THE BERSERKER RAGE

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It might seem a hopeful thing for optimists about human nature that widespread killing behavior among foot soldiers is not something that just happens, and, when it occurs, is often quite a bit less successful than the sheer technical capacity of the arms would permit.[1] Rather than being easy (or even "natural" as more bellicose formulations of human nature would have it), such killing behavior needs the right combination of numerous interacting factors, among them, physical distance (as it intersects type of range, accuracy, and power of the weaponry involved), cultural difference (which can be betrayal of shared norms in a civil war), teamwork (and group-bonding), hierarchy (and its attendant coercive powers), and emotional control (of fear and anger). The sobering news here though is that militaries have had thousands of years to figure out ways of finding the right balance adjusted to differing situations. Now the necessity of training, organizing, and equipping soldiers to enable wide-spread killing behavior betrays a tension between organism and mechanism in the military treatment of the soldier: they are human beings subject to emotional waves flowing in the small and large groups to which they belong while also being – or at least trained with an eye to becoming – replaceable units in a great machine. Those emotional waves in combat toggle among the threat reactions of simple fear, aggressive anger, and panicked freezing; these are the main aspects of emotional control militaries are concerned about in their soldiers, though "morale" issues in non-combat situations are also a matter of concern.

To sketch the fear / anger / freezing relation, most humans have a very quick freeze reaction to threats, followed by quick cortical threat assessment. This is usually followed by a fear-mediated impulse to flight, and when that is impossible, an anger-mediated impulse to fight. However, that trapped recourse to anger-fighting often only occurs in a situation in which victory seems possible; in hopeless situations, there is often a lock-in to freezing or, as a situation deteriorates, a return to freezing. There is of course also the option of a conscious decision to surrender (both freezing and surrender are a sort of "flight" from fighting). Of course, there is population variation and it might not be simple mythology that some folks will fight even in perceived hopeless situations, but freezing or surrender in perceived hopeless situations seem to be widespread phenomena. In combat, the ideal is to have the first flashes of simple fear be replaced by calm determination, or, if that is not possible, to have low-level fear morph into controlled anger; the overriding imperative is to avoid hyperbolic fear qua panicked freezing which can kick in when a situation is perceived as hopeless and no-win, flipping mid-range anger-mediated aggression into a paralyzed surrender.

The reason anger must be controlled is that combat stress, especially when sustained or frequently repeated, risks pushing soldiers into a berserker rage, a

highly intense reactive aggression behavior pattern. Although high-stress combat will often produce perceptual distortion that adversely affects performance (the hyper-selectivity of tunnel vision and / or auditory exclusion, the temporal distortion of things happening in a blur or in slow motion), it can even reach a point in which conscious, subjective, control is severely attenuated, with the limit case being "blackout" rages in which episodic memory is effaced. Although selection for control of reactive aggression is an important part of human bio-social evolution, the means by which "social selection" operates (capital punishment against hyper-violent individuals with poor impulse control) itself selects for the ability to control and hence channel anger into "proactive" or planned and pro-social aggression, which can, under certain social circumstances, be organized as war qua anonymous inter-group violence. The end result is that contemporary militaries, if they cannot eliminate anger in their troops, at least seek to find the right shades of it to engage reactive and proactive aggression while avoiding instances of the berserker rage, which can break unit cohesion, destroy battlefield command, and lead to civilian atrocities.

In this essay, I'll first provide an overview of the relation of anger and combat, then I'll follow that with a discussion of the evolution of anger control, provide a sketch of the neuropsychology of the berserker rage, and finish with some comments on historical occurrences of it in military situations.

ANGER AND COMBAT

Control of fear in the face of threats is a prime directive in warfare (Keegan 1976 is the modern historiographic classic here), but so is the control of anger in surmounting a surprising inhibition on killing if the situation is not right. Now each concrete war situation is a crystallization of the multiple factors that affect killing behavior on both sides of a dynamic confrontation: distance, weaponry, teamwork, and hierarchy, as they intersect fear and anger, as these are shaped by hatred and dehumanization, and, very importantly, the cohesion or dissolution of the opposing forces (Grossman 1996; Protevi 2008; Collins 2008; Smith and Panaitiu 2016).[2] The navigation of "confrontational fear and tension" explored in Collins 2008 explains the common military wisdom that many more casualties and deaths are inflicted upon a fleeing enemy than occur when groups are still organized: turning and running breaks the confrontational tension of the sides, transforming fear into the right relation to anger (what Collins calls "forward panic") that allows massive killing behavior, and often prompting freezing for the routed, especially in isolated victims, who often offer little resistance when confronted with groups of aggressors. What that right relation is depends on the dimensions of the concrete situation, such as the distance and weaponry involved. Basically put, the more distance from the enemy, the more technical the means of fighting, the more teamwork you can rely upon, the more hierarchy and command can coerce your actions, the more training can mechanize your actions, the more self-induced breathing and attentional techniques can calm you down, the less fear you experience, and you are able to either to operate calmly, or, if you do experience some anger, it is controlled enough to allow efficient even if not completely anger-free cold-blooded action.

If we adopt Joseph LeDoux's constructivism, anger is a conscious experience assembled from the nonconscious motivational state allowing aggressive behavior along with other nonconscious "ingredients" (LeDoux 2015, 228; see also Blair 2012). Once assembled in consciousness, anger as the emotional tone and motivational push of the experience is retained in memory. But the "rage" in "berserker rage" is tricky, as the extreme cases are blind or blackout behavior with no recall of a subjective experience. So, in this paper "berserker rage" should not necessarily be taken to imply an emotional experience, even though many violent episodes do have a feel to them that can be recalled.

