

THE PREVALENCE OF EXTRA-LETHAL VIOLENCE ACROSS CULTURES IN WARFARE

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by

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## **Abstract**

Extra-Lethal Violence, a form of physical aggression that goes beyond the necessity to kill someone, presents a conundrum: it is inefficient and dangerous to produce, especially during warfare. Extra-Lethal Violence, particularly when it manifests in warfare, does not contribute to the immediate survival of individuals; the time, effort, and lack of awareness of surroundings or other attack suggests that Extra-Lethal Violence could be maladaptive at the individual level or in the short term. Yet this individually risky behavior that seems to have no direct benefit to the aggressor is both common and persistent across time and space. We utilized the electronic Human Relations Area Files (HRAF) to conduct a cross cultural analysis of the prevalence and potential predictors of Extra-Lethal Violence. Our research indicates that Extra-Lethal Violence is present across all populated regions of the world, for the entire timespan of the ethnographic record up to the ethnographic present, across subsistence, marriage, and social complexity levels. Our research suggests that Costly Signaling Theory (CST) is currently the best explanation for this behavior. Extra-Lethal Violence can be characterized as a difficult to fake, clear indicator of martial skill and physical fitness that has a high broadcast efficiency, both within and between groups. Rather than allowing behaviors such as Extra-Lethal Violence to be labeled as 'abhorrent' or 'disgusting,' we must view Extra-Lethal Violence in the same light as the cavalry, the ironclads, or nuclear weapons: societies seeking a decisive advantage over their enemies, utilizing available resources, be they material or behavioral.

**Keywords:** Extra-lethal Violence, Warfare, HRAF, Costly Signaling Theory

## 1. Introduction: What is Extra-Lethal Violence?

Lethal interaction between conspecifics is certainly not exclusive to humans, but no other species approaches it with nearly so much gusto. As a collection of behaviors, warfare can be a fascinating collection that has generated important questions to be answered in order to understand cooperation, such as why individuals risk their lives for a group to which they are not genetically related (Henrich, 2004; Mathew & Boyd, 2009), the potential reduction of future reproductive fitness to zero (Zefferman & Mathew, 2015), and punishment if they do not participate (Mathew & Boyd, 2011). Explanations for participation in warfare at the individual level have included reproductive success (Chagnon, 1988; Glowacki & Wrangham, 2015), while group-structured cultural selection theory has demonstrated that evolution can favor cultures that integrate and utilize warfare (Zefferman & Mathew, 2015). In either case, warfare, and participation in it, would seem to confer some sort of advantage to participants, be it direct (survival and reproduction) or indirect (group survival, prestige, etc.). At the individual level, aggression and lethal action might be explained through self-preservation; cooperative action during lethal conflict likely improves individual survival (Duffey, 2017); and expansionist warfare that includes occupation, enslavement, or looting might all be explained as a form of resource acquisition (Otterbein, 1989).

In warfare, extra-ordinarily violent acts of aggression occur beyond the effort required to inflict fatal injuries on victims; peri-mortem, post-mortem, during, and immediately after hostilities. Various terms are used to describe these acts: *Extra-Lethal Violence*: violent transgression of shared norms about violence or body treatment after death (Fujii, 2013) or *overkill*: repeated and unnecessary 'killing blows' to a victim (Collins, 2006). Used in broader contexts of within groups and between individuals as well as warfare, these terms share a common behavioral characteristic: aggressors spend valuable time, attention, and effort to commit acts of face-to-face violence that go beyond the immediate means needed to kill the victim. While Extra-

