Is it true that "apes cannot understand the communicative intentions of others" (sect. 5.1), and that, therefore, their acts of intraspecific aggression cannot be seen as punishment? Primates develop socially in part by learning how to avoid punishment from other members of the group. Macaque infants quickly develop an appreciation of the meaning of social signals, such as direct eye contact; already by the middle of the second postnatal week, infants show gaze aversion to another individual's direct stare (reviewed in Machado & Bachevalier 2003). During the second year of their lives, macaques acquire their dominance rank in the troop equipped with an understanding that each individual has a "unique set of intensions determined by the combination of kinship, dominance, gender, environmental conditions, and the current social context" (Machado & Bachevalier 2003). Such observations challenge Nell's assumption that the intention to inflict pain presupposes a theory of mind.

"Disciplinary cruelty" and "public punishment" inflict pain deliberately but are not motivated by delight in another person's suffering. The motivating affect is anger caused by an individual's breach of social conventions or challenge to the rank order. If spectators or perpetrators do delight in public punishment then this may be attributable to projection of and temporary relief from their own punishment anxieties. What spectators experience in "spectacles of pain and bloodshed" is a marked, though transient, relief in *psychic tension* that derives from constant unconscious death fears in a society that readily resorts to corporal punishment and wars. Soldiers in war have to endure continuous fear of death so that success in combat is bound to produce a surge of relief and feelings of superiority and invincibility. The mechanism is one of projection, as hinted at in Nell's quote (in sect. 5.2.8.2 of the target article) from Coetzee (1974): "The gun saves us from the fear that all life is within us. It does so by laying at our feet all the evidence we need of a dying and therefore a living world."

It can be argued that it is the suppression of aggression in the process of cultural evolution – not enjoyment of cruelty per se – that became "a primary driver of the modern entertainment industry" (sect. 1.1.3). People are likely to enjoy media cruelty for the same reason that they show an incessant interest in scandals involving the downfall of people in society, where there is no role to play for "blood, pain, and death." Impulses of intraspecific aggression that are culturally suppressed can find transient relief also in humour (laughter as a sudden relief of inhibited aggression, according to Lorenz [1963/2002]), but once the cultural inhibitory framework is removed (including through "moral disengagement"), intraspecific aggression becomes disinhibited and can manifest in actual acts of cruelty. Social barriers restrain aggressive impulses, as Nell acknowledges, and these barriers "crumble as opportunity and situation allow" (sect. 5.3). Then, indeed, aggression may be accompanied by "exultant" affective tone – mostly, though, because of its effect of instilling a sense of dominance and power in the perpetrator.

Hunting success may not confer "direct," as Nell argues, but indirect "fitness benefits" in terms of sexual desirability and access to females for reproduction – mediated by enhancement of one's ranking position within the group; and the same applies to cruelty. Both hunting success and public acts of cruelty may signify greater potential for social control over others or greater likelihood of success in hostile encounters with the outside world. Indeed, as Nell reviews, females respond positively to "aggressive *success*," that is, the acquisition of dominance, not "aggression" per se. It is primarily the "dominance-seeking" aspect of what Nell calls "dominance-seeking aggression" that "is driven by reproductive-fitness needs" (sect. 3.4.5, para. 4). Clinically, this is evident in the association of mania (representing excessive dominance-seeking and control of others) with hypersexuality, and depression (marked by low self-esteem and social withdrawal) with loss of interest in sex.

Sadism does seem to involve the deliberate infliction of pain for the sake of enjoyment. Unlike competitive aggression, there is no anger involved, and unlike predation, the perpetrator is not just aroused by but enjoys the other's suffering and, perhaps more importantly, the other's *denigration*, allowing him to project into the victim his sense of inferiority, experience a sense of superiority, and, in conjunction with this, become sexually aroused. The question why the "infliction of pain on the self" can be "pleasurable and also sexually arousing" is challenging but not "incomprehensible." Freud (1917) elucidated the mechanism of enjoyable self-tormenting in melancholia. Masochism plays a role also in the psychodynamics of narcissism, envy (Joseph 1986; Spillius 1993), and child abuse (Milton 1994).

Make love, not war: Both serve to defuse stress-induced arousal through the dopaminergic "pleasure" network

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Abstract: Nell restricts cruelty to hominids, although good evidence suggests that secondary aggression in rodents and particularly primates may be considered cruel. A considerable literature shows that glucocorticoid secretion stimulated by stress facilitates learning, memory, arousal, and aggressive behavior. Either secondary aggression (to a conspecific) or increased affiliative behavior reduces stressor-induced activity, suggesting the reward system can be satisfied by other behaviors than cruelty.