In warfare, anger and aggression have various dimensions and intensities; they are always intersecting with fear. A three-fold distinction among types of aggression is common; again, anger is a mid-range phenomenon depending on the surmounting of the first flash of fear and the avoidance of the final surrender of full-fledged freezing. First, there is reactive aggression, a quick if not automatic attack on a close-range, inescapable, threat that nonetheless offers the chance of being overcome by attack; the chance of winning is crucial here in avoiding freezing (Blair 2012; Siegel and Victoroff 2009). Next is proactive aggression, a consciously controlled attack in order to eliminate a future threat (Siegel and Victoroff 2009; Wrangham 2014), and finally there is instrumental aggression, a consciously controlled attack on those that do not pose present or future threat in order to gain various rewards (Nelson and Trainor 2007, 536). I propose the following links of these types of aggression to variations in anger. First, there is appropriate anger, which is associated with adaptive reactive aggression that is calibrated accurately to the threat; contrast this with hyperbolic anger, which is associated with maladaptive reactive aggression that comes from those with a low threshold of threat detection and poorly calibrated threat estimation, problems often acquired by previous trauma. (See Flanagan 2016 for a criticism of this basically Aristotelian position on the appropriateness of some forms and intensities of anger.) Second, instrumental aggression tends to be accomplished in cold-blood; this can be associated with psychopaths (Nelson and Trainor 2007; Blair 2010, 2012; Hirstein and Sifferd 2014), but can also be produced by people who have undertaken various training procedures to control fear and anger and produce an emotional dominance over their victim (Collins 2008 discusses techniques employed by professional hit men). Lastly, proactive aggression, absent completely successful self-calming techniques, is intermediate in intensity between hot reaction and cold instrumentality. Proactive aggression often needs some angry arousal as one is attacking to eliminate a future threat to those with whom you are emotionally invested; thus the link of the image of the one to be protected and the image of the threat kicks up your anger. In this way, proactive aggression is less intense than reactive aggression, but is not cold-blooded instrumental aggression either.

This is not the whole story, however, as Barash and Lipton 2011 distinguish reactive aggression or retaliation (attacks directed back at the aggressor) from redirected aggression and especially redirected aggression targeting the kin of the aggressor (39). This latter tendency might have evolved to resolve conflicts by threatening kin, as it would select for control in the aggressor and redirected aggression in victims. Redirected aggression provides a costly, honest signal of

continued potency that increases the chances of non-victimization in the future. The proximate explanation of redirected aggression is relief from stress hormones from adrenals. Barash and Lipton hypothesize that prolonged stress, especially social subordination stress, burns out the pituitary – adrenal axis and produces lower testosterone and serotonin and higher cortisol. There is thus a hypothesized reduction in bad hormonal effects for those able to engage in redirected aggression when retaliation is not possible.

With this in mind, we can recognize a few basic dimensions to military anger, always keeping in mind two things: first, that anger occurs in an intermediate zone between simple fear on the low end and paralyzing freezing on the high end, and secondly, that both fear and anger are orthogonal to calm self-possession. Anger can be linked to quick reactive retaliation or self-motivated returned aggression; to quick or planned redirected aggression aiming to harm the kin or comrades of the enemy; to proactive or preventive aggression, either retaliatory or redirected, designed to protect self and others; and to vengeance or third-party mediated retaliatory or redirected aggression. Experiences of anger in each of these dimensions also vary in intensity, from white-hot flashes to the sort of simmering "baseline resentment" among US soldiers in Iraq for wrongs supposedly done ranging from 9/11 to Saddam Hussein's treatment of civilians and the latest atrocity (Sherman 2005, 90; cited in Flanagan 2016). This fluctuating background anger is amped up by the death or wounding of comrades; here there is a narrow temporal / spatial / attachment focus on wrongs done to the "band of brothers." There can also be resentment at the betrayal of a moral code by superiors (Shay 1994, 2003, 2014). Of course, there is also the hot flash of anger at being trapped and in mortal danger yet with a chance of overcoming the foe. While Panksepp (1999) invokes rage as the result of triggering neural circuits homologous between humans and other mammals, such that rage occurs for us when we are put into the situation of a trapped prey animal, we have to add that human rage is dependent on situational analysis: being trapped cuts off fear and flight and forces rage and fight only when the situation is analyzed as winnable, even if dire, as otherwise panicked freezing might kick in or conscious surrender be chosen.

As it turns out, however, whatever the anger and aggression combination, killing in modern combat is less widespread than it might seem to those outside the military, for whom the logic of "kill or be killed" would predict high rates of deadly interaction. As the military historian John Keegan explains (Keegan 1976, 68-71), one of the most important turning points in recent military training came from taking seriously the general outlines of the findings of SLA Marshall's survey of American infantry troops after World War II. Marshall claimed to find only a 15-20% *firing rate* among American infantry troops, excluding machine-gunners (Grossman 1996: 3-4, citing Marshall 1978). Now a firing rate doesn't indicate willingness to kill, as Grossman explains. The usual "fight or flight" dichotomy is falsely drawn from *inter*-species conflicts; *intra*-species conflicts are also marked by display and submission, which, along with flight, are much more likely to occur before fight to the death.[3] Given these factors, Grossman concludes that much of the World War II firing rate was display rather than fight (Grossman 1996: 5-6).

Many have complained that Marshall's methodology makes exact replication of his findings impossible; but Keegan (1976), Grossman (1996; 2000), and Collins (2008) all accept the broad outlines of his findings. (Chambers 2003 provides pro and con references; see also Smith and Panaitiu 2016.) Marshall chalked up the reluctance of soldiers to engage to their American upbringing, but we will place it in evolutionary context; this is not to say however that some factors in modern cultural upbringing are irrelevant in discussing inhibition and the "moral injury" aftermath of overcoming it (Trivigno 2013; Shay 2014; Crowley 2014). Marshall's solution was friendship, as the fear of being seen a coward by one's comrades would help overcome inhibitions and produce firing. Hence Marshall advocated encouraging friendships in small group structures in infantry units (Keegan 1976, 71). By contrast, Keegan shows that the French military historian Ardant du Picq, who also demonstrated reluctance to engage, advocated for coercion (military police and so on) to ensure firing (Keegan 1976, 70). Grossman 1996 then details changes in post-WWII American military training that, by taking into account fear and bypassing it via operant conditioning, resulted in reflexive firing at greatly increased rates; we will discuss these changes later in the paper.

