

# Love: The Synthesis of Science and Society

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Have you ever been in love? Before answering, consider past relationships and amassed experiences. Take into account all you have been taught about attraction and attachment and use the information you've been given to come up with a definitive yes or no. For most of us, closer examination unveils a beautiful complexity that forces us to ask further questions. In order to answer the query, there needs to be a clear and exhaustive definition of love. Obviously, we lack one. Not that we haven't tried our damndest. Songs have been composed, epics penned, battles fought, tears shed, all to describe something so integral to the human experience. One would think that by this point we'd have some sort of resolution. It was only recently that technology allowed us to look inside the question, to see concretely what had been only abstractly considered for so long. The scrutinization of neurological processes has provided great insight, but as any optimist hopes, brain chemistry can't explain everything. Biology is supplemented by the views we've absorbed from the society in which we live.

The human perception of romance and love has been refined over the past few hundred years, evolving into the contemporary image we hold, a synthesis of inborn neuroscience and a belief-system passed onto individuals by societal conditioning. Romantic love, as viewed contemporarily in the US is a product of neurology based on the biological need to form attachments, and historical models of sophistication. These two elements are often at odds.

People like to think love is one of the greatest mysteries of all time. Part of it's allure is that it is unpredictable, rearing it's head in unexpected ways, at unexpected times. For those infatuated with the mystery of love, it may come as a surprise that the answers to how, when, why, and who we love can often be predicted through straight neuroscience. Through processes of interviewing, observation, and social experiments, scientists have been recording what love and sex mean to people for decades. More recently, research has been aided by technology such

as brain-imaging, electroencephalography, and laboratory testing of tissue and fluids to empirically quantify love physiologically. While the study of love is relatively new, research has yielded insightful results, sometimes confirming scientifically what everyone already knew, but other times providing facts that support novel ideas of love no one was thinking about.

### **Biological Need for Attachment**

The first obvious question love science was able to answer was, why? Why do humans seem to have this innate drive to love? What purpose does it serve? “The brain evolved to protect the body (and mind presumably). Therefore, the brain tells us what to do that will improve our chances of surviving and passing on our genes so that our species survives” (Horstman 6). Through centuries of evolution, this ability to form love attachments is a trait that survived. The importance of social ties cannot be overestimated. Humans are social animals, for whom interaction with others is necessary to maintain mental and physical health.

It all begins with the parent and offspring. The first relationship formed is between a child and his or her mother. This appears to be the most inherent, unconditional, and deep love found on earth, for humans and other members of the animal kingdom. The biological need for love between parents and offspring is also the most explicable form of love. “Parental love for a child is essential for survival of the species. Unlike most other mammals, humans are not only born helpless but remain in need of intensive adult attention and care for years” (7). The love between parents and offspring is vital not only in the development of the child, but also the existence of the species. This explains why mothers love their children so unconditionally; it is imperative for everyone’s survival. “Several researchers propose that attachment in fact is the result of evolution: that babies who had people who cared deeply about them survived to pass on their genes.” (41). A child certainly benefits from love. While the human brain is incredibly

malleable, it does seem that people who grew up knowing they were loved have fewer difficulties in at least one area: forging their own attachments in their adult lives. Growing up with the knowledge of love in one's surroundings also makes it easier for a person to trust, communicate, empathize, and exhibit other behaviors important in human relations.

The love humans have for their friends and siblings is the next step in the development of love. If the need for parent-offspring love is to ensure the survival of the offspring to adulthood, the purpose of creating loving relationships between friends is to help an individual maintain health and safety in their adult life. Furthermore, living in a community surrounded by positive interactions is necessary for one's physiological and psychological well-being. On a neurological level, more human connections make more neurons connect and more brain growth. Friendship, while an important form of love on its own, also aids in the procurement of a significant other. The idea of a "wing-man" is an old one, but also the bonding that occurs during friendship can lead to romance when coupled that other important thing.

Humans are driven by sex, this goes without saying. Just noting the reaction of post-pubescent young adults to any stimulus perceivably sexual signals that much of our brain chemistry revolves around the instinctual desire to engage in sexual activity during procreational peaks in the body. It is easy to see how the evolution of a sex drive is important to the continuation of the species. Though libido is in no way unique to *Homo-sapiens*, there are a few interesting mysteries within human sexuality that have developed and continue to confound scientists.

