysis, Chapter

IV will tackle the aforementioned dilemma by analyzing both intra- and interpersonal

variables to determine their predictive power of marital satisfaction. Stressing the

interpersonal aspect of this chapter, social exchange theory is incorporated as a

conceptual foundation for understanding these relationships; John Lee's (1973) six love

styles will also be described to supplement the psychological emphasis.

Conceptual Model for Study II

Social Exchange Theory

Social exchange theory was influenced by various disciplines, including

anthropology (e.g., Boehm, 1984; Mauss, 1954), social psychology (e.g., Thibaut &

Kelley, 1959), and sociology (e.g., Blau, 1955; Goulder, 1960; Homans, 1958) and can

be traced as far back as the eighteenth century to the works of economist Adam Smith

(Floyd & Wasner, 1994; Sprecher, 1998). The core concept of social exchange theory is

that when individuals engage in interactions, they evaluate the perceived costs and

benefits of the exchange (Blau; Homans; Molm, 2001). Of particular relevance to the

present study, the evaluation of the exchange between marital partners is perceived as

interdependent because one partner's behavior is contingent on the behaviors of the other;

this results in relationships that develop, weaken, and disintegrate due to an unfolding

social exchange process (Cropanzano & Mitchell, 2007).

Assumptions. Due to the interdisciplinary influences, the social exchange

framework is not a single theoretical model, but has evolved to include multiple perspectives from different viewpoints and fields. Three core assumptions seem to exist: individuals (1) influence the outcomes of their relationship through exchange processes, (2) are motivated to obtain more of the outcomes that they value and others control, (3) and are likely to maintain the placed value on the interaction over time (i.e., expect the same amount of reward/cost exchange during the next interaction). Thus, social behavior is a series of exchange processes in which individuals strive to make the most of their rewards and reduce their costs.

Furthermore, this theory suggests that opting to engage in an interaction means that the individual involved understands that the exchange will include the direct cost of executing it and the opportunity cost of foregoing other options. Since there is no way to guarantee an equivalent return for a favor, social exchange requires trusting others to discharge their obligations, to reciprocate, and to prove oneself as trustworthy (i.e., *norm of reciprocity*). In general, transactions generate obligations to reciprocate, but there is controversy about whether or not the act of reciprocating is always a rational choice (Blau, 1964; Emerson, 1976; Molm, 2001).

Exchanges that are mutually beneficial and characterized by the norm of reciprocity tend to motivate participants to interact with one another more. Conversely, exchanges that involve one or both parties perceiving that the costs of the exchange relationship outweigh the rewards are less likely to continue (Wayne & Ferris, 1990; Konovsky & Pugh, 1994). Over time, as the individuals fulfill what they view as mutual obligations, the commitment and trust in the relationship grows with each person consistently perceiving contributions to the exchange, loyalty for the other member in the exchange,

and mutual affection for one another (Blau, 1964; Dienesch & Liden, 1986).

Concepts. Thibaut and Kelley (1959) identified two key constructs: *comparison level for exchange* (CL) and *comparison level of alternatives* (CLalt). To begin, the CL looks at how the impact of previous experiences and expectations place value on current costs and rewards. For example, if an individual has been in a relationship that ended due to infidelity, they may perceive a phone call from a past relationship to their current partner as more of a cost than if they had not had that previous experience. Similarly, the CLalt assesses the costs and benefits of alternatives to their current situation. For example, a woman might be more likely to leave the relationship if there is another partner waiting for her.

The amount of dependency one individual has on another defines the magnitude of *power* in the relationship (Molm, 1990; Pfeffer, 1981); thus power and powerlessness can be seen in this theory as relationally based on the interactions between one or more individuals (Hodson, Roscigno, & Lopez, 2006). Power can be measured by understanding the behaviors over time and how the power strategies are cultivated and exercised as a means of controlling the interaction (Blau, 1964; Emerson, 1976). This concept has been expanded to include two characterizations: *frequency* and *distribution* (Molm). These qualities are determined by the amount and balance of the power during the interaction with a more equal distribution being an indicator of satisfaction.

The final construct—*reciprocity*—that will be discussed in this paper is based on the generally accepted standard for how people should behave in exchange situations and has already been highlighted in the assumptions of this theory. Although cultural differences do exist, reciprocity tends to follow the standard that when one individual

provides a benefit to another than the other is obligated to respond similarly (Gouldner, 1960). Other than the latter statement, the so-called norm of reciprocity has been steered by two additional rules: (1) it is an interdependent exchange where one interaction results in another and (2) is guided by the belief that people should receive what they have earned (Cropanzano & Mitchell, 2007; Gouldner).

Relevance to present investigation. Of particular value to the present study is the popularity of the social exchange theory in research surrounding attraction, love, and marriage (Aronson, Wilson & Akert, 1994; Nakoezny & Denton, 2008). Social exchange theory predicts that the extent to which perceived benefits are viewed as reciprocal would influence the permanency of the relationship (Gardner, Avolio, Luthans, May, & Walumba, 2005). Therefore, marriages should endure when positivity exists in the relationship, the obstacles to leaving the relationship are strong, and alternatives to the relationship are not appealing. Based on the aforementioned concepts, marital success or failure should depend on the couple's balance of rewards (e.g., dual parenting), costs (e.g., loss of finances), and a feeling of equal power in the relationship (see *Figure 4.1*).
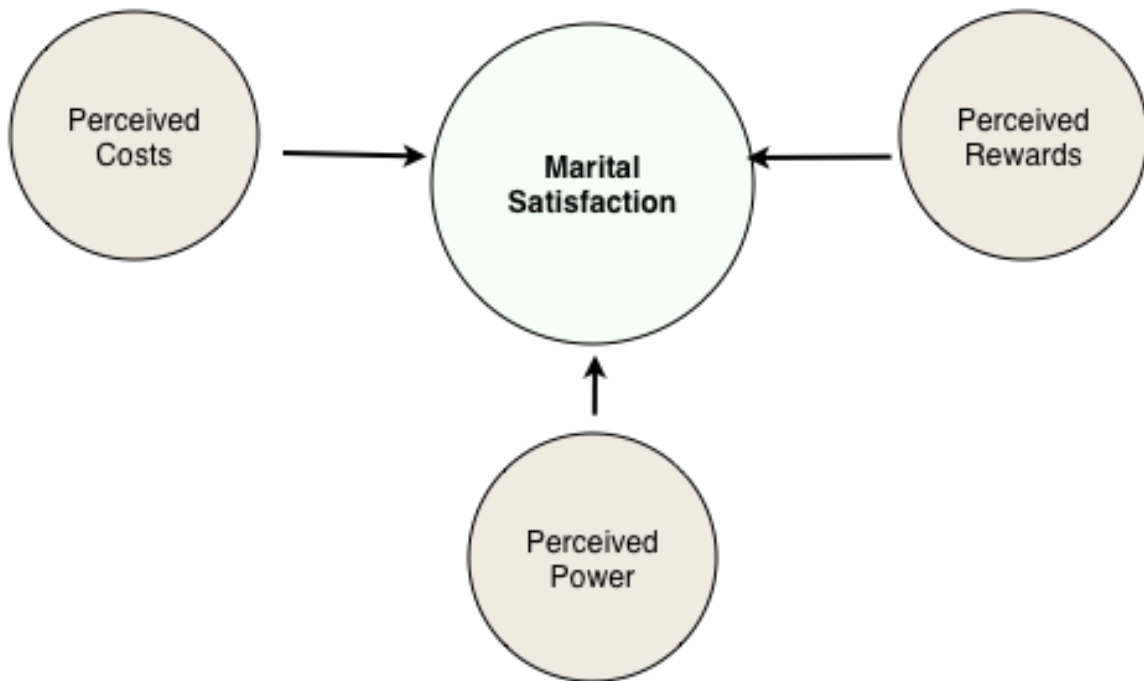
Figure 4.1: Authors' perception of the core concepts of Social Exchange Theory.

As with all theories, critiques of social exchange theory have been common. Of particular connection to the present study, though, are the challenges social exchange has had in understanding and predicting people's behaviors based on emotions; how do we truly assess the influence of emotions on people's interpersonal decisions? The present study will attempt to form this connection by looking at how an interaction in a marriage can portray power (i.e., interpersonal decisions using Gottman's Four Horsemen) and how that is influenced by the personal perception of what is desired in the relationship (i.e., interpreting emotional understanding with John Lee's six love styles).

Relevant Literature for Study II

As noted previously, scholars have suggested that the predictive power resulting from analyzing communication during conflict has been exaggerated (e.g., Bradbury, Rogge, & Lawrence, 2001; Fincham, 2003). Rodrigues, Hall, and Fincham (2006) stated that the "first step in integrating existing research and exploring mechanisms is to define

the relationship between intrapersonal variables and relationship-process variables (p. 33)." Of particular relevance to the present study is the individual's definition of what they desire in their relationship.

One of the most commonly used frameworks for studying the varying definitions of love is John Lee's (1973) love styles. Resulting from an analysis of over 4,000 written descriptions and 200 interviews with individuals, Lee quantified the definitions associated with love into three primary (*eros, ludus,* and *storge*) and three secondary (*mania, pragma,* and *agape*) love styles. The breadth of these love styles and their ability to encompass numerous other approaches that try to conceptualize love attests to the internal validity of this concept. For example, Hahn and Blass (1997) noted that connections could be drawn between Lee's *manic* (obsessive) and *agape* (selfless) love styles to Sternberg's (1987, 1988) *infatuation* and Clark and Mills' (1979) *communal love,* respectively.

Eros. The *eros* love style is characterized as a passionate love with deep—and sometimes immediate—physical attraction. *Eros* lovers tend to demonstrate heightened levels of intimacy, passion, and relationship satisfaction (Dais & Latty-Mann, 1987; Hendrick, Hendrick, & Adler, 1988; Levy & Davis, 1988; Middleton, 1993). This latter finding was so marked in one study that *eros* was termed as the "most consistent predictor of marital satisfaction," regardless of gender or ethnicity (Contreras, Hendrick, & Hendrick, 1996, p. 412).

Eros lovers, because of their high level of relationship investment and concern for partner well-being, also tend to exhibit healthy communication and self-disclosure skills (Hendrick & Hendrick, 1987c). One study found that *eros* lovers were more likely

than those who emphasize other love styles to utilize conflict resolution strategies that were integrative, obliging, and compromising in nature (Richardson, Hammock, Lubben, & Mickler, 1989). Those conflict resolution strategies, in turn, are associated with higher levels of relationship rewards, investments, and commitment (Morrow, Clark, & Brock, 1995).

Ludus.. *Ludus* lovers are often said to view relationships as a game, and are more comfortable pursuing or maintaining multiple relationships simultaneously than the other love styles (Lee, 1973). Non-married individuals and those that have not experienced many serious romantic relationships are more likely to be *ludus* lovers (Hensley, 1996; Montgomery & Sorell, 1997), and non-religious individuals tend to exhibit a *ludus* approach to love more than their religious counterparts (Hendrick & Hendrick, 1987b). *Ludus* lovers are more inclined to be deceptive and avoidant in their relationship communication than are those who accentuate any of the other five love styles; this includes using avoidance tactics such as withdrawal, denial of conflict, and general lack of concern for either the conflict issue or resolution (Hensley; Richardson, Hammock, Lubben, & Mickler, 1989).

Storge. Also known as the friendship style of love, *storge* lovers are typically characterized as being honest and loyal with a desire to develop a relationship rather than spontaneously fall into one (Hahn & Blass, 1997). The *storge* love style is negatively correlated with self-esteem, neuroticism, extraversion, and impulsivity, and is positively correlated with extraversion and conscientiousness (Mallandain & Davies, 1994; Middleton, 1993; White, 2003; White, Hendrick, & Hendrick, 2004; Woll, 1989). Religiosity was also found to positively correlate with *storge* love (Hendrick & Hendrick,

1987b), as was the relationship with satisfaction and intimacy (Aron & Westbay, 1995; Hendrick & Hendrick, 1993; Meeks, Hendrick, & Hendrick, 1998).

Agape. The secondary love styles are seen as combinations of the three aforementioned primary styles; *agape* is a mixture of the *storge* and *eros* love styles. According to Lee (1973), this style is characterized by enduring patience, gentle affection (i.e., *storge*), and the "disembodied ideal" of a perfect lover (i.e., *eros*; p. 162). The *agape* love style may best be described as a selfless approach to love, patterned by self-sacrificial actions on behalf of others with no thought of reciprocity (Hallett, 1989; Nygren, 1953). Lin and Huddleston-Casa (2005) found that religiosity is positively correlated with *agape* love, which they attributed to the idealistic associations many Christians may hold with the notion of self-sacrifice.

Agape lovers tend to be extremely forgiving, supportive, and committed lovers who readily set aside their own needs and desires in deference to those of their partners (Hahn & Blass, 1997). *Agape* love is positively correlated with relationship satisfaction and commitment (Aron & Westbay, 1995; Hendrick, Hendrick, & Adler, 1988; Lin & Huddleston-Casa, 2005), as well as intimacy and passion (Levy & Davis, 1988; Morrow, Clark, & Brock, 1995). These lovers are also more likely than those who accentuate other love styles to utilize obliging and compromising conflict strategies (Richardson, Hammock, Lubben, & Mickler, 1989), which is not surprising due to the high level of relationship investment and concern for the partner's well-being that is characteristic of *agape* lovers.

Pragma. *Pragma* lovers emphasize compatibility on characteristics such as religion, family values, and education. This style is typified by the rational decision-

making of whether to enter or remain in a relationship based on concerns such as personal and social compatibility (Hahn & Blass, 1997). *Pragma* love is seen as a hybrid of the concessions that a *storge* lover may make to enhance the stability of a relationship and *ludic* lovers' "detachment, manipulation, and coolheaded weighing of alternatives (Lee, 1973, p. 143)." Studies have found a positive correlation between *pragma* love and religiosity (Hendrick & Hendrick, 1987b), conscientiousness (White, 2003), and thought and delusional disorders (Arnold & Thompson, 1996), and a negative correlation between *pragma* love and openness (White, 2003).