The berserker rage is a classical means for enabling close-range killing behavior; it is a (close-to-)automated state that unleashes extreme violence on almost anything in its path (note the reference to "autopilot," and "felt something switch" in Vaughan 2015, an interview with Robert Bales, a berserker). It can have both reactive and proactive dimensions, insofar as it deals with immediate threats but can then go out in search of threats to eliminate, or passive and helpless victims on which to vent (Bales's victims were unarmed civilians). It has accompanied military action for all of recorded history, starting with its most memorable invocation in Homer's description of Achilles in the *Iliad* (Shay 1994; Cairns 2003). While some dis-inhibiting anger is needed in many close-range encounters for those who have not mastered the techniques for cold-blooded engagement, unleashing the berserker rage is associated with many problems in the contemporary military. Its hyperactive threat processing fits poorly in counter-insurgency operations, both urban and rural, as it can lead to civilian atrocities (as in the case of Bales) and it is closely associated with PTSD (van der Kolk and Greenberg 1987).

THE EVOLUTION OF ANGER CONTROL AND ITS TIE TO WAR

Why do militaries need to enable killing behavior – as opposed to just channeling it – and yet still also need to be on the lookout for episodes of berserker rage? Why do they need elaborate training, organization, and equipment to produce the appropriate anger-aggression relation in the bulk of their forces? One promising train of thought is the "human self-domestication" (HSD) hypothesis, which concerns the evolution of reactive aggression control (Hare 2017). As we have seen, reactive aggression occurs with blocked flight after threat detection, and berserker rage is out-of-control reactive aggression. But HSD cannot be perfect; it can increase the cortical means of behavior control and raise danger detection thresholds for defensive behavior activation in a large portion of the population, but the genetic disposition to develop defensive circuits remain for many, so for them the circuits

themselves are present and able to be activated, and there will be also be ontogenetically-induced variation in control and thresholds. All that means that given the right circumstances, instances of blind rage behavior are still possible in many members of the population.

According to the HSD hypothesis "later human evolution was dominated by selection for intragroup sociality over aggression," and because of this, "the reduced emotional reactivity that results from self-domestication and increased self-control created a unique form of human tolerance allowing the expression of the more flexible social skills only observed in modern humans" (Hare 2017). The HSD hypothesis is an advance on the "emotional reactivity hypothesis" which states that "human levels of cooperative communication were a result of an increase in social tolerance generated by a decrease in emotional reactivity… an increase in tolerance in humans allowed inherited cognitive skills to be expressed in new social situations. Selection could then act directly on revealed variance in these newly expressed cognitive abilities (Hare 2017; with reference to Hare and Tomasello 2005a, b). The HSD predicts neurological changes in humans ("interaction between subcortical and cortical pathways"; as well as increased serotonin, which is known to inhibit impulsivity and reactive aggression [Nelson and Trainor 2007]) producing self-control via reduced reactivity and increased inhibition, which "creates the human-specific adaptation for more flexible tolerance and unique forms of human social cognition" (Hare 2017).

For Hare (2017), the HSD "also led to enhanced cooperation in intergroup conflicts." We have to nuance this claim, however, by delving into the various "economies of violence" that inform debates on the origin of war (Protevi 2015). Here the basic question is whether war is a universal human experience, or whether it only occurs in certain social circumstances. The key distinction, in my mind, is that proposed by Kelly 2000 and 2005 between vengeance as personal and war as anonymous. If you define war as anonymous intergroup violence, the case can be made that it only arises in segmented societies, leaving unsegmented forager societies as those without war, and thus defeating the universal war thesis. (See Fry 2013b for a full treatment of the issue.)

To see what's going on here, note that a prime selection pressure for self-domestication in early humans is capital punishment (CP) in unsegmented foragers (Wrangham 2014; the success or failure of CP in reducing murder in state societies is not directly deducible from its use in early forager societies). There is an interesting dialectic here: the acephalic social structure of forager bands is produced by the CP killing of murderers qua would-be dominators, while that same structure produces the need for CP, as, without an alpha to impose conflict resolution, individual conflict can result in murder, and hence the need for CP (Boehm 2012a). Forager CP is a paradigm case of "warm" proactive aggression (Wrangham 2014), but the targeted killers are those hot-heads exhibiting poor control of reactive aggression or those cold-blooded bullies whose instrumental aggression is used to dominate others. CP thus selects for the ability to carry out the controlled anger / proactive aggression complex that enables war: it is language-mediated, group-oriented, and premeditated, though sometimes achieved by taking advantage of spontaneous opportunity.[4]

Having said all that, I don't think capital punishment is a form of war, even if it helps prepare for it; it is personal and intra-group as opposed to anonymous and inter-group. To see the stakes here, note that war and the in-group / out-group distinction has been linked to the evolution of altruism since this passage in Darwin's 1871 *The Descent of Man*.

> When two tribes of primeval man, living in the same country, came into competition, if (other things being equal) the one tribe included a great number of courageous, sympathetic and faithful members, who were always ready to warn each other of danger, to aid and defend each other, this tribe would succeed better and conquer the other (Darwin 2004 (1871), 113).

An interesting new book by Samuel Bowles and Hubert Gintis, *A Cooperative Species* (2011) posits widespread pre-State war as a necessary selection pressure for prosocial behavior, calculations, and emotions. Some definitions are needed here. Altruism is helping behavior with a fitness cost. This includes prosocial and third-party punishment as they carry risks: you could start a feud; you eliminate a potential ally. There are some ways of explaining helping behavior that appears to be altruistic, but has hidden benefits that balance out (or outweigh) the fitness costs: 1) kin selection: costly helping behavior that helps genes in kin to survive ("I would sacrifice myself for two brothers or for 8 cousins"); 2) reciprocal altruism: aid given back to donor by recipient with time delay ("I'll scratch your back if you scratch mine"); 3) mutualism: working together so that immediate benefits (at end of successfully completed task) accrue to all parties compensating for any costs; 4) indirect altruism: aid given to an altruist donor by a third party due to reputation gained by altruistic acts; 5) sexual selection (qua female mate preference instead of male arms race): altruist behavior as "costly signaling," hence as predictor of genetic quality.