Romantic love is arguably the least easily understood. Why do we seek long-term relationships that seem to include the deep, unconditional love between family, the positive connections of friendships, and of course the intense and instinctual sexual attraction? What

purpose does endearment serve in our lives? There is not one clear answer. It is argued that falling in love exists for the offspring, that long-term matings are an advantage in child-rearing. Children with two parents often have more success in forming other relationships, and generally have better mental health and esteem growing up. Not to mention the fact that having two sets of eyes makes it that much less likely the youngster will get eaten by a lion.

Still, there are other arguments that propose falling in love is not an evolutionary advantage but a weird side-effect of different parts of the emotional brain. The development of neurological anatomy such as mirror neurons, and the amygdala, and chemicals such as oxytocin, vasopressin and endorphins have important value in a variety of areas in a functioning physiological system. None of these structures' primary function is to facilitate romantic attachment, but all have something to do with empathy, human interaction, bonding, or reward. It has been conjectured that the combination of such hormones and systems has resulted in a unique ability to love romantically.

Most probably, romantic love is the culmination of the other evolved forms of love, and that it simply gives humanity the same benefits as any other type of companionship. Judith Horstman of Scientific American sums up the benefits of long-term relationships that include sexuality, friendship, and unconditional attachment.

There are many obvious and immediate economic and sexual benefits and long-term health advantages, including emotional support and a sense of belonging, which act as buffers against depression. Being mated lowers stress hormones and generally improves health, and that's true even for those who are happily and tightly mated even if not married. Overall, monogamous mating benefits the lives and brains of both partners (and their children as well). (144)

It is in an individual's best interest to surround him or herself with love and relationships. It's clear that romantic love is stressed in the human brain more than anywhere else in the animal kingdom, and science has been able to pinpoint why that may be. The reason humans are able

to love each other is on the simplest level, brain chemistry and evolutionary biology. The capability for love has less to do with enlightenment and more to do with techniques for effectively furthering the existence of the human race. The next question to answer in the struggle to define love through science is perhaps the “how”. How is the human brain hardwired for attachment and romance? What goes on in there as an individual falls in love?

### **The Anatomy and Chemistry of Love in the Brain**

The secrets of how humanity loves are tucked deep inside the bulk of the midbrain, in what is referred to as the “emotional brain”. The limbic system controls the most basic human drives, such as hunger, sleep cycles, sex hormones, sensory input, pleasure, fear, and other emotions (Horstman). The amygdala is at the heart of this system, controlling most of an individual's emotional learning. The amygdala holds most of the key chemicals and structures most vital to the ability to love romantically, erotically, and platonically.

The aforementioned hormone oxytocin is often regarded as our natural love potion. There is a correlation between an individual's levels of oxytocin and his or her perceived trustworthiness. Oxytocin infusion is used as a treatment for autism, to reduce repetitive behaviors and language abnormalities (Hollander). Oxytocin is a chemical considered integral to the entire human gestation process. It also may have a lot to do with how humans form attachments.

Love is supported by oxytocin, a hormone secreted by the pituitary. Oxytocin reinforces attachment and trust and is vital for childbirth and breastfeeding. In both men and women (but more in women), it increases during sex and surges at the orgasm, playing a role in pair bonding. (Horstman 24)

Most people have felt the effects of oxytocin more than once. It's the feeling of wanting to hold the hand of a loved one, it's what makes sleeping beside a sexual partner feel

just as good as the orgasm itself. The way the male and female brain react differently to oxytocin may also substantiate the perception that women are more drawn to snuggling.

Oxytocin is perhaps the true love potion, called the 'cuddle hormone' because it promotes that post-climax loving feeling. But it's different in men than in women: in women, estrogen adds to the oxytocin effects, while in men, testosterone tends to offset some oxytocin effects. (108)

Oxytocin creates that lovin' feeling, but like many hormones, the effects of it are somewhat fleeting. Perhaps it's the build-up of having another individual trigger a chemical response many times throughout a relationship that forms a love attachment. It's easy to see how the consistent stimulation of attachment-inducing hormones between a pair could create a more permanent bond over time. And then, oxytocin isn't the only force at work.