Mania. The *mania* love style is characterized by a rapid progression to intimacy and the need for a great deal of attention and affection. Manic lovers want an all-encompassing union with their partners and are thus characterized as being emotional, obsessive, and jealous (Hahn & Blass, 1997). This style is seen as a combination of *eros* and *ludus;* the preoccupation with one's lover is similar to *eros* love, and the level of physical passion is comparable to *ludus* (Lee, 1973). Compared to those who accentuate other love styles, *mania* lovers tend to have lower self-esteem (Hendrick & Hendrick, 1986; Mallandain & Davies, 1994), more neuroticism, impulsivity, and emotionality (Mallandain & Davies; Middleton, 1993; White, 2003; Woll, 1989), and higher rates of mental health issues such as borderline personality disorder and depression (Arnold & Thompson, 1996).

<div align="center">

Research Hypotheses for Study II

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Although research on love styles has been prominent (for review, see Hendrick, 2004), little research has been done to examine how love styles influence the use of negative relational maintenance behaviors (Goodboy & Myers, 2010). In fact, most

studies that have analyzed psychological variables with relationship maintenance have

used the "Five Factor Mode of Personality" (i.e., neuroticism, extraversion, openness to

experience, agreeableness, and conscientiousness) and have disregarded configural or

typological approaches (Feeney & Noller, 1996; Furman & Flanagan, 1997). Only one

study known to the author has attempted to find this connection (i.e., Goodboy & Myers)

and, although limitations were prevalent, a relationship was found between the love styles

and negative relational behaviors such as jealousy, avoidance, and infidelity. Thus the

present study will attempt to fill this void by integrating the definition of love with

negative communicative patterns and marital satisfaction as shown in Figure 4.2.
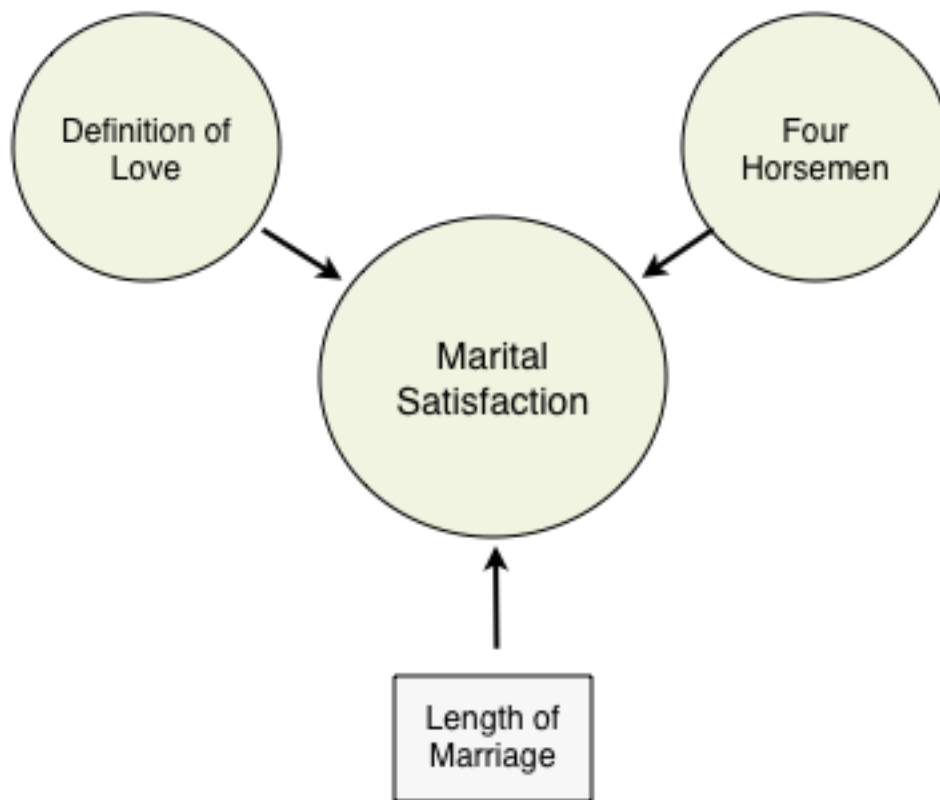
Figure 4.2. Author's diagram of variables of interest.

In particular, the following research question and hypotheses were posed:

RQ1: How do communication techniques used during marital conflict and the

definition of love impact marital satisfaction?

H1: Ludic and manic love styles will inversely relate to marital satisfaction.

H2: Agapic, erotic, storgic, and pragmatic love styles will relate positively to

marital satisfaction.

H3: Gottman's Four Horsemen will inversely relate to marital satisfaction.

H4: After controlling for length of marriage, Gottman's Four Horsemen and Lee's

love styles will have predictive power of marital satisfaction.

Method for Study II

Procedure

A survey was mailed to 300 individuals in randomly selected households from two large urban populations in Kentucky. The contact information was obtained from the United Postal Services for an additional cost. All respondents were over the age of eighteen and only those who had been married qualified for the study. No additional restrictions were placed on respondents based on their race, gender, or age.

The survey design followed the procedure suggested by Dillman, Smyth, and Christian (2009) in their book. To begin, a brief pre-notice letter was sent to the respondents a few days prior to the official invitation to participate. It noted that an invitation for an online questionnaire would arrive in a few days and that the person's response would be greatly appreciated (Appendix A). A questionnaire mailing was then sent that included a detailed cover letter explaining why a response is important, instructions for how to complete the questionnaire online, and information for how to win

$100 (Appendix B). A thank you postcard was sent one week after the questionnaire mailing. This mailing expressed appreciation for responding and indicated that if the questionnaire has not yet been completed it is hoped that it will be done soon (Appendix C). Finally, an invitation for a replacement questionnaire was sent to non-respondents 2 to 4 weeks after the original questionnaire mailing. It indicated that the person's questionnaire has not yet been completed and urged the recipient to respond (Appendix D). The response rate was lower than expected (13%) so additional recruitment was done by (1) sending a link to the survey to all Directors of Graduate Studies at a southeastern college requesting that they forward it to their students and (2) creating an event on Facebook inviting members to take the survey.

Sample

The three sampling techniques (i.e., mail, email, and Facebook) resulted in 653 individuals that were currently married. Of those participants, sixty-six (10.1%) had been married before with a majority (83.1%) of those on their second marriages. The average length of time that the participants stated knowing their current spouse was a little under 15 years (*Min.* = 1.00 years; *Max.* = 66.00 years; *SD* = 10.10 years) while the mean for being married was almost 11 years (*Min.* = 1.00; *Max.* = 64.00; *SD* = 10.03). A small minority (.5%) noted that they were in an open marriage (e.g., swingers) while a few others (1.9%) stated that they were homosexuals; the remaining participants categorized themselves as being in a heterosexual and monogamous relationship.

A majority of the participants were female (72.2%) and Caucasian (91.9%). Almost equal representation was found among Asians (3.3%), African Americans (2.5%), Hispanics (1.5%), and Native Americans (1.5%). Multicultural (1.5%) and "Other"

ethnicities (1.7%) were also presented as options though it should be noted that the participants were able to select more than one category. The average age of the participants was almost 37 years with a minimum of 22 and a maximum of 89 years.

Religiosity was assessed by how regularly the participants attended religious services. This category resulted in the most diverse of the demographics and included 44.2% that attended church once a week and almost equal variance between rarely (18.9%), once a month (15.6%), and never (13.0%). The remaining participants stated that they only attended services on important holidays (7.6%). Financial status was gauged by how comfortable the participants felt with their current financial situation; a majority felt secure (70%), followed by insecure (19.2%), very secure (8.8%), and very insecure (1.5%). Finally, of particular interest to the social chapter of this dissertation (i.e., Chapter V), it was asked what type of family the participants grew up in. A majority of the participants grew up in a nuclear household (81.8%), followed by only living with a mother (7.7%) and living with a mother and stepfather (4.3%). The remaining 11% was distributed among living with "other", father and stepmother, grandparents, father only, adopted parents, and extended family members.

Table 4.1. *Overall Demographics* (*n* = 653)

Variable	% (#)
Married Before	
No	89.9 (587)
Yes	10.1 (66)
Number of Times Married	
2	83.1 (54)
3	1.1 (7)
4+	.7 (4)
Type of Marriage	
Heterosexual	97.4 (630)
Homosexual	1.9 (12)
Open	.5 (3)

Table 4.1. *(continued)*

Variable	% (#)
Gender	
Female	72.2 (467)
Male	27.4 (177)
Religiosity (attend service)	
Once a week	44.2 (286)
Once a month	15.6 (101)
On important holidays	7.6 (49)
Rarely	18.9 (122)
Never	13.0 (84)
Ethnicity	
Caucasian	91.9 (591)
Asian	3.3 (20)
African American	2.5 (15)
Hispanic	1.7 (10)
Native American	1.5 (9)
Multicultural	1.5 (9)
Other	1.7 (10)
Financial Status	
Very Secure	8.8 (57)
Secure	70.0 (453)
Insecure	19.2 (124)
Very Insecure	1.5 (10)
Guardian	
Mother and Father	81.8 (529)
Mother	7.7 (50)
Mother and Stepfather	4.3 (28)
Other	2.0 (13)
Father and Stepmother	1.1 (7)
Adopted Parents	.8 (5)
Grandparents	.9 (6)
Father	.9 (6)
Extended Family	.5 (3)

	Mean	Min.	Max	SD
Years Married	10.78	1.00	64.00	10.03
Known Spouse	14.74	1.00	66.00	10.10
Age	36.81	22.00	89.00	10.99

Measures

   Gottman's marital typologies. The questionnaire used to analyze Gottman's

typologies and concepts was obtained from Holman and Jarvis' (2003) research on

premarital and marital couples. To begin interpreting the use of Gottman's Four Horsemen, the participants were given 11 questions to assess their use of contempt/defensiveness, criticism, and withdrawal. According to the authors of this questionnaire, contempt and defensiveness were combined because of the two being "different sides of the same coin (p. 273)." These items were given on a 5-point scale anchored by 1 = *never* and 5 = *very often*.

Furthermore, four short paragraphs characterizing the Gottman's marital types were provided (i.e., conflict avoider, volatile, validating, and hostile) in which the participants had to select the one they felt best fit their communication style. For example, the prototypical description of the conflict avoider type read as follows:

> I avoid conflict. I don't think there is much to be gained from feeling openly angry with others. In fact, a lot of talking about emotions and difficult issues seems to make matters worse. I think that if you just relax about problems, they will have a way of working themselves out.

Respondents were also instructed to rate on 7-point scales the extent to which each marital type corresponded to their actual conflict behavior.

After checking the reliability of Gottman's scale and subscales, question #17 (i.e., "I've found that during an intense argument it is better to take a break…") was found to be inconsistent in interpreting the contemptuous subscale (i.e., corrected item-total correlation was .002). Eliminating this question from the subscale increased Cronbach alpha from .509 to .658. Analyzing the reliability of the questions illustrating criticism resulted in a similar challenge; the question "let[ing] my partner have it full force" had a corrected item-total correlation of .249. Unfortunately, there were only three questions

assessing this variable and the change in Cronbach alpha was not much (i.e., .07) so it was decided to not eliminate this question. Cronbach alpha therefore resulted in .528 for criticism and .746 for stonewalling. The remaining ten questions of the overall scale produced Cronbach Alpha of .837.

Fitzpatrick's family communication patterns. The Revised Family Communication Patterns scale (RFCP; Ritchie & Fitzpatrick, 1990) measured participants' perceptions of family communication norms. RFCP was chosen over the original Family Communication Patterns (FCP) scale due to its better ability to "label and operationalize the underlying dimensions of conversation orientation and conformity orientation (Koerner & Fitzpatrick, 2002b, p. 42)." The scale is composed of 26 statements across two dimensions. Conversation orientation refers to the perception of "parental encouragement of conversation and the open exchange of ideas and feelings (Ritchie & Fitzpatrick, p. 525)." Conformity orientation, the second dimension, corresponds to the perception of "parental power to enforce the child's conformity to the parent (Ritchie & Fitzpatrick, p. 525)." Research supports the internal consistency and test-retest reliability of the scale (Ritchie & Fitzpatrick) with Cronbach alpha indicating a high internal consistency for both scales (Conversation Orientation = .92; Conformity Orientation = .82). In the current study, Cronbach alpha was even higher with .95 for the subscale *conversation* and .87 for *conformity*. The questions were also randomized (i.e., always appearing in a different order) on the online questionnaire to truly test validity.

Measure of relationship satisfaction. The Revised Dyadic Adjustment Scale (RDAS) was chosen over the Dyadic Adjustment Scale (DAS) because of its brevity (18 fewer items than the original DAS), multidimensionality, and its ability to distinguish

between distressed and non-distressed individuals and relationships (Busby, Crane, Larson, & Christensen, 1995). The RDAS consisted of 14 items that provided a total score (*RDASTotal*) and 3 sub-scores: dyadic consensus (*consensus*; measuring the degree to which couples agree on matters of importance to their relationship), dyadic satisfaction (*satisfaction*; measuring the degree to which couples are satisfied with their relationship), and dyadic cohesion (*cohesion*; measuring the degree of closeness and shared activities experienced by couples). RDAS scores ranged from 0-48 with "distressed relation" having the lowest score. The instrument has shown high internal consistency (alpha coefficient = 0.90) and construct validity (Busby et al.). In the present study, the following Cronbach alphas were found for both the subscales and for the overall questionnaire: *Consensus* = .77, *Satisfaction* = .82, *Cohesion* = .76, and *RDASTotal* = .87.

Measure of John Lee's love styles. The Love Attitudes Scale: Short Form was developed by Hendrick, Hendrick and Dicke (1998) to examine the six love types of individuals based on Lee's (1973) *Color of Love Theory*. LAS-Short form consists of 18 items with a 5-point Likert Scale (1 = *Strongly Agree*; 5 = *Strongly Disagree*). Three items in the scale represent each of the six major love styles: eros (passionate love), ludus (game-playing love), storge (companiate love), pragma (practical love), mania (possessive, dependent love), and agape (all-giving, selfless love). Prior reported test-retest reliabilities ranged from .60 and .78 (Hendrick & Hendrick, 1986) and alpha ranged from .62 and .88 (Hendrick, Hendrick, & Dicke). Similarly, Cronbach alphas for the present study resulted in the following: *Eros* = .71, *Ludus* = .57, *Storge* = .78, *Pragma* = .54, *Mania* = .63, and *Agape* = .68.

