7-2014

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March 2013

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by

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*Research support from the Center for Science, Technology, and Society, Santa Clara University, is gratefully acknowledged. This paper has benefited from presentations at Santa Clara University, April 2009, the International Economic History Association Meetings in Utrecht, Holland, July 2009, the University of California, Davis, October 2009, Stanford University, April 2010, and the symposium on Biological Determinants & Contingencies of Economic Behavior, Max Planck Institute, Ringberg Castle, Germany, August 2, 2012. I thank Greg Clark, Michael Ghiselin, Herbert Gintis, Avner Greif, Kris Mitchener, Nathan Nunn, Bill Sundstrom, Hans-Joachim Voth, David Sloan Wilson, Ulrich Witt, and Gavin Wright for useful comments. Forthcoming in the Journal of Bioeconomics.

Abstract

In this paper, I consider a body of observational evidence not commonly studied by social scientists, namely the behavior of men and women (mostly men) in the military. I focus here on two issues: first, the behavioral foundations for creating an effective military unit, and second, evidence that infantrymen have historically been reluctant to fire on the enemy and how this reluctance has been overcome in the last half century through changes in military training. The evidence in each of these areas reinforces the appeal of the idea of cognitive modularity, the view that thought and behavior are influenced by different "mental organs." With respect to behavior, these usually align in the counsel they provide, but not always, and focusing on circumstances where guidance conflicts—Prisoners Dilemmas are examples—offers a route towards building a behavioral science with greater explanatory and predictive success.

1: Prosociality: Theory and Explanation

Humans are predisposed to solve one shot prisoners dilemmas surprisingly easily, at least as compared to what adherents to a narrow interpretation of rational choice might otherwise expect (Field, 2001, 2005, 2006, 2007, 2008a). Throwing caution and arguably prudence to the wind, we trust and rely upon each other, and by and large we avoid physically harming each other, even when the appeal of gain or the prospect of insuring against loss might suggest we do otherwise. And we do this even when, as is generally the case among adults, we are not so closely related that these behaviors could be accounted for by kin selection.[1] To be sure, the understandable appeal of defection sometimes wins out, but often it does not, to the collective benefit of the players involved.

These behaviors cannot necessarily be rationalized, as is often proposed, as self-serving behavior within a repeated game. We can't assume people are, always have been, and always will be in a repeated game with uncertain termination, for the simple reason that most interactions start with the possibility they might end after one play. Defection by one or the other or both (or all) will kill any prospect of continuing interaction and may well result, in extreme circumstances in predator species, in the deaths of one or more of the players. *If we start with the assumption that people act so as efficiently to advance their own material welfare*, we face a challenge. We have to

[1] Genetic relatedness drops off very quickly; first cousins for example share only an eighth of their genes. Even in small bands of hunter-gatherers, relatedness of group members is relatively low. In a survey covering thirty-two hunter gatherer societies, Hill et al (2011) found that, for any member, only one in ten of that individual's workgroup was likely to be a close relation. As a consequence, reliance on the mechanism of kin selection to explain the evolutionary emergence of our propensities to cooperate among non-kin faces serious hurdles.

explain how and why humans manage often to avoid defection in their first (and quite possibly only) encounter.[2]

Sociologists and anthropologists have traditionally attributed this to acculturation, socialization, norms, or institutions, an approach championed in earlier work (Field, 1981, 1984, 1991). This account, although identifying relevant proximate mechanisms, is nevertheless incomplete. The anthropological-sociological perspective doesn't necessarily conflict with the traditional economists' view that we are inherently (innately) selfish and dangerous to each other, an approach with which it is often contrasted. The explanation of the prevention of catastrophic conflict is, however, not, as traditional economists would have it, narrow self interest within a framework of repeated games, but rather a "thin veneer of civilization" that prevents us from tearing each other apart. This leaves open such questions as exactly what this thin veneer consists of and why we are so readily prepared both to articulate and be influenced by norms, such as the golden rule, which despair of an instrumental rationale.

The "thin veneer" explanation, moreover, poses an evolutionary/historical conundrum. We share a common ancestor with two other surviving chimpanzee species, the common chimpanzee (*Pan troglodytes*) and bonobos (*Pan paniscus)*. It stands to reason that our ancestor, living roughly six million years ago, as well as the progenitors of that species, also exhibited some behavioral inhibitions against attacking and killing

[2] Once we posit that individuals are enmeshed within an indefinitely repeated interaction, we can sometimes demonstrate the stability of an equilibrium in which players rationally choose to cooperate. It is a different challenge to explain how narrowly rational agents come to interact repeatedly in the first place. Similarly, in evolutionary models we can sometimes appeal to frequency dependence to explain how cooperative agents survive. But such an account begs the question of how the frequencies that enable such survival come to be established in the first place. If, upon first appearance, cooperators face an evolutionary (reproductive) disadvantage, how can they persist and grow in numbers? These issues are central in Field (2001). They were recognized by Darwin who, in The Descent of Man (1871), gave a group selectionist explanation of how this came about. See also discussion in Sober and D.S. Wilson, 1998, p. 4, or Haidt, 2012, p. 192.

conspecifics (as is true for most animal species surviving today).[3] That doesn't mean murder never happened – both common chimps and humans do, after all, kill their own, and our common ancestor may have done the same. The critical question however is not why this happened and happens sometimes, but why it hasn't been more frequent.

Precultural levels of violence among human progenitors, although probably higher than today, were evidently moderate enough to allow continued speciation and evolution toward anatomically and behaviorally modern humans. Genetically encoded restraints on intraspecific violence are observed today throughout the animal kingdom among predator species,[4] and are for this among other reasons highly probable among our precultural ancestors. Our behavior today reflects such inhibitions, just as it does the attributes that can make us fearsome warriors and sometimes murderers. Both types of evolutionary inheritance have played a role in allowing our numbers to increase to almost seven billion, and to populate every continent of the world. But we need to question whether the explanation for why humans don't kill each other more frequently is to be found entirely in the cultural realm.

Archeological evidence, in particular stone tools, suggests that humans and proto-humans have had capabilities to develop, learn, and transmit culture (learned behavior patterns) for at most two and a half a million years. That is the age of the oldest tools in the oldest (Oldowan) tool tradition – and places the earliest origin of human culture in the Lower Paleolithic.[5] Through most of our cultural history learning and transmission must

[3] There are exceptions: when a male lion takes over a pride he kills all the existing offspring; feral housecats act in a similar fashion.

[4] Dogs, in general, don't eat dogs, and wolves don't eat wolves. Chimpanzees, patrolling in groups, will sometimes kill and eat stray members of other groups. Such exceptions illustrate the rule

[5] There is little variation among Oldowan and Acheulean tools across both space and millennia, suggesting that the ability to construct these tools may have been genetically encoded rather than culturally transmitted. See Haidt, 2012, p. 208. If that is so, then true human culture does not emerge until roughly

have been strictly through imitation, as is the case with chimpanzees today. The emergence of human language greatly facilitated and accelerated these processes by offering a powerful and flexible complementary channel. This momentous development regrettably leaves no trace in the archaeological record, so the dating of its emergence remains a matter of controversy. The overall consensus is that it took place within the last 100,000 years, and perhaps as recently as 50,000 years ago. The development and rapid acceleration of cultural innovation, which allowed the accumulation and transmission of techniques for hunting, the use of fire, and the manufacture of clothing and shelter played a critical role in enabling our ancestors to emerge out of Africa into Asia, Europe, and eventually Australia and North America. These were momentous developments; these capabilities are not to be trivialized.

But cultural development could not have been the mechanism responsible for our common ancestor (and his or her progenitors) not destroying each other six million years ago, because our capabilities in this area, if we accept the evidence of the archeological record, arose more recently. This leads to the following inference. Since the inhibitions on violence toward conspecifics that allowed our common ancestor to persist *predate* our cultural capability,[6] their foundation must predate the emergence of human culture, and therefore must be to some extent biological. If culture is not the entire explanation then

500,000 years ago, when we see an explosion of new varieties of tools and weapons (Richerson and Boyd, 2005).

[6] Humans are not unique in developing and exploiting culture. Chimpanzees, for example, use twigs to "fish" for termites in termite mounds, and they learn and transmit such tool-using techniques by imitation. It's possible our common ancestor had similar capabilities. But these are not the aspects of culture appealed to in thin veneer explanations. Learning to fish for termites is different from internalizing a social norm, even though both are often subsumed in what we mean when we talk of human culture. No one claims that restraint on intraspecies violence among chimpanzees is due to a thin veneer of chimpanzee civilization. We are therefore, I think, justified in concluding that the survival of our common ancestor, insofar as it was based on such restraint, did not depend on culture.

there must be some genetically encoded[7] foundation not just to the aggression we display towards others, but also towards the inhibitions that most of the time prevent us from falling into a Hobbesian war of all against all (Field, 2008b).

