



Adrenaline  
Makes the  
Heart Grow  
Fonder

by Elaine Walster  
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"Love is a folly  
of the mind,  
an unquenchable  
fire, a hunger  
without surfeit,  
an agreeable illness,  
a sweet delight,  
a pleasing madness,  
a labor without  
repose and a repose  
without labor."

**A**FRIGHTENED MAN is a potentially romantic man. So is an angry man, a jealous man, a rejected man or a euphoric man. Anyone, in fact, who experiences the physical arousal that accompanies strong human emotion is a potentially romantic person in that he has already fulfilled one of the two essential conditions for love and is a step ahead of the person whose emotions are in a quiescent stage. If he should meet an unusually desirable woman while he is in this state, he is likely to be more intensely drawn to her than he would be in normal circumstances.

To love passionately, a person must first be physically aroused, a condition manifested by palpitations of the heart, nervous tremor, flushing, and accelerated breathing. Once he is so aroused, all that remains is for him to identify this complex of feelings as passionate love, and he will have experienced authentic love. Even if the initial physical arousal is the result of an irrelevant experience that usually would produce anger, or even if it is induced in a laboratory by an injection of adrenaline, once the subject has met the person, been drawn to the person, and identified the experience as love, it is love.

This is not to say that passionate love can be induced easily in a laboratory setting. However, recent experiments have shown that physical arousal, as a pre-condition to love, can be so induced. Research also demonstrates that in settings that foster interpersonal attractions, the aroused subject is likely to respond with more affection than is the unaroused subject.

**Taboo.** For years, the subject of love has been ignored by psychological researchers. A multitude of scientists have conducted experiments on "liking," which is defined as "a positive attitude toward another, evidenced by a tendency to approach and interact with him." Most theorists simply assume—without evidence—that passionate love is nothing more than very intense liking.

"Love" and "sex" have long been taboo words for psychologists. Foundations and government agencies have been reluctant to grant funds for studies on these subjects and psychologists themselves have considered experimenters on the topic of love to be "soft-headed," "unscientific" or possessed of a flair for the trivial.

Psychologists have tended to assume that in the laboratory one can study

only mild and quickly developing phenomena. Although poets have proclaimed that love can occur at first sight, psychologists have had less confidence that one can generate passionate love in a two-hour laboratory experiment. Thus, many researchers erroneously assumed that passionate love could be studied only in the field.

**Lab.** With Masters and Johnson's impressive research, indicating that sex could be studied in the laboratory, the situation quickly reversed itself. In the last five years more psychologists have begun to study romantic love than in the entire history of the science.

The problem now is not with the respectability of such studies, but with the accumulation of facts. When they are asked for information about love and sex today, chagrined psychologists must admit they know very little. However, we believe that by applying an existing theoretical framework that is concerned with human emotion generally, to the specific emotion of passionate love, our understanding of love will be increased.

**X.** Friendship, or liking, even when it is unusually intense, is an easily predictable phenomenon, a sensible emotion, because it invariably follows the rules. One can predict quite well how much a person will like another if one knows to what extent his companion rewards or punishes him. Reward has so predictable an impact on liking that Donn Byrne has proposed an exact correspondence between reinforcement and liking. "Attraction toward X," he says, "is a positive linear function of the proportion of positive reinforcements received from X or expected from X."

Love, on the contrary, seems to operate in accordance with the reinforcement rules only part of the time. Some practical persons have been known to fall in love with those beautiful, wise, entertaining and kind persons who offer affection and material rewards to them. Generally, however, love does not seem to fit so neatly into the theory of reinforcement. Individuals do not always feel passionate about the person who provides the most rewards with the greatest consistency. Passion sometimes develops in conditions that would seem more likely to provoke aggression and hatred than to permit love to flower. When we reinforcement theorists state that "we like those who like us and reject those who dislike us," we forget that indivi-

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duals may intensely love those who have rejected them. A woman experiences pain and jealousy, to be sure, when she discovers that her husband is seeing another woman. But the experience causes some women to realize how much they love their husbands.