Lethal Violence focuses on the transgressions of shared norms and beliefs, overkill stresses the excessive or repeated 'killing blows' in violent confrontations. In either case, both definitions relate their respective behaviors back to cultural norms within a group. This culturally contingent definition makes Extra-Lethal Violence difficult to analyze cross-culturally. Overkill can have exceeding broad implications when modern technology is considered. The use of modern munitions to destroy or disable industrial sites during World War II also killed thousands of people per attack with far more force than was necessary to kill individuals, but one would not generally use overkill to define these engagements. Because of this, overkill becomes cumbersome and difficult to use in describing behavior in warfare after the Industrial Revolution, where high yield explosives and other large scale lethal weapons abound. Extra-Lethal Violence also presents problems to study: while a Briton may find it unacceptable to consume the flesh of the defeated French at the Battle of Waterloo, the Orokaiva of Papua New Guinea are not nearly so squeamish. Similarly, while many cultures have specific proscriptions against allowing friendly fallen warriors from having body parts taken as trophies, the Delaware Tribe of North America maintained a tuft of hair on their heads to make it easier to scalp them, should a worthy enemy dispatch them in battle (Heckewelder, 1876). It has also been pointed out that unacceptable behaviors in warfare, from ancient cannibalism and scalping to modern occurrences of mutilations and trophy taking tend to occur when two groups in conflict are from different cultural backgrounds, and thus have different social norms (Abler, 1992). The unacceptability of these behaviors is a result of these two different norm systems coming into contact with each other. Under the above previous definitions, Extra-Lethal Violence would abound in areas where culturally unrelated groups come into violent contact with one another, but will vary wildly depending on shared, or not shared, norms about violence, war, death, and disposition of remains.

To provide a more objective conceptual definition, we propose the following as a definition of Extra-Lethal Violence: acts of physical aggression beyond the effort required to inflict fatal injuries on a victim. Examples include, but are not limited to, cannibalism (excluding extreme cases of food shortages that require it), decapitation (other than strictly as a fatal blow), torture, and trophy-taking of body parts. Many behaviors, in and out of war, may be considered as or more repugnant than what might be included as Extra-Lethal Violence by various societies, but do not actually meet the conditions for Extra-Lethal Violence. Not only is the above discussion about overkill exemplars of this issue, but two other examples may help illustrate the borders of Extra-Lethal Violence and other extreme behaviors. Mass killing events, whether they are spontaneous, just as just after a battle in order to dispatch unwanted populations (Keeley, 1997), or planned, methodical acts such as the Holocaust are not in and of themselves Extra-Lethal Violence. While the moral, psychological, and demographic impacts of mass killings or executions have long lasting effects on a population and region, they are not in and of themselves Extra-Lethal. Modern warfare presents a problem in defining and analyzing Extra-Lethal Violence in the modern era: artillery or air bombardments can kill thousands in a matter of minutes, with levels of kinetic force far beyond lethality. This additional data from wars of the 20<sup>th</sup> Century would skew any ethnographic data collected so heavily that we have chosen to limit our working definition to interpersonal events of aggression, so as to better understand and analyze Extra-Lethal Violence in the ethnographic literature.

## **2. Background**

### **2A. Extra-Lethal Violence in other species**

While we may think of the acts that are classified as Extra-Lethal Violence might be the strict providence of humans, a review of the behavior of humans close relatives yields a different outcome. Intergroup violence among Chimpanzees (*Pan troglodytes*) demonstrate many of the characteristics of Extra-Lethal Violence as seen in humans. Border patrols and territorial incursions have led to polyadic confrontations between multiple males of one group and a solitary member of another group. This confrontation can lead to the killing of the individual at very little risk to the group of male chimps (Wrangham, 1999). These lethal confrontations can last over an hour, yet include bites, kicks, and stomps on non-vital areas, deliberate castration, and post-mortem violence (Watts, Muller, Amsler, Mbabazi, & Mitani, 2006). This behavior does not seem to provide an immediate or obvious benefit to the attackers. Bites to the hands, feet, and major muscles of the victim chimp are enough to immobilize the victim, and the imbalance of the ratio of attacker to victim would seem to negate a need for a haphazard type of attack that could lead to these injuries accidentally.

Behavioral evidence suggests that lethal encounters serve to both protect home ranges and expand them, as well as provide a certain amount of social solidarity (Watts et al., 2006). If these lethal encounters are strictly a matter of territorial defense and/or expansion, the acts of Extra-Lethal Violence that these chimps display seem to be both excessive and dangerous to the aggressors. In other confrontations between groups of males, physical, and subsequently lethal encounters do not occur, leading to the imbalance of power hypothesis, which states that lethal engagements do not occur unless one group has a decisive advantage of numbers over their victims (Manson et al., 1991; Wrangham, 1999). The possibility for the victim's group members could also be in the area and could intervene or

precipitate another confrontation would suggest that dispatching a victim rapidly and moving off would be the optimal tactic. Yet these aggressors can remain for extended periods, even returning to a corpse the following day, and in one case nearly facing another conflict when another group of males came near (Watts et al., 2006).

