chapter 8

Two Wolves in the Heart

All sentient beings developed through natural selection in such a way that pleasant sensations serve as their guide, and especially the pleasure derived from sociability and from loving our families.

—Charles Darwin

I heard a story once about a Native American elder who was asked how she had become so wise, so happy, and so respected. She answered: "In my heart, there are two wolves: a wolf of love and a wolf of hate. It all depends on which one I feed each day."

This story always gives me a little shiver. It's both humbling and hopeful. First, the wolf of love is very popular, but who among us does not also harbor a wolf of hate? We can hear its snarling both far away in distant wars and close to home in our own anger and aggression, even toward people we love. Second, the story suggests that we each have the ability—grounded in daily actions—to encourage and strengthen empathy, compassion, and kindness while also restraining and reducing ill will, disdain, and aggression.

What are these wolves and where did they come from? And how can we feed the wolf of love and starve the wolf of hate? This chapter considers the first question; the next two chapters explore the second.

THE EVOLUTION OF RELATIONSHIP

Although the wolf of hate gets more headlines, the wolf of love has been painstakingly bred by evolution to be more powerful—and more central to your deepest nature. In the long march from tiny sponges in the ancient seas to humanity today, relating well to other members of one's species has been a great aid to survival. During the past 150-million-year journey of animal evolution, the advantages of social abilities were arguably the most influential factor driving the development of the brain. There were three major advances, and you benefit from them every day.

Vertebrates

The first proto-mammals probably lived about 180 million years ago, followed by the earliest birds around 30 million years later (these dates are approximate because of the ambiguous fossil record). Mammals and birds face survival challenges similar to those of reptiles and fish—harsh habitats and hungry predators—yet in proportion to body weight, mammals and birds have bigger brains. Why?

Reptiles and fish usually don't take care of their young—and may in fact eat them!—and typically make their way in life without a partner. By contrast, mammals and birds raise their young, and in many cases, they form pair bonds, sometimes for life.

In the dry language of evolutionary neuroscience, the "computational requirements" of selecting a good mate, sharing food, and keeping young alive required increased neural processing in mammals and birds (Dunbar and Shultz 2007). A squirrel or

sparrow has to be smarter than a lizard or shark: better able to plan, communicate, cooperate, and negotiate. These are the exact skills that human couples discover are critical when they become parents, especially if they want to remain mates.

Primates

The next major step in brain evolution occurred with the primates that first appeared roughly 80 million years ago. Their defining characteristic was and is great sociability. For example, monkeys and apes spend up to a sixth of their day grooming other members of their troop. Interestingly, in one species studied—Barbary macaques—the groomers experienced more stress relief than the groomees (Shutt et al. 2007). (I've tried to use this rationale to get more back scratches from my wife, but so far she's not buying it.) The evolutionary bottom line is that, for both female and male primates, social success—which reflects relationship skills—leads to more offspring (Silk 2007).

In fact, the more sociable a primate species is—measured by things like breeding group size, number of grooming partners, and complexity of hierarchies—the bigger its cortex is compared to the rest of the brain (Dunbar and Shultz 2007; Sapolsky 2006). More-complex relationships require more-complex brains.

Further, only the great apes—the most modern family of primates, which includes chimpanzees, gorillas, orangutans, and humans—have developed *spindle cells*, a remarkable type of neuron that supports advanced social capabilities (Allman et al. 2001; Nimchinsky et al. 1999). For example, great apes routinely console other members of their troop who are upset, although this type of behavior is rare among other primates (de Waal 2006). Like us, chimpanzees laugh and cry (Bard 2006).

Spindle cells are found only in the cingulate cortex and insula, indicating that these regions—and their functions of empathy and self-awareness—have experienced intense evolutionary pressure over the last several million years (Allman et al. 2001; Nimchinsky et al.

1999). In other words, the benefits of relationships helped drive the recent evolution of the primate brain.