<center>**Results for Study II**</center>

Preliminary Analysis

There was some concern regarding demographic differences resulting from how the participants were recruited. To assist in furthering our understanding of possible variances, a one-way between-groups analysis of variance was conducted to explore the impact of recruitment method on years married, years knowing the spouse, and age while a chi-square was performed on gender. Subjects were divided into three groups according to the recruitment technique used for their participation (Group 1: Mail; Group 2: Facebook; Group 3: Email). There was a statistically significant difference at the $p < .05$ level in all three variables of interest between mailing the survey and Internet recruitment: (1) years married: F (2, 642) = 19.90, $p < .000$, (2) years known spouse: F (2, 640) = 14.86, $p < .000$, and (3) age in years: F (2, 640) = 27.49, $p < 0$. Despite reaching statistical significance, the actual difference in mean scores between the groups was not extremely large. The effect size, calculated using eta squared, was .05 for years married, .04 for years knowing the spouse, and .08 for age in years. Post-hoc comparisons using the Tukey HSD test indicated that the mean scores for Group 1 when compared to Groups 2 and 3 were significantly different on all three variables, but not between Group 2 and Group 3. Finally, the Chi-square test for independence with gender indicated significant associations between gender and recruitment method, X^2 (2, $n = 647$) = .243, $p = 38.23$, phi = .243.

Table 4.2. *Demographics of Participants Contacted by Email, Facebook, Mail, and Overall*

Variable	Email (n = 305) % (#)	Facebook (n = 303) % (#)	Mail (n = 45) % (#)	Overall (n = 653) % (#)
Married Before				
Yes	10.2 (31)	7.9 (24)	24.4 (11)	10.1 (66)
No	89.8 (274)	92.1 (279)	75.6 (34)	89.9 (587)
Number of Times Married				
2	83.3 (25)	83.3 (20)	81.8 (9)	83.1 (54)
3	13.3 (4)	8.3 (2)	9.1 (1)	1.1 (7)
4+	.3 (1)	8.3 (2)	9.1 (1)	.7 (4)
Type of Marriage				
Heterosexual	97.0 (291)	83.3 (20)	97.7 (43)	97.4 (630)
Homosexual	2.0 (6)	8.3 (2)	2.3 (1)	1.9 (12)
Open	1.0 (3)	0 (0)	0 (0)	.5 (3)
Gender				
Female	68.3 (205)	80.9 (245)	38.6 (17)	72.2 (467)
Male	31.0 (93)	18.8 (57)	61.4 (27)	27.4 (177)
Religiosity (attend service)				
Once a week	30.0 (90)	56.8 (172)	54.5 (24)	44.2 (286)
Once a month	17.0 (51)	14.9 (45)	11.4 (5)	15.6 (101)
On important holidays	8.0 (24)	6.3 (19)	13.6 (6)	7.6 (49)
Rarely	24.0 (72)	14.5 (44)	13.6 (6)	18.9 (122)
Never	20.7 (62)	6.3 (19)	6.8 (3)	13.0 (84)
Ethnicity				
Caucasian	87.7 (263)	95.0 (288)	88.9 (40)	91.9 (591)
African American	2.0 (6)	2.0 (6)	6.7 (3)	2.5 (15)
Hispanic	1.0 (3)	2.3 (7)	0 (0)	1.7 (10)
Native American	1.7 (5)	1.0 (3)	2.2 (1)	1.5 (9)
Asian	6.3 (19)	.3 (1)	0 (0)	3.3 (20)
Multicultural	2.3 (7)	.7 (2)	0 (0)	1.5 (9)
Other	2.0 (6)	1.0 (3)	2.2 (1)	1.7 (10)
Financial Status				
Very Secure	8.0 (24)	9.6 (29)	9.1 (4)	8.8 (57)
Secure	65.3 (196)	72.6 (220)	84.1 (37)	70.0 (453)
Insecure	23.0 (69)	17.2 (52)	6.8 (3)	19.2 (124)
Very Insecure	2.7 (8)	.7 (2)	0 (0)	1.5 (10)
Guardian				
Mother and Father	80.0 (240)	84.2 (255)	77.3 (34)	81.8 (529)
Mother	10.7 (32)	5.3 (16)	4.5 (2)	7.7 (50)
Mother and Stepfather	4.3 (13)	4.3 (13)	4.5 (2)	4.3 (28)
Father and Stepmother	.3 (1)	1.3 (4)	4.5 (2)	1.1 (7)
Adopted Parents	1.0 (3)	.7 (2)	0 (0)	.8 (5)
Grandparents	.7 (2)	1.0 (3)	2.3 (1)	.9 (6)

Table 4.2. *(continued)*

	Email (*n* = 305)	Facebook (*n* = 303)	Mail (*n* = 45)	Overall (*n* = 653)
Variable	% (#)	% (#)	% (#)	% (#)
Father	0 (0)	1.3 (4)	4.5 (2)	.9 (6)
Extended Family	.3 (1)	.7 (2)	0 (0)	.5 (3)
Other	2.7 (8)	1.3 (4)	0 (0)	2.0 (13)

	Email		Facebook		Mail		Overall	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Years Married	9.38	8.52	10.93	10.89	19.30	9.21	10.78	10.03
Known Spouse	13.58	8.59	14.79	11.06	22.30	9.76	14.74	10.10
Age	36.00	9.19	35.94	11.83	49.20	9.95	36.81	10.99

Furthermore, prior research has alerted the author to potential gender differences that could cause a spurious relationship. For example, agape has been found in at least one study to be more common in women (Davies, 2001) while manic lovers were found to be more likely men (White, Hendrick & Hendrick, 2004). Thus independent sample t-tests were performed to analyze the differences between the RDAS and LAS scales with gender. There were significant differences found with LAS scores for males and females on the variables *ludus* ($p < .05$), *pragma* ($p < .01$), and *agape* ($p < .001$). However, the difference in mean scores and the resulting eta squares for *ludus* and *pragma* showed that the differences were actually very small (mean difference = -.47 and .60, eta squared = .01 and .01 respectively). Conversely, the magnitude of the difference between the means of *agape* (mean difference = -1.61, 95% *CI*: -2.04 to -1.20) were moderately high (eta squared = .09). No significant differences were found between gender and RDAS scores.

Primary Analysis

To begin looking for a relationship between marital satisfaction, Lee's love styles, and Gottman's negative communicative techniques, a Pearson correlation matrix was performed with results presented in Table 4.3. In regards to the relationship found

between marital satisfaction (as measured by RDAS) and Lee's love styles, there was a strong, positive correlation between the *consensus* subscale and RDAS overall score with *eros* ($r = .51$ and $.56$, $p < .0005$ respectively). Thus high levels of marital happiness and the degree in which the couples agree on matters (i.e., *consensus*) were associated with higher scores on the passionate love style. Although not as powerful of a relationship, significant findings were also found between *eros* and the degree of closeness and satisfaction with the relationship ($r = .16$ and $.28$ respectively, $p < .01$).

The correlation between *agape* males and the RDAS also resulted in moderate relationships with *consensus* and *RDASTotal*: the more likely the male agrees with being a self-less lover, the higher the likelihood of marital happiness and consensus on important matters (i.e., $r = .38$ for *consensus* and $r = .41$ for *RDASTotal*). Similar findings were found with *agape* females, but were not as strong of a relationship with $r = .24$ for *consensus* and $.25$ for *RDASTotal*. Although the overall score from the RDAS was positively correlated with four of the six love styles (exception of *ludus*, $r = -.28$ and *pragma*, $r = -.02$), only *eros* and *agape* males were found to be a strong relationship by Cohen's (1988) standards ($r = .56$ and $.41$ respectively).

Table 4.3. *Pearson Correlations between Measures of Marital Satisfaction with Lee's Love Styles and Gottman's Four Horsemen* ($n = 572$)

Scale	Consensus	Satisfaction	Cohesion	RDASTotal
Eros	.51**	.16**	.28**	.56**
Ludus	-.23**	-.14**	-.18**	-.28**
Storge	.10*	.08	.09*	.14**
Pragma	.03	.07	-.05	-.02
Mania	.01	-.04	-.05	.01
Agape (Male)	.38**	.05	.18*	.41**
Agape (Female)	.24**	.11*	.08	.25**

Table 4.3. *(continued)*

Scale	Consensus	Satisfaction	Cohesion	RDASTotal
Contempt	-.45**	-.18**	-.27**	-.53**
Criticism	-.45**	-.09*	-.25**	-.56**
Stonewall	-.48**	-.22**	-.33**	-.60**

* $p < .05$, ** $p < .01$

The Pearson correlation matrix showed a stronger relationship between Gottman's Four Horsemen and RDAS. In general, the negative techniques described by John Gottman resulted in a moderate to strong negative relationship with the RDAS measurements; the exception was with the subscale *satisfaction.* Although a significant negative relationship was found between the Four Horsemen and this subscale, the relationship was weak (*contempt* = -.18, *criticism* = -.09, and *stonewall* = -.22).

Hierarchical multiple regression was used to assess the ability of John Gottman's Four Horsemen and John Lee's six love styles to predict marital satisfaction (as measured by *RDASTotal*), after controlling for the amount of time married. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedaasticity occurred. Length of marriage was entered in Step 1, explaining 1.5% of the variance in marital satisfaction. After the entry of Gottman's Four Horsemen at Step 2, the total variance explained by the model as a whole was 45.2%, $F(4, 566) = 29.40$, $p < .001$. The added variables explained an additional 43.7% of the variance in marital satisfaction, after controlling for years married, R squared change = .44, F change $(3, 566) = 150.23$, $p < .001$. In Step 3, Lee's love styles were entered with the total variance explained by the model as a whole being 54.6%, $F(10, 560) = 67.38$, $p < .001$. The added variables explained an additional 9.4% of the variance in marital satisfaction, after controlling for years married and Gottman's Four

Horsemen, R squared change = .10, F change (6, 560) = 19.45, $p < .001$. In the final

model, all of Gottman's Horsemen were statistically significant, with *criticism* (*beta* = -

6.79, $p < .001$) and *stonewall* (*beta* = -5.49, $p < .001$) showing higher beta levels than

contempt (*beta* = -.14, $p < .001$). Of John Lee's six love styles, only *eros* was found

significant ($p < .001$) with *beta* = 9.41.

Discussion for Study II

To begin fulfilling the need to understand the connection between intra- and

interpersonal variables to marital satisfaction, communicative techniques and one's

personal definition of love was compared to satisfaction in marriage. Assessing

interpersonal variables, significant negative relationships were found with Gottman's

negative communicative techniques (i.e., contempt, criticism, and stonewall) and marital

satisfaction. In particular, the overall score on the RDAS and the *consensus* subscale

resulted in the strongest relationships with Gottman's Four Horsemen. This finding

supports the existing literature surrounding a negative relationship between negative

communicative patterns, and marital happiness/consensus on important matters

(Gottman, 1994).

Further supplementing existing research (e.g., Hensley, 1996; Montgomery &

Sorrell, 1997), only the love style that views love as a game (i.e., *ludic*) resulted in a

significant negative relationship (i.e., -.28) with the overall score from the RDAS. The

findings for *eros*—the passionate love style—also produced non-surprising results of a

positive significant relationship with all variables used to assess marital satisfaction (e.g.,

Contreras, Hendrick & Hendrick, 1996). Thus the overall relationships found between the

love styles and marital happiness supported current research, but two styles resulted in

findings that differed from existing literature: pragma, $r = -.02$ and mania, $r = .01$. The lack of significant findings and negative relationship with the manic and practical love styles could possibly be due to the validity of the questionnaire (i.e., Cronbach alpha = .63 and .54 respectively). Thus hypotheses 1, 2, and 3 can generally be supported with some hesitation in regards to the pragmatic and manic love styles.

The present study's true contribution to current literature, though, lied in its ability to interpret the impact of both inter- and intrapersonal variables to marital satisfaction. In assessing the predictive power of Gottman's Four Horsemen (i.e., interpersonal) and Lee's love styles (i.e., intrapersonal) with marital satisfaction, a model that included the amount of time married, the use of Gottman's communicative techniques, and Lee's styles accounted for 54.6% of the variance in marital satisfaction. Although the overall model was found to be significant, only Gottman's Horsemen and *eros* were found to be independently significant in the final model. These particular findings were also supported by the significant relationships found in the aforementioned regression analyses.

Thus the resulting relationship between marital satisfaction and Lee's love styles support existing data, but the power of the relationship provides some hesitation in regards to the overall validity of this analysis. Nonetheless, the ability of Gottman's Four Horsemen and the love styles to account for a large amount of variance in marital satisfaction justifies the need to understand both the intra- and interpersonal variables present in married couples.

CHAPTER V: STUDY III

As illustrated by the literature review in Chapter II, analyzing communicative practices and parental influences on marriages have been one of the most frequently investigated aspects of marital satisfaction. Thus studies are beginning to incorporate both of these concepts by investigating the impact that family-of-origin communicative techniques have on marital conflict (see Ledbetter & Schrodt, 2008; Schrodt, 2009). For example, family-of-origin communication practices have been shown to relate to children's future use of conflict management techniques, relationship competence, and self-disclosure while providing a foundation for beliefs about love, relationships, and the social world (Roloff & Anastasiou, 2001; Whitton, Waldinger, Schulz, Allen, Crowell, et al., 2008). Koesten (2004) found that families who displayed strong conversation skills at home were more likely to show positive interpersonal skills—such as disclosing personal information or providing emotional support—in their romantic relationships. In addition, Bryant and Conger (2002) noted that a supportive family environment tended to increase the children's likelihood of being satisfied with and committed to marital relationships in adulthood. Therefore, it seems imperative to investigate the influence of family-of-origin communication on communicative practices used with current intimate partners.

Although these connections have been implied, they have yet to be confirmed (Yoshida & Busby, 2012). For example, Jacquet and Surra's (2001) observation of the influence of divorced parents on their children's later relationships had nebulous results due to the difference in what commitment-related messages were remembered. Nonetheless, this area is in desperate need for further development. In a decade review of the research surrounding marital satisfaction, understanding the connection between the

conflict in the family-of-origin and early in marriage was seen as the "promising elements of the broader conceptualization of marital conflict that is emerging (Fincham & Beach, 2010, p. 632)." Thus the present study will begin by introducing conceptual models that have previously been used to understand the connection between families-of-origin and later romantic relationships. Since marital communication was described in Chapter II, the next portion will be an expansion upon the relevant literature surrounding family communication.

