# The Brain in Lust and Love:

## The Evolution of Empathy, Cooperation, and Caring – And Graceful Ways to Ride the Roller-Coaster of Romance



### Introduction

The marvelous human capabilities for understanding each other, and feeling understood, developed in the brain over millions of years.

Learning about these can help you understand and work better with your own empathic capabilities.

And they point to a hard-wired tendency in the human character – a kind of Dark Side of the Force – that must be managed, even transcended, for the full flowering of virtue, compassion, empathy, kindness, and love.

### Building Blocks of Empathy

Organisms develop attributes through evolution because those characteristics function to increase . . . grandchildren.

Evolution builds complex capabilities out of simpler ones.

These are the five major building blocks of empathy that increased the grandchildren – ultimately, us – of our ancient, great- great great primate, mammal, and reptile ancestor-parents:

**1.** Understanding the intentions of other animals, both of one's own species, and others.

For example, consider the basic distinction between: Do you want to mate with me? Or eat me? (Or both . . . But hopefully, we've moved beyond the black widow spider level . . . )

Even quite primitive animals work to infer the true plans of other animals from the behavior of those other animals.

2. Simulation systems – Many of the same neural circuits activate both when we take an action and when see others taking the same action.

Since the brains of normal humans are 99.9% identical to each other in their core functionalities – since they are derived from the same basic template in human DNA – this means that the general experience of an action within me – let's say, of reaching for a cup – is close to, or shares features with, the experience of that action within you.

In terms of motor activities, when I see you reaching for a cup, neural circuits (called "mirror neurons") within me create a simulation – a kind of echo – of the actual felt experience within you of reaching for that cup.

Similarly, many of the same neural circuits activate when we experience primary emotions and when we see others experiencing the same emotion. For example, the insula activates both when you are having a gut feeling – such as fear of pain, disgust, or nausea – and when you see someone having a similar gut feeling (particularly someone you care about). Literally, you really do feel my pain.

And more broadly, many of the same neural circuits activate when we have more subtle emotions and when we see others having that same emotion. As a result, impairments in the production of emotions – such as with strokes in certain parts of the brain – lead to impairments in the recognition of those emotions.

These activations are hard-wired and occur automatically, often outside of awareness.

In other words, there is a kind of natural, unbidden resonance in which our brains are continually re-creating within ourselves traces of the experience of other people.

3. Empathy facilitates cooperation and altruism. We come from a long line of social animals, and within groups where others know what you're up to – where your reputation can be known – there are reproductive advantages in being seen as a cooperative, giving individual.

Further, groups characterized by a high level of cooperation and altruism among their members had advantages compared to other groups in which cooperation and altruism was low. In other words, all things being equal, groups with strong teamwork will beat groups with weak teamwork.

Even sometimes, groups with individually weaker members – but who unselfishly work together for the greater good – will often beat groups with individually stronger members but less teamwork . . . as one can often see in professional sports, especially those that really rely on teamwork, such as basketball.

And the accumulating advantages of that difference – the degree of teamwork – really mount up in harsh environmental conditions. Which are precisely the conditions in which our primate and mammalian ancestors evolved (and the NBA playoffs!).

4. Language offers a rich medium of communication that helps us describe inner states more fully and more clearly. Humans, unlike other animals, can put their feelings into words. Consider the nuances available in some of the words we use for flavors of fear: unease, worry, apprehensiveness, anxiety, dread, panic, terror.

5. Last, with language came increasing abilities at conceptualization, or abstract thought. This aided empathy in two key ways:

- It enabled us to stand outside our own point of view in order to consider the point of view of the other person.

We need a basic mental flexibility to be empathic. Consider people who tend toward a certain mental rigidity – hmm, probably a few of us here in this room! – and how they tend to have limited empathy.

(Which is another good reason to develop the ability to step back and observe and reflect upon our own mental processes – which is, in Buddhist practice, called the Third Foundation of Mindfulness.)

- It enabled us to make educated guesses – to make inferences – about what's going on inside the other person.

More primal sensate and emotional mirroring systems give us lots of data, and then we step back and reason about it, creating hypotheses, and checking them out to produce more data, and so on.

Empathy has an intelligence to it. It is much more than simple mirroring of or resonance with the other person. Empathy is inquiry. Which is an aspect of the investigation factor, which is one of the seven factors of enlightenment in Buddhist thinking.