It is true that these inhibitory predispositions can be and indeed often are overcome, and, as in other behavioral traits, there is variation within the human population in the extent to which individual behavior is governed by them.[8] But again, game theoretic analysis predicts 100 percent defection in a one shot PD game. Evolutionary reasoning, assuming no selection above the organism level, points in the same direction. I don't mean to suggest that there is no defection. Of course there is, and this no doubt reflects certain evolved behavioral predispositions. The question is why this response is not universal.

This chain of reasoning has an important implication. Since inhibitory predispositions could upon first appearance not have been favored by organism level natural selection, anymore than the play of cooperate in a possibly one time PD can be justified as rational, *it would appear likely that these predispositions took root in humans as the result of natural selection at levels higher than that of the individual organism*. In

[7] These inhibitions have a genetic substrate in this sense: the human sexual responses that facilitate reproduction of the species are not, by and large, culturally constructed, and neither are the predispositions against harming others. There may be cultural variations in these inhibitions and responses, but the basic, species typical predispositions are related to our genetic heritage.

[8] Recent estimates, based on administrations of the Minnesota Multiphasic Personality Inventory, place the proportion of the U.S. population with sociopathic tendencies at four percent. Relatively few of these people are dangerous killers. Nevertheless, because of their lack of emotional attachment or interest in others, except as instruments, sociopathic individuals are unlikely to anticipate or experience remorse as the consequence of killing others. This makes them well suited for certain military tasks such as service as a sniper. Studies with identical and fraternal twins indicate a sociopathy heritability of between 35 and 50 percent, comparable to that found for other personality indicators (Stout, 2005, p. 122)

other words, multilevel or group selection would need to have occurred at the biological and not just the cultural levels.[9]

This argument draws support from the deficiencies of alternate explanations, and from both experimental and observational evidence. The argument poses a challenge, both for economists and fellow travelers who adopt behavioral assumptions consistent with a narrow reading of rational choice, and for sociologists and anthropologists, for whom culture and socialization are all powerful in imparting the "thin veneer of civilization" that explains human cooperation. If the argument is accepted it will affect our understanding of the human ethogram[10] and more specifically how we should advance social and behavioral science. It has special implications for economics, a social science often conducted under the assumption of a particularly constricted version of

[9] This claim remains contentious, as the response to E.O. Wilson and colleagues' apostasy (Nowak, Tarnita and Wilson, 2010) has shown. In his earlier work Wilson embraced inclusive fitness, reciprocal altruism, and other non-group selectionist accounts. He now rejects these as adequate explanations of the origin of eusociality. A multilevel selection approach to evolutionary history, one which includes a role for group (above the level of the individual organism) selection, continues to generate strong opposition, in spite of the work of D.S.Wilson and Sober (1994), Sober and D.S. Wilson (1998) and many others, and in spite of the fact that it is in no way inconsistent with a gene-centric view of evolutionary processes. For a fuller treatment, see Field (2001) and elaborations in Field (2006, 2007, 2008a,b). The 2001 book contains a detailed critique of the Trivers model of reciprocity, as well as discussion of the limitations of Hamiltonian kin selection (inclusive fitness) theory, and much else. Haidt (2012) is also notable for endorsing a likely role for selection above the level of the individual in human evolutionary history, though he believes it to have operated only relatively recently, following the development among humans of shared intentionality. For some perspective, see Kurzban (2012, ch. 6), who offers an amusing and insightful discussion of scientific debates, and a reminder that, like all humans, the ancestors of scientists may have faced selection pressures to be at times "strategically wrong."

[10] The term originates with animal ethologists such as Nikolas Tinbergen and Konrad Lorenz, who used it to refer to an enumeration of discrete behaviors typically displayed by a species. We can think of an ethogram as a catalogue of modal behaviors, or behavioral proclivities, characteristic of a species. The emphasis on central tendencies should not of course preclude recognition of individual variability. In nonhuman animals fixed action sequences – instinctive behavioral patterns responsive to particular stimuli that run uninterrupted to completion play a predominant role. For humans, involuntary fixed action patterns (such as the startle reflex or the rooting reflex observed in infants) are less important. For many types of behavior a history of interaction with the environment will play an important determining role in how an individual acts or responds. But the learning resulting from these interactions is often biased: humans appear to be differentially prepared to learn in specific directions. A human ethogram can therefore be understood not simply to include a catalogue of human universals but rather a limited number of fixed action patterns combined with a broader range of behavioral and cognitive predispositions in which our genetic inheritance and biology predispose our learning in ways that violate the principle of equipotentiality.

human rationality, which assumes that humans act in all spheres so as efficiently to advance their material self interest.

This paper aims to stimulate continuing discussion of these fundamental issues by considering a body of observational evidence not commonly studied by social scientists, namely the behavior of men and women (mostly men) in the military. The focus is on two areas of behavior: the behavioral foundations for creating effective military units, and second, evidence that infantrymen have historically been reluctant to fire on the enemy and how this reluctance has been overcome through changes in military training. Both cases involve biologically altruistic behavior, but only the first involves affirmative acts of assistance, upon which most of the altruism literature has focused. Affirmative acts are, however, only the tip of the iceberg of altruistic behavior (Field, 2001). The second case highlights instances of altruism as restraint on harm.[11]

2. **Squad Loyalty**

Armies are hierarchical organizations, with clearly defined and articulated components aggregating to higher levels. Armies are commanded from the top down, but are built from the bottom up. The squad is the smallest organizational unit, a group of eight to eleven soldiers led by a staff sergeant (for some specialized units, such as tanks, the analogous unit is the crew). A platoon combines two to four squads, a company three to five platoons, a battalion four to six companies, a brigade (group or regiment) two to five battalions (around 500-1,500 men), and a division three maneuver brigades along

[11] It is much easier for me to make you better off simply by not harming you (though this may expose me to risk) than by providing affirmative assistance. Most of the discussion about group and individual level selection has centered on the Pleistocene, and has been focused on the emergence of our cooperative nature, which truly distinguishes us from most other species (see E.O. Wilson, 2012). The evolution of restraint on intraspecific harm – a much more universal trait and one which I argue is an empirically more important form of biologically altruistic behavior -- clearly took place much earlier. Even if one can persuade oneself that group level selection played no role at all in the Pleistocene and later, one is still faced with accounting for the 90 percent of the iceberg below the surface.

with a combat support brigade. Finally, at the top of the pyramid, a corps combines two or more divisions and an army two or more corps (U.S. Army, 2003, ch. 2). There is minor variation in the nomenclature used by different nations today, but virtually all display a similar structure. In particular, for all armies, the basic building block is the squad.[12]

Infantry training aims to blunt, tone down, or contravene individualistic predispositions and instill or strengthen values such as honor, duty, courage, and sacrifice. The emphasis is on sacrifice of self for others. Evidence can be found, for example, in the U.S. Army Field Manual, The Soldiers Guide (2003, sections 1.15. 1.19. and 1.22; see also 2007, sect 1.9). Although the manual mentions duties toward the nation, the effectiveness of an infantry force depends first and foremost upon the development of bonds of personal loyalty at the lowest level: among members of the squad. Commitments to the Constitution or the nation, or even the political causes underlying the war, are almost always weaker than the trust individual soldiers develop in each other. These bonds are described as often stronger than those that unite husband and wife, perhaps equal to those between parent and child, and if successfully established create what is referred to in military writings and popular culture as a band of brothers. Effective military training, aside from teaching soldiers discipline, endurance, and various skills, creates an environment in which these bonds take root.

From a practical standpoint, we need to appreciate just how important these bonds are. Members of a squad in combat trust each other with their lives. This is not just a repeated game of I'll cover your back if you'll cover mine. Infantry members face the

[12]The constraint on squad size appears to be related to the number of men a noncommissioned officer can effectively direct by voice command. Thus the relative size uniformity across different military organizations (in a few instances squads may be one or two men larger).

prospect of injury or death and must be and are prepared to risk their lives, in some cases with almost certainty of death, for the benefit of the group. For example, if a grenade rolls into a foxhole and cannot be tossed out in time, an infantryman is expected, depending on proximity, to cover the grenade with his body to absorb the explosive force. Group leaders anticipate this response, along with many others, to be done without thinking, to be automatic, to be essentially a conditioned reflex, in a manner similar to the fashion in which a US Secret Service Agent is prepared without thinking to place herself between a bullet and the President.

