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[Eric Michael Johnson](#) has a Bachelors degree in Anthropology and a Masters in Evolutionary Anthropology. He pursued his PhD in Evolutionary Anthropology at Duke University before joining the University of British Columbia to complete a doctorate in the History and Philosophy of Science.

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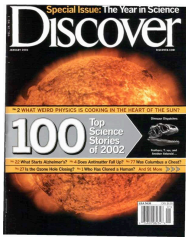
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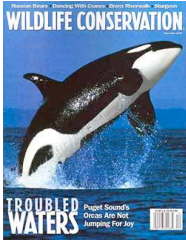
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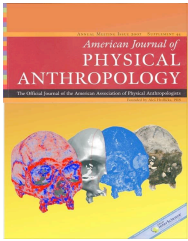
[JHE 2009 56\(5\):471-478.](#)



*American Journal of Physical Anthropology*

Career or Family?: Maternal style and status-seeking behavior in captive bonobos (*Pan paniscus*).

[AJPA 2008 135\(S46\):126](#)



***American Journal of Physical Anthropology***

Lack of inbreeding avoidance and reduction of alliance formation in matrilineally- housed bonobos (*Pan paniscus*).

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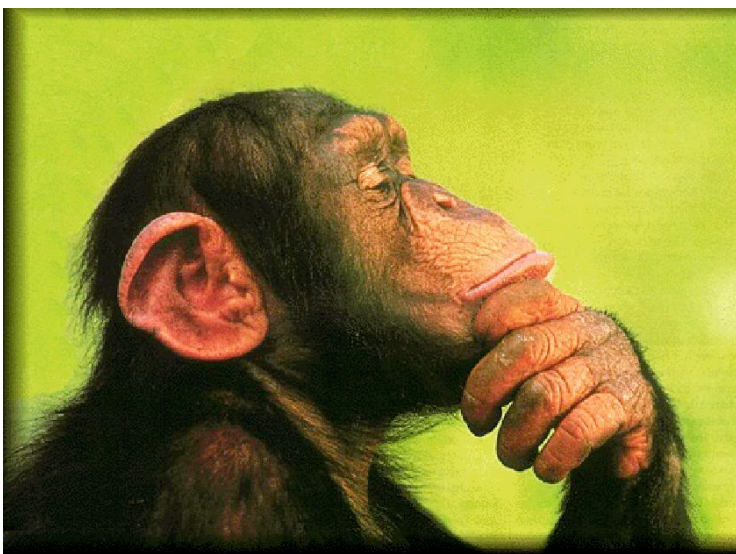
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## [Why Chimpanzees Make Bad Suicide Bombers](#)

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Posted on: August 7, 2009 1:05 PM, by [Eric Michael Johnson](#)

The Evolution of Spite is the Evil Twin of Altruism





The Primate Archives

Someone walks into a crowded restaurant, looks about the diners calmly, and blows themselves up as well as everyone nearby. Why? This is a scenario that forces us to explain the dark side of human nature. Why do humans have a capacity for such hate that they'll take their own lives in order to destroy others?

A study in [Proceedings of the National Academy of Sciences](#) on chimpanzee behavior suggests that humans may be alone in this way: a dubious distinction to say the least. In a [review published in the Chicago Tribune](#) the researchers suggest:

"Spitefulness may be a peculiarly human trait," said Keith Jensen, a Canadian evolutionary biologist who has been looking to see whether human concepts like fairness and punishment are present in the social organization of another highly socialized species.

In biological terms spite is the flip side to altruism and both have posed a thorny issue for evolutionary biologists. While an altruistic act is one where the actor takes a hit in order to help someone else, a spiteful act is one where that same actor seeks to hurt someone else at a cost to themselves.

"Spite is kind of interesting, because it is altruism's evil twin," Jensen said. "Humans can care about making somebody feel better, but we also have the darker side of sometimes wanting to make somebody feel worse."