What then, could lead to these excessive acts against their victim? It has been observed in both border patrolling that does not result in contact as well as in violent encounters that aggressor chimps will repeatedly embrace one another both prior to and during violent encounters (Watts et al., 2006). This suggests that the behaviors surrounding border patrols, and specifically the attacks on non-group member chimps, have a social solidarity aspect to them. This suggests that the Extra-Lethal Violence displayed by chimps in these situations could also be a social solidarity act; the participation in Extra-Lethal Violence acts to reaffirm group commitment by showing at least a token willingness amongst adult male chimps to take risks and inflict injuries on non-group members. This behavior, and its consequences, in humans will be more fully discussed later in the Discussion section.

## **2B. Extra-Lethal Violence in the Archaeological Record**

Archaeological evidence suggests that Extra-Lethal Violence may have existed deep into prehistory.. European sites suggest both trophy taking and cannibalism (although if this cannibalism is nutritional or non-nutritional is contested) occurred in the Mesolithic and Neolithic periods (Fraye, 1997; Guilaine & Zammit, 2008). Keeley (1997) stresses that trophy taking of various forms were practiced across North America predating European contact, although its frequency and type of trophy taken changed over time due to contact with different cultures. Tool marks on skulls indicating scalping took place prior to European contact (Keeley, 1997; Milner, Anderson, & Smith, 1991). Further evidence of

Extra-Lethal Violence in the form of mutilations and decapitations go back more than seven thousand years across Egypt, Anatolia, Europe, and North America (Keeley, 1997).

### **3. Predictions**

Observed behaviors of chimpanzees and their aggression towards other conspecifics, taken in conjunction with archaeological evidence, suggests it is possible that the capacity for Extra-Lethal Violence as a behavior may have deep roots in our evolutionary history. It is nearly impossible to determine with any certainty if Extra-Lethal Violence is a homologous trait derived from the last human/chimpanzee common ancestor. If it is not, then could this be an analogous trait that has been independently invented by different species and/or different cultures across time and space? In order for Extra-Lethal Violence to occur, perpetuate, or be copied by other groups, it would need to provide some sort of adaptive advantage, either to the aggressor or to the aggressor's group, or in some way be linked to another behavior that is adaptive to individuals or groups, and be carried along with it.

Having outlined Extra-Lethal Violence as distinguishable and observable from other behaviors in warfare, we can now turn to predictions to test with ethnographic data. The first prediction relates to the acceptability across cultures of Extra-Lethal Violence as a practice. Considering international treaties and United Nations mandates that prohibit such behaviors in warfare, is it possible that these prohibitions in the 21<sup>st</sup> century could be a manifestation of instinct or human universal? If Extra-Lethal Violence is considered to be an abnormal behavior for humans in general, than we expect to see Extra-Lethal Violence in a small percentage of populations. Extra-Lethal Violence would be more likely to be limited geographically to a small number of groups that have been previous exposed to the behavior (single 'invention' of the trait, which is then spread to neighboring groups) with limited diffusion. Finally, any cultures that do practice Extra-Lethal Violence are more likely to cease to employ this behavior in warfare within the timespan of the ethnographic record.

Further predictions may be derived from correlations between the use of Extra-Lethal Violence in warfare and other aspects of those societies that use Extra-Lethal Violence. If Extra-Lethal Violence, and more specifically the aspects of Extra-Lethal Violence that result in trophies or other materials that return with the aggressors to their community, is an early form of looting, then Extra-Lethal Violence will be prevalent in cultures such as hunter-gatherer groups that lack significant moveable wealth. Extra-Lethal Violence will decrease as groups have increasing amounts of moveable wealth, such as pastoralists, agriculturalists, and industrialized societies, as attention becomes focused on more useful or valuable objects.