Nell writes on important issues that have plagued human societies from time immemorial. However, he has boxed himself in with his third point, specifying that cruelty is only a human endeavor, because of its intention to inflict pain. Thus, he ignores a considerable literature that documents "cruelty" in subhuman primates and other mammals. I generally and strongly agree with the other points he has developed. However, I must take issue with respect to the notion that cruelty is specifically a characteristic of hominids, because much applicable behavioral and neuroscience research is lost through this definition.

Some dictionary definitions of cruel, or cruelty include the phrase "inhuman" or "inhuman treatment" (cf. *The American Heritage Dictionary of the English Language* [American Heritage Dictionary 1992]; *Webster's Seventh New Collegiate Dictionary* [Webster 1963]); thus, implicit in the definition is the notion that humans should be a step more morally advanced than subhuman primates or other animals. I suspect that Nell is probably right in his assertion that the origin of cruelty is some kind of a behavioral by-product of predation. However, because of his exclusion of the use of cruelty to behavior solely in humans, he ignores the fact that the situations which he documents so well of cruelty in mankind have strong parallels in other animals. Unprovoked aggression to group members in animals is, in my opinion, analogous to cruelty in man. Predatory aggression in animals (and probably in man) comprises physiological and psychological stimuli that result in adrenocortical activation.

Rapid actions of cortisol (or glucocorticoids) secreted by the adrenals increase learning and memory, arousal, and salience of ongoing activity, and also facilitate ongoing aggression (Bass & McKibben 2003; Makara & Haller 2001; Pardon et al. 2002; Roozendaal et al. 2001). Aggression is reinforcing, and many species will perform instrumental responses that are reinforced by the opportunity for aggression (cited in Fish et al. 2005). In mice and rats, aggression is glucocorticoid dependent (Fish et al. 2005; Haller et al. 2004). Thus, the glucocorticoid response to stress sensitizes both aggressive behavior and the memory of aggression, as well as taking arousal to a higher pitch. Such a

state is both dangerous for appropriate future behaviors and uncomfortable, and it needs to be defused.

In socially vocal midshipmen fish, cortisol increases the frequency and duration of vocalization in a hierarchical network in the brain pons and medulla when territory is threatened by conspecifics (Remage-Healey & Bass 2004). In socially threatened rats, corticosterone also increases aggressive behavior toward conspecifics (Haller et al. 2000). Under conditions of acute or chronic stress, there is increased glucocorticoid-dependent secretion of norepinephrine throughout the cortical and limbic brain in response to a novel stress (Finlay et al. 1995; Nissenbaum et al. 1991; Valentino et al. 1983). Thus, the actions of glucocorticoids on the stress response network in the brain hone vertebrates to a greater pitch of arousal.

There is a need, then, after predation, or during and after stress, to cool off, reduce arousal, and return to a sustainable state that is ready to deal with the future. I suggest that this may occur in both animals and humans by employing aggression, accompanied by either real or potential cruelty, to available conspecifics. Reduction of stress-induced glucocorticoids (and presumably a high state of arousal) is effected in both rats and baboons through aggressive behavior toward others in the group.

Given the opportunity to aggress with another rat when electrically shocked, male rats fight. Provided with that opportunity, ACTH and corticosterone concentrations are lower than if the rats are not given that outlet (Conner et al. 2000; Weinberg et al. 1980). Other "displacement behaviors," such as schedule-induced polydipsia, and biting wooden sticks can also achieve reduced adrenal activity during stress in rats (Brett & Levine 1979; Hori et al. 2004). More to the point raised by Nell, baboons that have been defeated by a dominant male have lower cortisol concentrations when they aggress either other more subordinate males or females, compared to similarly defeated males that do not aggress (Virgin & Sapolsky 1997). These results suggest strongly that secondary aggression reduces stress and arousal. However, when the composition of the troop under study shifted to one that was more female-dominated, affiliative rather than aggressive interactions came to dominate behaviors, and again, glucocorticoid concentrations were lower (Sapolsky & Share 2004).