W.D. Hamilton, the British evolutionary biologist most famous for kin selection theory, proposed how altruism could evolve in a population composed of close relations. If the cost to the actor is less than the benefit to the recipient times their coefficient of genetic relatedness (0.5 for full siblings, 0.25 for nephews) than the altruistic act improves their inclusive fitness and the trait will perpetuate.

Hamilton also wrote on altruism's evil twin in his classic 1970 *Nature* paper [Selfish and Spiteful Behaviour in an Evolutionary Model](#). Hamilton suggested that the evolution of spiteful behavior could be selected for in cases where the recipient of the spite was less likely to be related than an average member of their population. This is because, if a spiteful organism goes out of their way to hurt someone related to them, those spiteful genes would be less likely to be passed on by both the individual and the recipient of the spite. However, if that same organism were to sacrifice themselves to hurt someone less related than the rest of the population it could benefit their inclusive fitness.

In a 2004 article in *The Scientist* (which is an excellent review and has been reproduced in full at [The Primate Appendices](#)) researchers have done studies with bacteria which suggest that, not only are spite and altruism related, they often rely on each other.

Many bacteria manufacture toxins called bacteriocins, which they release explosively, killing both themselves and sensitive competitors, but sparing clonal relatives that possess a resistance gene. Gardner says the spiteful credentials of such bacterial suicide bombings are reinforced by the presence of an equivalent altruistic trait, siderophore production. Siderophores are compounds that scavenge iron from the environment for absorption.

"You do better as a bacterium if you don't produce the proteins and just mop up those produced by others. So, production of the proteins is altruistic," says Gardner. In line with predictions, West's team, in collaboration with Angus Buckling at Oxford University, has shown that bacteriocin production is increasingly favored by selection, as competition between bacterial strains becomes more local, whereas siderophore output declines.

This suggests that suicide bombers could be motivated, at least in part, by inclusive fitness. The tactic of suicide bombing only exists because of a perceived threat to the bomber's family and community (sometimes extended more widely to their "family" of faith). By targeting populations that are outside this group they aim to benefit their community and, by consequence, their inclusive fitness by hurting other, unrelated, individuals. This interpretation has recently been explored in the [American Journal of Economics and Sociology](#).

While chimpanzees have yet to show evidence of spiteful behavior (a distinction that we should remember when holding ourselves above "mere animals") they have been shown to be [capable of altruism](#). Perhaps the rainforest equivalent of an Israeli restaurant is at this moment quietly munching figs as a solitary individual from a distant troop creeps through the underbrush, canines at the ready. But this is probably unlikely for one very important reason: chimps aren't religious.

Reference:

Jensen, K., Call, J., & Tomasello, M. (2007). Chimpanzees are vengeful but not spiteful *Proceedings of the National Academy of Sciences*, 104 (32), 13046-13050 DOI: [10.1073/pnas.0705555104](https://doi.org/10.1073/pnas.0705555104)

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1

Lucky chimps regarding the religion thing. I think that development of the human brain was a waste of energy.

Posted by: [Tony P](#) | [August 7, 2009 7:40 PM](#)

2

Since it is quite common for chimps to fight (which comes at a cost to themselves), isn't that spite as defined? In the fights between groups, the benefit is the lowered fitness of the opponents and this increases the inclusive fitness of the spiteful ape.

Posted by: [Bjørn Østman](#) | [August 7, 2009 11:53 PM](#)

3

@Bjørn: No, because chimpanzees aren't seeking to harm others at a direct cost to their own reproductive fitness. Territorial behavior is not spite. When male chimp patrols hear a rival group's calls along the border of their territory they've shown themselves adept at determining the size of the rival party. If it's larger than theirs they'll usually slink back into the forest, however, if it's only a single individual or two they'll often attack viciously. There has been no observation of a single chimpanzee entering a rival troops territory and attacking others when it's clear they'll be killed in the process.