However, for Bowles and Gintis 2011, all the above mechanisms are not enough for the evolution of prosocial behaviors, calculations, and emotions. For them, war is also necessary to group selection for prosociality. Although Fry (2013a, 9-10 and 15-20) has a number of criticisms of Bowles and Gintis 2011, it should be said that he – correctly – does not accuse them of upholding the "human nature = killer ape" line. Indeed, Bowles and Gintis insist that early bands had extensive trade, marriage, and generally peaceful non-conflict relations with other groups (e.g., big seasonal meetings of many bands) as well as allowing for climate disasters to be a major predictor of warfare (thus not some "aggression" thesis).

What complicates things for Bowles and Gintis is the bitter controversy in anthropology about the alleged universality of warfare in human evolution and history (Fry 2013b covers the basics from an anti-universalist perspective). There are three elements to consider here: the biological, the archaeological, and the ethnographic. Regarding the biological, an important first step is to distinguish human war from chimpanzee male coalition and aggressive hierarchy, to which it is assimilated in the "humans as killer apes" hypothesis (see Ferguson 2014 for an argument that chimpanzee inter-group violence is due to human impact rather than being an adaptation). Since as we know bonobos and chimpanzees have different social structures and behavioral repertoires, researchers have triangulated human, chimpanzee, and bonobos (for an interesting attempt to show that the last common

ancestor here was more bonobo-like than chimp-like, see Gonzalez-Cabrera, forthcoming). For instance, Wrangham and Peterson 1997 point to female coalition-building in bonobo society as preventing inter-group violence by male-coalitions. But I think the focus on eco-social difference is not going to be male (chimpanzees and men) vs female (bonobos) but egalitarian foragers vs hierarchical horticulturalists / agriculturalists (bands vs chiefdoms and States). Wrangham and Peterson equivocate between "war" and "violence" (war is a very specific form of violence) and conflate "war" and "border raid" — which they in turn assimilate too quickly to chimpanzee coalitionary killing (Kelly 2005). They are right that we have to look to an eco-social multiplicity, but they overlook "techno" as one dimension, a key point of Kelly 2005 who evokes era of defensive advantage due to adoption of javelins (see also Sterelny 2014). In sum, Wrangham and Peterson are not sufficiently careful in examining the economies of violence in different forms of human social organization. Specifically, they don't investigate egalitarian forager anti-war societies (whose anti-war practices include violence qua CP and peace-seeking festivals) because for them all stories of anti-war societies are myths, not ethnography.

Regarding the archeological: proponents of universal war often point to findings of crushed skulls and the like in the archaeological record (Keeley 1997). Critics reply that some of the claims of war-damaged skulls are more plausibly accounted for by animal attacks (Fry 2007, 43). The anti-universalists will also seek to demonstrate that the universalists have cherry-picked their evidence (see Ferguson 2013a and 2013b); for Ferguson, there just aren't that many (or any) pre-State multi-body graves with violent marks on the skeletons. You need multi-body sites because no one denies individual killing, either murder or CP group response.

Finally, we must couple the archaeological record with the current ethnographic record. But to do that we must distinguish smaller and less internally differentiated forager bands from more internally complex hunter-gatherer tribes with chiefs. Chagnon 1988, focusing on the Yanomami tribes of Brazil and Venezuela, proposed war as an evolved adaptation. One of the most controversial papers of the last 50 years, it has multiple critics (Albert 1989; Ferguson 2001; Fry 2007) and defenders. The anti-universalists make two claims with regard to the penchant of the univeralists to cite the Chagnon: 1) they criticize the use of the horticultural Yanamamo as indicative of pre-State forager societies, and 2) they deny that Yanamamo warriors really did have reproductive fitness advantages [Fry 2007, 135-139].

While the critics of the universal war thesis admit that forager groups have individual-level murder and revenge killing and even group executions of murderous individuals (CP qua "social selection" per Boehm 2012a, b), they deny that they have the "logic of social substitutability" which enables warfare as anonymous group-level conflict in which any member of the opposing group is fair game (Kelly 2000; Fry 2007). The critics of universal war also remind us of the need to look at current tribal warfare in the context of Western contact and subsequent territorial constriction and / or rivalry over trading rights (Ferguson 1995).

Kelly (2005) sketches a geo-eco-techno-social multiplicity that results in a period of "intrinsic defensive advantage." The geographical aspect means defenders

know their territory and can hold ambush positions. The ecological aspect entails that low population density of foragers meant defenders can flee if needed. The technological aspect means throwing spears allow inflicting damage on invaders with low risk to defenders. Finally, the social aspect means invading parties would be non-specialists and that defenders would have throwing skills developed in hunting. Kelly concludes by mentioning the development of positive peace-seeking inter-group mechanisms (diplomacy, feasts, contests) as materially feasible and in fact prevalent. The take-away point here with Kelly 2005 is that with a universal war anthropological perspective, you assume hostility is the default setting for inter-group relations, and war is women-capture (acquisition of reproductive resources). But this is not a rigorous historical materialism; peace-seeking mechanisms are just as materialist as war. In fact, they allow more efficient resource exploitation: the two sides are not afraid to exploit to the border of their territories, as they would be if border raids were frequent. For Kelly 2005, it's a shift to state military specialization that allows strikes at the home camp that shifts the balance and allows state territorial acquisition and enslavement warfare (see also Sterelny 2014; Scott 2009).