If not a material benefit of some kind, perhaps Extra-Lethal Violence has some sort of tactical or strategic advantage in warfare. It is possible that Extra-Lethal Violence could provide a psychological advantage, used as intimidation against an enemy when outnumbered. If Extra-Lethal Violence is a tactic to 'even the odds' and present a more formidable appearance when at a disadvantage, then the ratio of aggressors to defenders or victims will be skewed to the left of the median. It is also possible that Extra-Lethal Violence could be used by aggressor groups that have an overwhelming advantage over their opponents, allowing them a free hand over their victims to conduct Extra-Lethal Violence. While this may not explain the origin of Extra-Lethal Violence, it may at least provide some correlation of when it occurs. If this prediction is accurate, then the ratio of aggressors to defenders or victims will be skewed to the right of the median. Depending on which outcome is accurate (and both may be true for cultures at different times depending on the situation), we will expect to see a distribution of aggressor to defender/victim ratios that are either heavily skewed in one direction or another, or a bimodal distribution.

Finally, we must consider what mechanisms might lead to Extra-Lethal Violence developing as a cultural trait, and then perpetuating over time and in repeated interactions with other

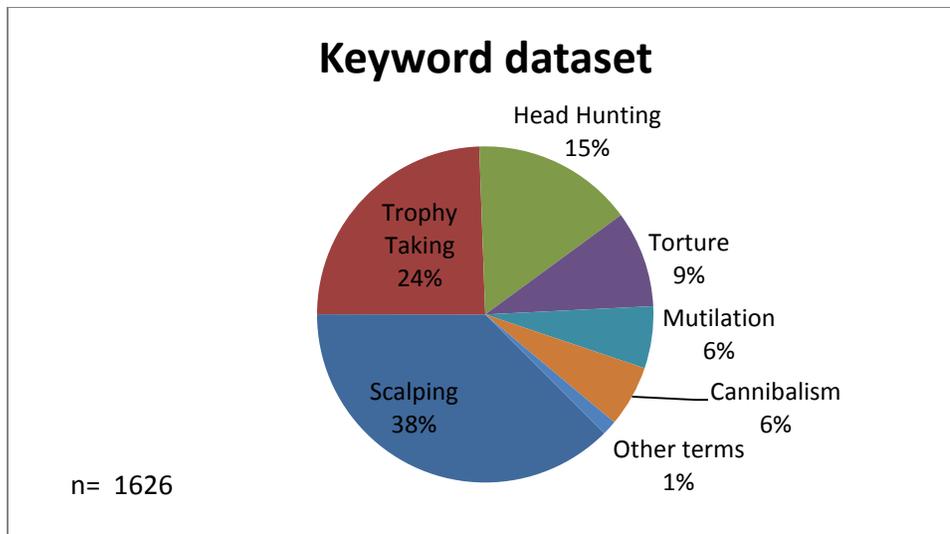
groups. While this behavior may seem on the surface to be wasteful or inefficient, it is possible that it provides some sort of advantage to the person or group employing it. Considering that Extra-Lethal Violence encompasses obvious, public displays of lethal and dangerous behavior, we decided to test whether or not CST might explain the observed behaviors. Costly signaling is predicated on the concept that a signaler and recipient have motivations and goals when communicating with each other (Zahavi, 1975). Reviewed elsewhere (Smith & Bliege Bird, 2005), CST outlines the relationship between signalers and observers, and how what might appear to be 'wasteful' behaviors or traits could actually be adaptive and thus selected for. If a signal is in some way an accurate indicator of some other, more difficult to observe trait, then both signaler and observer can benefit from knowledge about this trait. In order for these traits to be honest, they must impose some cost on the signaler, even if the relative costs, and the aforementioned benefit, are relative to the quality of the signaler versus other signalers. If Extra-Lethal Violence is a costly signal, then we can test whether the circumstances or behaviors of Extra-Lethal Violence might be explained by Extra-Lethal Violence. If the evidence does not fit CST, then other theories would be needed to explain Extra-Lethal Violence.