Conceptual Model for Study III

Attribution Theory

One of the most prominent models used to look at communicative skills in marriages is that of relational attributes (Manusov, 2002; Neff & Karney, 2003). Attributions have been defined as the perceived meaning one partner assigns to the other partner's characteristics and behaviors (Johnson, Karney, Rogge, & Bradbury, 2001). Interested in how people process information to comprehend events, the study of attributes is unique in that it focuses on both the internal and external processes of understanding others' behaviors (Benson, Arditti, Reguero de Atiles, & Smith, 1992) and has commonly been used in explaining mental and communicative processes in relationships. In particular, attribution theory has looked at how the communication in marriage influences—or is influenced by—attributes formed by a partner about their spouse (Manusov & Spitzberg, 2008). For example, Friesen, Fletcher, and Overall (2005) found that positive attributes were independently related to the likelihood of forgiving the partner and, subsequently, relationship satisfaction.

According to this theory, it is assumed that people in unhappy relationships

consistently engage in self-serving attributions and develop negative thoughts about their partner's behavior that are very difficult to disconfirm (Fincham, Bradbury, & Scott, 1990). Conversely, relationship-enhancing attributes would be considered maximizing the positive behaviors of one spouse while minimizing the impact of negative (Holtzworth-Munroe & Jacobson, 1985). For example, Jacobson, McDonald, Follette, and Berley (1985) found that couples who were distressed tended to attribute their partner's negative behavior to internal factors while non-distressed couples were likely to attribute it to positive behaviors. Emphasizing the long-term influence of negative attributes, Grych and Fincham (1993) saw that the attributes individuals formed about a dissolved relationship were found to connect to future cognition, affect, and behavior about future relationships.

Overall, attribution theory is intended to predict behaviors and explain judgments. Due to this purpose, most uses of this theory have mistakenly assumed that the emotions and attitudes that follow from attributes influence behavior in a simple and straightforward manner (see Neumann, 2000). To clarify this association, contextual information prior to the event being observed needs to be included. As stated by Fincham (1985), "attributions made for a past event may be influenced as much by the event's perceived consequences as its perceived antecedents (p. 227)." Thus simply trying to connect the current behavior to present attributes is unrealistic and begs for inclusion of prior influences.

Multigenerational Family Theory

A theory that could greatly benefit the limitations of attribution theory is one that accounts for influential behaviors present in one's life before adulthood. A number of

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theorists have attempted to understand this connection by analyzing the multigenerational

transmission of family problems and how they influence the challenges developed

between a husband and wife (e.g., Boszormenyi-Nagy & Ulrich, 1981; Bowlby, 1980;

Kagan & Schlosberg, 1989; Framo, 1981). For example, Bowen's (1978)

multigenerational family theory questions why interfamilial relationships repeat patterns

of thinking, feeling, and acting across generations (Framo; Hoopes, 1987). This theory

postulates that individuals acquire a foundation for interpersonal relationships in their

families-of-origin because conflict in a family is "determined largely by the experience

each parent had growing up (Kerr & Bowen, 1988, p. 166)." Thus current marital and

family problems are seen as an extension of relationship challenges in the spouses and

their original families (Framo, 1976; Hoopes; Kerr & Bowen).

Although still unclear as to how the transfer of certain dysfunctional behaviors

occurs (Holman & Busby, 2011), the behaviors learned during childhood appear to be the

"most important influence" on later emotional and physical problems (Kerr & Bowen,

1988, p. 248). For example, Hoopes (1987) found that patterns observed in one's family-

of-origin govern later interactions, beliefs, and attitudes regardless of whether or not they

are functional or dysfunctional. Other challenges of this concept—such as understanding

the transmission of behavior—were noted early on by Bowen (1978) and still provides

problems for researchers today: (1) the transfer from the family-of-origin into adulthood

may not always be transmitted to the next generation, (2) the intensity of the problem

may decrease or increase over time, and (3) the challenges are usually difficult to

differentiate because they are one of many. For example, individuals recently married

have shown to experience family-of-origin influences unconsciously, with little intensity,

and without direct contact with their families-of-origin (Bartle-Haring & Sabatelli, 1998; Hoopes). With these limitations in mind, Wamboldt and Reiss (1989) concluded that—although the connection does seem probable—"what actually persists and precisely how later marital development is influenced remains unknown (p. 319)." Thus regardless of the multigenerational transfer of marital instability being well documented, further research is needed (Holman & Busby; Kunz, 2000; Wolfinger, 2000).

Prediction of Marital Outcome

With these and many other theories beyond the scope of this paper (e.g., attachment, social behavioral, etc.) looking at the connection between family-of-origin and later relationship satisfaction, it is difficult to aggregate all the information surrounding the resulting conclusions. Holman (2001) approached this challenge by postulating that four overall factors influence marital outcomes: social context, couple interaction, family-of-origin influences, and individual characteristics. By his definition, social context includes support received from society and is directly impacted by age, race, and gender. The influence of the family-of-origin involves the family structure and environment while the couple interaction includes "communication, consensus, similarity, and relationship identity (p. 142)." Finally, individual characteristics were defined as attitudes toward marriage and were also expanded upon in Study II. Although Holman's model is relatively new to the field, it does provide guidance on how to clarify the vast amount of information surrounding the connection between family-of-origin and later relationship satisfaction.

Relevance to the present study. With Holman's (2001) recent summary of current literature and the basis of both multigenerational and attribution theory, an

attempt will be made to supplement the existing research of how one's past influences present and future relationships in regards to communicative techniques (see Figure 5.1).
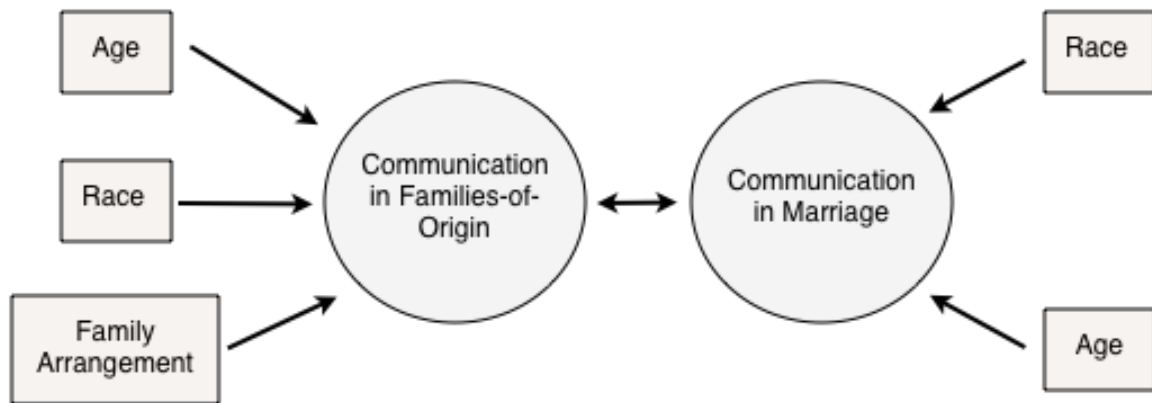
Figure 5.1. Author's speculated relationship between childhood and first marriage. In particular, the author posits that interactions between husbands and wives are influenced by the interactions experienced within their previous families-of-origins. Although young adulthood could easily be a period in time where an individual lives on their own before forming a union, the author still speculates that there is a relationship between these two stages that needs to be understood. The next portion of the present study will therefore be dedicated to expanding upon the research surrounding family communication.

Relevant Literature for Study III

Family Communication Patterns

Koerner and Fitzpatrick (2002) saw family communication as a product of cognitive processes that have evolved from previous family relationships and experiences. Individuals can hold distinct perspectives within the family, but these cognitive processes are based on expectations of interpersonal exchanges that mainly developed from familial interactions (Baldwin, 1992; Ritchie & Fitzpatrick, 1990). An expansion of this concept, later named *Family Communication Patterns* (FCP), isolates

dimensions of family communication by looking at the family relational formation and the cognitive structures that influence the relationship (Fitzpatrick & Ritchie; Koerner & Fitzpatrick, 2002b). Specifically, FCP looks at two dimensions of family communication: *conformity* and *conversation orientation* (Ritchie & Fitzpatrick).

Concepts. Built upon Ritchie's (1991) socio-orientation dimension that described the influence a parent has over their child, *conformity orientation* involves the communicative techniques used for parental power to maintain a homogenous atmosphere of views, rules, and behaviors (Fitzpatrick & Ritchie, 1994; Ritchie & Fitzpatrick, 1990). Thus the conformity dimension looks at the parental figures and their ability to maintain control and harmony within the family (Rueter & Koerner, 2008).

Families high in conformity encourage homogeny of ideas and values and are inclined to avoid conflict and confrontation (Koerner & Fitzpatrick, 1997, 2002c). This subgroup is typically less likely to vent feelings that differ from the values and views of the family (Koerner & Fitzpatrick, 1997). This inclination is so greatly present that a recent study found that children in families that fell in this category were more likely to develop anxiety when listening to complex and differing ideas when compared to those scoring low in conformity (Ledbetter & Schrodt, 2008). In an attempt to maintain harmony and decrease these negative feelings, interactions within high conforming families tend to follow the familial hierarchy (e.g., children obey parents and other adults) and abide by clear rules and expectations (Koerner & Fitzpatrick, 1997; Ledbetter & Schrodt).

Of particular relevance to the present study, conflict for those high in conformity is seen as particularly deviant of the family's norms because of its ability to openly

challenge the placed standards. For example, Koerner and Fitzpatrick (2002c) found that persons coming from families low in conformity reacted to conflict with "mutually supportive behavior" while those high in conformity often responded with "verbal aggressiveness (p. 247)" alluding to the particular challenge this sub-group has to disagreement (i.e., deviation to relational norms). To defer the potential of conflict in families high in conformity, family relationships are typically placed higher than personal interests, which can include sacrificing personal resources (e.g., money) and time for familial events (Koerner & Fitzpatrick, 2002b).

It should also be noted that families low in conformity tend to emphasize individuality within the family, which involves valuing differing views and beliefs (Koerner & Fitzpatrick, 1997). Support is typically given to the independence, equality, expression, and growth of each family member and the children are encouraged to question and challenge the existing family rules and standards (Koerner & Fitzpatrick, 1997, 2002b; Ledbetter & Schrodt, 2008). For example, those low in conformity were more likely to respond negatively to statements like "I was expected to obey my guardian(s)' rules" and "My guardian(s) sometimes become irritated with my views if they were different from theirs (Ritchie & Fitzpatrick, 1994)." This philosophy would also transfer onto physical items where personal resources and outside relationships were found to typically be valued above the family (Koerner & Fitzpatrick, 1997).

Conversation orientation. Built upon Ritchie's (1991) concept-orientation that described the parental support of open communication, *conversation orientation* refers to the degree that the family emphasizes and cultivates a positive atmosphere of independent exchanges of feelings and ideas (Fitzpatrick & Ritchie, 1994; Ritchie &

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Fitzpatrick, 1990). Thus the level of conversation orientation that a family holds accounts for the amount of vocalization regarding differing viewpoints and spontaneous interactions (Dumlao & Botta, 2000; Rueter & Koerner, 2008).

Families with a high degree of the conversation dimension are characterized by impulsive interaction, supportiveness, and open expression (Koerner & Fitzpatrick, 1997, 2002). Encouragement is given to controversial opinions and decisions that differ from the family's normative rules and viewpoints (Barbato, Graham, & Perse, 2003; Baxter, Bylund, Imes, & Scheive, 2005; Botta & Dumlao, 2002); thus children are expected to freely and recurrently express thoughts that stimulate new ideas (Ritchie & Fitzpatrick, 1990). Conversely, families with a low degree of conversation orientation tend to not share their opinions and emotions freely (Koerner & Fitzpatrick, 1997). Interaction is not viewed as essential for family functioning and, subsequently, communication occurs less often because of a constriction on the topics discussed (Keaten & Kelly, 2008).

According to Koerner and Fitzpatrick (2002b), the conversation and conformity dimensions interact with one another to form four family types: consensual, pluralistic, protective, and laissez-faire (see *Table 5.1*). Consensual and pluralistic families are both high on conversation orientation, but are high and low on conformity orientation respectively. Protective families are low on conversation orientation and high on conformity orientation, while laissez-faire families are low on both conversation and conformity orientations.

Table 5.1. *Visual Depiction of Fitzpatrick's Typologies.*

	High Conversation	Low Conversation
High Conformity	Consensual	Protective
Low Conformity	Pluralistic	Laissez-Faire

Consensual families. Scoring high on both orientations, consensual families attempt to balance both open communication and preserving the family's homogeneity (Fitzpatrick & Ritchie, 1994; Ritchie & Fitzpatrick, 1990). Thus a tension is typically formed between the attempt to equally stabilize the exploration of differing ideas and to agree with the familial views and values (Rueter & Koerner, 2008).

In general, consensual families value open communication when the beliefs are similar to those of the parental units (Dumlao & Botta, 2000); thus the parents of these families tend to be interdependent and hold traditional ideological beliefs about relationships (Fitzpatrick, 1988). A conflict within a consensual family can result in anything from verbal aggressiveness to compromising (Dumlao, 1997; Koerner & Fitzpatrick, 2002c). For example, unresolved conflict would be viewed as a potential threat to the well-being of the family and will result in the use of conflict resolution techniques. However, if the issue is viewed as unimportant to the family's well-being, consensual families tend to ignore the conflict. This is the result of an emphasis on the family rather than the individual (i.e., the conformity orientation) and the threats that open conflict can have on the family norms (Koerner & Fitzpatrick, 1997).

Pluralistic families. *Pluralistic* families support open communication (i.e., high on conversation orientation), but not compliance (i.e., low on conformity orientation); thus independence and expression of thoughts and ideas are encouraged in a supportive environment (Fitzpatrick & Ritchie, 1994). The parental units in a pluralistic family tend to hold non-traditional views and promote autonomy by supporting open and unrepressed communication in the younger generation (Fitzpatrick, 1988; Koesten, 2004; Rueter & Koerner, 2008).

High levels of the communication dimension characterize discussions that are open and unrestrained; this encourages both independence and communication competency (Fitzpatrick & Ritchie, 1994; Ritchie & Fitzpatrick, 1990). Thus pluralistic families view conflict as a continuous and non-threatening part of the family (Koerner & Fitzpatrick, 2002c). In fact, Koerner and Fitzpatrick (1997) state that pluralistic families "thrive on conflict" because controversy is an opportunity to further understand one's own views and personality (p. 62). With an emphasis on openly exchanging ideas without restrictions, it is not surprising that Dumlao (1997) saw pluralistic families using higher levels of collaborating and confronting techniques when compared to the other three family types.