NEUROPSYCHOLOGY OF THE BERSERKER RAGE

There are several axes in contemporary philosophy of the emotions and neuroscience to consider in examining the berserker rage. First, it is associated with a super-charging of threat circuitry, going beyond simple fear: “Threats lead to fear as well as anger. Indeed, the basic threat circuitry … (amygdala-hypothalamus-PAG) is involved in fear as well as anger. The avoidance behavior associated with fear relates to a lesser activation of this circuitry than that resulting in the reactive aggression associated with anger” (Blair 2012, note 1; see also Koutsikou et al 2014 on freezing). Beyond ordinary anger, however, the behavioral manifestations of the berserker rage are close to those described as Intermittent Explosive Disorder (IED), though that is linked with "impulsive" aggression as opposed to the reactive / proactive aggression we think of as characteristic of the berserker rage (Coccaro 2012). From a cognitive psychology perspective, the berserker rage seems like a candidate for an “affect program,” a modularized, automatic, behavior pattern (Griffiths 1997; recall the notion of “autopilot” the recent American berserker Robert Bales mentioned [Vaughan 2015]). From this perspective, extreme cases of rage produce a modular agent or “affect program” that replaces the subject. Affect programs are emotional responses that are “complex, coordinated, and automated … unfold[ing] in this coordinated fashion without the need for conscious direction” (Griffiths 1997: 77). They are more than reflexes, but they are triggered well before any cortical processing can take place (though later cortical appraisals can dampen or accelerate the affect program). Griffiths makes the case that affect programs should be seen in light of Fodor’s notion of modularity, which calls for a module to be “mandatory … opaque [we are aware of outputs but not the processes producing them] … and informationally encapsulated [the information in a module cannot access that in other modules]” (93; my comments in brackets).

Panksepp 1999 is able to cite studies of direct electrical stimulation of the brain and neurochemical manipulation as identifying homologous rage circuits in humans and other mammalian species (190). Panksepp proposes as adaptive reasons for rage agents their utility in predator-prey relations, further sharpening the difference between rage and predator aggression. While a hunting attack is by definition an instance of predatory aggression, rage reactions are a prey phenomenon, a vigorous reaction when pinned down by a predator. Initially a reflex, Panksepp claims, it developed into a full-fledged neural phenomenon with its own circuits (190). The evolutionary inheritance of rage is confirmed by the well-attested fact that infants can become enraged by having their arms pinned to their sides (189).

However, LeDoux challenges Panksepp's basic emotions terminology, as well as his locating basic emotions in subcortical, unconscious processes. LeDoux 2015 sketches a constructivist notion in which threat-triggered nonconscious defense motivational states are part of a "recipe" of nonconscious elements (along with sensory processing, brain arousal, body feedback, and memory) that are assembled by a working memory bricoleur into conscious feelings (LeDoux 2015, 228). LeDoux's complaint against Panksepp is about using emotion terms such as "fear" (or for us, "anger") to discuss unconscious threat detection and defensive reaction circuits when they should be reserved for conscious feelings. For LeDoux, danger detection and reactive behavior is triggered in parallel with conscious awareness, so they shouldn't be called "emotions."

It's possible to articulate Griffiths, Panksepp, and LeDoux however, if we say that a berserker rage is a highly intense reactive aggression behavior provoked by threat detection to the extent that conscious, subjective, control is severely attenuated, with the limit case being the inhibition of episodic memory, resulting in the appearance of an automatically running "affect program" and "blackout" rages. (LeDoux 2015, 124 allows for use of "affect program" terminology; on "redout" rages, see Swihart, Yuille, and Porter 1999; clinical work with blackout rage is recapped in Potter-Efron 2007.)

The neural circuitry of the rage reaction is recapitulated by LeDoux 2015 (93 and following). Sensory processing follows a fast "low" road and a slower "high" road. In the fast or low road, the lateral amygdala feeds the central amygdala and the basal amygdala. From the central amygdala, we get defensive behavior (initial freezing), physiological support in the autonomic nervous system, hormonal output via the pituitary, and brain arousal neuromodulators (norepinephrine, dopamine, serotonin and others [LeDoux 2015, 90; see also Nelson and Trainor 2007]). The slow or high road allows regulation of these first responses by the prefrontal cortex and hippocampus. Note the first reaction is freezing (see also Blair 2012), so that to activate learned responses, you have to inhibit freezing (LeDoux 2015, 101). LeDoux's full action model builds on the early reactions, adding connections from basal amygdala to the nucleus accumbens of the ventral striatum in the pre-frontal cortex (102-3). At this point, past freezing, and when flight is unavailable, then rage is the last resort. The rage circuit seems to be amygdala / hypothalamus / periaqueductal gray (LeDoux 2015, 89; see also Blair 2012 and Siegel and Victoroff

2007). Along with supporting physiology, the rage reaction is an "innately programmed reaction pattern" (LeDoux 2015, 89).

Interestingly, the hippocampus, which is an important part of risk assessment, creates environmental maps, especially spatial relations (LeDoux 2015, 106). Might it be the case that overstimulation here accounts for the very narrow focus or tunnel vision reported by some berserkers? LeDoux's final suggestion relevant to us is that the BNST or bed nucleus of the stria terminalis "sits at the crossroads between defensive circuits involving the amygdala and accumbens and risk-assessment circuitry involving the septohippocampal circuitry and prefrontal cortex. It thus may coordinate the two systems, balancing which dominates behavioral control, depending on the degree of uncertainty" (107). The berserker rage might then be caused by a BNST-mediated lock-in of the defense circuits, outlasting or overpowering controlled reactive threat response and moving on to super-charged proactive or hot aggression-seeking behavior (as opposed to the "warm" proactive or "cold" instrumental forms of aggression).

THE BERSERKER RAGE IN HISTORY

Berserker rage is unrestrained reactive aggression. That's why, although it works in close-range open-field combat, it fits badly in highly organized warfare situations, which rely on proactive aggression. What's interesting is that it seems some warrior cultures actively cultivate the potential for entering the berserker rage, as it fit the isolated, hand-to-hand combat style they used.