The first premise of CST, variation exists between individuals in some relevant quality (Zahavi, 1975), would be nearly impossible to test with the data collected. The ethnographic record in general is not so finely grained in recording of detail to be able to identify individual, or even group, differences between those engaged in warfare. We take as a given that both people and groups are not identical to each other, and that variation exists. Observers and signalers benefit from accurate information being conveyed about said variation is the next premise of CST (Smith & Bliege Bird, 2005). While it may not be possible to identify the specific benefits of having the information accurately conveyed, we predict that it will be possible to identify who the intended recipients are of Extra-Lethal

Violence signaling within the ethnographic data. The next aspect to consider in a signal is how difficult to produce, or at least difficult to fake or deceive, the signal is, and therefore the reliability of the signal to the observer (Smith & Bliege Bird, 2005; Zahavi, 1975). Finally, higher quality signalers will benefit more from conveying accurate information, while lower quality signalers must invest disproportionately more to achieve the same signal, or to attempt to deceive in order to make a similar signal (Smith & Bliege Bird, 2005). While measuring the actual costs to create an Extra-Lethal Violence signal would be as difficult as measuring the variation among individuals in the ethnographic record, it is possible to identify cultural norms that might act to provide checks against deception, as well as limit the potential for less accurate signaling in Extra-Lethal Violence. In sum, if Extra-Lethal Violence can be explained by CST, we predict we can at least identify the intended recipients of the signal, as well as cultural norms that will serve to preserve the accuracy of the signal.

#### **4. Methods**

The research design of this project utilized the electronic Human Relations Area File (HRAF) online database to collect data on Extra-Lethal Violence across cultures. In order to gather data on Extra-Lethal Violence across cultures, a keyword search list was created to include terms that were likely to fit the criteria for Extra-Lethal Violence (Figure 1). This yielded an initial search result of over 16,000 entries in the ethnographic record. In order to reduce the sample to a manageable size, it was decided to include the HRAF code 012 (international and interethnic relations). This is a code embedded by HRAF staff to identify the types of events occurring within an ethnographic record. This HRAF code includes all aspects of military and warfare code for by HRAF staff. While this coding might eliminate Extra-Lethal Violence when used as punishment or deviant behavior within a culture, it is considered an acceptable loss as it allows the data to focus on Extra-Lethal Violence as an aspect of warfare. This coding yielded a sample of just over three thousand entries into the database. The entries were then screened for false positive data, which was eliminated. This yielded a final dataset of 1,626 Extra-Lethal Violence events in HRAF.



**Figure 1: Percentage of keywords found to contain Extra-Lethal Violence. Keywords that did not yield any ethnographic data after coding and false positive removal were removed from the data set.**

Keyword hits were coded with data from HRAF for categorical data, including culture, subsistence pattern, geographic region, and inclusive dates of the ethnographic record (if present). Paragraphs were pulled from HRAF keyword search for coding purposes, as a full page of data was considered too cumbersome and a snippet insufficient for data collection. The ethnographic information was then coded for specific behaviors, such as body part trophy taking, intentional mutilation, cannibalism, captives taken, and proscriptions about such behaviors cited in the ethnographic record. Additional information was collected, including aggressor group and victim group (if identified), more specific inclusive dates, and motivation (if stated). These data were then supplemented with data about cultures utilizing HRAF culture pages, EthnoAtlas, and MultiTree to gather cultural information, such as marriage type, post-marital residence, languages spoken, social complexity, etc. to provide a comprehensive data set about the groups that conduct Extra-Lethal Violence and the circumstances surrounding each event. Using that information, we compared regional differences and specific behaviors that occurred with each Extra-Lethal Violence event, such

as captive or trophy taking, against cultural traits, such as language relatedness between aggressors and victims (either a dichotomous same language/different language, or a three-option system of same language, different languages on the same language tree, or unrelated languages on separate language trees (Department of Linguistics, The LINGUIST List, Indiana University, 2014)), subsistence patterns and location, .