Interestingly, these more conceptual aspects of empathy come fully on line relatively late in human development – in adolescence or even early adulthood – much as they have come on late only recently in primate evolution

In sum, 2.5 million years ago, our great- great-grandparents were making stone tools in Africa. And handing down that technology to generation after generation – sometimes unchanged for a million years. Pretty incredible!

But those folks had brains about half the size of our own. The other half that got added since then, mainly handles language and conceptualization, and related abilities with planning, emotion, and social behavior.

That's the difference – less than three cups worth – that has made all the difference in the world.

## Evolution of Bonding and Love

Then, building on these omnidirectional capacities for cooperation, empathy, and altruism, we have the evolution of *pair bonding*, culminating in the complexities of human love.

What was the payoff in the "reproductive advantages" of pair bonding – between parents and their young, and between mates – that drive evolution?

Humans evolved bonding in large part because childhood is so long – and childhood is so long in order to develop all the faculties of the higher brain functions.

So we needed ways to bond mothers with children for years and years, and ways to bond fathers with children and their mothers for years and years, and ways to bond family groups together for years and years in order to sustain "the village it takes to raise a child."

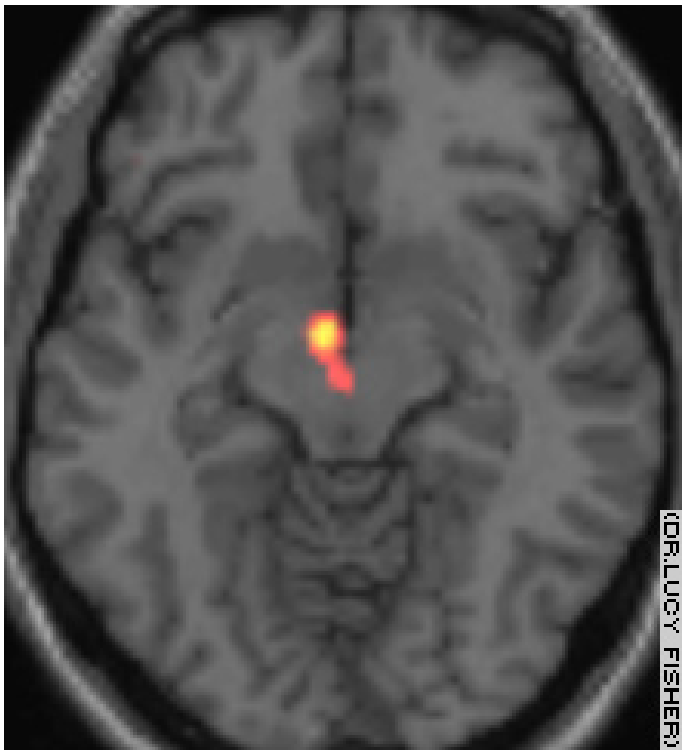
Many factors promote bonding, including virtue and empathy – the capacities for which have certainly evolved over time.

Biochemical factors have evolved as well, and let's consider two of them now: the chemicals dopamine and oxytocin. Both are neurotransmitters in the brain, and oxytocin also functions as a hormone when it acts outside the nervous system.

(By the way, dopamine and oxytocin, like many other biochemical factors, are present in other mammals, too, but as with most things human, their effects are much more nuanced and elaborated.)

## Dopamine

It's an error to reduce love to chemicals, since so many other factors are at work in the brain and mind as well, so let's hold this material in perspective.



That said, it appears that when people are in love, among other neurological activity, two parts of their brain really get activated.

Both of these areas are shown in the MRI slide just above. It's a sideways slice of the brain, looking down. The orange blob in the middle is actually two little – but very important – parts of the brain that are both very active. They are called the tegmentum and the caudate nucleus.

What's happening in the picture – taken of a college student in love while looking at a picture of his or her beloved – is that portions of the tegmentum are flooding the caudate with lots of dopamine.

The caudate really "likes" dopamine, so it sends signals back to the tegmentum to keep the supplies coming.

Dopamine is very involved with pleasure and motivation. And also addiction; cocaine triggers *lots* of dopamine.

In effect, being in love rewards the pleasure centers in your brain, which then crave whatever it was that was so rewarding – in other words, your beloved.

