COMMENTARY

Partitioning aggression

Martin Daly[a,1]

Human Nature: Nasty or Nice?

Have aggression and violence been ramped up in human evolution or dialed down? This sounds like a question that empirical research might have settled long ago, but it remains strangely contentious. In PNAS, Richard Wrangham (1) proposes that debates persist because too many evolutionary anthropologists mistakenly conceive of aggression as unitary and that a well-established distinction between "proactive" and "reactive" aggression holds the key to a resolution.

In what Wrangham calls the Hobbes–Huxley paradigm, people are considered violent animals whose destructive tendencies must be contained by cultural constraints and penalties. The alternative Rousseau–Kropotkin paradigm sees our species as naturally peaceable and interprets violence as a consequence of some execrable aspect of modernity. Twentieth-century versions of these visions have tended to be less overtly political but scarcely less flamboyant. Raymond Dart (2), the discoverer of *Australopithecus*, for example, proposed that "the loathsome cruelty of mankind to man forms one of his inescapable characteristics and differentiative features," which he attributed to our "carnivorous and cannibalistic" origins. In a popular book translated into English as *On Aggression*, the Nobel Prize-winning ethologist Konrad Lorenz (3) asserted that only two species routinely kill their own kind: rats (*Rattus norvegicus*) and ourselves.

Neither Dart nor Lorenz knew anything about the behavior of common chimpanzees (*Pan troglodytes*) in the wild (although Jane Goodall had begun her famous studies at Gombe when Lorenz wrote). These apes, our close cousins, certainly kill one another too. Wrangham is one of the scientists who followed Goodall to Gombe, where he added to our knowledge of the opportunistic lethal raiding that constitutes a kind of chronic "warfare" between chimpanzee communities. He has noted how the deliberateness and cooperativeness of that intraspecific raiding looks very much like how the same animals behave when hunting monkeys, and remarked upon its similarities to small-scale human warfare. What chimpanzees are exhibiting during these raids is "proactive aggression": a controlled and apparently planned use of violence, unmotivated by anger or even great emotional arousal, in a context in which the chances of having the tables turned so that the aggressor becomes a victim are low. Unequivocal examples of proactive aggression (other than interspecific predation) are relatively rare in most animal species, but we, like chimps, excel in this domain. Examples, according to Wrangham, include "bullying, stalking, ambushes and premeditated homicides."

Reactive aggression is a different story. This term refers to an angry reflexive response to frustrations and threats, and in these manifestations, human aggression seems to be relatively subdued. In a vivid reverie during a cramped plane ride, Sarah Hrdy (4) wondered, "What if I were traveling with a planeload of chimpanzees? Any one of us would be lucky to disembark with all ten fingers and toes still attached.... Bloody earlobes and other appendages would litter the aisles." Wrangham reviews data that corroborate Hrdy's whimsy: the frequency of physical altercations and assaults in common chimpanzees, and even in the relatively peaceable bonobo (*Pan paniscus*), dwarf what has been recorded in observational studies of any hunter-gatherer or other human society. In sum, human beings (and bonobos) are lower in reactive aggression than chimpanzees, but we match or surpass chimps (and are unlike bonobos) in proactive aggression. Whatever their precise evolutionary trajectories since the last common ancestor of these three species, these two types of aggression have clearly evolved somewhat independently of one another.

Case Closed?

The argument is important and persuasive. The neurobiological evidence in particular should put to rest, once and for all, the assumption that "aggression" is a unitary trait, thereby rendering any claim that "it" is unusually hypertrophied or unusually diminished in the human animal simplistic. Unfortunately, it is not quite so clear that the "reactive/proactive" distinction carves aggression at

[a]Department of Psychology, Neuroscience and Behaviour, McMaster University, Hamilton, ON, Canada L8S 4K1

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[1]Email: daly@mcmaster.ca.

its joints. As Wrangham discusses, other binary classifications have been proposed—affective/predatory, impulsive/premeditated, defensive/offensive, cold/hot—and not everyone agrees about the extent to which the various dichotomies may be synonymous or redundant. However, an even larger problem is that definitional criteria for distinguishing reactive from proactive aggression, and indeed for identifying aggression itself, are neither crisp nor consensual.