@Tony: I rather agree. To quote [Douglas Adams](#):

Many were increasingly of the opinion that they'd all made a big mistake in coming down from the trees in the first place. And some said that even the trees had been a bad move, and that no one should ever have left the oceans.

Posted by: Eric Michael Johnson | [August 8, 2009 8:54 AM](#)

4

I'm pretty much a lay person with an interest in science. Frankly, I'd never been much interested in anthropology and had virtually no interests in chimps what so ever. However, over the last couple of years, between current genetic research, and anthropologist researching what differences there are and what the implications are, I'm becoming very interested. A recent issue of "Scientific American,"

discussed several genetic differences and their impact and a recent PBS documentary discussed problem solving differences and possible explanations. I mention this because I find this blog post dove tails well with those presentations. Very cool stuff, thanks for putting it up.

Posted by: Mike Olson | [August 8, 2009 10:53 AM](#)

5

While I think the extent to which humans take spitefulness is something that is far more extensive in humans, I suspect chimpanzees, and other primates, do have some capability for spite (just as they have some capability for altruism). I think some instances of coalitionary aggression might indicate some level of spitefulness, and I feel like I've known quite a few sanctuary monkeys that seemed rather spiteful... but documenting this might be a bit more challenging. Nonetheless, I think if the same sort of anecdotal evidence used to document deception were amassed to document spitefulness, there might be an interesting body of data out there...

Posted by: [michellespidermonkey](#) | [August 9, 2009 1:35 PM](#)

6

I don't recall the source, but someone said, "The human brain is the only example of an animal having an organ it doesn't know how to use properly."

Personally, I find the theory of inclusive fitness to be a tad strained -- at least in many of its applications in evolutionary psychology. Suicide bombers, for example, don't only strike outside of their "community" -- depending on how you define that term. The Columbine killers were essentially suicide bombers (just without the bombs) who were killing those in their immediate community. The murder of immediate family members is far more common than inclusive fitness would predict, no?

Posted by: [CPR](#) | [August 10, 2009 10:18 PM](#)

7

@CPR: That's a really interesting question. I know the high levels of step-father abuse correlate well with inclusive fitness theory (and is found as a tactic in primates and other mammals), but I'm not aware of any studies looking at immediate family.

But to do a "back of the envelope" estimate (and please understand this is not endorsing familial murder), according to the [Bureau of Justice Statistics](#):

16% of murder victims were members of the defendant's family: 6.5% were killed by their spouses, 3.5% by their parents, 1.9% by their own children, 1.5% by their siblings, and 2.6% by other relatives. Women were 45% of the victims in murders involving family members but 18% of victims in other murders. Among family murder defendants, 35% were female versus 7% among nonfamily defendants. Women were over half of the defendants (55%) in only one category of family murder: parents killing their offspring.

The important statistics here would seem to be murders committed by parents, children or siblings (since the genetic relationships are well known - i.e. 0.5 or 0.25). What strikes me right away is how the likelihood of someone killing their children is just more than double the likelihood of killing a sibling, which, when genetic relationship is factored in, is close to equal (3.5 vs. 3.0). Since other relatives would have a lower coefficient of genetic relatedness their higher likelihood of murdering a family member also seems to fit. Children seem surprisingly less likely to murder their parents compared to the opposite. The higher likelihood of killing a spouse would also fit as the most commonly cited reason for murdering a husband or wife is infidelity.

I'm not sure how you could determine the expected level of familial murder in a society given inclusive fitness theory (and it would be subject to change given stressful environments, standards of health, economics, etc.) but I find it interesting that these numbers roughly correlate to what you would expect based on the genetic relationships.

Another striking statistic, notice how high women's murder rates are within families versus not: 45% to 18%. My guess is that husbands killing their wives are a large part of that.

Does anyone else have any thoughts?

Posted by: Eric Michael Johnson | [August 10, 2009 11:06 PM](#)

8

I'm way out of my comfort zone here, as my knowledge of genetics is admittedly quite basic. But a few thoughts come to mind.

