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Does Revenge Serve an Evolutionary Purpose?

Why all the celebration after the killing of Osama bin Laden? A psychologist who studies evolution and human behavior explains the complex desire for vengeance

By [Katherine Harmon](#) | Wednesday, May 4, 2011 | [17](#)



Killing for revenge?: Research has shown that humans are not the only animals that use revenge as deterrence. But people seem inclined toward long-term planning when it comes to their vengeance, and the U.S. Navy SEALs that killed Osama bin Laden might have just been the final step in that process. Image: Wikimedia Commons/U.S. Navy/Christopher Menzie

Spontaneous patriotic chants and flag-waving crowds were sparked by word that Osama bin Laden had been killed earlier this week. Despite the man's loathed reputation as the mastermind of the September 11 terrorist attacks, the jubilation over [bin Laden's death](#) raises the question: Why the celebration? Was it relief, a sense of justice—or the simple pleasure of revenge?

As draconian as lethal retribution might seem, science has shown that [the human brain can take pleasure in certain kinds of revenge](#). Magnetic resonance imaging (MRI) scans have revealed that thinking about revenge activates the reward center—where the feel-good neurotransmitter dopamine is lodged—in much [the same way that sweet foods](#) or even drugs can.

But the news also brought out some [more jumbled sentiments](#), including sadness for the

reminder of the past tragedy and ambivalence about the intentional killing of another person. With all of this gray area—colored in this instance by politics, history and the sheer scale of the international stage—is there a way to understand revenge in a basic, biological way?

To find out, *Scientific American* spoke with [Michael McCullough](#), a psychology professor and director of the Evolution and Human Behavior Laboratory at the University of Miami, as well as the author of *Beyond Revenge: The Evolution of the Forgiveness Instinct* (Jossey-Bass, 2008). He explains that the impulse for revenge evolved as a simple cost-benefit equation and why it is best served cold—but not too cold.

[An edited transcript of the interview follows.]

As a psychologist and someone who has written and thought a lot about this concept, how do you think about revenge?

We want to be very precise in the kinds of behavior that qualify as revenge. We think about behaviors that are generated by psychological mechanisms that were designed for biological functions. Why do I want to make such a niggling distinction? Because there are behaviors that can look like revenge but that aren't. Anytime I impose a harm on you, it might be revenge or it could be something else—I could try to hurt you because I'm trying to get away from you so that you don't harm me in the future, which wouldn't qualify as revenge.

We think there are mechanisms up in the heads of social animals that are designed to deter them from posing harms in the first place. So revenge is the output of mechanisms that are designed for deterrence of harm—behaviors designed to deter individuals from imposing costs on you in the future after that individual has imposed costs on you in the first place.

You'll hear people say things that *sound* right: it's to "balance the scales," or "right a wrong," or "serve justice," but those don't really meet the level of achieving a function that biology cares about.

So is revenge not about some sort of human desire for justice?

When I don't have my psychologist hat on, and someone has done something to make me feel vengeful, I do feel like I want to teach them a lesson. I think: "I'm going to feel better once I take care of this hangnail of a moral wrong that's on my mind right now." But we want to make a clear distinction between the way revenge *feels* to us as human critters and what the mechanisms are designed to do.

What evolutionary purpose does the impulse for revenge serve?

It's got costs, but it does look like, from the best models we have, that individuals with a taste for punishing those who have harmed them could become a major part of a group. The way revenge seems to operate in our minds today really does have a functional ring to it.

The loudest way to exact revenge is to make a person's gains less profitable. You have reached into their accounting system and changed what they've gained from harming you.

The interesting thing is that the desire for revenge goes up if there are people who have watched you be mistreated, because in that case, the costs have gotten bigger. If you don't take revenge, there's a chance that people will learn that you are the type of person who will put up with mistreatment. That is the kind of phenomenon that you would expect if there is a functional logic underlying the system that produces revenge. This is a well-tuned system that's highly specific in what it cares about and the kinds of responses that it generates.