Laissez-faire families. *Laissez-faire* families score low on both conversation and conformity orientations. In this typology, open communication and relational associations are discouraged between the upper and lower tiers of the family hierarchy (Fitzpatrick & Ritchie, 1994; Ritchie & Fitzpatrick, 1990); thus communication and interactions between the family members are limited (Dumlao & Botta, 2000; Huang, 1999; McLeod & Chaffee, 1972). In addition, laissez-faire families tend to have parental units with conflicting views and beliefs about how to form a cohesive family (Fitzpatrick, 1988).

With neither conformity nor conversation dimensions present, members of laissez-faire families tend to not vocalize their conflict (Koerner & Fitzpatrick, 1997; Rueter & Koerner, 2008). However, when conflict does occur, confrontation is a common technique used (Dumlao, 1997). This usually does not result in verbal aggressiveness for emotions tend to be low and support is not provided from other family members (Koerner & Fitzpatrick).

Protective families. Families high in conformity and low in conversation orientation are termed as *protective*. An emphasis is placed on agreement among family members and an attempt is made to restrict information gained from differing viewpoints (Chaffee, McLeod, & Atkin, 1971). Communication is therefore viewed solely as implementing and maintaining the family norms and harmonious relationships (Rueter & Koerner, 2008). Parents in protective families typically hold traditional family values and limit their sharing (Fitzpatrick, 1988). With the subsequent "overt compliance to parental authority", children are expected to follow and conform to their parents' views and rules (Fitzpatrick & Ritchie, 1994, p. 279).

Since there is an emphasis on conformity and not on communication, protective families tend to avoid conflict because of the feeling of threat to their family norms. When conflict does occur, the family does not have the communicative techniques to assist in resolving the problem because of the lack of practice in conflict resolution (i.e., a result of less communication). This attempt to maintain the family's homogeneity can therefore result in ignoring and prolonging family issues. Thus when a member of a protective family does express conflict, it is more likely to result in verbal aggressiveness when compared to the other family types (Koerner & Fitzpatrick, 1997).

Relevance to present study. Although families can show behaviors that fall into more than one family type, FCP can be used to further our understanding of the characteristics surrounding family communication, beliefs, and attitudes. Thus research surrounding FCP has been ubiquitous and includes topics such as conflict (Dumlao & Botta, 2000; Koerner & Fitzpatrick, 1997), family ritualizing (Baxter & Clark, 1996), affect on children's attitudes (Booth-Butterfield & Sidelinger, 1998; Fitzpatrick &

Koerner, 1996; Koerner & Fitzpatrick, 1997b), communication competence (Koesten & Anderson, 2004), reticence (Kelly, Keaten, Finch, Duarte, Hoffman, et al., 2002), and family cohesiveness (Schrodt, 2005).

Of particular interest to the present study, Gottman (1994) notes that his marital typologies (i.e., avoiders, validators, and volatiles) "parallel (p. 137)" with Fitzpatrick's (1988) work with family communication. Avoiders are similar to Fitzpatrick's laissez-faire because of their low level of conflict, concentration on conformity, and focus on maintaining satisfaction. Validating couples can also be viewed as similar to avoiders in that they engage in positive techniques, but differ in their amount of communication. This form of marriage seems to parallel more with Fitzpatrick's pluralistic typology where families do not necessarily conform to the guardian's views, but tend to openly communicate. Finally, Gottman's volatile couples are similar to Fitzpatrick's consensuals; these relationships tend to thrive on conflict and independence. Regardless of these noted similarities, unbeknownst to the author are any studies comparing the use of these communicative techniques in both the families-of-origin and marriages. This is particularly negligent due to the potential of Gottman and Fitzpatrick's "independent replication and corroboration" has to the current literature (Gottman, p. 137). Thus the present study asks whether or not a relationship could be found between how one handles conflict as a child to how one handles conflict in a marriage (see Figure 5.2)?
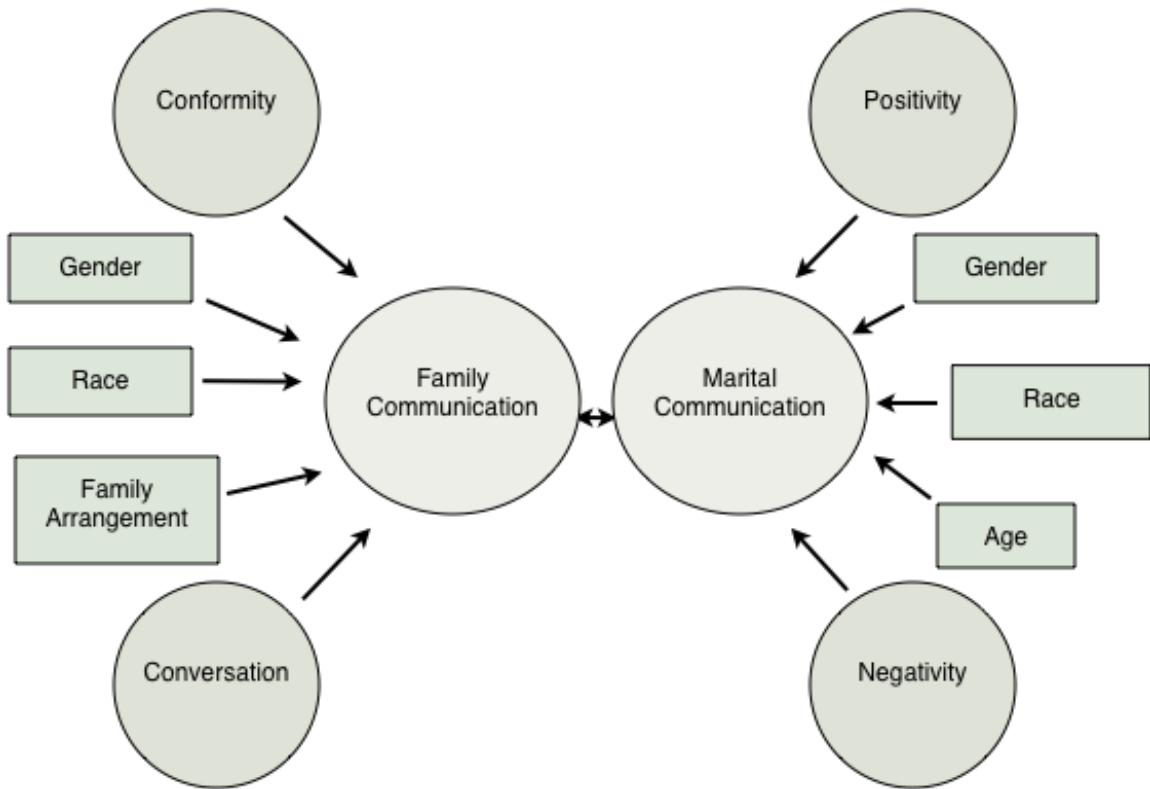
Figure 5.2. The author's proposed relationship between Gottman and Fitzpatrick's communication theories

Research Hypotheses for Study III

Regardless of the consistencies in finding a relationship between positive communicative patterns and marital satisfaction, unbeknownst to the author are any studies looking at the similar use of these communicative techniques in both the families-of-origin and marriages. Could a relationship be found between how one handles conflict as a child to how one handles conflict in a marriage? From a multigenerational and attributive perspective, the following research questions (RQ) and hypotheses (H) were posed:

RQ1: Is there a relationship between how one handles conflict as a child to how one handles conflict in a marriage?

H1: Conformity techniques in families-of-origin will inversely relate to negative communicative techniques in marriage while controlling for gender, ethnicity, family arrangement, and age.

H2: Communicative techniques used in families-of-origin will inversely relate to negative communicative techniques in marriage while controlling for gender, ethnicity, family arrangement, and age.

H3: Consensual families will be predictive of volatile couples while controlling for gender and age.

H4: Pluralistic families will be predictive of validating couples while controlling for gender and age.

H5: Laissez-faire families will be predictive of avoider couples while controlling for gender and age.

H6: Protective families will be predictive of validator couples while controlling for gender and age.

Method for Study III

Sample and Measures

The sample and measurements used for the present study were the same that were used in Study II. The participants were recruited through the mail, on a social website (i.e., Facebook), and through email. The three sampling techniques resulted in 653 individuals that were currently married. A majority of the participants were female (72.2%), Caucasian (91.9%), and were currently in their first marriage (89.9%). The average age of the participants was almost 37 years with a minimum of 22 and a maximum of 89 years. Of particular interest to the present study, it was asked what type of family the participants grew up in. A majority of the participants grew up in a nuclear

household (81.8%), followed by only living with a mother (7.7%) and living with a mother and stepfather (4.3%). The remaining 11% was distributed among the categories of living with "other", father and stepmother, grandparents, father only, adopted parents, and extended family members.

Among other measurements, the participants were given the questionnaires based on Gottman's marital typologies (Holman & Jarvis, 2003), Fitzpatrick's family communication patterns (Ritchie & Fitzpatrick, 1990), and marital satisfaction (RDAS; Busby, Crane, Larson, & Christensen, 1995). Gottman's measurement included four short paragraphs that characterized Gottman's marital typologies (i.e., conflict avoider, volatile, validating, and hostile). The participants were asked to choose which style they felt best fit their communication style and were also requested to rate on 7-point scales the extent to which each marital type corresponded to their actual conflict behavior. Fitzpatrick's Revised Communication Patterns scale (RFCP) consisted of 26 statements across two dimensions. Conversation orientation referred to the perception of "parental encouragement of conversation and the open exchange of ideas and feelings (Ritchie & Fitzpatrick, p. 525)." Conformity orientation, the second dimension, corresponded to the perception of "parental power to enforce the child's conformity to the parent (Ritchie & Fitzpatrick, p. 525)." Finally, the RDAS consisted of 14 items that provided a total score (*RDASTotal*) and 3 sub-scores: dyadic consensus (*consensus*; measuring the degree to which couples agree on matters of importance to their relationship), dyadic satisfaction (*satisfaction*; measuring the degree to which couples are satisfied with their relationship), and dyadic cohesion (*cohesion*; measuring the degree of closeness and shared activities

experienced by couples). RDAS scores ranged from 0-48 with "distressed relation" having the lowest score.

Results for Study III

Preliminary Analysis

To begin forming an understanding of the possible connection between Gottman and Fitzpatrick's typologies, cross-tabs were performed with each typology and participant demographics. Table 5.2 displays the number and percentage that characterizes each of Fitzpatrick's typologies. Although gender seems to be similarly dispersed between the pluralistic, protective, and laissez-faire typologies (i.e., 70-80% female), those that fell in the consensual family type were more equally separated by gender (i.e., 59.1% females). The majority of the participants in each typology were Caucasian though there is a surprisingly large minority of African Americans in the pluralistic family type (i.e., 5.0%) when compared to the other three (i.e., < 1.8%). In fact, the pluralistic and laissez-faire typologies were more varied in ethnicities when compared to consensual and protective.

Although the typologies were fairly equal in their family makeup, some additional differences were found that should be noted. Those that were raised by their grandparents seemed to be more likely to fall within the laissez-faire category (57.1%), though the number of participants that were in this category make it difficult to justify this finding (i.e., only seven participants stated that they were raised by their grandparents). However, the number of participants ($n = 536$) that were raised by both their mother and father was much larger. A majority of this subcategory did fall within the pluralistic or protective typology (68.5%) while the others were equally separated into consensual or laissez-faire.

Protective families had individuals that were, on average, younger and had known their

spouse and had been married for a shorter period of time when compared to the other

typologies. Conversely, pluralistics showed the highest averages on the aforementioned

variables when compared to the other typologies though the difference was slight.

Table 5.2 *Demographics on Fitzpatrick's Typologies*

Variables	Consensual (*n* = 110)	Pluralistic (*n* = 212)	Protective (*n* =234)	Laissez (*n* = 108)
	% (*n*)	% (*n*)	% (*n*)	% (*n*)
Gender				
Female	59.1 (65)	70.3 (149)	77.8 (182)	74.1 (80)
Male	49.9 (45)	29.7 (63)	22.2 (52)	25.9 (28)
Married Before				
Yes	10.0 (11)	12.3 (26)	8.5 (20)	10.2 (11)
No	90.0 (99)	87.7 (186)	91.5 (214)	89.8 (97)
Ethnicity				
Caucasian	92.0 (104)	85.0 (187)	93.3 (221)	85.6 (95)
African American	.9 (1)	5.0 (11)	.4 (1)	1.8 (2)
Hispanic	1.8 (2)	.9 (2)	.8 (2)	3.6 (4)
Native American	.9 (1)	1.8 (4)	1.3 (3)	1.8 (2)
Asian	1.8 (2)	3.6 (8)	2.1 (5)	3.6 (4)
Multicultural	1.8 (2)	2.3 (5)	.8 (2)	1.8 (2)
Other	.9 (1)	1.4 (3)	1.3 (3)	2.7 (3)
Guardian				
Mother and Father	75.5 (83)	79.7 (169)	84.6 (198)	79.6 (86)
Mother	9.1 (10)	8.5 (18)	6.4 (15)	8.3 (9)
Mother and Stepfather	5.5 (6)	5.2 (11)	3.8 (9)	4.6 (5)
Father and Stepmother	2.7 (3)	1.4 (3)	.4 (1)	0 (0)
Adopted Parents	.9 (1)	1.4 (3)	.4 (1)	1.9 (2)
Grandparents	.9 (1)	.5 (1)	.4 (1)	3.7 (4)
Father	1.8 (2)	.9 (2)	.4 (1)	.9 (1)
Extended Family	0 (0)	.9 (2)	.4 (1)	0 (0)
Other	3.6 (4)	1.4 (3)	3.0 (7)	.9 (1)

	Consensual		Pluralistic		Protective		Laissez	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Years Married	11.88	11.1	12.52	10.7	8.97	8.6	10.84	10.3
Known Spouse	16.08	11.1	16.35	10.5	13.09	9.1	14.22	10.0
Age	37.39	11.1	39.34	12.0	34.57	9.3	36.84	11.7

Table 5.3 shows the demographic findings separated by Gottman's typologies. Although there were consistently more females than males across all typologies, volatile and hostile showed a higher likelihood of being female than male (i.e., 78.0% and 80.0% females respectively). Similar to Fitzpatrick's typologies, not much variance was found in regards to the family's makeup. An interesting percentage was seen, though, with those being raised by their mother and stepfather; compared to the other typologies, a larger percentage of those in this family makeup were hostile. This finding was also seen with those that were raised by extended family members (i.e., 3.3% compared to .5% or less). Avoiders were found on average to be older, known their spouse, and been married longer when compared to the other typologies. Conversely, volatiles were the youngest and had known and been married for the shortest period of time.