Humans

About 2.6 million years ago our hominid ancestors began making stone tools (Semaw et al. 1997). Since then the brain has tripled in size, even though it uses roughly ten times as many metabolic resources as an equivalent amount of muscle (Dunbar and Shultz 2007). This enlargement has challenged the female body to evolve, as well, in order to enable babies with bigger brains to exit the birth canal (Simpson et al. 2008). Given its biological costs, this rapid growth must have conferred great survival benefits—and most of what's been added is used for social, emotional, linguistic, and conceptual processing (Balter 2007). For example, humans have many more spindle neurons than the other great apes; these create a kind of information superhighway running from the cingulate cortex and the insula—two regions that are crucial to social and emotional intelligence—to other parts of your brain (Allman et al. 2001). Although an adult chimpanzee is better than a two-year-old child at figuring out the physical world, that young human is already much smarter about relationships (Herrmann et al. 2007).

This process of neural evolution may seem dry and remote, but it played out in the daily life-and-death struggles of beings like us in many ways. For millions of years, until the advent of agriculture about 10,000 years ago, our ancestors lived in hunter-gatherer bands, usually with fewer than 150 members (Norenzayan and Shariff 2008). They bred mainly within their own band while searching for food, avoiding predators, and competing with other bands for scarce resources. In that harsh environment, individuals who cooperated with other members of their band typically lived longer and left more offspring (Wilson 1999). Further, bands with strong teamwork usually beat bands with weak teamwork at getting resources, surviving, and passing on their genes (Nowak 2006).

Even small reproductive advantages in a single generation accumulate significantly over time (Bowles 2006), much the way small differences in team batting averages add up over the course of a long baseball season. Over the 100,000 generations since tools were first invented, those genes that fostered relationship abilities and cooperative tendencies pushed their way forward in the human gene pool. We see the results today in the neural underpinnings of many essential features of human nature, including altruism (Bowles 2006; Judson 2007), generosity (Harbaugh, Mayr, and Burghart 2007; Moll et al. 2006; Rilling et al. 2002), concern about reputation (Bateson, Nettle, and Robert 2006), fairness (de Quervain et al. 2004; Singer et al. 2006), language (Cheney and Seyfarth 2008), forgiveness (Nowak 2006), and morality and religion (Norenzayan and Shariff 2008).

CIRCUITS OF EMPATHY

Powerful evolutionary processes have shaped your nervous system to produce the capabilities and inclinations that foster cooperative relationships; they've nourished a large and friendly wolf in your heart. Building on this general sociability, related neural networks support *empathy*, the capacity to sense the inner state of another person, which is required for any kind of real closeness. If there were no empathy, we'd make our way in life like ants or bees, brushing shoulders with other people but fundamentally alone.

Humans are by far the most empathic species on the planet. Our remarkable capabilities rely on three neural systems that simulate another person's actions, emotions, and thoughts.

Actions

Networks in your brain's perceptual-motor systems light up both when you perform an action and when you see someone else perform that action, giving you a felt sense of what he's experienc-

ing in his body (Oberman and Ramachandran 2007). In effect, these networks mirror the behavior of others, thus the common term, *mirror neurons*.

Emotions

The insula and linked circuits activate when you experience strong emotions such as fear or anger; they also light up when you see others having those same feelings, particularly people you care about. The more aware you are of your own emotional and bodily states, the more your insula and anterior cingulate cortex activate—and the better you are at reading others (Singer et al. 2004). In effect, the limbic networks that produce your feelings also make sense of the feelings of others. As a result, impairments in the expression of emotions—such as from a stroke—frequently also worsen the recognition of emotions in other people (Niedenthal 2007).

Thoughts

Psychologists use the term *theory of mind* (ToM), to refer to your ability to think about the inner workings of another person. ToM relies on prefrontal and temporal lobe structures that are evolutionarily quite recent (Gallagher and Frith 2003). ToM capabilities first appear during the third and fourth years of life and don't develop fully until the complete *myelination*—the insulation of axons which speeds neural signals along—of the prefrontal cortex in the late teens or early twenties (Singer 2006).

These three systems—tracking the actions, emotions, and thoughts of other people—help each other. For example, sensorimotor and limbic resonance with the actions and emotions of others gives you lots of data for ToM-type processing. Then, once you form an educated guess—often within just a few seconds—you can test it out on your body and your feelings. Working together, these

systems help you understand, from the inside out, what it is like to be another person. In the next chapter, we'll cover a variety of ways to strengthen them.