Another chemical vital to the human ability to love and be loved is serotonin. Serotonin is widely associated with neurological issues such as depression and obsessive-compulsive disorders. The connection of these neurological disorders with love and sex should not be overlooked. "Studies have shown a depletion of serotonin in early stages of romantic love to levels that are common in patients with obsessive-compulsive disorders. Love, after all, is a kind of obsession and in its early stages commonly immobilizes thought and channels it in the direction of a single individual" (Zeki). Of course, serotonin's primary function is not to help newly infatuated individuals focus on their lover. "This mood leveler helps regulate memory, emotion, sleep appetite, and mood, among other functions. Too little serotonin is connected with depression, and too much serotonin withers sexual desire" (Horstman 25). Because of this, anthropologists such as Zeki and Horstman speculate that antidepressants meant to increase levels of serotonin can also make it impossible to fall in love. This finding underscores that brain chemistry governs a lot of activities that are perceived as love.

There are many other hormones that are connected to the brain's ability to love. Two additional noteworthy love stars of brain chemistry include vasopressin and endorphins. Vasopressin is similar in effect to oxytocin, and in that both are produced in the hypothalamus. It facilitates reward circuits crucial for bonding. Endorphins are known for their effect during exercise, but they also surge with sex, and during periods of love. All these hormones that come into play as humans fall in love with each other end up combining into a longer-lasting attachment that leads to the monogamous relationships for which many strive.

There seems to be a balancing act going on among all these love-related hormones that may help explain some of the progression of love from hot, mad lust and sex to comfortable, loving companionship. High levels of testosterone that fuel desire actually suppress the release of the attachment hormones oxytocin and vasopressin-and high levels of oxytocin and vasopressin offset the crazy passion effects of testosterone, dopamine, and norepinephrine, leading to calmer feelings of attachment. (25)

In short, most feelings experienced by an individual as he or she falls in love and forms attachments to another human result from studied neurological responses. This explains why the vaguer patterns of love are universal, though brain chemistry varies a little from person to person, most have the structural capabilities to feel passion and endearment.

The hormones that rule sex are a slightly different set than those that control feelings of romantic love and attachment. Testosterone is commonly thought of in association with men, and estrogen as the woman's hormone, but both genders produce both chemicals; both testosterone and estrogen are vital to sexuality. Testosterone is the steroid hormone that makes a man male; it is connected to aggression and sexual desire. Higher levels of testosterone usually correlate with larger and more violent and sex drives. Women also have their dose of testosterone, produced in much smaller amounts, but still key to the experience of desire in women. Similarly estrogen is what makes women female. The primary function of estrogen is



to control reproductive and menstrual cycles in women, but men also need it, for sperm production and possibly desire.

Other brain chemicals vital for erotic love include dopamine and norepinephrine. Dopamine is the chemical most closely associated with the body's' reward system. Many addicting drugs-- including love and lust--elevate dopamine levels. "Lust is enhanced by dopamine, a neurohormone of many roles produced by the hypothalamus, which triggers the release of testosterone, the hormone that drives sexual desire in women as well as men. Dopamine is vital for voluntary movement, addiction, ecstasy, and love" (Horstman 24). Norepinephrine, also known as adrenaline, is catalyzed by positive human excitement, and a little bit commonly can hype sexual desire. Most people have felt that sudden high that accompanies sexual interest. It is not the result of being swept off one's feet so much as levels of dopamine and adrenaline increasing at the chance of satisfying one's sex drive.

### **Lost Love and Gender Differences**

What happens when the madness is brought to a screeching halt? How does the brain react to the inevitable end of a relationship, either in death or break-up? Answers to such questions come to mind immediately, when one recounts the last relationship experienced in his or her life. The end was most likely terrible; the loss of a significant other hurts us. "Our brains are hardwired to seek love and the companionship of others. In fact, social isolation is so bad for your brain that solitary confinement could be considered torture" (Horstman 5). It is good for mental, emotional, physical health, and when that attachment is severed, the victims suffer a legitimately wounding trauma. The level of trauma the broken relationship causes is dependent on a variety of variables. It's difficult to make any kind of generalization about the human

reaction to lost love, since everything about it is so internalized and individualized. Still, studies have found a few patterns in how different people react to losing love.