The Vikings are the paradigmatic berserkers, so we can speculate that through a co-evolutionary process with success in warfare as a selection pressure, they and other warrior cultures experimented with war dances and songs to hit upon critical points in setting up brain frequency patterns that triggered evolutionarily embedded rage circuits. (In this section I recapitulate arguments from Protevi 2010.) One researcher cites possible mushroom ingestion as a contributing factor (Fabing 1956; see also Kamienski 2016)[5], but I think the (speculative, to be sure, but not implausible) role of dance and song in deliberately triggering the berserker state should not be neglected. William McNeill notes that "war dances" produced a "heightened excitement" that contributed to the "reckless attacks" of the "Viking berserkers" (McNeill 1995, 102; see also Speidel, 276). Panksepp gives us a clue as to why dance and song were the elements of experimentation: "[Certain brain] areas presumably code the affective content of certain irritations, including vocalizations, and may give specific sounds direct access to RAGE circuitry" (Panksepp 1999, 197). Along with the angry tone of the war cry (and here elements of auto-affection must be taken into account—you can participate in an escalating affective episode by your own efforts, as we all know, just as you can calm yourself down with some deep breaths), the exertions of the dance help sensitize the system, that is, lower the threshold for the triggering of the rage episode: "increased activity in barorecptors of the carotid arteries monitors levels of blood pressure and can facilitate the sensitivity of RAGE circuitry" (Panksepp 1999, 198).

A common trigger of the berserker rage is the death of a comrade (Shay 1994; Kirkland 1995; see also Fields 2015 for other triggers).[6] We can speculate that such rage is triggered by the presence of pain in separation from and mourning for the comrade, coupled with the memory of pleasure tagged to the person of the comrade (see LeDoux 1996, 200-203 for a brief overview of emotional memory; although LeDoux focuses on fearful memories, dopamine would seem to be a key player in the production of pleasant memories [Niehoff 1999, 131]). The wrenching shift between the pleasant memories and the painful present triggers rage, a notion that dovetails with Panksepp 1999, where frustration, as the curtailment to the free use of "seeking" and "play" systems, triggers rage. Another trigger, at which we have already hinted, is direct and immediate threat to life, the panicked self-defense reaction that display and submission seeks to avoid. There are of course other rage triggers in other walks of life (Fields 2015; Potter-Efron 2007).

CONCLUSION: THE BERSERKER RAGE AND HUMAN NATURE

There is no denying that the social meaning of blind rages differs across cultures—how they are interpreted by others and by self after waking up—as do their triggers and thresholds. But I think it is important to rescue a minimal notion of human nature from extreme social constructivism and hold that the rage pattern is the same in some important sense across cultures, notwithstanding variation in genetic inheritances, environmental input, and developmental plasticity. Even with all that variation, there is remarkable similarity in what a full rage looks like, though how much it takes to get there, and what the intermediate anger episodes look like ("emotion scripts" according to Parkinson, Fischer, and Manstead 2005) can differ widely. Even James Averill, a leading social constructivist when it comes to emotion, relates "running amok" in Southeast Asian societies to Viking berserker rages. Averill writes: "Aggressive frenzies are, of course, found in many different cultures (e.g., the *berserk* reaction attributed to old Norse warriors), but amok is probably the most studied of these syndromes" (Averill 1982, 59; italics in original). It is the very commonality of "aggressive frenzies" that we are after in our notion of "rage pattern."

But we have to resist any idea that the berserker rage provides some insight into the "aggressive root of human nature" or some such bellicose formulation. A trapped-prey rage-fight potential is certainly part of our heritage, but we have to remember that it's "trapping," that is, cutting off flight, that is the key. Given the raw material of human bio-social organisms, militaries can find ways to train, organize, and equip soldiers that in effect "appropriately trap" them, overcome their fear, suppress their flight response, and unleash their fight responses, thereby allowing the overcoming of the inhibition on killing. Now such unleashing of anger can overshoot the mark and end up locked into a berserker rage. But that doesn't mean we are natural fighters any more than freezing means we are natural cowards; what it means is that we are plastic, gifted with various deep reaction patterns and the ability to learn to manipulate our responses to those patterns in ways that enable us to adapt to the constructed bio-social-techno environments in which we are placed.

LIST OF WORKS CITED

Albert, Bruce. 1989. Yanomami "violence": inclusive fitness or ethnographer's representation? *Current Anthropology* 20.5: 637-640.

Averill, JR. 1982. *Anger and Aggression*. New York: Springer.

Barash, David and Lipton, Judith. 2011. *Payback*. New York: Oxford University Press.

Blair RJR. 2010. Psychopathy, frustration, and reactive aggression: The role of ventromedial prefrontal cortex. *British Journal of Psychology* 101:383–399.

Blair, RJ. 2012. Considering anger from a cognitive neuroscience perspective. *Wiley Interdisciplinary Review of Cognitive Science* 3.1: 65–74.

Boehm, Christopher. 2012a. Ancestral Hierarchy and Conflict. *Science*. 336 (6083): 844-847.

Boehm, Christopher. 2012b. *Moral Origins*. New York: Basic Books.

Cairns, Douglas. 2003. Ethics, Ethology, Terminology: Iliadic Anger and the Cross-cultural Study of Emotion. In S. M. Braund and G. W. Most, eds., *Ancient Anger*. Cambridge: Cambridge University Press: 11-49.

Chagnon, Napoleon. 1988. Life histories, blood revenge, and warfare in a tribal population. *Science* 318: 636-640

Chambers, JW. 2003. SLA Marshall's *Men Against Fire*: New Evidence Regarding Fire Ratios. *PARAMETERS: US Army War College Quarterly*. 33.3: 113-21.

Coccaro, E. 2012. Intermittent explosive Disorder as a Disorder of Impulsive Aggression for DSM-5. *American Journal of Psychiatry* 169:577–588

Collins, Randall. 2008. *Violence: A Micro-sociological Theory*. Princeton: Princeton University Press.