**Hurdle.** Those who argue that "frustration always breeds aggression" likewise ignore the opinions of clinicians who claim that inhibited or frustrated sexuality is a foundation for romantic feelings. Freud noted that "some obstacle is necessary to swell the tide of libido to its height; and at all periods of history whenever natural barriers in the way of satisfaction have not sufficed, mankind has erected conventional ones in order to enjoy love."

The observation that passionate love sometimes flourishes in settings that would seem to thwart its development has always been puzzling to scientists. Poets attribute such inexplicable phenomena to the essential illogic of love. Psychologists, who refuse to acknowledge that anything is inexplicable, do not have such an easy way out. Fortunately, there is an existing theoretical framework—one devised for the study of human emotions generally—into which this "illogical" phenomenon of passionate love fits neatly and becomes both explicable and predictable.

**One-two.** On the basis of an ingenious series of experiments, Stanley Schachter proposed a paradigm for understanding human emotional response. It is from the theory he developed that we believe the specific emotion of passionate love can be clarified. Schachter suggests that in order for a person to experience emotion two factors must be present: 1. The individual must be physiologically aroused, as described above; and 2. It must be reasonable to interpret his stirred-up state in emotional terms. He argues that neither physiological arousal nor mere labeling alone would be sufficient to produce an emotional experience.

**Up.** In testing this hypothesis experimentally, it is possible to manipulate an individual's physiological arousal in the laboratory. The drug adrenaline replicates the discharge of the sympathetic nervous system. Shortly after one receives an injection of adrenaline, systolic blood pressure increases markedly, heart rate increases somewhat, cutaneous blood flow decreases, muscle and cerebral blood flow increase, and blood-sugar and lactic-acid concentrate increase, and respiration rate in-

creases slightly. The individual who has had the injection undergoes palpitation, tremor and sometimes flushing and accelerated breathing. These reactions are identical to the physiological reactions that accompany a variety of natural emotional states.

The adrenaline, however, does not engender a true emotion or emotional response in a person. After having been injected with adrenaline, subjects who are asked to report on their experiences will say frequently that there is no emotional response. Sometimes they will report feeling "as if" they might be experiencing some emotion. They make statements such as "I feel as if I were afraid." They perceive that something is not quite authentic about their reactions, that they are not true emotional experiences.

Schachter says the missing ingredient is an appropriate interpretation for the physiological reactions being experienced. If the subject could be led to attribute his stirred-up state to some emotion-arousing event, rather than to the adrenaline injection, Schachter says, his experience would constitute a true emotional state.

**Suproxin.** To test the hypothesis Schachter had to find a way of manipulating the two components—physiological arousal and appropriate interpretation—separately. In 1962, in his classical experiment with J. E. Singer, he conceived of a way to do just that.

Schachter and Singer recruited volunteers and told them they were to take part in an experiment to investigate the effects on vision of a new vitamin compound, Suproxin. He told them that they all would receive injections of the drug.

Suproxin was actually a fictitious name. Half of the students had injections of an adrenalinelike drug that causes the physiological reactions described earlier. The other half received placebo injections. The physiological arousal, thus, was in the control of the experimenter.

To gain control of the other element—the appropriate interpretation of the physiological state—Schachter explained to some of the subjects the exact bodily reactions they could expect. He theorized that this group, as they experienced the reaction to the drug, would properly attribute their stirred-up state to the injections. Whatever activities they were engaged in at the time the reactions began would not be blamed for their physical



state. Another group, however, was deliberately manipulated so that members would not attribute their reactions to the adrenaline injections.

Some got no information about the effects of the drug. Others got incorrect information about what they might expect, so that when the symptoms appeared these subjects would not easily recognize them. The experimenters hoped that subjects with either incorrect information or no information would attribute their stirred-up states to whatever activities they were engaged in when the symptoms appeared.

