

## Functional MRI and Hormonal Love

R. A. McConnell

16 June 2004

### Introduction

Through *Time* magazine dated 19 January 2004 there came to my attention what could well be the most significant scientific book of the year. Its title: *Why We Love: The Nature and Chemistry of Romantic Love*. Its author: Helen E. Fisher.

That issue of *Time* featured a series of 12 articles of general interest, grouped under the heading "Love, Sex, and Health." Fisher's article, titled "Your Brain in Love," was written as a promotion for her book, which was released by Henry Holt (ISBN 0-8050-6913-5) a few days later. Her book is a scholarly work, annotated and fully referenced.

After a brief foreword describing her initial plan to study human love from a behavioral and brain chemistry point of view, using functional magnetic resonance (fMRI) as her most important tool, Fisher provides a description of the behavioral symptoms of romantic love.

### Chapter 1 - The Symptoms of Romantic Love

Fisher begins promptly in Chapter 1, and continues in later chapters, summarizing the behavioral symptoms of romantic love. I have listed here all of these symptoms together. Chapter by chapter, she deals with various aspects of this phenomenon.

The overriding feeling of romantic love is one of extreme desire and pleasure to be one with the beloved in every sense of the word "one." Life takes on a new meaning for one who falls romantically in love. Lovers are characterized by hyperactivity and extreme energy. Thoughts of the loved one intrude constantly. Intense emotions of all kinds inflict themselves upon the lover. Attention is focussed almost exclusively upon the loved one, upon trivial events shared with the loved one, or upon objects even remotely associated with the loved one. Lovers reciprocally exaggerate their loved one's good traits and even admire their faults. These extreme feelings are directed toward only one person. Normal interest toward third persons disappears. Lovers each constantly seek affirmation of their loved one's affection. Interests in external life activities shift to match those of the loved. Lovers rearrange their living schedules or keep them open to accommodate the possible wishes of the loved one. Lovers are emotionally dependent upon each other and feel tremendous empathy toward the other. Adversity and obstacles heighten passion. Hope is constant for a loving response from the loved one. Romantic love is invariably accompanied by longing for sexual union. Lovers crave exclusivity. If there is threat of a third person, jealousy will ensue. Romantic love is involuntary. Romantic love may wax and wane upon the slightest whim or clue. Mood swings from ecstasy to despair are violent and unpredictable. Opposition enhances ardor. With time, rejection may turn love to hate. Not all of these symptoms occur every time in every case. Romantic love can be a blessing or a curse.

Statements that RAM believes are generally accepted by experts in the field:

Romantic love is a phenomenon observable by its objective and subjective symptoms.

Romantic love is characterized by:

- Choice
- Strength as determined by its symptoms
- Reciprocation or rejection
- Age of the loved
- Age of the lover
- Time of first appearance: puberty

Romantic love is:

- Generally strongest in adolescence
- Generally weaker between adults
- Interfered with by lust
- Affected by general intelligence (Spearman's *g*)

Statements that RAM believes from his experience:

Often, symptoms of romantic love should be regarded as an illness.

It is often personally catastrophic when one or two persons have fallen in love.

Romantic love is generally weaker in older people.

Many people who think they are enjoying a romantic love life have never experienced the real phenomenon but are enjoying a rapture diminished by pre-nuptial experience.

The story of happy romantic love has been told so many times that it is generally believed that romantic love is the usual path to a happy lasting marriage, but it is not.

## Chapter 2. Propagation of Animals

This chapter is largely of philosophic interest in its comparison of animal and human behavior.

While human love is normally between male and female and can result in offspring only by bisexual union, animals are characterized by the diversity of their reproductive mechanisms, both as to the nature of their sexual matings and as to the permanence and sequence of their propagating activities. Male elephants and other large mammals acquire harems and defend large areas against competition. Most courting animals engage in tenderness activities that could only be interpreted as showing affection. Remaining in body contact, grooming, "talking", nuzzling, patting, kissing. Animals of all sizes are biologically driven to prefer, pursue, and possess specific mating partners, but use many different non-human arrangements for choosing their mate and producing their offspring.