The process of breaking up is oddly divergent between men and women. Meaning, it has been observed that while everyone experiences the dissolution differently, women are more prone to some sorts of reactions, and men more likely to follow a different set of responses altogether.

When it comes to being dumped, male and female brains react in different ways. Women worldwide are more likely to suffer a major depression when they are abandoned in love, whereas men turn to alcohol or risky business and are three to four times more likely to commit suicide after a love affair gone wrong. (64)

The fact that women and men generally respond to breakup differently emphasizes some of the male/female differences in how they loved in the first place, for example men's love is based heavily on visual cues. "When men looked at a picture of their beloved, they showed activity in the visual cortex and also brain regions associated with sexual arousal. Women, on the other hand, showed more activity in the caudate nucleus and the septum-brain areas connected with motivation, attention, and pleasure--and in areas associated with retrieval of memories" (63). This study seemingly substantiates the popular notion that women are hardwired for emotional love and men for sexual. "Studies are showing that women may be more susceptible to many kinds of addiction, including drugs, alcohol, and sex, and so they may get hooked on love more than men do. It's all about the estrogen...Scientists believe that estrogen spurs addiction by stimulating the brain's reward pathways, enhancing the highs" (71). Estrogen may contribute to the idea that women are addicted to love, because addictions of any kind affect women more intensely.

Of course the stereotype that women are in love with love probably has a lot more to it than just hormone quantities; there is a lot to do with how US culture teaches girls and boys to

love differently. It is dangerous to point to minute biological differences in men and women and say that the two genders are radically different in the ways they fit in the world. These differences are often greatly overstated and many of these perceived differences are societally based. Assumptions are risky, and generalizations tough but necessary to the furthering of discussion.

Overall, science has added a great deal to the pursuit of defining love. For one, it is now known that parts of love can be quantified. While many questions remain, neurology has reported universal responses in the anatomy and chemical makeup of a human's brain that end up giving us great insight into the process of love. We have a greater understanding of how we love, with the research done on the amygdala, oxytocin and other chemicals, and mirror neurons. We've learned that love doesn't have a specific timeline, a moment of falling in love, or out of love, rather it is an accumulation of chemicals and memories that create attachment. Finally, evolutionary biology has given insight into why humans have developed a taste love in the first place. Why this drive is so important, why we need love in our lives.

### **Historical Notions of Love**

Much of the American view of love is an acquired and eclectic mix from various cultures and past patterns. Some of the deepest-held notions of love we practice today originated as far back as the Middle Ages, a time usually considered developmentally barren. But it was during 7th century the concept of love turned from a lofty philosophers game into rich stories and practices central to court culture. Romance became mainstream. It helped that this was a time with more than just primary survival affects that nobility could lay around composing songs about this drive that culture had been too busy to wonder about. "Were the models of courtly

love restricted to the nobility? In all probability, yes. Members of the lower classes had more elemental concerns, such as providing shelter and food for themselves and their families” (39).

### **The Intensity of Courtly Love**

The first stage of this widely-appreciated love infatuation cycle was courtly love. At some point lives of nobles became much more than inheriting a throne, then ruling and protecting a stake of land. “I would like to have lived through that shift in sensibility, when it became no longer possible for a knight to rely exclusively on his horse and sword. Male courtiers schooled in the new model of chivalry were required to learn dancing, verse writing, sweet talking, and chess” (Yalom 21-22).

Possibly the most telling evidence of this switch are the adaptations of King Arthur stories that were re-popularized during the 7th century. Though the tales of the Round Table had been around for years, during the medieval obsession with courtly love these stories changed from tales of valor in battle with a stress on mysticality into stories of chivalrous gentility, often infused with the intensity of true love. A good example of this is the love story between Lancelot and Guinevere. Prior to the popularity of courtly love, Lancelot had been seen as a great and noble knight because of his physical prowess and excellent combative skills. Through the eyes of courtly love, Lancelot became great because of his deep loyalty to not his king, but his lover. He was a skilled horseman, but also a charming and handsome individual who could dance, and woo. Lancelot and Guinevere’s story ends rather tragically, with the betrayal of the King, the death of many great Knights, and the final separation of the star-crossed lovers. But somehow this made the love all the more entertaining. True love as a concept had created as the idea of a perfect love being one that overcame obstacles and underwent great suffering. “Lovers were judged according to their generosity of spirit, their willingness to suffer, and, above all, their

unending loyalty. There was no more noble goal in life than love, but only if the lovers were up to its measure” (36).