1. Isn't 16% of all murders very high for family members? That's almost one out of every six murders is of someone with whom the murderer shares genes—sometimes, as in the case of a mother killing her child (55% of cases of a parent killing his/her children, if I understand correctly), this goes directly against what inclusive fitness theory would predict (unless the child was unlikely to reproduce for some reason). Thirty-five of every thousand murder victims being killed by a biological parent seems VERY high, if inclusive fitness theory really holds much weight.

2. I recall reading somewhere that the oft-cited studies on step-father abuse of children weren't as solid as reported. I can't remember the source or substance of this critique right now, but maybe another reader can point us to it or dispute my hunch.

Posted by: [CPR](#) | [August 11, 2009 8:01 AM](#)

9

But it wouldn't be 16% because that includes spousal murder and therefore (hopefully) low genetic relatedness. The actual number would therefore be about 9.5%.

I did a little virtual sleuthing and came across this paper by [Daly and Wilson in American Anthropologist](#) interested in this same question. They did an ingenious method of testing this, by looking at consanguineous murder rates (i.e. living in the same house). They looked at murder data from Detroit in 1972 and found that 6.3% were close relatives, not counting spouses which were the majority. They found that the likelihood of murdering someone not related to you was highly statistically significant:

consanguineal kin were relatively rarely killed in comparison to spouses and other nonrelatives (chi-square, 1 df = 161, p less than .0001).

That's actually a pretty strong argument that inclusive fitness is operating in the cases of consanguineous murder.

Posted by: Eric Michael Johnson | [August 12, 2009 12:59 PM](#)

10

just jumping on the string here

one thing y'all need to take into account in all of the consanguinal murder talk is that the human infant requires a goodly 5 or so years of training and specifically emotional containment and modelling in order to lay down the appropriate kinds of limbic pathways to actually be what we call a human when they grow up. chimps are not nearly so complex. empathy and other prosocial behaviors arise out of this early training, creating a real serious confound with between psychology and genetics(boring i know) in that psychopaths tend to raise more psychopaths, murderers more murderers etc, however little or none of this could be a direct result of genes. a great deal of the variance in behavior may result from the kids simply not being taught how not to be a psychopath. inclusive fitness then becomes a question of psychopaths feeling a sense of inclusive fitness with other psychopaths which throws the whole statistical model out of whack because whilst they recognize each other the people doing the research have no way to tell whether it is consanguinity or co-psychopathy creating the effect they are trying to measure, and one answer has little to do with evolution. oh and by the way, the Columbine boys WERE suicide bombers, their bombs were just poorly made and never went off

Posted by: Paul Turner | [August 17, 2009 5:34 PM](#)

11

@Paul: I agree with you completely about raising socially healthy children. However, in the Daly and Wilson paper alluded to, what you're talking about isn't relevant. The issue was whether murdering family members is too pervasive for inclusive fitness to be operating. This paper suggests it isn't, in fact it suggests that inclusive fitness is strongly influencing the outcome.

So, even if it is the case that "psychopaths tend to raise more psychopaths, murderers more murderers" (a claim that would need to be supported by evidence) they are murdering members of their own family significantly less than unrelated members of their household. This in no way suggests that genes are causing people to be predisposed to murder (I personally think social factors have much more to do with it). Psychopathy is a complex psychological condition (and not all murders are committed by psychopaths). Genetics clearly plays a role in this condition but social factors do as well.

Posted by: Eric Michael Johnson | [August 18, 2009 10:01 AM](#)

12

where have chimps been shown to be capable of altruism? I couldn't access the link.

Posted by: CMG | [August 21, 2009 9:32 AM](#)

13

Thanks for pointing out the broken link Cristina (it's fixed now). The paper I was referring to was by [Warneken et al. \(2007\)](#) in PLoS Biology.

Posted by: Eric Michael Johnson | [August 22, 2009 12:23 PM](#)

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