Almost all mammals and many birds and amphibians and fish show affective behavior that mimics persuasively human behavior characteristic of human romantic love. These include energetic play, making sounds of happiness, touching affectionately, pursuing, sharing rituals, persistence, tenderness, loss of appetite, and mate guarding. Among dogs, the species that has come closest to communicating with man, love at first sight, mate guarding, jealousy, faithfulness, shared happiness, and attachment are commonly observed.

## Chapter 3 -- Scanning the Brain "in Love"

How can an esoteric medical technique called functional magnetic resonance imaging (fMRI) yield information about the romantic love of husband and wife?

Chapter 3 of Fisher's book begins to answer this question by describing the fMRI process in terms of the brain hormones dopamine, norepinephrine, and serotonin, and other brain chemicals.

Chemical activity in any particular part of the brain requires increased blood flow to that area. The time-sequential chemical activity in several areas can be observed as the darkening of a photographic film of the brain during the fMRI process. From the degree, location, and time sequence of the darkening process, one can infer the chemical activity in various areas of the brain. It is a puzzle that requires a lot of guessing and fitting.

In terms of bodily activity, brain scanning, as originally conceived, is a rather simple three-step process. Left-handed persons and persons with metal in their heads were rejected as potential subjects for this study. The person being tested, the "testee," lies in a large, open scanning machine and gazes via a mirror for 30 seconds at a photograph of his or her lover. This is followed by a "distraction task" in which the testee counts backward by sevens from a large

arbitrarily pre-chosen number to cleanse the mind of the preceding scan. Following that, the testee gazes for 30 seconds at the photograph of a friend for whom the testee feels no romantic love. The procedure is repeated several times, reversing the order in which the photographs were viewed for each trial. It was found that the brain darkening pattern reflected the romantic love of the testee.

However, it was also found by debriefing, that the testee provided a larger darkening response on the film when he or she, although looking at the photograph of the loved one, was actually thinking about other aspects of the testee's relation to the loved one. The "other aspects" included a large variety of objects and past events. Thus, the attempt to standardize the project by having the testee gaze at the photograph of an unloved friend made no sense. Fisher was surprised to find one testee who produced a large film darkening even though he did not verbalize about his loved one but merely thought vaguely about her lovingly when requested to do so. This finding would seem to indicate that the original approach to use indications of specific brain chemical activity to explore love was based on too narrow an assumption about the neurochemical behavior of a brain "in love".

#### **Chapter 4 -- Lust, Romance, and Attachment**

This chapter is the intellectual heart of the book. While attention has been focussed on romantic love as the most intense aspect of human love, the variations and progressions of human love have been conceptualized by Fisher in the triad, romantic love, lust, and attachment and on how these determine the propagation of the species. Romantic love is the primary determinant of mate selection. Lust, driven primarily by testosterone, ideally implements the choice made by romantic love. Attachment (contentment) of the father provides support for the mother while she trains the child, and may continue indefinitely thereafter.

On the one hand, there is the explanatory power of this tripartite thesis, which is beyond dispute. On the other, as Fisher makes clear in her discussions, these three elements of love can occur alone or in any order. By assuming various chemical interactions, Fisher imagines ingenious explanations for all observed behaviors. In reaction to this, from my personal experience, I am inclined to believe that hope for the future happiness of mankind rests with the manipulation of attachment.

#### **Chapter 5 -- Whom We Choose: The Mystery of Sibling Love**

Fisher devotes 27 pages of Chapter 5 to the question, Whom do we choose as our romantic partner? Fisher answers by citing 15 subheadings as follows: *Timing, Proximity, Mystery, Do Opposites Attract?*, [bodily left-right] *Symmetry, The Golden Mean, Waist-to-Hip Ratio, Who Men Choose, The Male Brain in Love, Male "Mating Effort", The Female Brain in Love, Who Women Choose, Casual Passion, Love Maps, The Lover's Psyche, and The Mating Mind.*

Most of these deal with speculative or marginal effects that, taken together, give one a reasonable perspective of the complexity of the topic, *Whom We Choose.*

I found only one intellectually challenging idea, hidden under the subheading *Mystery.* It is well known that siblings do not experience romantic love and do not marry. Fisher carried this a step further where she said on p.102 that children in one Israeli kibbutz "grew up together in one common house where they lived, slept and bathed with youths of all ages. Boys and girls touched and lay together playfully [e.g., pretending intercourse]. By age 12, however, they became tense with one another. Then, as teenagers they developed strong brother-sister bonds. But none of those who started life in this common cradle married a fellow kibbutznik. It is now generally accepted that, at a critical time in childhood, some time between ages three and six, boys and girls who live in close proximity, lose the ability to fall in love with one another." Here is the secret of romantic love that needs research.