And being rejected in love activates a part of the brain called the insula, which is the same region that lights up when we are in <u>physical</u> pain (as noted above).

So we are doubly motivated to hold fast to the object of our love: feel the pleasure, and avoid the pain.

Interestingly, when people are in lust, rather than in love, different systems of the brain get activated, notably the hypothalamus and the amygdala.

The hypothalamus regulates drives like hunger and thirst; interestingly, the word in Pali that is translated in English as the "desire" or "attachment" or "clinging" that is the root of suffering has the fundamental meaning of "thirst," so it's pretty likely that the hypothalamus is involved in much of the clinging that leads to suffering.

The amygdala handles emotional reactivity, and both it and the hypothalamus are involved in arousal of the organism, readiness for action (and thus the amygdala and hypothalamus are central switchboards for the fight or flight responses to stress).

This speaks to the subjective experience of being in love, which generally feels softer, more "Aaaaahh, how sweet!" rather than the "Rawwrh, gotta have it!" intensity of lust.

That said, dopamine – increased in love – triggers testosterone production, which is a major factor in the sex drive of both men and women.

So, in short, we fall in love, and among other neural circuits and psychological complexities, the same reward chemicals involved in drug addiction lead us to crave our beloved and want sex with him or her. Sorry to be mechanistic here, but you get the idea.

The intended result, in the evolutionary playbook, is, of course, babies.

Then what?!

## Oxytocin

Oxytocin promotes bonding between mothers and children, and between mates, so they work together to keep those kids alive.

(By the way, we'd really like to credit Linda Graham, our friend and a great therapist and a writer for providing much of the information here about oxytocin. Thank you!)

For example, in women, oxytocin triggers the let-down reflex in nursing, and is involved in that blissful, oceanic feeling of peace and comfort and love experienced by many women while breastfeeding. (Of course, breastfeeding is often not so blissful!)

It also seems to be part of the female response to stress (more than in men – since women have much more oxytocin than men do), particularly encouraging what Shelley Taylor at UCLA called "tend-and-befriend" behaviors in women when they are stressed.

(Of course, men, too, will often reach out to others and be friendly during tough times, whether it's crunch quarter at the office, or somewhere in a dusty war – another example of how there are many pathways in the brain to important functional results.)

The experiential qualities of oxytocin are pleasurable feelings of relaxation and rightness, so it is an internal reward for <u>all</u> bonding behaviors – not just with mates.

Oxytocin encourages sociability; for example, when oxytocin capabilities are knocked out in laboratory mice, their relationships with other mice are very disturbed.

And oxytocin dampens the stress response of the sympathetic nervous system and the hypothalamus-pituitary-adrenal axis – besides having functional benefits, this is another pathway for rewarding, and thus encouraging, bonding behaviors.

What triggers this warm and fuzzy and let's-get-together-now chemical?

Oxytocin is released in both women and men:
- When nipples are stimulated (such as through nursing)

- During orgasm, promoting the afterglow of warm affection (and a tendency, sometimes annoying in a partner, to fall asleep!)

- During extended, physical, especially "skin-to-skin" contact (e.g., cuddling children, long hugs with friends, teens forming packs on the couch, lovers caressing after sex)

- When moving together harmoniously, like dancing

- When there are warm feelings of rapport or love; a strong sense of metta (lovingkindness) probably entails releases of oxytocin, though we have not seen a study on that specific subject (a great Ph.D. dissertation for someone).

- Probably during devotional experiences, such as in prayer, or while with certain kinds of spiritual teachers

Oxytocin can also be released just by *imagining* – the more vividly, the better – the activities just mentioned, particularly when combined with warm feelings.

Of course, to reiterate, oxytocin is just one of many factors at work in our relationships. For example, philosophical values or ideals of universal compassion, such as in the major religions of the world, can also influence a person's behavior greatly, whether or not any oxytocin is released.

## The Dark Side of Romantic Bonding

For all their wonderful aspects, the neuropsychological mechanisms of bonding have their shadow sides, too. Let's consider two of those.

The rewards of mating – so effective in getting people to make babies, and then stay joined to each other long enough to raise those children to semi-independent functionality – contain the seeds of two common problems:

- Those rewards – including sweet surges of dopamine and oxytocin – naturally incline the mind to seek whatever will trigger those rewards . . . even if that's not so good for us, or others. So we keep chasing the wrong person, looking for love in all the wrong places.