Table 5.3 *Demographics on Gottman's Typologies* (*n* =502)

Variables	Avoider (*n* = 103) % (*n*)	Validate (*n* = 227) % (*n*)	Volatile (*n* =200) % (*n*)	Hostile (*n* = 60) % (*n*)
Gender				
Female	66.0 (68)	67.4 (153)	78.0 (156)	80.0 (48)
Male	34.0 (35)	32.6 (74)	22.0 (44)	20.0 (12)
Married Before				
Yes	11.7 (12)	10.1 (23)	8.5 (17)	11.9 (7)
No	88.3 (91)	89.9 (204)	91.5 (183)	88.3 (53)
Ethnicity				
Caucasian	82.5 (94)	90.1 (210)	87.4 (181)	92.2 (59)
African American	3.5 (4)	.9 (2)	2.9 (6)	1.6 (1)
Hispanic	.9 (1)	1.3 (3)	2.9 (6)	0 (0)
Native American	0 (0)	1.7 (4)	.5 (1)	4.7 (3)
Asian	3.5 (4)	2.1 (5)	2.9 (6)	0 (0)
Multicultural	.9 (1)	1.3 (3)	1.4 (3)	1.6 (1)
Other	0 (0)	2.6 (6)	1.9 (4)	0 (0)
Guardian				
Mother and Father	82.5 (85)	81.1 (184)	81.0 (162)	76.7 (46)
Mother	8.7 (9)	7.5 (17)	9.0 (18)	6.7 (4)
Mother and Stepfather	5.8 (6)	4.8 (11)	2.5 (5)	8.3 (5)

Table 5.3 *(continued)*

	Avoider (*n* = 103)	Validate (*n* = 227)	Volatile (*n* =200)	Hostile (*n* = 60)
Variables	% (*n*)	% (*n*)	% (*n*)	% (*n*)
Father and Stepmother	1.0 (1)	.9 (2)	1.5 (3)	0 (0)
Adopted Parents	0 (0)	.9 (2)	1.5 (3)	0 (0)
Grandparents	0 (0)	1.8 (4)	.5 (1)	1.7 (1)
Father	0 (0)	.9 (2)	1.5 (3)	1.7 (1)
Extended Family	0 (0)	0 (0)	.5 (1)	3.3 (2)
Other	1.9 (2)	2.2 (5)	2.0 (4)	1.7 (1)

	Avoider		Validate		Volatile		Hostile	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Years Married	13.31	10.7	11.15	10.7	8.92	8.6	11.87	9.6
Known Spouse	16.88	10.5	15.18	11.0	12.8	8.4	15.9	10.2
Age	39.77	12.2	37.92	11.5	34.12	9.1	37.38	10.92

Primary Analysis

To assist in answering the research question and hypotheses, initial statistical

procedures were performed to assess the general relationship between Gottman's marital

typologies and Fitzpatrick's families-of-origin variables.

RQ1: Is there a relationship between how one handles conflict as a child to how

one handles conflict in a marriage?

To begin to answer whether or not there is a difference between the communicative

techniques used in marriage and those in childhood, a one-way between-groups

multivariate analysis of variance test was performed between Gottman (i.e., *typology*) and

Fitzpatrick's (i.e., *conformity* and *conversation*) variables. Preliminary analyses were

conducted to ensure that there were no violations of assumptions.

There was a statistically significant difference between Gottman's typologies with

Fitzpatrick's *conformity* and *conversation* variables, $F (3, 586) = 7.10$, $p = .000$; Wilks'

Lambda = .93; partial eta squared = .04. An inspection of the mean scores indicated a

fairly large variance between the typologies and the *conversation* variable. *Hostile*

resulted in a mean score of 48.07 while *volatile* resulted in ten points less (*M* =38.35).

The findings with *conformity* were not as significant, but also showed variance; *hostile*

resulted in a mean score of 28.85 while *volatile* was 31.62.

Table 5.4 *Descriptive Differences between Gottman and Fitzpatrick Typologies*

Variables	Conversation		Conformity	
	Mean	SD	Mean	SD
Avoider	46.4	11.6	29.8	6.5
Validate	40.4	12.8	31.4	7.2
Volatile	38.4	12.4	31.6	7.7
Hostile	48.1	14.0	28.9	7.5

With a general understanding of the differences, prediction models were formed

to assess the relationship between childhood and marital communicative techniques.

> H1: Conformity techniques in families-of-origin will inversely relate to negative
>
> communicative techniques in marriage while controlling for gender, ethnicity,
>
> family arrangement, and age.

> H2: Communicative techniques used in families-of-origin will inversely relate to
>
> negative communicative techniques in marriage while controlling for gender,
>
> ethnicity, family arrangement, and age.

The outcome variable for the first regression was *conformity* (from the RFCP) with

predictor variables *contempt*, *criticism*, and *stonewall* (from Gottman's questionnaire)

while controlling for *gender*, *guardian*, *ethnicity,* and *age*. To completely understand the

prediction ability, a hierarchical regression approach was taken starting with the

controlled variables and ending with Gottman's negative communicative practices.

Preliminary assumption testing was conducted with no serious violations noted.

Gender, ethnicity, family arrangement, and age were entered at Step 1, explaining 2.8% of the variance in the amount of conformity used with the family. After the entry of Gottman's communicative techniques at Step 2, the total variance explained by the model as a whole was 6.9%, $F (7, 597) = 6.29$, $p < .001$. The Gottman measure explained an additional 4.1% of the variance in Fitzpatrick's *conformity* variable, after controlling for age, ethnicity, family arrangement, and gender, R squared change = .04, F change (3, 597) = 8.6, $p < .001$. Only two variables were found to be statistically significant in the final model, with *stonewall* recording a slightly lower beta value (*beta* = -.14, $p < .05$) than age (*beta* = -.14, $p = .001$).

Hypothesis 2 was approached in a similar way as the previous. Gender, family arrangement, ethnicity, and age were entered at Step 1, explaining 4.3% of the variance in the amount of communication used with the family. After the entry of Gottman's communicative techniques at Step 2, the total variance explained by the model as a whole was 10.8%, $F (7, 597) = 10.32$, $p < .001$. The Gottman techniques explained an additional 6.5% of the variance in Fitzpatrick's conversation variable, after controlling for age, ethnicity, family arrangement, and gender, R squared change = .11, F change (3, 597) = 14.42, $p < .001$. In the final model, only three variables were statistically significant, with *stonewall* recording a slightly higher beta value (*beta* = -.178, $p < .05$) than *age* (*beta* = .165, $p < .001$) and *contempt* (*beta* = -.032, $p < .05$).

H3: Consensual families will be predictive of volatile couples while controlling for gender and age.

H4: Pluralistic families will be predictive of validator couples while controlling for gender and age.

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H5: Laissez-faire families will be predictive of avoider couples while controlling for gender and age.

H6: Protective families will be predictive of validator couples while controlling for gender and age.

To form Fitzpatrick's typologies, new variables were produced based on the answers to the RFCP. Similar to Koerner and Fitzpatrick's (1997) technique, the typologies (i.e., *laissez faire, pluralistic, consensual,* and *protective*) were produced based on median splits formed from Fitzpatrick's *conversation* and *conformity* data. For example, those that fell below the median on both *conversation* and *conformity* were placed in the laissez-faire category (i.e., making it a dichotomous variable). As a reminder, the variables for Gottman's typologies (i.e., *avoider, validate, hostile,* and *volatile*) were based on respondents rating on 7-point scales the extent to which each typology corresponded to their actual conflict behavior.

With one dichotomous variable (i.e., Fitzpatrick's typologies) and multiple predictor variables (i.e., Gottman's typologies, *gender*, and *age*), logistical regressions were performed to assess the aforementioned hypotheses. Hypothesis 3 resulted in numerous ZResid values that questioned the data found with the variable *consensual* (i.e., greater than 2.50). After further review, there was a significant difference found with gender on those that were consensual and those that were not ($F = 40.59$, $p = .000$). In addition, the "outliers" with high ZResid values were all found to be heterosexual Caucasian women in their first marriage; all but one grew up in a nuclear household. Although it is difficult to say which factor directly impacted this discrepancy in findings, the twenty-seven outliers make the assessment of H3 difficult to validate.

The resulting chi-squares from the other three hypotheses supported the particular ability of the models in H4 and H6 to distinguish between the respondents in Fitzpatrick's typologies (x^2 = 17.18 and 30.24, $p < .001$ respectively), but not for H5 with the variables *laissez-faire* and *avoider* [x^2 (3, 591) = .797, $p = .85$]. As shown in Table 5.5, the predictive ability of all the variables in the model were significant for H6 with *gender* being the strongest predictor with its odds ratio of 1.55 followed by *validator* 1.19. Therefore, the odds of being a part of a protective family is 1.19 times higher for someone that uses the validating technique in their marriage than for a person who is not with all other factors being equal.

Table 5.5 *Logistic Regression Predicting Fitzpatrick's Typology*

Variables	Pluralistic			Laissez-faire			Protective		
	B	p	Odds Ratio	B	p	Odds Ratio	B	p	Odds Ratio
Gottman Typology	-.09	.13	.92	-.03	.62	.97	.18	.00	1.19
Gender	-.07	.74	.94	.18	.48	1.19	.44	.03	1.55
Age	.03	.00	1.03	.00	.94	1.00	-.03	.00	.97

Discussion for Study III

The literature associated with marital satisfaction includes potential demographic differences between those that are happily married and those that have divorced (Holman, 2001). By comparing Gottman and Fitzpatrick's typologies to known demographics, further clarity was seen between communicative techniques and individual characteristics in married couples. For example, while males were more evenly dispersed between the four Fitzpatrick typologies, females were less likely to characterize their family-of-origin communicative patterns as consensual and laissez-faire. This alludes to a childhood environment that promoted either conformity or communication, not both. Supporting the literature surrounding racial differences, a large minority of pluralistic families (i.e., high

in conversation, but low in conformity) were African Americans. Pluralistics were also seen to be older, known their partner, and been married for a longer period of time than the other three typologies; thus alluding to a strong relationship between this form of family communication and later marital satisfaction. Protective families (i.e., low in conversation and high in conformity), on the other hand, were more likely to be younger, known their partner, and been married for a shorter period of time. Furthermore, this typology differed from the others in that it showed a higher percentage of being female (77.8%), currently in first marriage (91.5%), and being raised by both a mother and father (84.6%). This finding—particularly the youthfulness of this typology—begs for longitudinal research to question whether protective characteristics evolve to other typologies over time.

As for Gottman's typologies, interesting differences were also noted. Avoiders were seen as being older, known their spouses longer, and been married for a longer period of time while volatiles resulted in the opposite findings (i.e., younger, etc.). Once again, these results are suggesting a need for a longitudinal analysis of the evolvement of these typologies; do volatiles develop into avoiders over time? The use of unhealthy communicative techniques (i.e., hostile) were likely to be Caucasian females that had not been married before and were raised by both their mother and father, but these characteristics were similar to the other three typologies. Noted differences were seen, though, with the variables *guardian* and *ethnicity*. Although hostiles were likely to be Caucasian, a significant minority was found to be Native American (i.e., 4.7%). Furthermore, 23.3% of those that were found to be hostile were not raised by both a mother and father; a large minority was raised by their mother and stepfather (i.e., 8.3%).

This latter finding is particularly relevant to the study's question of whether family and marital communication are linked by suggesting that challenges in using positive communication in marriage may be related to not being raised in a nuclear household.

To further the understanding of the linkage between Gottman's typologies and Fitzpatrick's concepts, a MANOVA analysis resulted in statistical differences between the family-of-origin's amount of communication and conforming when compared to positive and negative communicative techniques used during marriage. In fact, hostile couples were more likely to be high in communicative techniques and low in confirmatory (i.e., pluralistic) during their childhood than the other three typologies. Subsequently, the suggested connection between pluralistic families and hostile couples was supported by the similarities in demographics. For example, both showed a high percentage of participants that were not raised by both their mother and father (i.e., > 23%) and were only one or two years different on average years married (12.5 and 11.8), known spouse (16.4 and 15.9), and age (39.3 and 37.4).

The attempts to predict marital communication using Fitzpatrick's typologies were not as successful as the aforementioned results though still noteworthy. While controlling for demographical differences (i.e., gender, ethnicity, age, and family arrangement), Gottman's communicative techniques accounted for 4.1% of confirmatory usage in families and 6.5% of the amount of conversation in families. Although significant (i.e., $p < .001$), only *contempt*, *age,* and *stonewall* were found to be particularly significant contributors to the final predictive models. In addition, only one of Gottman's typologies (i.e., validator) were shown to significantly relate to Fitzpatrick's (i.e., protective). Thus the contribution of Gottman's techniques to

Fitzpatrick's seems to be present, but clarification is greatly needed as to why certain

communicative techniques and typologies are showing a relationship and not others.

Chapter VI: DISCUSSION

Research supports the relationship between marital satisfaction and one's wellbeing (Proulx, Helms, & Buehler, 2007), though why and how it occurs is still unclear (Gottman, Swanson, & Swanson, 2002). In response, this dissertation was meant to synthesize theoretical, empirical, and clinical efforts in the family sciences by accounting for the complex interplay between biological, psychological, and social facets. By adopting a biopsychosocial framework, an effort was made to dispel current misunderstandings about the predictive and independent role that biological, social, or psychological factors have to marital satisfaction (Calkins, 2011). Furthermore, the use of social neuroscientific techniques helped to clarify the "study of social networks, the individuals that create them and the neural, hormonal, and genetic mechanisms that allow for their existence (Norman, Cacioppo, & Bernston, 2009, p. 60)."

Summary of Findings

The first study focused on why and how marital conflict relates to negative mental and physical health for both spouses by analyzing physiological and neurological functions during a conflict interaction between married couples. Similar to other studies finding relationships between HRV and marital satisfaction (e.g., Smith et al., 2004; Rozanski & Kubzansky, 2005; Stanton et al., 2007), the results of study one revealed that measurements of normal-to-normal heart rate intervals and rhythms regulated by the parasympathetic system accounted for a small, but noteworthy amount of variance of the use of negative communicative techniques. This was further supported with the findings from a hierarchical regression model that when including the HRV variables—after incorporating both the type of previous interaction and negative communicative techniques—accounted for an additional 9.1% variance in marital satisfaction.