Obviously, all members of a squad are collectively better off if each "agrees" in advance that, if closest, they will fall on the grenade, or to undergo training that will make their behavior in this circumstance automatic. But why, if humans operate so as efficiently to advance their material self interest, which would generally imply that they prefer life over death, would any rational individual ever agree to this?[13] Why would trainers waste their time talking about honor, duty, and courage? As far as the grenade in the foxhole, if individuals are self-regarding in the sense that they value life over death, it always makes sense to hesitate just a moment and see if someone else will do it. Training an effective military squad requires not just that soldiers be trained to kill but also that they are prepared to die for each other.

For most soldiers combat is an extraordinarily stressful experience, with fearful participants making split second decisions about the use of force, and having to bear, or (suppress) feelings of personal responsibility for the deaths of their buddies, civilians, and in some cases (particularly in close combat) enemy soldiers. In the First World War,

[13] The demonstrated ability of terrorist organizations such as Al Qaeda to motivate suicide bombers, including the crews responsible for 9/11, also stands as a challenge to models that assume that people act so as efficiently to advance their material welfare.

a US soldier had a greater probability of becoming a psychiatric casualty than being killed in combat. In efforts to prevent such high casualties from this source in the Second World War, military psychiatrists, working from a model that suggested some types of personalities were more prone to breakdown than others, tried to keep susceptible individuals out of the military. The effort failed miserably, and the consensus today is that such prescreening, at least as it was practiced, was largely a waste of time.[14] For a soldier engaged in combat, the question is not if but when he or she will break down.

One can, however, influence how long it takes before this happens. Research conducted during World War II showed "that a major element in preventing battle shock was rooted in the strong peer attachment that members of combat groups formed with one another" (Gabriel, 1987, p. 120). Strengthening squad loyalty, as well as providing periods of rotation away from the fighting, are key ingredients in lengthening the time an individual soldier could be expected to fight effectively.

A survey of veteran Israeli Defense Force (IDF) platoon and company soldiers and officers reinforces this point and confirms how important squad loyalty and the respect of peers is in enabling soldiers to hold themselves together. Respondents were asked to identify "the most frightening aspects of battle." Among soldiers other than officers or senior non-commissioned officers (NCOs), the fear of letting comrades down topped the list, at 40.4 percent, followed by loss of limb or injury (26.7 percent), which was more feared than death (20.7 percent). The fear of not living up to the expectations of squadmates was cited by combat veterans almost twice as frequently as the prospect of

[14] Of 15 million men screened, somewhere between 1.1 and 1.9 million were rejected for psychiatric reasons. Most of these screenings took less than two minutes and were done by physicians with no psychiatric training (Hale, 1995, p. 188, cited in Barber, 2008, p. 71).

death. In contrast, the fear of letting country down was identified by only 1.1 percent of respondents (Shalit, 1988, p. 11). Swedish soldiers not exposed to combat had greater fear of death, but after they had experienced combat, their fear decreased. Those who had fought preferred death to serious injury, which they in turn preferred to letting down members of their squad. Individuals with these preferences will in fact roll onto a grenade in a foxhole.

The fundamental importance of squad loyalty is reflected in The Soldiers Guide. The manual starts by identifying the warrior ethos with "the soldier's selfless commitment to the Nation, mission, unit and fellow soldiers (ch. 1.7). It goes on to observe that the soldier who jumps on a grenade to save his comrades is courageous (ch. 1.12). But in section 1.13 it gets to the heart of the matter: "Soldiers fight for each other; they would rather die than let their buddies down." Although the manual talks about loyalty extending "front to rear as well as left and right" the text reflects an implicit acknowledgment that loyalty to fellow squad members is the bedrock.

Infantry trainers pride themselves on their ability to "break down" and then "rebuild" the recruit in the Army's or Marines' image. While training is hard work and results may vary, drill sergeants give themselves too much credit when they fail to acknowledge the fertile ground they plow. Their success is in part testimony to the fact that humans are differentially prepared to receive this "instruction." What is striking from an evolutionary perspective that would restrict selection to levels no higher than the individual organism, or from a rational choice perspective that assumes that people are narrowly selfish, is that these bonds develop at all.

Note that in comparing squad member loyalty to parent - child or sibling bonds, we reference individuals who share half their genetic makeup. One need not appeal to higher level selection to understand why individuals might be prepared to sacrifice for their children or even for their siblings. The problem, of course, is that members of military squads are not, in most cases, actually siblings. They may see themselves as a band of brothers, but they are not actually brothers. Why, then, do recruits so readily accept these values, and how is it so relatively easy for trainers to forge men into squads whose members are prepared not just to kill the enemy, but to give their lives for each other?

It is true that it is easier to do this with younger recruits and among individuals who already have strong ties of affinity to each other. During the Civil War, for example, US military units were organized and named on a state basis. In World War I the British, Germans, Canadians, and French all raised regiments from single counties, and the Germans continued to do so during World War II (Gabriel, 1987, p. 103). Military organizers justified racial segregation in the US military along similar lines.

But the issue here is not the role that the demographics of the group may play in the ease with which these bonds can be fostered. The issue is that they can be forged at all. Progress in the United States in integrating the armed forces, both racially and regionally, shows that with the right leadership and training, these bonds can develop among individuals who are not siblings or close cousins, and are from quite different ethnic, racial, and regional backgrounds. Recent success in building cohesive units among individuals with differences in gender and sexual preference is relevant here as well.

If squad members were very closely related we could explain some of this through Hamiltonian kin selection (Hamilton, 1964). But they are not. The loyalty that develops

is an acute example of the relative ease with which humans develop trust and relations of reciprocity among unrelated individuals. To describe these bonds as emerging relatively easily is not to downplay the forces that threaten to disrupt them – for humans are calculating individuals, and our prefrontal cortex understands the nature of prisoner dilemmas, and the merits of the strictly dominant strategy of defection. Just as there are forces that constantly threaten to undermine an economic cartel, there are forces that threaten the bonds among members of a squad. But the prediction of an economic model based on a narrow version of rationality is that neither cartels nor effective military squads should ever form, or if they do they should never persist. Again, embedding the problem in an environment of repeated play begs the issue: one has to explain why the first iteration doesn't become the last.

3. Reluctance to Fire on the Enemy

If it turns out to be easy, all things considered, to take unrelated individuals and mold them into a squad prepared to trust each other with their lives, it turns out to be remarkably difficult to get them to fire on the enemy. That men are prepared, given state sanction for violence, to kill other men, will hardly be surprising to social scientists, particularly economists. What is remarkable is the evidence of how hard it can be to get them to do so, particularly in close combat.

In 1947, S.L.A. Marshall published Men Against Fire, in which he made the astonishing claim that in infantry companies in the Second World War the rate of firing rarely rose above 15 - 20 percent. Even for well trained troops with combat experience Marshall concluded that the firing rate never rose above 25 percent.[15] Marshall argued

[15] He was blunt: "I mean that 75 percent will not fire or will not persist in firing against the enemy…" (1947, p. 50).

that “the average and healthy individual… has such an inner and usually unrealized resistance toward killing a fellow man that he will not of his own volition take life if it is possible to turn away from the responsibility.” He thought moreover that the relief felt by U.S. troops when they went into a quiet sector “was due not so much to the realization that things were safer there than to the blessed knowledge that for a time they were not *under the compulsion to take life”* (1947, p. 79).

Marshall stated that he had interviewed “approximately four hundred infantry companies in the Central Pacific and European Theatres.” Battalion, company, and platoon commanders made no attempt to ascertain what percentage of their men had actually fired a weapon at the enemy, simply assuming, and averring, that it must have been close to all of them. But when Marshall drilled down, he claimed to have discovered a different story:

> … when the companies were interviewed at a full assembly …we found that on an average not more than 15 percent of the men had actually fired at the enemy positions or personnel with rifles, carbines, grenades, bazookas, BARs (Browning Automatic rifles), or machine guns during the course of an entire engagement” (Marshall, 1947, p. 54)…. The thing is simply this, that out of an average one hundred men along the line of fire during the period of an encounter, only fifteen men on average would take any part with their weapons (Marshall, 1947, pp. 54, 57).

Moreover, said Marshall, it was impossible in advance of battle to know which soldiers would comprise that 15 percent. Commanders claimed that loyalty and

obedience in drill enabled them to predict performance in battle. Marshall flatly denied this (p. 60), maintaining that performance in drill was a poor predictor of what would happen under battle conditions.