The effects of this idea of intense true love through suffering is still quite popular in US society today. The most well-loved love stories are the cliched rewritings of this idea over and over. ‘True love knows no limits’ seems to be the message. “Suffering became a character test that would make the lover worthy of his lady’s affection. But whatever her feelings toward him, he was expected to be submissive and unswerving in his devotion, despite malevolent adversaries resolved to undo him” (20). Sound familiar? This motif was drawn upon in the Renaissance, becoming a central theme for Shakespeare and other playwrights. Perfect contemporary examples of this idea include *Titanic*, *Dirty Dancing*, and *The Notebook*. Courtly love also popularized the notion that anyone could fall in love, and their love deserved to flourish, despite class differences and familial aggressions, love was regarded as sacred. “True love could even dissolve differences in rank, making a man or woman of low estate the equal of a prince or princess” (20).

Another result of courtly love was due to the emphasis love put on the woman in the middle ages. Courtly love in essence was about serving your lady, and giving her the power over all things romance. For the first time, “ love became feminized. The lady took center stage and has, I believe, commanded the spotlight ever since. Both as the object of man’s desire and as the subject of their own desire” (41).

Courtly love was so intensely romantic and deeply embedded in the minds of young nobility, one must wonder what it looked like in practice. Despite the literature and culture surrounding the idea of amour and lovers, much less of it actually seemed to be going around.

Tales of female adultery probably sprang from the fact that medieval marriages among the nobility were rarely an affair of the heart. As we have seen, it was common for a

nubile woman--as young as fifteen--be wed to a much older man for reasons of property and rank. Small wonder that she dreamed of an attractive knight her own age with whom she could share transports unknown to conjugal life. (38)

Past and present may not be so different. It's likely that though people (particularly the bored and noble young) were infatuated with deep romance, it wasn't realistic. True love was so inspirational that it appeared in societal conditioning for centuries, and has been integrated into US cultural in views of love and sex. But maybe it's never been so realistic.

After all, it doesn't fit well with what's going on in the brain. Dopamine is what gives love and sex that obsessive, addictive intensity, but dopamine works in short bursts, and isn't the most substantial part of a good relationship. The harsh cultural standards of the middle ages were stronger than short jolts of passion brought upon by dopamine and adrenaline.

Furthermore, the idea of one true love is ludicrous from a strictly scientific standpoint. Feelings of love are a body's natural responses to certain stimuli. While what turns people on differs from each individual to another, it's not as if these turn-ons are so specified they can only be met by one other person. After all, "Love isn't a searchlight. It's more like a security light that only some things trigger" (Reeve 14).

### **The Flirtation of Gallant Love**

According to Marilyn Yalom, a renowned European historian, after courtly love, Gallant love is probably the most prevalent theme that is still seen in contemporary US culture. If courtly love was an intensive ordeal full of sacrificial acts between lovers, gallant love was an exhalation after courtly love's domination of the infatuation scene for centuries. Gallant love held a much more social role in the seventeenth century, whereas courtly love was more dreamily rare and beyond reach. Gallant love was certainly real, and practiced in the upper classes on a daily basis.

The primary attribute that defined gallant love was the idea of courting and flirtation. Up to this time, there had been arranged marriages, and then the amours of courtly love, but both stressed loyalty to hegemonic level. Maybe by the time the 1600s rolled around people were sick of all that deep attachment to only one person. The mentality shifted during this time to a much more practical one that is not only backed by science but appreciated by realists all around. The idea that many different individuals could enrich love and sex lives changed the scene. Gallant love was considerably looser than anything that had come before it, in every sense of the word.

Courtly love in the Middle Ages had required devotion to only one lady, who was usually married and of higher status than the knight. Gallantry could be spread around: men usually courted women of their own rank, but could also reach out to women above and beneath them, as long as everyone understood that the lovers of unequal status were not likely to marry. (Yalom 52)

This de-stress of monogamous intensity probably helped to create some of the first skeptics of love. Some of the most renowned texts of this time respond to the idea that love exists, but is not to be taken too seriously. A good example of this was the monumental novel, *La Princesse de Cleves*, an early psychological novel in which a young woman falls wildly in love with a man who is not her husband, only to dutifully reject him upon her husband's death.