In addition to looking at the relationship between biological factors and marital satisfaction, study one also focused on the influence of prior socializing: in particular, the impact of having a warm or neutral conversation with one's spouse prior to a problem-solving interaction. When comparing the two groups based on their first discussion (i.e., warm or neutral), a significant difference was found in regards to the participants' sympathetic activity (i.e., LF/HF) during the problem-solving discussion. In particular, heightened sympathetic activity was seen with those that engaged in a neutral conversation while those discussing how they met were less likely to have a fight-or-flight response during the problem-solving discussion. Furthermore, a hierarchical regression model revealed that simply incorporating the type of interaction prior to the problem-solving discussion accounted for very little of the variation in marital satisfaction (i.e., $r^2 = .005$). These results support the need for incorporating both social and biological factors when attempting to understand the differences between those that are happily married and those that are not.

Furthermore, this study included neurological analysis to supplement research on the relationship between biology and marital satisfaction. In particular, an attempt was made to clarify the differences between the valance and motivation associated with anger. Similar to current literature (e.g., Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Oatley & Jenkins, 1996), greater activity in the left frontal cortical region tended to correlate with individuals satisfied with their marriages. Variation was found, though, with the practice of stonewalling or the attempt to withdraw oneself from the interaction (i.e., higher right hemispheric activity was found). Thus these results seemingly support the view that when an individual feels like they are in an action-possible situation—rather

than action-impossible—higher left hemispheric activity is produced regardless of whether or not the emotion present is viewed as positive or negative.

Study two was dedicated to supplementing the literature surrounding marital satisfaction by analyzing individual differences with communicative techniques and relationship outcomes. Based on social exchange theory and utilizing John Lee's six love styles, the definition of love tended to relate to the rewards, costs, and power perceived in marriage. For example, in assessing the predictive power of negative communication (i.e., interpersonal) and one's definition of love (i.e., intrapersonal) with marital satisfaction, a model that included the amount of time married, the use of Gottman's communicative techniques, and Lee's love styles accounted for 54.6% of the variance in marital satisfaction. Thus incorporating negative communicative techniques and an understanding of what is desired in a relationship accounts for a large amount of variance in marital satisfaction. This study justified the need to include both intra- and interpersonal variables present in married couples when attempting to understand marital satisfaction.

Although analyzing communicative practices and parental influences on marriages have been one of the most frequently investigated aspects of marital satisfaction, this connection has also yet to be confirmed (Yoshida & Busby, 2012). This is particularly detrimental due to the understanding of this linkage being "promising elements of the broader conceptualization of marital conflict (Fincham & Beach, 2010, p. 632)." Thus study three asked whether or not a relationship could be found between how one handles conflict as a child to how one handles conflict in a marriage by focusing on the relationship between Fitzpatrick's family communication concepts (i.e., conformity

and conversation) and typologies with Gottman's marital communication concepts (i.e., criticism, contempt, stonewall, and defensiveness) and typologies.

Although the attempts to predict marital communication using Fitzpatrick's typologies were not particularly successful, these results were noteworthy due to the lack of any research—known to the author—attempting to test the relationship. Nonetheless, by performing a hierarchical regression, Gottman's communicative techniques accounted for 4.1% of confirmatory usage in families and 6.5% of the amount of conversation in families while controlling for demographical differences (i.e., gender, ethnicity, age, and family arrangement). Thus the contribution of Gottman's techniques to Fitzpatrick's seems to be present, but clarification is greatly needed as to why certain communicative techniques and typologies are showing a relationship and not others.

In addition to the aforementioned revelation, particular enlightenment was found with the analysis of the relationship between Gottman's "unhealthy" typology (i.e., hostile) and Fitzpatrick's pluralistic typology (i.e., high in conversation, but low in conformity) where hostile couples were more likely to be pluralistic during their childhood than the other three typologies. Subsequently, the connection was also shadowed by similarities in demographics where both typologies included a high percentage of participants that were not raised by both their mother and father (i.e., > 23%) and were only one or two years different on average years married (12.5 and 11.8), known spouse (16.4 and 15.9), and age (39.3 and 37.4). This possibility of a connection between Fitzpatrick's and Gottman's analysis of communication styles present in the family and later relationships could greatly benefit therapists and educators by providing guidance for intervention.

Significance of Study

The purpose of the dissertation was to: (1) advance current knowledge surrounding interpersonal relationships, (2) expand upon a rarely used research procedure for analyzing relationships, (3) elucidate marital conflict for therapists and educators working with couples, and (4) build upon the extant literature across numerous disciplines. Researchers have tended to agree that to advance the current knowledge surrounding interpersonal relationships we must clarify the vast amount of information already surrounding marital satisfaction (Fincham & Beach, 2010). Rodrigues, Hall, and Fincham (2006) recommended that the first step that should be taken is "to define the relationship between intrapersonal (sociodemographic and individual difference) variables and relationship-process variables (p. 33)." Study two was dedicated to fulfilling this need by integrating communicative techniques, demographical differences, and the definition of love to marital satisfaction.

In addition to Rodrigues et al.'s (2006) statement of need, Fincham and Beach (2010) also presented the need of understanding the connection between the conflict in the family-of-origin and early in marriage. This desire was supported by numerous other researchers who found a suggestive relationship between communicative practices used in one's family-of-origin and future use of conflict management techniques, relationship competence, and self-disclosure (Roloff & Anastasiou, 2001; Whitton, Waldinger, Schulz, Allen, Crowell, et al., 2008). Thus study three incorporated Fitzpatrick's research on family communication and Gottman's marital typologies—based on marital communication—in an attempt to fulfill this recommendation.

In addition, existing literature shows that family researchers can no longer ignore the multiple factors that intervene between genetic and behavioral phenomena. To evolve theoretical, empirical, and clinical efforts in the family sciences, an effort was also made in study one to understand the complex interplay between biological, psychological, and social facets by integrating the rarely used research procedure for analyzing relationships; neurological analysis. Camerer and Lowewenstein (2004) stated that this is a particularly fruitful form of analysis for it "could resolve years or decades of debate that are difficult to resolve with other sorts of experiments (p. 38)."

Practical Implications

Finally, it was the hope that the resulting literature would be able to assist therapists, educators, and professionals in any helping field. For example, study one revealed the need to include both social and biological factors when attempting to understand the differences between those that are happily married and those that are not. Furthermore, marital satisfaction seemed to relate to the ability of one feeling like they were in an action-possible situation regardless of whether or not the emotion present was viewed as positive or negative. Finally, negative communication being related to marital satisfaction was supported in study three while understanding what the individual desires in their relationship was also relevant to understanding marital satisfaction as shown in study two. Overall, these results reveal that researchers, therapists, and educators must incorporate biological, psychological, and social elements in their interpretation of marital conflict.

Limitations

There were some concerns with the aforementioned results that should be noted. Although the variables of interest showed high alphas, the video analysis performed in study one did result with variables of concern (e.g., "domineering" and "belligerent" resulted in $r < .15$). Using Gottman's (1994) technique of analyzing videos (i.e., SPAFF) would probably have produced a more valid analysis, but the amount of time necessary with this technique to train coders and analyze the videos was difficult to overcome in this study. Thus further expansion needs to be performed on alternative options to interpreting the Four Horsemen.

As for studies two and three, gender differences were found with the recruitment method performed (i.e., mail, Facebook, or email) with females being more likely to respond to online recruitment. This was particularly interesting due to Dillman, Smyth, and Christian's (2009) finding that females were, overall, more likely to respond to requests to participate in research. A speculated reason for this difference may be due to females being more likely to use Facebook for interpersonal communication (Weiser, 2000) and the email being sent to a university that has more female than male graduate students (IRP, 2011).

In addition, the questionnaires used to measure Gottman's Four Horsemen and John Lee's love styles (i.e., LAS) had some concerning results in regards to their validity. For example, even after eliminating one question, the variable *contempt* resulted in a Cronbach alpha of .658 while the other two variables (*criticism* and *stonewall*) were .528 and .658 respectively. Once again, this method of analyzing Gottman's techniques is relatively new to the field and begs for more clarity. The measurement of four of John

Lee's six love styles did have a respectable amount of validity (i.e., <.62); *ludus* and *pragma,* on the other hand, resulted in alphas less than .58. It is speculated that the placement of this particular questionnaire (i.e., at the end) may have impacted the lack of consistency in measuring what the variables were intended to measure.

Future Research

With an understanding of the aforementioned limitations, the results of all three studies beg for further research. Although study one's results showed that HRV and prior discussions impacted marital satisfaction, it was also found that simply incorporating the type of interaction prior to the problem-solving discussion accounted for very little of the variation in marital satisfaction (i.e., $r^2 = .005$). Thus research needs to begin incorporating both social and biological factors when attempting to understand the differences between those that are happily married and those that are not to help clarify this variation.

It is also recommended that those using social neuroscientific techniques to analyze the relationship between alpha waves and marital satisfaction should also pay particular attention to whether differences are found because of the time measured. This suggestion is based on the results in study one revealing moderate positive relationships at positions F4/F3 (mid-frontal) during eyes open and closed, but not during the two problem-solving interactions.

The original recruitment (i.e., mailouts) for the latter two studies had a disappointingly low response rate (15%). For future research, it might be a good idea to include a letter of support prior to the request for the participants to complete the

questionnaire. This will hopefully increase the desire of those contacted to participate in the study.

Study two did support the ability of Gottman's Four Horsemen and the love styles to account for a large amount of variance in marital satisfaction. This justified the need to understand both the intra- and interpersonal variables present in married couples. However, the found relationship between marital satisfaction and Lee's love styles was questionable due to the strength of the relationship and the resulting Cronbach alphas of the measurement used (i.e., LAS). It is recommended that further analysis be performed on both questionnaires, but particularly with those that measure Gottman's Four Horsemen.

In study three, avoiders were seen as being older, known their spouses longer, and been married for a longer period of time while volatiles resulted in the opposite findings (i.e., younger, etc.). Furthermore, pluralistics (i.e., high in conversation, but low in conformity) were found to be older, known their partner, and been married for a longer period of time than the other three typologies. Protective families (i.e., low in conversation and high in conformity), on the other hand, were more likely to be younger, known their partner, and been married for a shorter period of time. These results are suggesting a need for a longitudinal analysis of the evolvement of these typologies; do pluralistics develop into protectives over time?

Finally, the impact of children on marital satisfaction is a variable that needs to be included in future research. It has also been noted that the sibling relationships may greatly impact the families-of-origin communication. Although these variables were

outside the scope of this dissertation, research supports the need to include it in the future.

Ethical Considerations

In all procedures done to recruit participants, study participants were given information directly about the nature and scope of the study prior to participating. Participants were also told that the study was associated with a university and contact information for the school's Institutional Review Board was given to them in case of any questions or concerns; unbeknownst to the author were any questions or concerns given. No identifying information, such as names, was collected from the respondents in the online questionnaires. In study one, participants were given an id number and names were never linked to the resulting data. The undergraduate students who coded the videos all signed an ethical contract that restricted them from relaying any information to anyone outside of the study and all videos were stored in a locked room.

Appendix A

September 2, 2010

Mr. and Mrs. Smith
123 Shady Lane
Lexington, Kentucky 40502

Dear Mr. and Mrs. Smith,

I am writing to ask for your help with an important study being conducted by the University of Kentucky to understand family and marital interactions. In the next few days you will receive a request to participate in this project by answering questions about yourself.

We would like to do everything we can to make it easy and enjoyable for you to participate in the present study. I am writing in advance because many people like to know ahead of time that they will be asked to fill out a questionnaire. This research can only be successful with the generous help of people like you.

To say thanks, you will be given a chance for $100 when you complete the survey. I hope you will take 15-20 minutes of your time to help us. Most of all, I hope that you enjoy the questionnaire and the opportunity to reflect on your family.

Best wishes,

Claire Kimberly

Claire Kimberly, M.S.
Research Assistant

315 Funkhouser Building * University of Kentucky * Lexington, KY 40506-0050 *

Appendix B

Dear Mr. and Mrs. Smith,

I am writing to ask for your help in understanding family and marital interactions. The best way we have of learning about these issues is by asking different people what their family and marriages are like. Your address was randomly provided to us by the United States Postal Services and is one of only a small number that have been selected to help in the present study.

We are hoping that an adult in your household will be able to complete the questionnaire on the Internet so that we can summarize results more quickly and accurately. Doing that is easy: just enter this web page address in your Internet browser, and then type in your access code to begin the survey.

tinyurl.com/marriageandfamily
Your access code: 123456

To help you complete the questionnaire on the web, we have enclosed step-by-step instructions that also show examples of the questions included in the survey. We realize that some households do not have Internet access. If you do not, we will send you a paper questionnaire. Please contact Claire Kimberly by telephone at (859) 257-7750 for this request.

The questions should only take about 15-20 minutes to complete. Your responses are voluntary and will be kept confidential. Your answers will never be associated with your mailing address or name. The questionnaire does include sensitive questions so you may refuse to answer any questions or stop the survey at any time.

If you have any questions about this survey, please call Claire Kimberly, the study's director, by telephone at (859) 257-7750 or by email at cekimb2@uky.edu. If you have any questions about your rights as a participant in the present study, you may contact the University of Kentucky Institutional Review Board by telephone at (859) 257-8295.

By taking a few minutes to share your thoughts and opinions about yourself you will be helping us out a great deal. As a small token of our appreciation, six individuals will be randomly selected to receive $100 in the mail at the end of the study.

I hope you enjoy completing the questionnaire and look forward to receiving your responses.

Many thanks,

Claire Kimberly

Claire Kimberly, M.S.
Research Assistant

315 Funkhouser Building * University of Kentucky * Lexington, KY 40506-0050

September 20, 2010

Last week a letter was mailed to you requesting your participation in an online questionnaire because your household was randomly selected to help in a study about family and marriages.

If someone at your address has already completed the online questionnaire, please accept our sincere thanks. If not, please have an adult in your household do so right away. We are especially grateful for your help with this important study.

If you did not receive an initial letter, or if it was misplaced, please call us at (859) 257-7750 or email us at cekimb2@uky.edu. We will get you the information immediately.

Sincerely,

Claire Kimberly, M.S.
Research Assistant

315 Funkhouser Building * University of Kentucky * Lexington, KY 40506-0050

Appendix D

Dear Mr. and Mrs. Smith,

A few weeks ago, we sent a letter to your address that asked for a member of your household to complete an online questionnaire about issues related to marriages and families. To the best of our knowledge, it has not yet been done.