Marshall was not a philosopher trying to demonstrate the inherent goodness or morality of humans. He was a military man, and this low rate of firing was a *problem* he was intent on overcoming. As he wrote, "What we need in battle is more and better fire. What we need to seek in training are any and all means by which we can increase the ratio of effective fire when we have to go to war" (Marshall, 1947, p. 23).

Marshall's 1947 work received wide and favorable attention at the time it was published, and is still frequently included on military reading lists. Four decades after it was published, however, it was vigorously attacked on the grounds that, among other misrepresentations, Marshall had embellished his resumé and exaggerated the number of interviews conducted (Smoler, 1989). Marshall's grandson, whom S.L.A. Marshall had disowned when the younger Marshall became a conscientious objector during the Vietnam conflict, concluded, based on his own research and interviewing, that some of these allegations were probably true (Marshall, 1995). But he also concluded that S.L.A. Marshall's basic generalizations about firing rates were correct (see also Grossman, 1995; Holmes, 1985, p. 58).

After reading both Marshall and much of the critical literature, my conclusion is that, despite the shortcuts and retrospective career enhancements he sometimes took, Marshall put his finger on a very real phenomenon. Had his claims about World War II fire rates been far off the mark, they should have been subject to vigorous objection and widespread challenge in the 1950s, rather than the 1980s. In fact, in the decades

following publication, both the US and Israeli military, and eventually armed services in many other countries, took his diagnosis and proposed remedies to heart, and changed training practices. These changes were associated with substantially higher fire rates in post-World War II engagements. If we conclude that Marshall's claims were manufactured from whole cloth, rather than from notes taken during the group debriefings following combat that he pioneered, we must also conclude that the changes in infantry training regimes were unnecessary: it would have been better, from the standpoint of cost effectively training an effective fighting force, to stick with the older (and cheaper) KD ranges with the paper bulls-eye targets. For bibliographical references to the critical literature, see Chambers (2003).[16]

Why, starting in the 1980s, were critics so upset? Although members of the military greeted the book warmly when it was published in 1947, four decades later some came to see the allegation of low fire rates as a calumny on American servicemen. Again, this was not the reaction when the book first appeared, and the Army took Marshall's findings very seriously, changing its training methods in ways that resulted in, or at least were associated with, much higher fire rates in the Korean and Vietnam conflicts.

[16] Marshall's lasting influence on infantry operations extends beyond the issues addressed in Men Against Fire. The Soldier's Load and the Mobility of a Nation (1950) emphasized the close relationship between fear and fatigue Marshall had observed in others and experienced in himself. Tired soldiers were prone to fear, and fearful soldiers were prone to fatigue. Marshall stressed the desirability of limiting a soldier's pack and equipment to a third or less of his body weight (the same rule of thumb used today among backpackers). To achieve this, he argued that it was better for a soldier to march with one rather than three days rations, and carry fewer grenades and less ammunition. Why? Because a more lightly burdened warrior was more mobile, less subject to fatigue and fear, and ultimately more effective. A strategy of carrying lower inventories of food and ammunition requires for its success strong and reliable logistical support or recovery of material in the field for resupply. It is a paradox that as logistics capabilities have improved, soldier's packs have tended to get heavier rather than lighter. As in the case of infantry training, Marshall's observations and arguments found (and find) sympathetic audiences. As is the case with Men Against Fire, The Solder's Load continues to be read because the conflict between weight and mobility, between fear and fatigue on the one hand and fear of running out, continues to bedevil planning and operations. See Williams (1990) for details.

Marshall did not argue that the 80 percent of non-firers were cowards. They were often prepared to carry ammunition, go to the assistance of wounded, or carry messages, activities that in some instances put them in more peril than those who were firing. And they were prepared to stand their ground and face death as readily as their more aggressive comrades. Apparently, they simply had powerful inhibitions against killing other people which military training, at least as it was practiced up to that point, had been unable to overcome. Marshall also argued that a study of psychiatric casualties in the European theatre showed that "fear of killing rather than fear of being killed was the most common cause of battle failure in the individual" (p. 78).

Joanna Bourke (1999, pp 238-46) articulated a contrary view, suggesting that soldiers rarely had or have any problem killing,[17] and that fear of dying was the main cause of psychiatric casualties. In the aftermath of the First World War, with its high rate of psychiatric casualties, Bourke's position was the accepted explanation for why men cracked. The equation of fear of death with breakdown underlay part of the case for bombing civilian populations during World War II. Expose civilians to the reality and fear of death experienced by infantrymen, went the argument, and noncombatants would become psychiatric casualties at the same rate as combat soldiers.

Experience did not bear this out. London, of course, was repeatedly bombed and in Hamburg in July of 1943, at least 50,000 civilians died and a quarter million houses destroyed in a firestorm ignited by Royal Air Force aerial bombardment. Residents of Dresden and Tokyo received similar treatment months before the atomic bombing of Hiroshima and Nagasaki. But there is little evidence the strategy had the desired effect in

[17] Niall Ferguson in The Pity of War expressed similar sentiments, suggesting that killing was exciting, fun, a great adventure, and that the First World War was in fact prolonged because soldiers enjoyed the killing so much (1998, pp. 357-66).

Britain, Germany, or Japan. The conclusion of the US Strategic Bombing Survey, conducted in 1945, was that aerial bombardments of population centers failed in their objectives. Morale did not deteriorate, and civilians subjected to aerial bombardment did not suffer increased rates of breakdown.[18] How are we to explain this failure of air power (terror bombing)? One interpretation is that although civilians faced death, unlike combat soldiers, they did not have to struggle with the onus of killing others.

Consistent with this view, Navy personnel rarely suffered breakdown: sailors didn't have to kill anyone directly, and no one personally targeted them. Similarly, medics faced the same or even higher risks of death as regular infantrymen, but experienced few psychiatric casualties. They too didn't have to kill. Perhaps there was self-selection of certain personality types resistant to breakdown into the Navy or the medical corps. But this argument runs up against the view, increasingly accepted, that the continuing experience of close range ground combat will eventually break anyone (Gabriel, 1987). Economists and others might be receptive to the argument that soldiers will pursue a psychiatric diagnosis when they can benefit from one, and if such a diagnosis offers a ticket to safety away from the front, it would naturally be pursued by those who fear death. Indeed, concern about malingering lay behind the decision to locate medical stations in forward positions. But the evidence indicates that this had little

[18]John Kenneth Galbraith, a staff member of the Strategic Bombing Survey, concluded that the disruption to civilian life resulting from the firebombing of Hamburg in 1943 actually helped increase military production. Overall, German aircraft and other munitions production continued to rise between 1943 and 1944. Galbraith experienced enormous pressure from proponents of air power to change or modify the Survey's conclusions. His refusal to do so came close to resulting in denial of a tenured appointment at Harvard in 1949 (Parker, 2005). It is true that the atomic bombings of Hiroshima and Nagasaki achieved the objective of ending the war with Japan, and one can say that they broke the leadership's will to resist. But these weapons had their effect because of the qualitative difference in their nature and destructiveness. They did not do so through the mechanism of creating a large number of psychiatric casualties.

or no effect on the propensity of soldiers to present themselves with psychiatric problems (Grossman, 1995, p. 59).

Consistent with the view that most people have difficulty or are conflicted about killing at close range is the practice of randomly providing one man in a firing squad with a blank cartridge. Other evidence consistent with the view that people have an aversion to killing at short range are responses elicited by philosophers to trolley problems. Denise can pull a switch that will prevent the derailment of a trolley car and the death of its five inhabitants but at the cost of killing a boy playing on the usually unused spur line. Ninety percent of those queried say it's OK for Denise to pull the switch. Frank is standing on a bridge and can push a fat man to his death in front of a trolley with the (same) effect of saving five passengers in the trolley. Only ten percent of those queried say it's OK for Frank to push the fat man off the bridge (Hauser, 2006, pp. 124-5). These two scenarios are formally identical. Why the difference in reactions? One hypothesis is that in Frank's case the nexus between his actions and the fat man's death appears to be tighter and more direct. In the first scenario the five passengers saved apparently loom psychologically larger. This hypothesis finds support in functional magnetic resonance imaging studies conducted by Greene et al. (2001).