With *La Princesse de Cleves*, the medieval tradition of courtly love collides with seventeenth-century skepticism. It brings critical thinking into the realm of human relationships, religion, philosophy, and what we now call psychology. Madame de La Fayette [the author] does not deny the power of love. She masterfully describes it, even inflates it, then analyzes and deflates it. (68)

During the time period in which gallant love was in fashion, cynicism soared, and barriers were broken. The upper class was no longer so tightly bound, and a larger gray area grew between the upper and lower classes. Love was something of a game. Certainly flirtation was nothing serious and any individual could entertain numerous lovers. The idea of gifting became popular in this

time. The mind games and double-speak so associated with the start of a relationship nowadays were created.

In the seventeenth and eighteenth centuries, one learned how to please the opposite sex by reading novels and poetry, by attending plays, and by observing the conduct of one's elders and contemporaries. It was understood that a man should always make the first advance, never the woman. She, on the other hand, had the right to encourage or discourage a would-be suitor. (71)

The use of these practices today can be seen in the multi-faceted love lives of adolescents. Social structure from middle school until college fairly revolve around the ideas of dating, casual sexual partnership, and flirtation. While much of that can be explained by what's going on chemically inside adolescents, the ways in which the hormones and feelings rear up is a direct adaption of gallant love.

Gallant love isn't totally sustainable. It's most demonstrated in young flirtation, and at some point people grow up and settle down. Gallantry, like courtly love was most popular with the young and rich. It was expected that the love games would eventually settle into a couple with matching classes, gentility, and attraction. Most cultures tend to favor longer-term monogamy in the end. Evolutionarily, this makes sense for human beings. Since human children take so long to raise, and because it's better to have two parents, humanity has evolved to have the kind of relationships that best serve the furthering of a productive species. At some point the flightiness of courting is no longer acceptable. Biologically, this point arrives when pregnancy occurs. That boundary also existed in the times of gallant love, often it was what made a pair decide to settle down, and it is still seen today.

As European societies continued to advance, intimacy took a rather public stage as the concept of gallant love made it's way through the seventeenth and eighteenth centuries. Among European nobility, affairs became commonplace; mistresses were a kind of power symbol, not



unlike today. Only a wealthy man could afford to have an extra-marital woman with whom he could conceive illegitimate children, and on whom he could spend a lavish amount of money. It was expected that Kings would have women available for sex. “Louis XV [of France] became notorious in his old age for the harem of very young women he bedded on the royal budget. Poor Marie Leszcynska, his Polish wife, was kept busy bearing him children, while in her husband’s quarters, the line between gallantry and debauchery was simply effaced” (106). Of course, nowadays, US politicians and other figures of power are publicly condemned for participating in extramarital relationships, the frequency and scale at which they occur is telling that maybe the subliminal message remains.

In addition to the sex equates power concept, it was in this time the now-popular archetypes of the ‘player’ and the ‘slut’ were introduced. As gallant love degenerated, disgrace ran high.

A libertine would seduce a woman by any means, taking advantage of her youth or modest parentage, and then abandon her after ‘he had had his way with her’. Often she was left pregnant, which could reduce her to outcast status. This was not merely the stuff of literature; it was an old story in France, as in other European countries, but it seems to have garnered more print attention in the eighteenth century than any other time. Seduction novels proliferated in France and England, to be imitated by pulp fiction for years to come, well into our own benighted era. (107)

Gallantry had its victims, usually in the form of young girls seduced and then shunned. The man responsible was also considered as though he had committed a crime in the eyes of the society, though his life was less affected by his actions than his victim’s and he was more able to move on to continue his exploits elsewhere. This theme of the ruined girl and the man who took advantage of her is still a common feature in the media, and in the warnings of mothers. The word ‘ruin’ here of course means that the woman in question has had sexual intercourse, alluding to the notion that virginity correlates to purity, which was the mentality at that time. “Today,

most of us do not think of an unmarried woman as ruined if she goes to bed with a man. Indeed, in both France and the United States, we have come to accept non marital sex as a norm. This was not the case in eighteenth-century France (not to mention colonial America), nor would it be until the late twentieth century” (119). Though Yalom makes the argument that this puritanical-based image of virtue is old-fashioned, there is still a rather strong societal stress on women to limit their sexual ventures for fear of becoming ‘whores’ or ‘sluts’ and therefore shunned by society. The fact that this is outdated practice is still socially relevant just goes to show that in the contemporary perceptions of love, where neurology leaves off, historical precedence most likely fills the gap.