Clearly, in at least two species, intense and uncontrollable stress stimulates glucocorticoid secretion, which, in turn, augments and cements aggressive behavior. However, equally clearly, provided that other outlets to the stress-induced arousal exist, aggressive behavior is either diminished, or need not occur. Frans de Waal has beautifully distinguished behavioral differences between our close relatives, chimpanzees (de Waal 2000), and bonobos (de Waal & Lanting 1997). Although the former are quite highly aggressive, the latter are generally non-aggressive but highly sexually affiliative. Tapping into the same "pleasure" dopaminergic pathways that are invoked by Nell to explain the pleasures of cruelty, both increased conspecific aggression and heightened affiliative behavior appears to reduce arousal and glucocorticoid reactivity. These findings suggest strongly that a positive response to the issue of human cruelty could be to push the motto of "make love, not war" into formal programs that foster affiliative behavior. It seems that the deliberate promotion of increased affiliative behaviors could achieve the same tension reduction as secondary aggression, and might, if widely available, result in reduction of the amount of pleasure seeking directed toward cruel behaviors.

Neurobiological bases of aggression, violence, and cruelty

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Abstract: Aggression, violence, and cruelty are symptoms of psychiatric illness. They reflect abnormalities in the regulation of the stress and emotion circuitries. The functioning of these circuitries depends upon the interaction between genetics and environment. Abuse and neglect during infancy, as well as maternal stress and poor quality of maternal care, are some of the causes that produce these types of abnormal behavior. Research on the neurobiological bases of emotion regulation will allow the detection of the population at risk.

Alterations in the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system (SNS) constitute the stress system and its connection with a complex circuit that regulates emotions. These alterations produce psychiatric illness, where aggression, violence, and cruelty are the most remarkable symptoms. The stress system and its interconnected particular brain structures exist in humans and nonhumans to ensure adaptation and survival (Chrousos 1995; Kelley 2004). While these systems generally serve a highly functional and adaptive role in behavior, they can be affected in maladaptive ways, producing psychopathology (Brady & Sinha 2005; Duman 2002; Goeders 2003; Sinha et al. 2003; Weiss 2005; Wüst et al. 2004).

Difficulties in managing stressful life events associated with negative emotions and failure in coping to regain control, without attaining the desired goal, influence the adaptative processes and produce psychopathology (Sinha et al. 2004). Evidence from studies performed on animals and humans have substantiated the belief that maternal stress or anxiety in pregnancy is associated with general, rather than specific, susceptibility to psychopathology in offspring, as a result of an overactivity and impaired negative feedback regulation of the HPA axis. Reduced activity of the opioid GABA/benzodiazepine, serotonin, and dopamine and increased activity of the sympathico-adrenal systems have also been found.

The serotonergic system has been associated with mood disorders, anxiety, aggression, and impulsivity. The noradrenergic system is involved in attentional processes, memory, and stress responses. The dopaminergic system is involved in cognition, affects, and control of locomotion. The amygdala mediates fear, anxiety, and mood regulation. In addition, other brain structures complete the emotion regulatory circuitry, such as the orbital frontal and the prefrontal cortex, amygdala, hippocampus, hypothalamus, anterior cingulated cortex, insular cortex, as well as the ventral striatum and periaqueductal gray (Huizink et al. 2004). The orbital frontal cortex is also involved in the modulation of antisocial behavior.

We have to contrast reactive from instrumental aggression. Reactive aggression (impulsive aggression) is triggered by a frustrating or threatening event, often culminating in physical violence. It is associated with a low threshold for activating negative affects (a mixture of emotions and mood that include anger, distress, and agitation). It is initiated regardless of any potential goal. Patients with borderline personality disorders characterized by impulsive aggressive behavior, affective instability, inappropriate intense anger, and unstable interpersonal relationship present this type of aggression. Conversely, instrumental aggression (proactive aggression) is purposeful and goal directed. It is premeditated and is used instrumentally to achieve a specific desired goal, which is not always the pain of the victim (cruelty), but rather the victim's possession, or the increased status within a group hierarchy. Psychopathic individuals present a breakdown in moral socialization and impairment in the affective system, thus showing especially this type of aggression. Dysfunction in the orbital frontal cortex has been described in reactive aggression as the amygdala in instrumental aggression. The activity of this circuitry will depend on the interaction established between genetics and environment (Blair 2004; Davidson et al. 2000b; Moya-Albiol 2004).

It is known that the quality of maternal care received during infancy determines the adult social competence and ability to cope with stress. The development of a neurochemical system within the brain that regulates mothering, aggression,