Technological developments in war in the last decade provide additional support for the idea that it is responsibility for (in this case psychologically) close range killing that breaks soldiers, even more than the stresses of combat per se. Army or CIA personnel situated in cubicles in Nevada or Virginia can now target and eliminate humans using unmanned drones fitted with Hellfire missiles and television cameras. These cameras provide a fairly close view of targets before and after they are killed. The public is

generally more comfortable with these "antiseptic" killings than with targeted one on one assassinations. But according to Peter Singer, the "pilots" of these drones have experienced rates of post traumatic stress disorder equal to or greater than those experienced by soldiers actually on the ground in Iraq or Afghanistan (Mayer, 2009, p. 40).

What was the explanation for the inhibition on killing that led to low fire rates in the Second World War? On one reading, Marshall accepted a conventional cultural account:

> (The American soldier) is what his home, his religion, his schooling and the moral code and ideal of his society have made him. The Army cannot unmake him. It must reckon with the fact that he comes from a civilization in which aggression, connected with the taking of life, is prohibited and unacceptable…. This is his great handicap when he enters combat. It stays his trigger finger even when he is hardly conscious that it is a restraint upon him (p. 78).

But the references to the unconscious nature of the restraint, and of the inability of the Army to "unmake" the recruit, suggest deeper roots for the inhibition and also some pessimism regarding the challenge of overcoming the problem he had identified. Although Marshall talks in this passage as though this is an American "problem," he made it clear elsewhere in the book that low fire ratios afflicted U.S. adversaries as well – to varying degrees. My own interpretation is that what military trainers struggled with is a more or less universal human aversion to the close range killing of other conspecifics,

an aversion with biological as well as cultural roots.[19] To say that this is more or less universal is to say that it is observed across cultures, but also to acknowledge that, with respect to this trait as well as many others, there are variations among individuals in the strength of the predisposition. It is also to acknowledge that effective conditioning can largely suppress the inhibition (as reforms in military training undertaken in response to Marshall's writings have confirmed) and that even in the absence of explicit conditioning, there are circumstances that will defeat it.

It seems evident, based on the criticism of his work, that Marshall's research methodology was more informal than he allowed, that he took shortcuts, some difficult to defend, and that his norms were closer to that of a combat journalist than an academic historian or a social scientist. But it is, I think, a mistake to question his basic conclusion. If we do, we must also conclude that the changes made to military training protocols in response to his work were without consequence. We must also account for a large body of additional evidence consistent with the view that, prior to the second half of the twentieth century, the problem of low fire rates was endemic in military conflict.

After Gettysburg, 27,574 muskets were recovered from the battlefield. Of these, roughly 24,000 were loaded and ready to fire. 12,000 had been (improperly) loaded more than once and of those, 6,000 had had 3-10 rounds rammed down their barrels. One

[19] Grossman summed up his basic argument: "… the vast majority of the rifle and musket armed soldiers of previous wars were consistent and persistent in their psychological inability to kill their fellow human beings. Their weapons were technologically capable, and they were physically quite able to kill, but at the decisive moment each man became, in his heart, a conscientious objector who could not bring himself to kill the man standing before him" (1995, p. 27). There are of course other explanations for the low fire rates claimed. Some have suggested that they resulted because soldiers had been trained not to fire unless they could clearly see their targets, or that they were concerned about revealing their position or being accused of wasting ammunition. Others claim that the phenomenon was not real and that Marshall's claims were simply bogus. The explanation of failure to fire due to absence of clear targets is contravened by the many instances in which this was simply not the case (see Holmes, 1985, p. 325). Again, what is interesting about these alternative "explanations" is that none seems to have been advanced in the decades immediately following the publication of Men Against Fire.

weapon had been loaded 23 times (Lord, 1976, p. 242). Civil War soldiers used rifled, muzzle loading muskets with explosive force provided by black powder. With training, infantrymen could reload these weapons quickly. The soldier bit open a paper cartridge, poured powder into the muzzle, followed this with a minié bullet, which he drove home with a countersunk ramrod. A percussion cap ignited the charge. The weapons, particularly the Springfield and Enfield rifles, were relatively accurate, certainly more so than smoothbore muskets, and their large caliber bullets produced devastating wounds when they hit home.

A well trained soldier could expect to get off 4 or 5 shots a minute. In drills soldiers spent five percent of their time firing; the remainder was consumed by the loading process. As Grossman notes, if most soldiers were attempting to load and fire as fast as they could, then 19 times out of 20 they should have fallen with a weapon not ready to be fired. Moreover, a fallen comrade's loaded, cocked, and primed weapon would have been taken up by a survivor and fired (Grossman, 1995, p. 22). Why should it have been left on the ground? In light of this, the number of unfired weapons recovered from the battlefield is surprising. The thousands of rifles with multiple charges suggest that many soldiers went through the drill of loading, then neglected or chose not to fire, and then commenced again with the reloading process.

In the eighteenth century, the Prussian army conducted experiments in which a battalion of infantry fired smoothbore muskets at a target 100' by 6', designed to simulate an opposing infantry battalion (smoothbore muskets were less accurate than the rifled Springfields or Enfields used increasingly in the Civil War). At 225 yards, one out of

four shots fired by the Prussian soldiers hit their mark. At 150 yards this rose to 40 percent, and at 75 yards to 60 percent.

The Prussian studies indicate a 60 percent hit rate at 75 yards. Facing off against a 200 man battalion at 75 yards, 120 men on each side should have been hit in the first volley. Since it is generally agreed that the effectiveness of a combat unit often disintegrates at the 50 percent casualty rate, such withering fire should have ended battles quickly. And yet the historical evidence indicates both that these battles typically went on for several hours and sometimes days and that typically only *one or two men per minute* died in exchanges between battalion strength units (Griffith, 1989, pp. 139-40).[20] High casualty rates were apparently the result not of intense and effectively aimed fire, but of the fact that battles persisted for a long time (the introduction of artillery fire, however, could also raise the fatality rate – and there is little or no evidence of compunctions about firing artillery weapons). Obviously, even at a kill rate of 1-2 per minute per battalion, hundreds or even thousands of men could die over the course of such a battle, in part because multiple battalion strength units were involved, in part because the battles went on for a long time, and in part because of the effects of artillery.

Described by McPherson (2002, p. 5) as "the bloodiest single day in American history," the battle of Antietam in 1862 killed, according to Cannan (1997), a total of 3,654 on both sides, although adding in those reported missing brings the total closer to the 6,000 figure given today by the U.S. Army (U.S. Army, 2003, ch. 2).[21] But the battle

[20] Griffith attributes the low death rates to the inaccuracy of smoothbore muskets, which were replaced by rifled muskets only slowly as the war progressed. This is not entirely persuasive, given the close range of most Civil War engagements – Griffith cites 100 yards as typical (1989, p. 146)..

[21] Total casualties were almost four times higher. Cannan (1997, p. 201) provides these data for the Union: 2,108 dead, 9,540 wounded, 753 missing; and for the Confederacy: 1,546 dead, 7,752 wounded, 1,018 missing, for a total of almost 23,000 casualties.

lasted 12 hours, which means, using the estimate of 6,000 killed, that men were dying at a rate of "only" about 8 per minute.

Estimates of casualties in the Battle of Gettysburg vary, but again, it appears that combined deaths over the three day period were in the range of 6,000. Assuming 12 hours of fighting per day, this works out to under 3 men per minute killed. Four or five times as many men experienced wounds, of varying severity, and total casualties were therefore heavier. To take an extreme case, the 1st Minnesota regiment suffered 82 percent killed or wounded, and several Confederate regiments experienced similar losses (Griffith, 1989, p. 174). There is no minimizing any of this. During the Civil War over 600,000 soldiers died out of a population of 31 million, making it the bloodiest US war as measured both by the absolute number of fatalities and their proportion of population. But the rates of killing nevertheless appear to have been substantially below what was technologically feasible, given the distances at which units engaged. [22]

War involves killing, lots of it. The surprise here is the widespread evidence suggesting human inclinations in conflict with each other– with the discinclination to kill at short range to some degree mitigating human propensities to destroy each other even when the use of deadly force is sanctioned and encouraged.

A study conducted in 1986 by Britain's Defence Operational Analysis Establishment collected data on the weapons used in one hundred nineteenth and twentieth century battles and then using pulsed laser weapons simulators (a high tech version of laser tag) to measure potential kill rates. They found that these were far higher

[22] In both battles, some deaths resulted from artillery. Artillery guns are crew serviced weapons fired at a distance. There is no evidence that soldiers have ever had trouble firing them. Cannan (1997) emphasizes that at Antietam both sides faced severe artillery fire at close range, which may account in part for the relatively higher casualty rates in that battle.

than what had actually happened in combat, a result consistent with the other evidence cited here (Grossman, 1995, p. 16; Rowland, 2006).[23] Additional data points in the same direction. The nineteenth century French military officer Ardant du Picq noted that in all his years of combat, Alexander the Great suffered only 700 battle fatalities (1946, p. 70). Richard Holmes claims that troops under the command of General George Crook fired 25,000 rounds against the Sioux and Cheyenne at Rosebud Creek on June 16, 1876. Yet casualties on neither side in this battle rose above the double digit level (1985, p. 168).