Crowley, Jason. 2014. Beyond the Universal Soldier: Combat Trauma in Classical Antiquity. In Meineck and Konstan 2014.

Darwin, Charles. 2004 (1871). *The Descent of Man*. New York: Penguin.

Fabing, H. 1956. On Going Berserk: A Neurochemical Inquiry. *American Journal of Psychiatry* 113 (November): 409-415.

Ferguson, Brian. 1995. *Yanomami Warfare*. Santa Fe: School for American Research Press.

Ferguson, Brian. 2001. Materialist, cultural and biological theories on why Yanomami make war. *Anthropological Theory* 1: 99–116.

Ferguson, Brian. 2013a. Pinker's List: Exaggerating Prehistoric War Mortality. Chapter 7 in Fry 2013b.

Ferguson, Brian. 2013b. The Prehistory of War and Peace in Europe and the Near East. Chapter 11 in Fry 2013b.

Ferguson, Brian. 2014. Anthropologist Finds Flaw in Claim That Chimp Raids Are "Adaptive" http://blogs.scientificamerican.com/cross-check/2014/11/25/anthropologist-finds-flaw- in-claim-that-chimp-raids-are-adaptive/ (accessed 28 March 2015).

Fields, Douglas. 2015. *Why We Snap*. New York: Dutton.

Fry, Douglas. 2007. *Beyond War*. New York: Oxford University Press.

Fry, Douglas. 2013a. War, Peace and Human Nature: The Challenge of Achieving Scientific Objectivity. Chapter 1 in Fry 2013b.

Fry, Douglas. ed. 2013b. *War, Peace, and Human Nature*. Oxford: Oxford University Press.
Flanagan, Owen. 2016. *The Geography of Morals*. New York: Oxford University Press.
Fry, Douglas. 2007. *Beyond War*. Oxford: Oxford University Press.
Gonzalez-Cabrera, Ivan. Forthcoming. On social tolerance and the evolution of human normative guidance. *The British Journal for the Philosophy of Science*.
Grossman, David. 1996. *On Killing*. Boston: Little, Brown.
Grossman, David. 2000. Aggression and Violence. In JW Chambers, ed. *Oxford Companion to American Military History*. New York: Oxford Press.
Hare, Brian. 2017. Survival of the Friendliest: Homo sapiens Evolved via Selection for Prosociality. *Annual Review of Psychology* 68:24.1–24.32
Hare, Brian, and Tomasello, Michael. 2005a. The emotional reactivity hypothesis and cognitive evolution: reply to Miklósi and Topál. *Trends in Cognitive Science* 9:464–65
Hare, Brian, and Tomasello, Michael. 2005b. Human-like social skills in dogs? *Trends in Cognitive Science* 9:439–44
Hirstein, William & Sifferd, Katrina. 2014. Ethics and the Brains of Psychopaths. In Charles Wolfe ed., *Brain Theory*. Springer: 149-170.
Kamienski, Lukasz. 2016. *Shooting Up: A Short History of Drugs and War*. New York: Oxford University Press.
Keegan, John. 1976. *The Face of Battle*. London: Jonathan Cape.
Kelly, Raymond. 2000. *Warless Societies and the Origin of War*. Ann Arbor: University of Michigan Press.
Kelly, Raymond. 2005. The evolution of lethal intergroup violence. *Proceedings of the National Academy of Sciences* 102: 15294–15298.
Kirkland, Faris. 1995. Postcombat Reentry. In Russ Zajtchuk, ed. *War Psychiatry. Textbook of Military Medicine, Part I.* Washington DC: Office of the Surgeon General: 291-317.
Kolk, Bessel van der, and Greenberg, M. 1987. The Psychobiology of the Trauma Response. In *Psychological Trauma*, ed. Bessel van der Kolk. Washington DC: American Psychiatric Press: 63-87.
Koutsikou, Stella, et al. 2014. Neural substrates underlying fear-evoked freezing. *The Journal of Physiology* 592.10: 2197–2213.
LeDoux, Joseph. 1996. *The Emotional Brain*. New York: Simon & Schuster.
LeDoux, Joseph. 2015. *Anxious*. New York: Penguin.
Marshall, SLA. 2000 [1947]. *Men Against Fire*. Norman: University of Oklahoma Press.
McNeill, William. 1995. *Keeping Together in Time*. Cambridge MA: Harvard University Press.
Meineck, Peter, and Konstan, David, eds. 2014. *Combat Trauma and the Ancient Greeks*. New York: Palgrave Macmillan.
Miller, Greg. 2013. A Gruesome War Crime Renews Concerns About a Malaria Drug's Psychiatric Side Effects. *Wired*. https://www.wired.com/2013/08/mefloquine-robert-bales/all/
Nelson, Randy, and Trainor, Brian. 2007. Neural mechanisms of aggression. *Nature Reviews: Neuroscience* 8: 536-546.