- Those pleasures also make us suffer when we lose them, if the other person distances or abandons us. Recall how rejection or abandonment activates some of the regions also triggered by physical pain. Rejection and abandonment hurt.

There are many toolboxes for dealing with these issues. Let's consider the methods from Buddhism, for example.

The Buddha's general analysis of the two problems just above – reduced to their essence, which is that unhealthy attachment leads to emotional pain – can be seen in what he called the Chain of Dependent Origination: contact with a stimulus [the beloved person] has a feeling tone [pleasant] which leads to craving, which leads to clinging, which leads to suffering.

To deal with this chain of one thing leading to another, Buddhism has many tools, and we will highlight two here – *insight* and *equanimity* – applied to romantic love and heartbreak.

As we explore insight and equanimity, you might like to keep applying these ideas to a specific love relationship – current or in the past – which will make them more real for you.

**Insight**

Insight, or Wise View, helps us remember that letting ourselves crave a pleasure is the slippery slope to suffering . . . and if we're clinging to that pleasure, we've fallen over the edge and it's usually just a matter of time before we hit the ground.

It also helps us see the nature of the person, or the experiences, we crave: insight reminds us that they are all *impermanent*. They are bound to change. If we are not prepared for the person to change, or for the experiences with them to change, or for the relationship to change, or for ourselves to change within the relationship . . . then we will suffer, and usually cause suffering as well.

Insight also helps us move to the wisdom place of *disenchantment*. We start to recognize that the pleasures of being with another person are nice – but rarely incredible. Nothing can be that great that long!

The stories told in novels and movies about the Fairy Prince or Princess and living happily forever after are just spells cast over the mind.

Love and long-term relationships and families are great, but it's wise to keep their rewards in perspective. If we are clear-eyed about what is actually possible over the long haul in love, we will tend to feel more relaxed in the relationship, more accepting of inevitable ups and downs, and be easier to live with . . . and to keep loving!

**Equanimity**
Equanimity is more profound than calm.

When we are calm, we are not upset. When we are in a state of equanimity, even if our mind has gotten reactivated, we are not upset about the disturbance of mind.

In the Buddhist understanding of equanimity, to be a little technical, we are not reacting to the moment to moment feeling tone of experience, whether it is pleasant, unpleasant, or neutral.

It is hard to control the feeling tone in the moment – and in a way, wisdom realizes that this world, sometimes called *samsara*, is not perfectible, and will always have lots of neutral and pleasant experiences – so the best bet is to develop a wise response to that feeling tone . . . which is equanimity.

Applying this approach to the pleasures of mating, equanimity means to enjoy what is pleasant without chasing after it. Letting physical pleasures of mating flow through . . . letting the emotional rewards of closeness flow through . . . enjoying them, but not grasping them.

Similarly, equanimity with the unpleasant means being present with it, but not adding insult to injury – what the Buddha called the second dart – by getting frightened, or agitated, or losing touch with virtue and empathy and lashing out. Or feeling affronted – suffering what in psychology lingo is a "narcissistic wound," clinging to self – in how could you treat <u>me</u> this way?!

And when the feeling tone is neutral – as it really is so much of the time, both in life in general and in our relationships – equanimity stays relaxed with the neutral and

doesn't need it to jump up and get great again. For example, lots of time we get frightened that nothing is happening in the relationship, and stir things up needlessly, to get some stimulation going.

The result of equanimity with the neutral is patience and ease of mind for yourself, and for others, it makes you a person who is a lot easier to be with.

Daily life in a bonded relationship, or daily life without a bonded relationship but wanting one, is full of opportunities to practice with insight and equanimity. Since "neurons that fire together, wire together," that regular practice will cultivate greater insight and equanimity in you.

Additionally, no surprise, meditation is a direct path to insight and equanimity, and we encourage you to commit to meditating every day, at least one minute or more. Meditation is to mental health what aerobic exercise is to physical health.

In sum, to refer to perhaps the greatest dharma story of all time – Goldilocks and the Three Bears! – romantic love goes best when we're in the "just-right" spot of not too cold and not too hot: brave enough to give our hearts, and wise enough to not get over-clinging about whatever results.

The practices of virtue, empathy, insight, and equanimity can really help us find and stay in that just-right place.