Or consider the battle of Wissembourg, the first of the Franco-Prussian War, on August 4, 1870. The French General Henri Bonnal subsequently analyzed the ratio of hits to rounds fired. The Germans, firing against the French, spent 80,000 rounds to hit only 400 French defenders, a result that can be partly attributed to the fact that the French were dug in behind fortified positions. The outnumbered French defenders, however, fired 48,000 rounds against Germans *who were advancing across open ground* and struck just 404 of them, for a hit to fire ratio of 1:119. The actual ratio was probably considerably lower, since many of those casualties were from artillery fire, and again, soliders have exhibited little compunction about firing artillery (Bonnal, 1899, pp. 138-40; Holmes, 1985, p. 168). Holmes attributed this low ratio to rifle inaccuracy. But this seems implausible, given the baseline eighteenth century Prussian tests using smoothbore muskets.[24]

An alternative explanation is simply that many men aimed high. The natural human tendency to aim high partly explains why guerilla forces have been relatively

[23] Rowland (2006) provides a comprehensive overview of the methods, hardware, and findings of this type of simulation.

[24] Wawro (2003, pp. 97-100) gives a much bloodier description of the battle. But it is one based almost entirely on qualitative sources. He does not address or even mention Bonnal's calculations.

unsuccessful in the second half of the twentieth century, when faced with infantry trained and drilled using new methods which largely suppress it.

The historical problem from a military standpoint was that, when faced with live opponents at close range, a significant number of soldiers reverted to a posturing mode in which they fired over the heads of their enemies. An even larger majority simply did not fire. For many soldiers, aiming high felt like the right thing to do: posture and huff and puff, make a lot of noise, with the aim of intimidating the enemy to retreat. This they did in spite of what had been practiced in drill. As Grossman (1995, p. 87) put it, "The resistance to the close range killing of one's own species is so great that it is often sufficient to overcome the cumulative influences of the instinct for self protection, the coercive forces of leadership, the expectancy of peers, and the obligation to preserve the lives of comrades."

The accuracy and firing rate of the longbow was far superior to that of the smoothbore musket that replaced it. The conventional wisdom, as argued by James Burke, is that the longbow – without question an impressive weapon -- was supplanted because the human capital requirements to become proficient with it were so much higher (Burke, 1979, ch. 8). But Grossman suggests another reason. The musket made a lot more noise, and was thus much better suited to posturing.

Grossman argues that the standard dichotomous behavioral choice (fight or flight) suggested by psychologists as applying to humans under stress is too limited. Indeed, for both humans and animals, he suggests, it is a choice between fight, flight, *posturing, or submission*. Most conflicts between animals of the same species do not in fact end in death, but in the equivalent of chest beating exercises designed to intimate the opponent

and get him or her to withdraw or submit (as when a cat arches its back and raises its hackles or a dog rolls over and exposes its vulnerable stomach).

Konrad Lorenz noted that piranhas and rattlesnakes – two dangerous predator species - will bite almost anything, but when piranhas fight among themselves they do so with taps; while rattlesnakes wrestle each other rather than fighting using their poisonous bite. Lorenz placed great emphasis on posturing, mock battle, and submission processes which he thought were vital to species survival. The equivalent of posturing in conflicts between infantry battalions is firing over the heads of the enemy, a tendency noted by Ardant du Picq. Lieutenant George Roupell, who commanded a British platoon in World War I, recalled walking down the trench with sword drawn "beating the men on the backside and, as I got their attention, telling them to fire low" (Grossman, 1995, p. 12). Primitive New Guinea tribesmen, when they went to war, took the feathers off their arrows to make them less accurate and deadly even though they were excellent shots with bow and arrow.

The problem of low fire rates also applied to close range aerial combat. During World War II less than 1 percent of fighter pilots became aces (more than five kills), and they accounted for 30- 40 percent of all enemy aircraft destroyed. Most fighter pilots "never shot anyone down or even tried to" (Dyer, 2005, p. 57). To rectify this the U.S. Air Force engaged in a screening program to try and select for fighter pilot training from among the portion of the population with sociopathic tendencies (Grossman, 1995, p. 30).

But of course large numbers of combatants are intentionally killed in war, and Marshall argued that there were certain circumstances where the posited disinclination to

fire was much more likely to be overcome.[25] First, when the weapon, such as a machine gun, was *crew-serviced*, the sense of responsibility towards one's partner overcame reluctance to fire and fire persistently. As Marshall wrote, "Men working in groups or teams do not have the same tendency to default of fire as do single riflemen. This is such a well fixed principle in human nature that one very rarely sees a gun go out of action simply because the opposing fire is too close" (Marshall, 1947, pp. 75-76). Second, inhibitions against killing decline dramatically with distance – both physical and "social" -- from the target.[26] Thus artillery and bomber crews rarely had difficulty taking action which killed other humans. And the "problem" of non-firing was virtually nonexistent in the Navy, where one fired at ships or planes (not the people in them). Nor did the problem tend to afflict snipers, who killed from great distance.[27] The main problem was the individual infantryman engaged in close range combat.

Predispositions against killing at close range (at least in situations where the inclination was not defeated by social distance) would have been favored by group level selection in the environment of evolutionary adaptiveness (EEA). Neither crew serviced weapons, which achieve higher fire rates by exploiting group loyalty and fear of letting down one's buddy, nor the ability to kill at great distance using advanced weaponry, and without seeing one's individual victims, would have been anticipated in that

[25] These and related issues remain matters of continuing debate. For example, Grossman states that "in most wars from the time of Napoleon on down to today, it was not the infantry but the artillery that inflicted most of the casualties." This generalization is widely accepted and may well be true for the twentieth century, but Drew Gilpin Faust (2008, p. 247) points to evidence suggesting it may not have been so for the Civil War. Citing Adams (1952), she states that 94 percent of Civil War wounds were from bullets, 5.5 percent from artillery, 0.4 percent from saber or bayonet. The rates for deaths alone, however, may have been different. Source: George Worthington Adams, *Doctors in Blue: The Medical History of the Union Army in the Civil War* (New York: Henry Schuman, 1952) p. 113.

[26] Conditioning could create or reinforce other types of distance (such as racial, ethnic, or religious) between combatants.

[27] Although since snipers could usually see their victims through scopes, this may have to do with the personality types of those who entered this military specialization. Snipers are particularly detested by infantrymen, and this sometimes spills over into dislike or discomfort even with those on one's own side.

environment. Thus there is less reason we would have developed hard wired inhibitions against killing under those circumstances.

This is consistent with Konrad Lorenz's nuanced position with respect to human aggression. Lorenz provided much evidence of how inhibitions against harming other conspecifics were common among animals, and generally stronger among predator species with more potential for harm. He acknowledged that humans had inherited some such inhibitions from their forebears. At the same time, he articulated something close to a "thin veneer" position that it was only civilization and culture that protected us from destroying ourselves. His pessimism was based on the view that technological advances in weaponry made us more dangerous to each other than we were in the EEA, and that our culturally evolved potential for harm had outrun our evolutionary evolved restraints on such harm (Lorenz, 1966).

A final circumstance, historically, in which inhibitions on taking life typically weaken is when an opposing force breaks rank and flees. Clausewitz asserted that most of the casualties in battle took place after one side had won (1908, Book IV, ch. IV). Just as it is generally a bad idea to run from a potentially dangerous animal in the wilderness (stand your ground) it is also extremely dangerous for soldiers to retreat from their opponents. For whatever reasons, perhaps the lack of or inability to see faces when soldiers turn tail, this appears to be a circumstance which is strongly disinhibiting. The importance of direct exposure to the faces of potential victims is reflected in the advice Richard Holmes offers to surrendering soldiers: drop your weapon, but also remove your helmet (which is equivalent to the submission displayed when a dog exposes this abdomen). This counterintuitive advice may not keep you from being killed (the act of

surrender is extremely dangerous) but paradoxically may improve your survival chances. Similarly, an Israeli study shows that if you are kidnapped it is much more probable you will be killed if you are hooded or blindfolded (Miron and Goldstein, 1979). A systematic dehumanizing of the enemy so that they are perceived as not really human (thus creating more psychological distance) can also be disinhibiting.

