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Passionate Love and Sexual Desire

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Passionate love is as old as humankind. The Sumerian love fable of Inanna and Dumuzi was spun by tribal storytellers in 2,000 B.C.E. (Wolkstein, 1991). Since the 1960s, scholars from a variety of disciplines, and employing an impressive array of techniques, have attempted to unravel the mysteries of love. Ethologists have studied primates in the wild. Historians have poured over demographic information, architecture, medical manuals, church edicts, legal records, song lyrics, and diaries. In the last decade, neuroscientists have begun to investigate the biochemistry and brain activity of those enjoying the pleasures or suffering the miseries of love. In this chapter, we will briefly discuss the information that scientists have amassed about this once elusive phenomenon.

What is Romantic/Passionate Love? Love carries many definitions, but it is clear that it is a complex emotional state involving chemical, cognitive, rewarding, and goal-directed behavioral components. Here we will define passionate love as:

A state of intense longing for union with another.
A complex functional whole including appraisals or appreciations, subjective feelings, expressions, patterned physiological processes, action tendencies, and instrumental behaviors. Reciprocated love (union with the other) is associated with fulfillment and ecstasy; unrequited love (separation) is associated with emptiness, anxiety, or despair.

Cultural and Anthropological Approaches: True, cultures often differ in their attitudes toward passionate love, the meanings they ascribe to it, and whether or not love is considered a prerequisite for marriage. In spite of this, most cultural researchers and anthropologists argue that passionate love is a universal experience, transcending culture and time. In South Indian Tamil families, for example, a person who falls head-over-heels in love with another is said to be suffering from *mayakkam*—dizziness, confusion, intoxication, and delusion. The wild hopes and despairs of love are thought to “mix you up.” Social anthropologists have explored folk conceptions of love in such diverse cultures as the People’s Republic of China, Indonesia, Turkey, Nigeria, Trinidad, Morocco, the Fulbe of North Cameroun, the Mangrove (an aboriginal Australian community), the Mangaia in the Cook Islands, Palau in Micronesia, and the Taita of Kenya. In all these studies, people’s conceptions of passionate love appear to be surprisingly similar.

Sex researchers often use the terms "passionate love" and "sexual desire" almost interchangeably. This is not surprising given that passionate love is defined as a "longing for union," while sexual desire is often defined as a "longing for *sexual* union." Although these two phenomena are indeed often experienced in concert, recent evidence sheds light on their similarities and differences in the human brain (Stephanie Cacioppo et al., 2012).

Neuroscience Approaches: In the last decade, neuroscientists have begun to contribute to our understanding of the nature of passionate love and sexual desire. Overall, fMRI studies demonstrate that both passion and sexual desire spark increased activity in the subcortical brain areas that are associated with euphoria, reward, and motivation, as well as in the cortical brain areas that are involved in self-representation and social cognition (Cacioppo et al., 2012). Notably, recent neuroscientific evidence suggests that sexual desire shares with love a specific matrix within the striatum, thalamus, hippocampus, anterior cingulate cortex (ACC), middle frontal gyrus (MFG), superior temporal gyrus (STG), precentral gyrus, TPJ, and occipito-temporal cortices. The co-activation of subcortical emotion-related areas and higher order cortical areas that mediate more complex cognitive functions (e.g., body image, mental associations, and self-representation) reinforces the top-down neurofunctional model of interpersonal relationships and the potential role of past experiences on future emotional feelings and

behaviors. Comparing love with sexual desire, activity has been shown to be diminished in the ventral striatum, hypothalamus, amygdala, somatosensory cortex, and IPL. Those reductions are in keeping with sexual desire as a motivational state with a very specific, embodied goal, whereas passionate love could be thought of as a more abstract, flexible, and behaviorally complex goal that is less dependent on the physical presence of another person. Love is associated with a more intense activation of the ventral Tegmental Area (VTA), and a specific recruitment of activity in more dorsal regions of the right striatum, two dopamine-rich regions involved generally in motivation, reward expectancy, and habit formation. Those findings reinforce the importance of specific goal-directed incentives for one's mind to fall "head over heels in love." The activation of these subcortical dopaminergic-rich areas mostly during experiences of passionate love is in line with psychological studies defining love as a rewarding, positive and motivating experience.

Interestingly, the anterior part of the insula has been shown to be activated significantly by feelings of love, whereas the posterior part of the insula is activated significantly by feelings of sexual desire. This posterior-to-anterior insular distinction between sexual desire and love reinforces the neuro-functional characteristic of a posterior-to-anterior progression of integrative representations of affective bodily feelings to an ultimate representation of all feelings. This is in line with the view that love is an abstract construct, which is partly based on the mental representation of repeated past emotional moments with another. This specific pattern of activation suggests that love builds upon a neural circuit for emotions and pleasure, adding regions associated with reward expectancy, habit formation, and feature detection. In particular, the shared activation within the insula, with a posterior-to-anterior pattern, from desire to love, suggests that love grows out of and is a more abstract representation of the pleasant sensorimotor experiences that characterize desire. From these results, one may consider desire and love on a spectrum that evolves from integrative representations of affective visceral sensations to an ultimate representation of feelings incorporating mechanisms of reward expectancy and habit learning.

Love and Quality of Life: When passionate relationships are going well, they are associated with joy, contentment, and improved mental health. Those in love have also been found to be more resistant to stress, less sensitive to pain, and less likely to crave nicotine and other drugs. Love is also related to the frequency and variety of couple's sexual activity and satisfaction.

Of course, as we noted in our definition, love has a dark side. When passion is unrequited, thwarted, or lost, people often experience subjective social isolation (loneliness), grief, sadness, and a sense of abandonment, i.e., a series of subjective feelings and perceptions that may affect mental health as well as the immune system. Love can enrich our lives; its loss may spark misery and suffering.

Cross-References: [None as yet](#)

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References and Further Readings

Cacioppo, Stephanie, Bianchi-Demicheli, Francesco, Hatfield, Elaine, and Rapson, Richard L. (2012). Social neuroscience of love. *Clinical Neuropsychiatry*.

Hatfield, Elaine, & Rapson, Richard L. (2005). *Love and sex: Cross-cultural perspectives*. Lanham, MD: University Press of America.

Jankowiak, William. (Ed.). (1995). *Romantic passion: A universal experience?* New York: Columbia University Press.

Abstract: Scholars from a variety of disciplines have investigated passionate love and sexual desire. Passion is considered to be a cultural universal, transcending culture and time. In the last decade, neuroscientists have contributed greatly to our understanding of the nature of passionate love and sexual desire. Overall, fMRI studies show that both passion and sexual desire spark increased activity in the subcortical brain areas that are associated with euphoria, reward, and motivation and the cortical brain areas that are involved in self-representation and social cognition, although these two phenomena differ specifically at the subcortical level along a posterior-to-anterior insula pattern, from desire to love, suggesting that love is a more abstract representation of the pleasant sensorimotor experiences that characterize desire.