Schachter further subdivided the group to get further control of the interpretation component of the experiment. He left some in the presence of fellow subjects (actually trained experimenters) who had been instructed to generate excitement by mischievous and humorous activity. Then Schachter left other subjects in the presence of persons trained to make them angry. These *provocateurs* complained, called the questionnaire they had been asked to fill out "stupid," and finally left the room in a show of anger.

**Mood.** The experimenters, who watched through one-way mirrors, first determined to what extent each subject had caught the excited or angry mood of his room partners; then they asked the subject to describe his moods and to estimate his own degree of excitement or anger.

Before conducting the experiment, Schachter predicted that subjects who had received adrenaline injections would have stronger emotional reactions than would those who had received placebos or who had received adrenaline, but who were warned what symptoms to expect.

The data supported these hypotheses. The experiment thus supported the contention that both physiological arousal and appropriate interpretations are indispensable components of a true emotional experience. The experiment seemed to indicate that almost any sort of intense physiological arousal, properly interpreted, will precipitate an emotional experience.

**Key.** It was intriguing to attempt to apply this theory to the specific emotions, particularly to passionate love. Up to this point, researchers had been busy trying to explain love in terms of reinforcement—one's love for another is a function of the reinforcements the other provided—a

theory successfully applied to the emotion of friendship, or liking, but not to passionate love. With the reinforcement theory, it was impossible to explain what one could see easily—that negative experiences often led to increased rather than decreased love.

A sudden insight solved our dilemma and allowed us to apply Schachter's general theory of emotions to the emotion of love. Two components are necessary for a passionate experience: arousal and interpretation. What if the negative experiences function not in the interpretive realm, as had been supposed, but in the realm of arousal? Perhaps negative experiences are effective in inducing love because they intensify one's physiological arousal.

It would follow that the manner in which one produces an agitated state in a lover may be insignificant. What is significant is the fact of heightened physiological arousal. Stimuli that usually produce sexual arousal, gratitude, anxiety, guilt, loneliness, hatred, jealousy or confusion can all increase one's physiological arousal, and thus intensify his emotional experience.

**Spark.** Some early observers noticed that any form of strong emotional arousal can breed love (although, of course, they did not interpret this relationship in Schachterian terms). H. T. Finck, an early psychologist, concluded: "Love can only be excited by strong and vivid emotion, and it is almost immaterial whether these emotions are agreeable or disagreeable. The Cid wooed the proud heart of Diana Ximene, whose father he had slain, by shooting one after another of her pet pigeons. Such persons as arouse in us only weak emotions or none at all, are obviously least likely to incline us toward them. . . . Our aversion is most likely to be bestowed on individuals who, as the phrase goes, are neither 'warm' nor 'cold'; whereas impulsive, choleric people, though they may readily offend us, are just as capable of making us warmly attached to them."

As long as the subject attributes his agitated state to passionate love, he should experience love.

There is almost no evidence that directly supports this contention. However, a few studies designed to test other hypotheses provide minimal support. Generally, they are concerned with experiments designed to test liking, or friendship, and their application to love may be invalid. Is the fright-

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ened man cited at the beginning really a passionate man? To be sure, frightening a person is a very good way to produce intense physiological arousal.

In one study, J. W. Brehm and his associates led one group of men to believe they would soon receive three "pretty stiff" electrical shocks. Later the experimenters told half of them that there had been an error and they would not receive the shocks. The experimenters never discussed the possibility of electrical shocks with a control group. The experimenters introduced each of the men to a young girl and asked later how much each liked her. Those who were still expecting the electrical shock and those who had been told initially to expect one, but later were told none would be forthcoming, exhibited more liking for the girl than did the control group.

The experimenters concluded that the fear, though it is irrelevant to the emotion of liking, facilitated the attraction. Likewise, the relief from fear—which was a strong emotional experience in itself—seemed to facilitate the attraction.