4. Changes in Training Regimes

What types of changes in basic training rectified the problem of low firing rates? The major innovation was in marksmanship courses. The military exploited Skinnerian operant conditioning methods to more effectively overcome the human inhibitions that led to low firing rates. Up through the Second World War, such training was conducted on a known distance (KD) range in which soldiers practiced hitting paper targets at various fixed distances. Beginning in the 1950s, Army and Marine trainers replaced this with courses (the new program was called "Trainfire") in which recruits donned full combat gear, sat in foxholes, and faced lifelike targets popping up unexpectedly at unpredictable distances. If you "dropped" one, it literally dropped. You got immediate gratification, much as in a modern day POV video game. The intent was, in a more realistic combat setting, to make firing an almost automatic response to the appearance of a target.[28]

Secondly, there was now, on average, considerably less delicacy in regard to the reality that a major duty of the soldier was to kill. Authors such as Dyer, Holmes and Grossman report that in basic training of Marine and Army recruits, there was much more glorification of killing, which was "almost unheard of in World War I, rare in World War

[28] The new marksmanship program was developed by the Army's Human Research Office. For a history of postwar innovations in marksmanship training, see Dyer et al. 2010, Appendix A.

II, increasingly present in Korea, and thoroughly institutionalized in Vietnam" (Grossman, p. 252). Much more so than in previous conflicts, soldiers learned that their goal was to kill, not just to be brave or to fight well. Training ingrained a 'quick shoot' reflex and left soldiers, at least in the short run, much less conflicted about what they had to do and had done. A combination of desensitivization – targeted efforts to generate contempt for the enemy -- along with both classical and operant conditioning, raised the fire rates, according to Marshall's subsequent work, from 15-25 percent in World War II to 55 percent in Korea, to 80-90 percent in Vietnam.

Psychiatric casualty figures were substantially lower in Vietnam than in previous conflicts. Partly this was due to the fact that aside from a few set battles, combat intensity was much lower. Units went on patrol and the Viet Cong generally avoided them. Casualties occurred in ambushes, which were short, if bloody, fire fights. Relatively few soldiers were actually involved in combat, and the army made major efforts to supply comforts of home. For a variety of reasons, however, Vietnam vets experienced higher rates of psychiatric disturbance when they returned home, so raising fire rates by suppressing the conflicts associated with killing may have delayed but not prevented psychological reckoning.

There is much evidence, however, that changed training methods gave armies that adopted them an edge in combat. Prior to the Falklands War, for example, British troops had received new style training; Argentineans had not. British veterans attributed their success to higher fire rates and less firing over the heads of the enemy on their part. Again, the problem of low fire rates and aiming high did not afflict Argentineans

operating crew-serviced weapons, such as machine guns (Grossman, 1995, p. 175; Holmes, p. 326).

The relative success of counterinsurgency forces against guerillas in the last half of the twentieth century can also be attributed less to weaponry advantage and more to higher and better aimed fire achieved through the new training. Aside from Cuba, the American defeat in Vietnam (which in the end involved a full scale invasion by North Vietnamese troops) and, until their defeat in 2009, the Tamil Tigers in Ceylon, after mid-century, guerilla movements mostly suffered defeat. In Rhodesia in the 1970s, counterinsurgency forces had an 8:1 superiority in their kill rate vs. guerillas, even though they had little advantage in weaponry and no air or artillery support. Commando units had a kill ratio superiority of 35:1 or 50:1. As Grossman puts it, "the effectiveness of modern conditioning techniques in battle is irrefutable, and their impact on the modern battlefield is enormous" (1995, p. 179).

5. Discussion and Conclusion

The behavior of humans in the military supports two hypotheses about species-typical inclinations. First, we have a weak predisposition to provide affirmative assistance to those not closely related to us. This predisposition can be strengthened through training, acculturation, or socialization. Second, we are more strongly predisposed to avoid harming other conspecifics. This inhibition can be weakened or neutralized with training, acculturation, or socialization. The study of the goals, methods, and success of infantry training supports the first proposition. The examination of behavior in combat and its aftermath provides support for the second.

The evidence in each of these areas reinforces the appeal of the idea of cognitive modularity, the view that thought and behavior are influenced by different "mental organs" (Barkow et. al. 1992; Kurzban, 2012). With respect to behavior, these usually align in the counsel they provide. But not always, and focusing on circumstances where guidance conflicts -- one shot Prisoners Dilemmas are examples – offers a route towards constructing a behavioral science with greater predictive and explanatory success. This approach is at odds methodologically with how many economists and other social scientists think about decision-making, thought, and behavior. Whereas some (e.g., Thaler and Shefrin 1981) have explored the implications of "dual selves", many adopt what political scientists would refer to (when talking about governments) as a unitary actor approach. And whereas economists (unlike sociologists or anthropologists) are generally not averse to appealing to biological influences on behavior, the appeal usually assumes no selection above the level of the individual organism, in which case Darwin merely backstops narrowly selfish assumptions about human behavior. This approach leads to predictions inconsistent with a wide body of experimental and observational evidence.[29]

[29] Much of the experimental research fueling advance in behavioral economics has studied cognition –how people process information and make decisions under uncertainty. It has also studied behavior in games where cognition poses few challenges because the games are simple enough to be understood easily. Examples include one shot Prisoner's Dilemma, voluntary contributions to public goods, ultimatum, dictator, and trust games (for a partial review of this literature, see Camerer, 2003, ch. 2). These studies provide evidence relevant for identifying fundamental human proclivities, and a large body of results is inconsistent with a view of human behavior that assumes that humans are all or most of the time narrowly self-regarding. The appeal of the experimental method has been the claim that it can control for such confounds as reputation and repetition which often bedevil the interpretation of observational data (in one shot anonymous games there is no repetition, and concerns about reputation should be irrelevant). Skeptics continue to question the interpretation of results on the grounds that people carry with them into the experimental arena heuristics developed for use in everyday life. In other words, critics believe that the laboratory methods don't actually succeed in controlling for the confounds. This obstacle to persuasion suggests that we will continue to benefit from an integration of experimental and observational data in exploring what might be included in the human ethogram.

Faced with evidence of prosocial behavior and apparently altruistic behavior towards non-kin, those skeptical generally fall into one of two groups. The first minimizes, denies, or reinterprets such evidence in such a way as to reduce the apparent conflict it poses with a view of human nature as essentially selfish, reflecting narrowly rational choice. In 1974 Michael Ghiselin wrote that to scratch an altruist was to watch a hypocrite bleed.[30] Similar sentiments are frequently expressed in the faculty common rooms of economics and other departments concerned with human behavior. One might argue that this view is no longer as widespread as it once was, and thus we are setting up a straw man. Although there has been some evolution of opinion on this issue, such ideas continue to exert strong intellectual and emotional appeal, and their foundations run deep.

The problem with this point of view, from a scientific perspective, is that it is simply very difficult to claim that prosocial behavior, including altruistic behavior toward nonkin, is an empty set. Suppose we restrict attention to observational data, rejecting all experimental evidence on the grounds that the methodologies fail in their aspiration to control for repetition and reputation. Is a soldier who rolls on a grenade to save his buddies or a Secret Service agent who takes a bullet for the President really a hypocrite? Such individuals may know that their families will be cared for after they have gone, and, with eyes open, may have understood the risks when they signed up for these assignments. They may hope that at the last minute something will save them. But are they really hypocrites?

The second group of skeptics acknowledges the category of prosocial behavior as something that needs to be explained, but tries, often with great creativity (Pinker 2012),

[30] "No hint of genuine charity ameliorates our vision of society, once sentimentalism has been laid aside. What passes for cooperation turns out to be a mixture of opportunism and exploitation….Scratch an "altruist," and watch a "hypocrite" bleed" (Ghiselin, 1974, p. 247).

to provide an evolutionary explanation of predispositions to behave prosocially that avoids appeal to group selection. Those arguing along these lines typically invoke, as does Pinker, reciprocal altruism and Hamiltonian kin selection as non-group selectionist (ultimate) explanations of such behavior.

The Trivers model of reciprocal altruism (1971) suggests that it could be in an individual's self interest to perform apparently altruistic acts (saving a drowning stranger) because the favor might subsequently be reciprocated when the tables were turned. The work continues to be favorably cited. It remains a puzzle, however, why, if one assumes that humans are narrowly rational, the individual on the riverbank would ever jump in to save the stranger. Trivers acknowledges that there would be some risk to the rescuer (that is what makes the behavior arguably altruistic). But if the risk of death is positive, why should the narrowly rational individual expose herself to it? Stated otherwise, why shouldn't individuals predisposed to avoid that risk have a fitness advantage?