### **The Meeting of Science and Society**

“We crave sex, connection, and companionship so much that we will do almost anything and put up with almost anything to have love and loving relationships” (Horstman 16). Love is important, to everyone. It is a universal and important drive. It is something we need, in all forms. The forms in which we are taught to expect to receive love are historically significant, but not chemically realistic, leading to cynicism. “Hot passion is what we want to give and get; cold duty all we can reasonably promise or demand” (Reeve 15). The make-believe constructs of intimacy we harbor as a result of societal perpetuation isn’t backed by the reality of neuroscience and biological evolution. The reason this ability to form attachment exists and it’s underlying neurological process are totally disconnected from the historical models that subconsciously influence us today. The perception of love is constructed from two clashing elements; rendering it ineffective.

### **Love to Marriage**

"Americans want it all: the freedom to choose a partner and the deep, lasting love of fantasies and fairy tales. And it's possible we can have it all. By adopting some of the practices and techniques (and patience) that science and arranged marriages show build love over time, we may be able to achieve that kind of lasting love" (Horstman 151).

So here we are, Americans, in love, with strict ideas of what love is. In many ways, our views are a reflection of the forces in our bodies beyond our control. This is what tells us how to feel and react. Other perceptions come from what has been taught to us by historical models of love. A question remains, does it work? If the love Americans buy into is one that is closely tied to neuroscience, and backed by centuries of romantic advancement, shouldn't how we love be effective and lasting? Well, it isn't. The highest sign of love by American standards is marriage. It shows the commitment and loyalty of courtly love, favors fun and sexual sustainability of gallant love, represents the combining of the oxytocin, and the serotonin in a pair's sense of home and comfort. Yet, "About half of first marriages in the United States fail, and practice does not make perfect: two-thirds of second marriages also fail. Yet arranged marriages, practiced by more than half of the rest of the world, succeed" (Horstman 148). Arranged marriage was prevalent before humans began philosophizing, before the brain imaging that made clear the reality and reasoning behind love. America is a place of freedom, including the freedom to choose a partner and forge lasting fantasies of what love should be. Where have the science and history failed?

Some conjecture that we fail in large part because of our highly unrealistic expectations of relationships and our poor skills for maintaining them. Studies of arranged marriages, in which love has grown over time, hint that commitment, communication, accommodation, and vulnerability are key components of a successful relationship. (148)

Maybe it's that the American perception of love is too based on capriciousness. Falling in love is a result of chemical responses to visual and genetic stimuli. The upkeep of a fulfilling relationship on the other hand, is a much more arduous process, and chemistry doesn't have as big an impact. Oxytocin and other neuro-anatomy contribute to longer-term feelings of attachment, but don't give much insight into how to maintain a close companionship surrounded by outside forces that may strain it. While evolutionary biology seemingly favors long-term monogamy, it contradicts the fickle nature of hormonal responses to stimuli and unsaid rules of gallant love imparted upon culture. Not all of what we are taught about love complements the union of marriage, which is a much older practice. If half of all marriages end in divorce, then it's clear there's a disconnect between what we've been taught, and what works. "Couples don't have to be legally married to benefit from being together. A recent study suggests that those in a committed, long-term relationship, married or not, have lower levels of the stress hormone cortisol than their single peers. And when stressed, they also had lower levels of testosterone, which is related to being less aggressive" (Horstman 145). From a scientific viewpoint, marriage isn't necessary. From a sociological perspective, long-term love matches in the form of marriage isn't effective. Love exists, research has proved as much to the world, and to me. But the perception of love we worship in the US today hasn't fulfilled our dreams. The contradicting nature of science and history aren't compatible with the sociological constructs we've developed for love.

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