A passage in Bertrand Russell's autobiography illustrates the point. He reports that an irrelevant, frightening event—World War I—intensified his passion for Colette, a mistress:

"We scarcely knew each other, and yet in that moment there began for both of us a relation profoundly serious and profoundly important, sometimes happy, sometimes painful, but never unworthy to be placed alongside of the great public emotions connected with the War. Indeed, the War was bound into the texture of this love from first to last. The first time that I was ever in bed with her (we did not go to bed the first time we were lovers, as there was too much to say), we heard suddenly a shout of bestial triumph in the street. I leapt out of bed and saw a Zeppelin falling in flames. The thought of brave men dying in agony was what caused the triumph in the street. Colette's love was in that moment a refuge to me, not from cruelty itself, which was unescapable, but from the agonizing pain of realizing that that is what men are. . . ."

**Nay.** What of the emotional experience of rejection? Could it also, under certain conditions, engender love? In one test, experimenters asked male students to take a series of personality tests. Later, a psychologist interpreted the results to the students in such a

manner that half received flattering personality profiles while the other half received insulting reports.

Soon thereafter, it was arranged for a young female college student to make the acquaintance of each of the males. She had been trained to treat each boy initially in a warm, accepting way. Under these conditions, the men who had received the critical evaluations were far more attracted to her than were their more confident counterparts. It could be concluded that the previous arousal engendered by the rejection facilitated the later display of affection.

When the girl was cold and rejecting, there was a dramatic reversal. The previously rejected men disliked the girl more than did their confident counterparts. In summary, it seems that an irrelevant, painful event can inspire strong emotional reactions toward others. Depending on how he labels his feelings, the individual may experience either intense attraction or intense hostility.

**Accord.** Socrates, Ovid, Terence, the *Kamasutra* and Dear Abby are all in agreement on one point: the person whose affection is easily won will inspire less passion than the person whose affection is hard to win.

Vassilikos poetically elucidated the principle that frustration flames passion while continual gratification weakens it:

"Once upon a time there was a little fish who was a bird from the waist up and who was madly in love with a little bird who was a fish from the waist up. So the Fish-Bird kept saying to the Bird-Fish: 'Oh, why were we created so that we can never live together? You in the wind and I in the wave. What a pity for both of us.' And the Bird-Fish would answer: 'No, what luck for both of us. This way we'll always be in love because we'll always be separated.'"

**Gain.** Some support for the contention that the hard-to-get person may engender unusual passion in the eventually successful suitor comes from Elliot Aronson ["Who Likes Whom — and Why" *P.T.*, August 1970] and Darwyn Linder, who tested the hypothesis that "a gain in esteem is a more potent reward than invariant esteem." They predicted that a person would be better liked if his positive regard were hard to get.

In the test, subjects talked during seven separate meetings with another subject, who was actually a confed-

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erate of the experimenters. After each meeting the subjects learned how the confederates regarded them. The experimenters systematically varied these estimations. In one segment, the confederates began by expressing negative impressions of the subjects, gradually modifying their reports until, finally, they appeared to like the subjects. In all the remaining segments, the confederates expressed, right from the beginning, only positive opinions about the subjects.

As predicted, the subjects liked the confederates whose affections appeared to be hard to win better than they liked those who appeared to like them from the beginning.

This experiment is consistent with our suggestion that a hard-to-get girl should provoke more passion than the constantly rewarding girl. The aloof girl's challenge may excite the suitor; her momentary rejection may frustrate him. Such arousal may intensify his feelings toward her.

The preceding analysis underscores the contention that the juxtaposition of agony and ecstasy in passionate love is not entirely accidental. Loneliness, deprivation, frustration, hatred and insecurity may, in fact, supplement a person's romantic experiences. Passion demands physiological arousal, and all of these experiences are certainly arousing.

**Error.** Thus far the experiments cited have dealt with a negative component as a factor in heightening passionate love. Yet, positive reinforcements—such as sexual gratification, excitement, companionship, discovery and joy—can generate arousal as intense as that stirred by fear, frustration or rejection. It follows that these positive reinforcements can likewise facilitate passionate love.