If it's so well tuned in humans, do we see this sort of behavior in other animals?

Absolutely. Imposing costs on individuals that have imposed costs on you is really common in nonhuman animals. We see it in birds. We see it in fish. It does actually seem to change them. It produces reformed behavior—the way it ought to if it's designed for deterrence.

Does the killing of bin Laden qualify as revenge?

Maybe. These things quickly get out of control once they move beyond individuals acting on their own behalf to a state level. But I think the logic is still there. One of the goals was to change our enemy's incentives for continuing the violent struggle against us. In so far as the goal is to signal a message—to change people's incentive to harm us, to have them say, "This is not leading us where we thought it was"—if you've reached into their heads, then you've effected revenge.

Does an action *have* to be effective, then, to be considered revenge?

It doesn't have to be effective, and that's really important. When someone gets treated kind of shoddily when driving his or her car, and that driver chooses to blare the horn or make a finger gesture, it's unlikely that the other driver is going to say, "Gee, I'm not going to cut that guy off again," because if you're driving on I-95, you're probably never going to see that driver again. We're not going to modify that individual's calculation of what's gained by harming us *personally* because that's not the world we live in anymore.

It seems senseless in a modern world. But in the world in which our minds were fine-tuned—when there were fewer people and smaller groups—it would have been effective at changing people's minds.

We have learned that revenge can activate pleasure centers in the brain and lead to that so-called "sweet taste of revenge." But what other effects does it have on the brain?

We don't feel revenge for just anybody. It's generally toward people who have imposed a cost on us personally or someone we care about and know well. So as an outsider watching things, you're not going to experience the same phenomenology.

One of the really interesting things is that when someone's insulted or mistreated, not only do you get activation of the brain's reward anticipation system, you also get a lot of activity in the left prefrontal cortex of the brain. This is a signature pattern of activation in the planning of a goal.

Let's say there's something you want to work toward, like training for a half marathon. When we're planning those sorts of goals, we see differential activation in the left prefrontal cortex as we figure out: How do we get toward something we *really* want? Revenge, then, is like a

craving—"I have to get this thing I really want." It tells us something about the kind of tissue upstairs that's getting recruited to enact revenge: it's planning a multistep process to work toward a goal we really want to obtain.

So does this help explain some of the reactions to the news of bin Laden's death?

I actually thought the response was pretty subdued. People were not sort of savoring the bringing low or humiliation of our enemies more than the accomplishment of a really long goal, which isn't inconsistent with revenge being part of a long-planned goal. It may be that the amount of grief we've had to suffer as a nation has kind of muted our ability to enjoy our revenge too much. I think the reaction tells us a lot about human nature. Given some time and distance, that hot thirst for revenge really gets tempered by other things.

What are some of the alternatives to the impulse for revenge?

You can simply say, "I'm going to make it impossible for you to harm me" by avoiding them—you can kick them out of your camp, you can move, you can change jobs.

You can accept the abuse. You can say, "This relationship is valuable to me." You might love the person or say, "Look, I really need this job, so I'll pretty much let this person do anything they want to me"—you'll just accept a certain level of mistreatment because at the end of the day, you're still up relative to your alternative.

The final thing you can do is that [you can forgive](#). It can signal a return to a positive attitude to the person who harmed you if they are willing to change their behavior. It's an attempt to get a relationship back without enacting revenge.

That's a dicey thing. It's saying, "Look, I'm not going to teach you a lesson. I'm going to hold this harm aside because this relationship is valuable—you're my friend and I've been watching football on your wide-screen TV for 10 years. But it requires you to change your regard for me."

With all of those cues in place, forgiveness seems like a reasonable thing to do. But it's hard. It's easy to mistake forgiveness for weakness, and that's just the hard truth of our social world today—inaction is easy to mistake for lack of nerves.