The argument for jumping depends on the possibility of reciprocity in the future, in which case the individual on the riverbank would end up having exchanged a small risk now for a much larger gain down the line. But this setup is equivalent to a trust game, and the strictly dominant strategy for player 1 in such games is to advance nothing. Why should the narrowly rational individual trust, when there is no guarantee that trust will be reciprocated? Moreover, there is still the chance that, while struggling in the water several months later, she might be rescued by someone (albeit one less narrowly rational) who would jump in and save her. In that case she would have made a withdrawal from the favor bank without ever having deposited to it – again, a win in both material and fitness terms. In a world populated by individuals lacking prosocial predispositions,

reciprocal altruism could never get started. In evolutionary models where selection operates no higher than the organism, organisms with such predispositions can never acquire a foothold.[31]

As far as reliance on kin selection, it is evident that prosocial behavior often extends to nonkin (this paper provides more evidence). Thus those, including Pinker, who rely on this mechanism must argue that inclinations to behave altruistically towards kin (whose ultimate explanation can be found in the Hamiltonian mechanism) are somehow manipulated so that similar behavior is displayed toward nonkin. Yet one would suppose, if selection can occur no higher than the level of the individual, that organisms less subject to such manipulation would have enjoyed a fitness advantage.[32]

The explanation of our susceptibility to such manipulation remains something of a conundrum for those wedded to models where selection can occur no higher than the level of the individual. Supporters of this approach sometimes argue that it is a spandrel: a trait upon which natural selection operated only indirectly because it was linked to one

[31] For more extensive argument, see Field (2001, ch. 3); the critique was subsequently endorsed in a number of publications by Gintis (e.g. 2009, p. 244). The continued appeal of the Trivers model suggests that we need to go beyond the traditional distinction between proximate and ultimate explanation. Proximate explanations of behavior focus on organism – environment interactions in the moment and the neurobiological processes within organisms that produce behavior. Ultimate explanations address why the organism is built the way it is. But we may need a further distinction between proximate and ultimate evolutionary explanation, or at least an acknowledgement that the balance between within and between level selection may have varied over different time scales in evolutionary history. In other words, it is possible that frequency based selection, operating no higher than the organism level, sustained and reinforced prosocial traits during the Pleistocene in what evolutionary psychologists call the EEA (environment of evolutionary adaptation). But this could not be considered an ultimate explanation for prosociality unless one disclaims interest in how genes predisposing to such behavior, upon first appearance, managed to gain a foothold. And it is in addressing that question (as in the case of other major evolutionary transitions) that a multilevel evolutionary framework has special appeal. The problem may be restated in this way. Upon first appearance, a gene predisposing to conditional cooperation would be biologically altruistic – conferring a fitness advantage on others and a fitness cost on self. If however, self operates in an environment populated by conditional cooperators, the trait can become mutualistic. The fitness characteristics of the predisposition, therefore, cannot be considered independently of the environment, and that environment includes other conspecifics. The altruistic or mutualistic character of the trait is therefore frequency dependent.

[32] Had that been true, of course, the scale of human social organization would have been severely limited.

more advantageous (Gould and Lewontin, 1979).[33] But does it make sense to assume that the manipulability of kin preference was a necessary byproduct of selection favoring predispositions to favor kin? That variability simply did not or could not include organisms who were more effective discriminators?

The appeals to reciprocal altruism and manipulatable kin preference are central in attempts to provide an evolutionary explanation of prosociality that avoids group or multilevel selection. The effort is ultimately quixotic. If one goes back further in evolutionary history to major transitions such as the development of prokaryotic bacteria, the eukaryotic cell, or multicellular organisms, the same issues of potential conflict between within and between group selection arise (Margulis, 1970; Haidt, 2012). In those cases cultural group selection can have played no role, nor can reciprocal altruism. Conflict between selection at different levels, decomposable in principle using the Price equations (1970, 1972), has been a recurring theme in evolutionary history since the origin of life. Biological as well as cultural group selection has played a role in an evolutionary (ultimate) explanation of the prosocial dispositions that allow us to cooperate effectively in groups beyond those composed of close kin.

Larger scale human cooperation requires that we exhibit some hesitation before harming others even when there are potential material or fitness benefits (based on aggrandizement or prudential protection) from doing so. And, to the degree that cooperation requires affirmative help to others in situations where self interest counsels otherwise, that we be receptive to social norms encouraging this. Both sides of the prosocial coin are puzzles for evolutionary accounts where selection occurs no higher

[33] Thus manipulatable kin preference would have risen in frequency not because (group level) natural selection had favored it, but because it was linked to kin preference which was favored by organism level selection.

than the organism, as well as for (proximate) explanatory models in which individuals are assumed to be narrowly rational. Allowing for multilevel selection in our evolutionary past cuts this Gordian knot.[34]

There is no contradiction between accepting the possibility that cultural and institutional progress has reduced the incidence of human on human violence,[35] while at the same time maintaining that evolutionary forces operating in the distant past have also played (and play) an important role. They have done so, I suggested in section 1, by favoring behavioral predispositions that restrain violence amongst ourselves and, in a complementary fashion, by differentially preparing us to be influenced by social norms and teachings that may have further reduced conflict and facilitated cooperation.[36]

Debates about the inherent aggressiveness of humans towards each other, and more generally, the features of the human ethogram, have a long history, reflected for example in the diverging views of Lorenz (1966) and Ashley Montagu (1976). One might expect the behavior of soldiers to provide strong and unequivocal support for a position closer to the Lorenz view, since, after all, war is brutal, and soldiers have participated directly in killing hundreds of thousands, indeed millions of people. But in fact the behavior of men

[34] Prosocial predispositions don't necessarily improve human welfare. What they do is enable us to work effectively in groups. From a standpoint of public policy, there is often a case for encouraging this, but not always, as in antitrust law: In industries characterized by oligopoly the public benefits when the strictly dominant strategy of defection – which prosocial inclinations can override – triumphs. Were it always the case that defection triumphed, we would not need to worry about conspiracies in restraint of trade – or any sort of conspiracy, or for that matter any degree of cooperation beyond closely related kin. Because defection doesn't always triumph, we can work in groups, but groups (as well as individuals) can act in socially harmful as well as beneficial ways.

[35] Steven Pinker (2011) argues that the progress of civilization has over time reduced the incidence of intraspecies violence. What I question is not this possibility but rather the venerable tradition of attributing current levels of violence entirely to this progress. Some have interpreted Pinker's argument as falling squarely in that tradition, although I think that is a misreading. The title of his book, after all is "The Better Angels of our Nature," not "The Better Angels of our Culture."

[36] An emphasis on differential preparedness is consistent with Pinker's earlier (2002) criticisms of the blank slate view of human nature.

in the military presents a more complex and nuanced picture, providing evidence that humans have, in addition to their willingness under the right conditions to kill others, both innate predispositions against harming each other and somewhat weaker predispositions toward affirmatively assisting nonkin. The former inhibitions can be overcome, and the latter inclinations strengthened, but only with effective training.

While many social scientists and armchair philosophers adopt the "thin veneer of civilization" view of mankind – that only culture and civilization stand in the way of our tearing each other apart, most students of the military reach a quite different conclusion. As Gwynne Dyer, author of the BBC series and subsequent book War: The Lethal Custom, put it, "Men will kill under compulsion – men will do almost anything if they know it is expected of them, and they are under strong social pressure to comply—but the vast majority of them are not born killers" (Dyer, 2005, p. 57).

A central theme of Field (2001) was that every day we visit more benefit on our conspecifics by not harming them than we do through affirmative acts of assistance. The greatest benefit I can confer on you is usually not to harm you: it is my nonaction in this way that benefits you most. Affirmative acts – such as soldiers' sacrificing their life for their comrades -- are only the exposed tip of the iceberg of altruistic behavior, even though most of the literature on altruism focuses exclusively on them. One might expect to find little evidence of either type of biologically altruistic behavior in military units which, over the centuries, have been responsible for tens of millions of deaths. Perhaps surprisingly, as the above discussions illustrate, we find evidence of both. The study of behavior in the military provides additional evidence of how evolution has crafted us to

solve collective action problems, making us receptive to moral intuitions that often despair of a narrowly instrumental rationale.

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