According to Randy Nelson and Brian Trainor (5), expert reviewers of the diversity of relevant neural mechanisms, "Aggression is an umbrella term for behaviours that are intended to inflict harm." The invocation of intent is immediately problematic. Do fighting crabs, say, "intend" anything, and if not, are they not engaged in aggression? Additionally, what about territorial defense whose impetus is quenched by the withdrawal of an intruder? Does failure to inflict harm disqualify such behavior as aggressive? I am not suggesting that Nelson and Trainor's definition of aggression is uniquely flawed; I cannot readily point to a better one. However, in trying to define aggression, we may be in a situation analogous to that faced by US Supreme Court Justice Potter Stewart who, conceding his inability to provide a good definition of hard-core pornography, famously declared, "But I know it when I see it" (6). If a basic problem is that the several things subsumed by the term aggression have no defining attribute in common, we should be neither surprised nor discouraged by the fact that a satisfactory definition is elusive.

Wrangham opens a can of worms similar to that opened by Nelson and Trainor's invocation of intent when he writes that the distinction between reactive and proactive aggression "is centered on the aims of aggression." "Aims" are invisible psychological constructs and difficult to identify with certainty even in articulate human beings, let alone other animals. A possible escape is to say that words like "intended" and "aim" are not meant mentalistically, but are shorthand for what evolutionary biologists call adaptive function. (Wrangham hints at this by saying the "aims of aggression" rather than the "aims of the aggressor.") This remedy cannot guarantee consensual classification, however, since the "design" criteria for identifying adaptive function depend on informed judgment of the degree to which a match between structure and putative function is unlikely to have arisen by chance.

Defining Wrangham's titular "two types of aggression" proves to be as tricky as defining the overarching concept. After explaining that the two types are distinguished by their "aims" and that the "goal" of reactive aggression is "only to remove the provoking stimulus," Wrangham seems to contradict himself by writing, "Note that the term 'reactive aggression' refers to the nature of the aggressive act rather than the reason for acting aggressively." Two paragraphs later, he further explains that "the proactive–reactive distinction applies more to individual traits, whereas the premeditated–impulsive distinction tends to reflect the aggressive act itself." By this point, the distinction is getting murkier rather than clearer, apparently because the two types of aggression have no agreed-upon definition in the literature that Wrangham reviews.

The evidence that qualitatively distinct categories of aggressive acts are the products of distinct neural and hormonal mechanisms is compelling. However, most of the relevant research has of course been conducted with nonhuman animals, and making connections with the paper-and-pencil research methods that dominate the study of individual differences in human aggression is not necessarily straightforward. Most human research bearing on "types of aggression" has entailed the administration of self-report personality scales, and a common finding is that putative measures of proactive and reactive aggression are moderately highly correlated with one another (7). This could mean that there is a common factor fueling aggressivity in general, but it could also mean that the scales are insufficiently specific, or even that there is a confounding personality variable such as variable willingness to acknowledge antisocial feelings and actions. Possibly more surprising is the fact that standard measures of impulsivity have also been found to be positively associated with proactive aggression, the variety that is supposedly planned and is typically contrasted with the more impulsive reactive aggression (7).

In short, how best to categorize types of aggression is not yet settled, and there may well be grounds for distinguishing more than two basic types. That said, Wrangham is surely correct in arguing that the evolution of aggressive motives, emotions, and actions in our lineage has involved distinct selection pressures acting on dissociable psychophysiological systems. Further exploration of exactly what those pressures and systems are should help move us beyond fruitless debates about the inherent goodness or evil of human nature.

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6 *Jacobellis v. Ohio*, 378 U.S. 184 (1964).
7 Babcock JC, Tharp ALT, Sharp C, Heppner W, Stanford MS (2014) Similarities and differences in impulsive/premeditated and reactive/proactive bimodal classifications of aggression. *Aggress Violent Behav* 19:251–262.