We are writing again because of the importance that your household's questionnaire has for helping us get accurate results. It is only by hearing from nearly everyone in the sample that we can be sure that the results truly represent the general population. Therefore, we hope an adult in your household will fill out the questionnaire soon at:

tinyurl.com/marriageandfamily
Your access code: 123456

We realize that some households do not have Internet access. If you do not, we will send you a paper questionnaire. Please contact Claire Kimberly by telephone at (859) 257-7750 for this request.

As mentioned previously, the questions should only take about 15-20 minutes to complete. Your responses are voluntary and will be kept confidential. Your answers will never be associated with your mailing address. If you have any questions about this survey, please call Claire Kimberly, the study's director, by telephone at (859) 257-7750 or by email at cekimb2@uky.edu. The present study has been reviewed and approved by the University of Kentucky Institutional Review Board, and if you have any questions about your rights as a participant in the present study, you may contact them by telephone at (859) 257-8295.

We hope that you enjoy the questionnaire.

Best wishes,

Claire Kimberly

Claire Kimberly, M.S.
Research Assistant

315 Funkhouser Building * University of Kentucky * Lexington, KY 40506-0050 *

Appendix E

Online Survey

Variable	Subscale	Description	Long Description
Married		Dichotomous	Are you currently married?
Married2		Dichotomous	Have you been married more than once?
Marriedx		Ordinal	How many times have you been married?
Wedding		Ordinal	What year did you get married?
MarriedDes		Categorical	Which category best describes your marriage?
Dating		Ordinal	What year did you first meet your spouse?
Age		Ordinal	What year were you born?
Gender		Dichotomous	What is your gender?
Religion		Ordinal	How often do you attend religious services?
Race		Categorical	What is your ethnicity?
Income		Ordinal	How would you best describe your total household annual income?
FinancialSec		Ordinal	How do you perceive your financial situation in life?
Guardian		Categorical	How would you best describe your guardian while growing up?
RFCP			Revised Family Communication Patterns
	Conversation	Continuous	Add questions 1-15
	Conformity	Continuous	Add questions 16-26
Gottman			Based on Gottman's marital communication theory
	Contempt	Continuous	Add questions 6, 5, 12, 17
	Criticism	Continuous	Add questions 1, 4, 10
	Stonewall	Continuous	Add questions 7, 8, 9, 11
	Typology	Categorical	Question 34
	Avoider	Continuous	Question 35
	Validate	Continuous	Question 36
	Hostile	Continuous	Question 37
	Volatile	Continuous	Question 38
RDAS			Revised Dyadic Adjustment Scale
	Consensus	Continuous	Add questions 1 through 6
	Satisfaction	Continuous	Add questions 7 through 10
	Cohesion	Continuous	Add questions 11 through 14
	RDASTotal	Continuous	Add questions 1 through 14

IJS		Continuous	Intimate Justice Scale
	Low	Dichotomous	Add questions 1 to 15; total is between 15 to 29
	Minor	Dichotomous	Add questions 1 to 15; total is between 30 to 49
	High	Dichotomous	Add questions 1 to 15; total is above 50
LoveStyles		Continuous	John Lee's six love styles
	Eros	Continuous	Add questions 1, 2, and 10
	Ludus	Continuous	Add questions 3, 11, and 12
	Storge	Continuous	Add questions 4, 5, and 13
	Pragma	Continuous	Add questions 6, 14, and 15
	Mania	Continuous	Add questions 7, 8, and 16
	Agape	Continuous	Add questions 9, 17, and 18

Appendix F

Lab Survey

Variable	Subscale	Description	Long Description
AgeL		Continuous	Age in years
GenderL		Categorical	Male or female
RelationshipL		Categorical	Married, living with partner, or dating
LengthL		Continuous	Years in relationship
KnownL		Continuous	Years known partner
ReligionL		Categorical	What is your religious affiliation?
EthnicityL		Categorical	How do you define your ethnicity?
IncomeL		Ordinal	How would you describe your total household annual income?
IJSL		Continuous	Intimate Justice Scale
	LowL	Dichotomous	Add questions 1 to 15; total is between 15 to 29
	MinorL	Dichotomous	Add questions 1 to 15; total is between 30 to 49
	HighL	Dichotomous	Add questions 1 to 15; total is above 50
DASL		Continuous	Dyadic Adjustment Scale
	ConsensusDL	Continuous	Add questions 1 through 15
	SatisfactionDL	Continuous	Add questions 16 through 22
	CohensionDL	Continuous	Add questions 23 through 28
	DASLTotal	Continuous	Add questions 1 through 32
RDASL		Continuous	Revised Dyadic Adjustment Scale
	ConsensusRL	Continuous	Add questions 3, 4, 6, 7, 12, and 15
	SatisfactionRL	Continuous	Add questions 16 and 20-22
	CohesionRL	Continuous	Add questions 24, 25, 27, and 28
	RDASLTotal	Continuous	Add the above questions
RFCPL			Revised Family Communication Patterns
	Conversation	Continuous	Add questions 1-15
	Conformity	Continuous	Add questions 16-26

Appendix G

Bio and Neuro Data

Variable	Description	Long Description
FirstInteraction	Dichotomous	Quantifies the first interaction as either about the day or about first meeting one another
NNFirst	Continuous	Normal beats during 1st interaction
VLFFirst	Continuous	Total power of NN intervals between .003 and .04 Hz in 1st interaction
LFFirst	Continuous	Low frequency (.04 to .15Hz) in 1st interaction
HFFirst	Continuous	High frequency (.15 to .4 Hz) in 1st interaction
RMSSDFirst	Continuous	Square root of the mean squared difference of successive NNs in 1st interaction
pNNFirst	Continuous	The proporation of NN50 divided by total number of NNs in 1st interaction
SDNNFirst	Continuous	Standard deviation in 1st interaction
LFHFFirst	Continuous	Low to high ratio in 1st interaction
NNConflict1	Continuous	Normal beats during 1st conflict.
VLFConflict1	Continuous	Total power of NN intervals between .003 and .04 Hz during 1st conflict.
LFConflict1	Continuous	Low frequency (.04 to .15Hz) during 1st conflict.
HFConflict1	Continuous	High frequency (.15 to .4 Hz) during 1st conflict.
RMSSDConflict1	Continuous	Square root of the mean squared difference of successive NNs during 1st conflict.
pNNConflict1	Continuous	The proporation of NN50 divided by total number of NNs in 1st conflict.
SDNNConflict1	Continuous	Standard deviation in 1st conflict.
LFHFConflict1	Continuous	Low to high ratio in 1st conflict.
NNConflict2	Continuous	Normal beats during 2nd conflict.
VLFConflict2	Continuous	Total power of NN intervals between .003 and .04 Hz during 2nd conflict.
LFConflict2	Continuous	Low frequency (.04 to .15Hz) during 2nd conflict.
HFConflict2	Continuous	High frequency (.15 to .4 Hz) during 2nd conflict.
RMSSDConflict2	Continuous	Square root of the mean squared difference of successive NNs during 2nd conflict.
pNNConflict2	Continuous	The proporation of NN50 divided by total number of NNs in 2nd conflict.
SDNNConflict2	Continuous	Standard deviation in 2nd conflict.
LFHFConflict2	Continuous	Low to high ratio in 2nd conflict.
AlphaFp1	Continuous	Alpha waves measured at Fp1 during conflict interaction.
AlphaFp2	Continuous	Alpha waves measured at Fp2 during conflict interaction.
AlphaF7	Continuous	Alpha waves measured at F7 during conflict interaction.
AlphaF8	Continuous	Alpha waves measured at F8 during conflict interaction.

Appendix H

Video Coding

Variable	Subscale	Description	Long Description
GottmanV			Video analysis from every 30s of the conflict interaction
	DefensiveV	Continuous	Question 1
	CriticismV	Continuous	Question 2
	AffectionateV	Continuous	Question 3
	AngryV	Continuous	Question 4
	SadV	Continuous	Question 5
	WarmV	Continuous	Question 6
	TenseV	Continuous	Question 7
	IrritableV	Continuous	Question 8
	HumorousV	Continuous	Question 9
	AcknowledgeV	Continuous	Question 10
	WithdrawnV	Continuous	Question 11
	ContemptV	Continuous	Question 12
	InterestedV	Continuous	Question 13
	FearfulV	Continuous	Question 14
	DomineerV	Continuous	Question 15
	BelligerentV	Continuous	Question 16
	DisgustedV	Continuous	Question 17
	TunedV	Continuous	Question 18
	HostilityV	Continuous	Add questions 1, 2, 4, 8, 12, and 15
	DistressV	Continuous	Add questions 5, 11, 7, 14, 16, and 17
	AffectionV	Continuous	Add questions 3, 9, and 6
	EmpathyV	Continuous	Add questions 10, 13, and 18
TypologyV			Gottman typology done after viewing second conflict interaction
	TypologyV	Categorical	Question 1
	AvoiderV	Continuous	Question 2
	ValidateV	Continuous	Question 3
	HostileV	Continuous	Question 4
	VolatileV	Continuous	Question 5

Appendix I

Hypothesis	Variables	Statistical Test
H1: Marital satisfaction will relate to HRV during the conflict interaction.	HRV variables *DASTotal*	Pearson Correlation
H2: During conflict interactions, couples who previously engaged in day-to-day interactions will have significantly increased HRV compared with those that had affective interactions.	*FirstInteraction* HRV variables	Independent samples t-test
H3: Gottman's Four Horsemen will account for a large variance in HRV during a conflict interaction.	HRV variables *StonewallV* *CriticismV* *ContemptV*	Multiple regression
H4: Gottman's Four Horseman, HRV, and the type of first interaction will have predictive power of marital satisfaction.	*FirstInteraction* *StonewallV* *CriticismV* *ContemptV* HRV variables	Hierarchical Regression
H5: Participants showing contempt during a conflict with their spouse will show relatively higher left frontal cortical activity.	Asymmetrical Alpha Power *ContemptV*	Pearson Correlation
H6: Participants showing criticism/defensiveness during a conflict with their spouse will show relatively higher left frontal cortical activity.	Asymmetrical Alpha Power *CriticismV*	Pearson Correlation
H7: Participants engaged in withdrawal techniques during a conflict with their spouse will show relatively higher right frontal cortical activity.	Asymmetrical Alpha Power *StonewallV*	Pearson Correlation
H8: Marital satisfaction will positively correlate with relatively higher left frontal cortical activity.	Asymmetrical Alpha Power *DASTotal*	Pearson Correlation
H9: Ludic and manic love styles will inversely relate to marital satisfaction.	*Ludus* *Mania* *RDASTotal*	Pearson Correlation
H10: Agapic, erotic, storgic, and pragmatic love styles will relate positively to marital satisfaction.	*Agape* *Eros* *Storge* *Pragma* *RDASTotal*	Pearson Correlation
H11: Gottman's Four Horsemen will inversely relate to marital satisfaction.	*Contempt* *Criticism* *Stonewall* *RDASTotal*	Pearson Correlation
H12: After controlling for length of marriage, Gottman's Four Horsemen and Lee's love styles will have predictive power of marital satisfaction.	*Married2* *Ludus* *Mania* *Agape*	Hierarchical Regression

	Eros	
	Storge	
	Pragma	
	Contempt	
	Criticism	
	Stonewall	
	RDASTotal	
H13: Conformity techniques in families-of-origin will inversely relate to negative communicative techniques in marriage while controlling for gender, ethnicity, family arrangement, and age.	*Conformity* *Contempt* *Criticism* *Stonewall* *Gender* *Ethnicity* *Guardian* *Age*	Hierarchical Regression
H14: Communicative techniques used in families-of-origin will inversely relate to negative communicative techniques in marriage while controlling for gender, ethnicity, family arrangement, and age.	*Conversation* *Contempt* *Criticism* *Stonewall* *Gender* *Ethnicity* *Guardian* *Age*	Hierarchical Regression
H15: Consensual families will be predictive of volatile couples while controlling for gender and age.	*Consensual* *Volatile* *Gender* *Age*	Logistic Regression
H16: Pluralistic families will be predictive of validating couples while controlling for gender and age.	*Pluralistic* *Validate* *Gender* *Age*	Logistic Regression
H17: Laissez-faire families will be predictive of avoider couples while controlling for gender and age.	*Laissez-Fair* *Avoider* *Gender* *Age*	Logistic Regression
H18: Protective families will be predictive of validator couples while controlling for gender and age.	*Protective* *Validator* *Gender* *Age*	Logistic Regression

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KENTUCKY

Initial Review

Approval Ends
December 2, 2011

IRB Number
10-0848-F4S

TO: Claire Kimberly, M.S.
Family Studies
315 Funkhouser
CAMPUS 0054
(859) 257-7761

FROM: Chairperson/Vice Chairperson
Non-medical Institutional Review Board (IRB)

SUBJECT: Approval of Protocol Number 10-0848-F4S

DATE: January 25, 2011

On January 24, 2011, the Non-medical Institutional Review Board approved minor revisions requested at the convened meeting on December 3, 2010 for your protocol entitled:

Marital Typologies

Approval is effective from December 3, 2010 until December 2, 2011 and extends to any consent/assent form, cover letter, and/or phone script. If applicable, attached is the IRB approved consent/assent document(s) to be used when enrolling subjects. [Note, **subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.**] Prior to the end of this period, you will be sent a Continuation Review Report Form which must be completed and returned to the Office of Research Integrity so that the protocol can be reviewed and approved for the next period.

In implementing the research activities, you are responsible for complying with IRB decisions, conditions and requirements. The research procedures should be implemented as approved in the IRB protocol. It is the principal investigator's responsibility to ensure any changes planned for the research are submitted for review and approval by the IRB prior to implementation. Protocol changes made without prior IRB approval to eliminate apparent hazards to the subject(s) should be reported in writing immediately to the IRB. Furthermore, discontinuing a study or completion of a study is considered a change in the protocol's status and therefore the IRB should be promptly notified in writing.

For information describing investigator responsibilities after IRB approval has been obtained, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" from the Office of Research Integrity's Guidance/Policy Documents web page [http://www.research.uky.edu/ori/human/guidance.htm#PIresp]. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site [http://www.research.uky.edu/ori/]. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at (859) 257-9428.

N Van Vuleyei PhD/pa
Chairperson/Vice Chairperson

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