Niehoff, Debra. 1999. *The Biology of Violence*. New York: Free Press.
Panksepp, Jaak. 1998. *Affective Neuroscience*. New York: Oxford University Press.
Parkinson, B., Fischer, and Manstead, A. *Emotions in Social Relations*. New York: Psychology Press, 2005.
Potter-Efron, Ronald. 2007. *Rage*. Oakland CA: New Harbinger Books.
Protevi, John. 2008. Affect, Agency, and Responsibility: The Act of Killing in the Age of Cyborgs. *Phenomenology and the Cognitive Sciences* 7.3: 405-13
Protevi, John. 2009. *Political Affect*. University of Minnesota Press.
Protevi, John. 2010. Rhythm and cadence, frenzy and march: Music and the geo-bio-techno-affective assemblages of ancient warfare. *Theory & Event* 13.3.
Protevi, John. 2013. *Life, War, Earth*. University of Minnesota Press.
Protevi, John. 2015. Economies of Violence. Lecture presented at Penn State University, April 7, 2015. http://www.protevi.com/john/ECONOMIES-28-March-2015.pdf
Scott, James C. 2009. *The Art of Not Being Governed*. New Haven: Yale University Press.
Shay, Jonathan. 1994. *Achilles in Vietnam*. New York: Macmillan.
Shay, Jonathan. 2003. *Odysseus in America*. New York: Scribner.
Shay, Jonathan. 2014. Moral Injury. *Psychoanalytic Psychology* 31.2: 182–191
Sherwell, Philip. 2012. Sgt Robert Bales: The story of the soldier accused of murdering 16 Afghan villagers. *The Telegraph.* http://www.telegraph.co.uk/news/worldnews/northamerica/usa/9150641/Sgt-Robert-Bales-The-story-of-the-soldier-accused-of-murdering-16-Afghan-villagers.html
Siegel, Allan and Victoroff, Jeff. 2009. Understanding human aggression. *International Journal of Law and Psychiatry* 32: 209–215
Smith, David Livingstone and Panaitiu, Ioana. 2016. Horror Sanguinis*. Common Knowledge* 22.1: 69-80.
Speidel, M. 2002. Berserks: A History of Indo-European 'Mad Warriors.' *Journal of World History* 13.2: 253-90
Sterelny, Kim. 2014. Cooperation, Culture, and Conflict. *British Journal for the Philosophy of Science* 67.1: 1-28.
Swihart, Gayla, Yuille, John, and Porter Stephen. 1999. The Role of State-Dependent Memory in "Red-Outs." *International Journal of Law and Psychiatry* 22.3–4: 199–212.
Tritle, Lawrence. 2014. "Ravished Minds" in the Ancient World. In Meineck and Konstan 2014.
Trivigno, Franco. 2013. A Virtue Ethical Case for Pacifism. In *Virtues in Action: New Essays in Applied Virtue Ethics*. Ed. Michael W. Austin. New York: Palgrave Macmillan: 86-101.
Vaughan, Brendan. 2015. Robert Bales Speaks: Confessions of America's Most Notorious War Criminal. *GQ*. http://www.gq.com/story/robert-bales-interview-afghanistan-massacre
de Waal, Frans. 1997. *Good Natured*. Cambridge MA: Harvard University Press.

Wilkins, Adam, Wrangham, Richard, and Fitch, WT. 2014. The "Domestication Syndrome" in Mammals: A Unified Explanation Based on Neural Crest Cell Behavior and Genetics. *Genetics* 197.3: 795-808.

Wrangham, Richard. 2014. Did *Homo Sapiens* Self-Domesticate? http://www.uctv.tv/shows/CARTA-Domestication-and-Human-Evolution-Richard-Wrangham-Did-Homo-Sapiens-Self-Domesticate-28902

Wrangham, Richard, and Peterson, Dale. 1997. *Demonic Males: Apes and the Origins of Human Violence*. New York: Houghton Mifflin.

NOTES

[1] My thanks for comments that have greatly aided the paper go to Randall Collins, Steve Greening, Bryce Huebner, Joseph LeDoux, and the volume editors, Myisha Cherry and Owen Flanagan.

[2] While it is adduced in an argument about the historicity of PTSD, Crowley 2014 lays out the way the Athenian phalanx concretized the killing-enabling multiplicity to overcome fear and inhibition (close physical proximity and camaraderie in battle, ability to directly confront and strike back at the enemy [see note 3 on Barash and Lipton 2011 and the hormonal recalibration enabled by retaliation and redirected aggression], short tours of service, cultural ties in the recruitment from demes, and an overall war-glorifying culture). Crowley juxtaposes the Athenian multiplicity to that in 20th century American warfare, where infantry troops need to scatter in combat, due to the firepower of their enemies, and are unable to always directly strike back but must call for reinforcement, are subject to long tours of duty, and were raised in a post-Christian culture valuing – however hypocritically, I feel compelled to add – peacefulness. Crowley argues for the recent creation of PTSD; his counterpart, Tritle 2014, adduces evidence for Greek PTSD. I believe Crowley creates a plausible case that the specific environmental differences between contemporary and ancient warfare create a greater propensity for PTSD in a wider slice of the infantry population today than in the ancient world, but I also think we should not gainsay Tritle's evidence that some (perhaps lesser) percentage of Greek hoplites emerged from war with PTSD.

[3] While it is true that in some territorial species, such as lions, a newly victorious alpha male will kill the offspring of his defeated adversary, we do find a widespread inhibition on killing by animals of the same generation in one-on-one combat; chimpanzee killing always involve ambushes in which at least two but often seven or eight chimpanzees attack a single, isolated victim (de Waal 1997: 38).

[4] This would tend to be one-on-one. Note that Kelly 2000 distinguishes single CP from ambush by multiple people. This is on the way to social substitutability and war, as it requires group vengeance duty. Once we couple group duty on the side of the victimized avengers to group liability on the side of the offenders, we have set up feud, a form of war as anonymous inter-group violence.

[5] The problem I see with Kamienski is that he doesn't explain how the berserker rage can be triggered in non-mushroom-using (though certainly drug-using) cultures, although he goes on to discuss them immediately after his treatment of the Vikings.

[6] The Robert Bales case was multi-factorial but we can note that one of the soldiers he was charged with protecting had lost a leg hours before he committed the massacre. The Bales massacre occurred in Afghanistan March 2012. Bales was a staff sergeant charged with providing base security for combat troops, killed 16 civilians in two villages near base in two trips at 3 am, dressed in Afghan clothes over his military uniform. Three other factors besides the injury to one of his soldiers are mentioned: a) alcohol and steroid use; b) mefloquine, a malaria drug with possible psych effects (Miller 2013); c) domestic and financial trouble, as 3 days previously house was put up for sale in an "underwater mortgage" in which the

property was listed for less than what they had paid for it in 2005, and less than what they owed the bank (Sherwell 2012).