## **Chapter 6 -- The Evolution of Romantic Love**

The evolution of romantic love in man offers many puzzles as to the historical forces that shaped him. Fisher speculates upon these at length in Chapter 6.

We are faced with the fact that man did develop a mating repertoire, and we can imagine chemical pathways by which he might have done so. The question remains: what motivated or guided him in doing so?

In Chapter 6, Fisher bravely speculates that beginning perhaps 1.5 million years ago, man began to evolve his present mating strategy merely by taking advantage of chance genetic variations. She assumes that a tendency toward pattern and order had been, or became, implicit in his earlier existence. Perhaps so. This sounds as though man, from somewhere, acquired a predilection toward religion.

## **Chapter 7 -- Lost Love: Rejection, Despair, and Rage**

This Chapter is aptly titled. Fisher lists the worldwide social and personal ills that are connected with the triad of lust, romantic attraction, and attachment. A dreary list it is: adultery and divorce, sexual jealousy, stalking and spousal battering, homicide, suicide, anxiety, and clinical depression associated with spurned passion.

For various reasons, romantic love does not last forever. Its duration is typically 18 months. When two people share a romantic love, they don't ordinarily stop loving at the same time. Instead, one is rejected by the other and this brings sorrow.

Using the fMRI technique with photographs of people, Fisher did a separate fMRI scanning of photographs of those who volunteered themselves at SUNY (Stony Brook) as "rejected in love and can't let themselves go" against photographs of friends for whom there were no love feelings. For example, pre-interviews showed that one such volunteer, "B," was both heartbroken and physically broken. In the post-scan interviews, "B" was found to be also angry at Fisher who, in this situation, served as a substitute for "B's" former lover. At some point, anger turns to despair. Edna St. Vincent Millay wrote these wrenching lines following her rejection by her lover:

"Sweet love, sweet thorn, when lightly to my heart  
I took your thrust, whereby I since am slain,  
And lie disheveled in the grass apart,  
A sodden thing bedrenched by tears and rain."

## **Chapter 8 -- Taking Control of Passion**

This chapter gives practical suggestions for creating and preserving romantic love. Often, falling in love seems to happen by itself. Experience has shown that there are many ways by which a lonely person can capture and hold a mate.

If you have been captured in love, rejected, and can't let go, Fisher describes many practical ways by which you can escape in preparation for finding a new love.

Her suggestions are largely obvious: Treat your problem as an addiction. Physically avoid the activities and places that you formerly associated with your loved one. Engage in vigorous exercise. Find new interests. Be patient. Time away from all aspects of your former love will weaken his or her influence. Consider psychotherapy. With your doctor's advice, try anti-depressants. Find a friendly person who might be suitable as a mate and associate with him or her as a friend but not a romantic lover. Be totally honest in describing yourself and your desires.

## **Chapter 9 -- The Triumph of Love**

This is a ruthlessly optimistic chapter in which Helen Fisher describes how, for economic reasons including the monetary emancipation of women, arranged marriages are disappearing and marriages for love are increasing. The age of the onset of puberty in women has dropped from

16 to 12 and security in old age has encouraged marriages for love that are still functional into the eighties.

All that I can add to this is that Dante, the great Renaissance Florentine poet wrote the following words in the 13th Century to describe the moment he first saw Beatrice:

"Behold a deity stronger than I, who, coming, will rule me from that time forward. Love quite governs my soul."

It is reported that Dante lingered for hours on a bridge over the Arno in hopes of speaking with his beloved. It has been known throughout history that socially mature adults associate with post-puberty adolescents in romantic love. It seems odd that, as an historically sophisticated scholar, Dante expressed no curiosity as to the historical frequency of his experience. Why don't we have such information today?