Even the erroneous belief that one has been sexually aroused by a member of the opposite sex will facilitate a real attraction for that person. Stuart Valins recounts an experiment in which male college students viewed 10 photographs of seminude women. They were told that as they looked at the pictures, their heartbeats would be monitored. In reality, the "monitoring device" was manipulated by the experimenter in a systematic manner that was not influenced by the subject's actual heartbeat. The men were told that certain of the photographs had caused their hearts to beat faster and that some of the pictures had produced lit-

tle or no physiological reaction. The men then showed marked preference for the photographs that they believed they had reacted strongly to.

**Need.** The positive emotional reaction of need fulfillment likewise seems capable of facilitating passion, as is the common experience of us all. We have a wide variety of needs, and at any stage of life many of them are unsatisfied. When an unsatisfied need is finally met, the emotional response that accompanies such reinforcement can provide fuel for passion. The adolescent boy who has been babied at home for many years might react most favorably to the girl who acknowledges his maturity and masculinity. Again, the typical hard-working father whose day-to-day activities are generally limited to breadwinning and family routine may be captivated when an alert lady makes him feel like a reckless lover.

**Label.** All these experiments serve to validate the contention that Schachter's two-component theory can be applied to passionate love. They all demonstrate that physiological arousal is a crucial component of love, and that fear, pain, frustration, delight and sexual gratification can all deepen the passionate experience under certain conditions.

Yet the experiments also reveal that, according to the two-component theory, the individual so aroused will not actually be experiencing passionate love unless conditions are right for him to label the experience as love.

The American culture strongly encourages individuals to interpret a wide range of confused feelings as love. Ralph Linton makes this point in a somewhat harsh observation: "All societies recognize that there are occasional violent emotional attachments between persons of the opposite sex, but our present American culture is practically the only one which has attempted to capitalize on these and make them the basis for marriage. The hero of the modern American movie is always a romantic lover, just as the hero of an old Arab epic is always an epileptic. A cynic may suspect that in any ordinary population the percentage of individuals with capacity for romantic love of the Hollywood type is about as large as that of persons able to throw genuine epileptic fits."

A physiologically aroused person is more likely to conclude that he is "in love" when cultural pressures encour-

age him to interpret his mixed feelings in this way than when they do not.

As an example, while the delightful experience of sexual intercourse can be frankly labeled as "sexual fun" by a man, it is more difficult for a girl to interpret her feelings in this way. Culturally, a girl is expected to experience sex only when she is "in love." Thus girls are probably more likely than boys to label sexual feelings in romantic terms.

**Green eyes.** In our culture, jealousy is manifested in a variety of petty ways. Margaret Mead said: "Jealousy is not a barometer by which the depth of love may be read. It merely records the degree of the lover's insecurity. It is a negative, miserable state of feeling, having its origin in a sense of insecurity and inferiority." But when the jealous person can convince himself that this emotion is a manifestation of love, he need not regard it as petty. The spurned husband who treats his wife as a chattel may in reality be insecure, yet might interpret his jealousy as a lofty form of love.

Besides the cultural implantations, each individual acquires a set of self-images that also can determine to what extent he is likely to label a physiological arousal as love. The individual who thinks of himself as a nonromantic person should fall in love less often than should an individual who assumes that love, for him, is inevitable. The nonromantic person may experience the same feelings that the romantic does, but he will code them differently.

A girl with a great deal of self-confidence, who considers herself attractive, may induce a normally unresponsive man to label his feelings for her as love. The insecure girl who complains that her boyfriend doesn't love her, who even itemizes for him evidence of his neglect, may effect an actual lowering of his esteem for her.

The examples, of course, are not meant as solid evidence that Schachter's two-component theory can explain passionate love. The consistency of available data with our argument suggests, however, that we should conduct laboratory experimentation to test the thesis that both physiological arousal and proper labeling of the aroused state as passionate love are basic to the human emotion of passionate love. Psychological research is now free of the taboos that prevented such experimentation for many years. 