## 5. Results

Previously, discussion of overkill or Extra-Lethal Violence were anecdotal in nature (Collins, 2006; Fujii, 2013; Guilaine & Zammit, 2008; Keeley, 1997). Utilizing a cross cultural record such as HRAF allows us to quantitatively measure the prevalence of Extra-Lethal Violence, regardless of cultural norms ascribed to it. Of the 307 cultures represented in HRAF, 149 (48.5%) had documented Extra-Lethal Violence in the ethnographic record, spread across all regions of the world. Extra-Lethal Violence cuts across all subsistence patterns (Figure 2), and comparisons of Extra-Lethal Violence across marriage practices, residence patterns, and geographic regions produced similar results. By far, trophy taking is the most common behavior found in the sample, with 1217 of 1626 (74.8%) Extra-Lethal Violence events including some sort of human body part (or the entire body) taken by the aggressors from their victims, usually back to their community. Of the 149 cultures that utilize Extra-Lethal Violence, 51 (34.2%) have no record at all of trophy taking in the Extra-Lethal Violence sense.

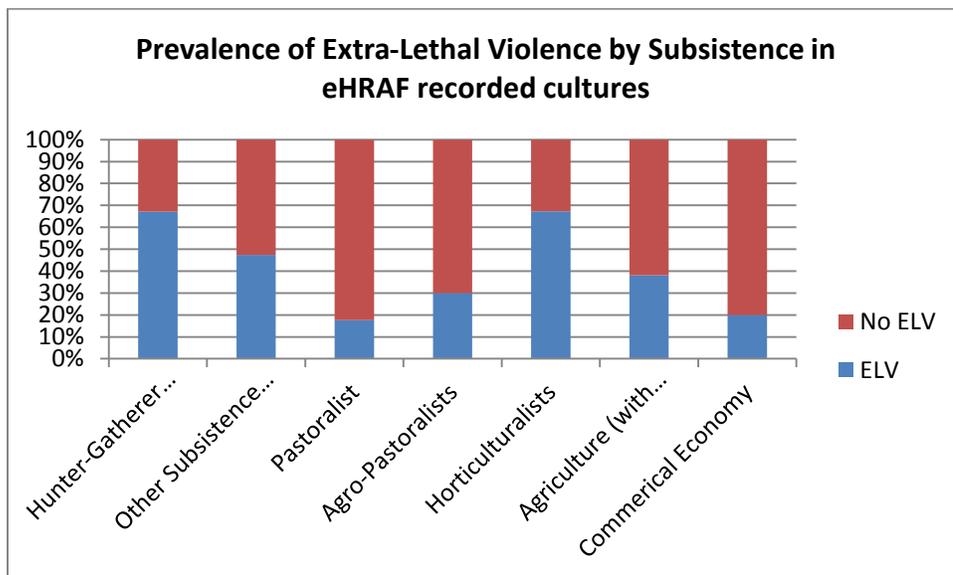


Figure 2: Extra-Lethal Violence by Subsistence, relative to other HRAF cultures

Extra-Lethal Violence does not appear to be correlated to many of the behaviors common preconceptions might associate with Extra-Lethal Violence. Cannibalism only appears in 6% (98 of 1627) of Extra-Lethal Violence events. Captive taking is also not common, with 19.3% (314 of 1627) of Extra-Lethal Violence events including captive taking. It should be noted that in 48.1% (151 of 314) of all captive taking events, captives were tortured and killed. In short, if taken captive by a group that practices Extra-Lethal Violence, a prisoner had about a 50% chance of either dying under torture or being incorporated into the community on some level. Women were specifically taken in only 5.1% (83 of 1627) of all Extra-Lethal Violence events, but account for 26.4% of captive taking events.

It is important to note that absence of data in HRAF is not an absence of the behavior, only that the behavior was not recorded or has not been put into HRAF. But missing data cannot be tested, so until further data becomes available, we assume that any missing data is randomly distributed and not biased. One issue that can be tested by the data is the potential over-reporting. To determine the temporal validity of our data across time, we compared the prevalence of Extra-Lethal Violence to other overall publication of sources that have been entered into HRAF. The results are shown in Figure 3. While the numbers of cultures and publications in HRAF have steadily grown, with a marked increase starting around 1775 CE, the percent of cultures with Extra-Lethal Violence also increased apace. The introduction of new cultures began decreasing around 1950 CE, with a corresponding decrease in Extra-Lethal Violence events in HRAF up to the present day. We conclude the prevalence of Extra-Lethal Violence in HRAF across time is representative of actual behaviors, rather than an artifact of selective sampling for 'odd' behaviors.

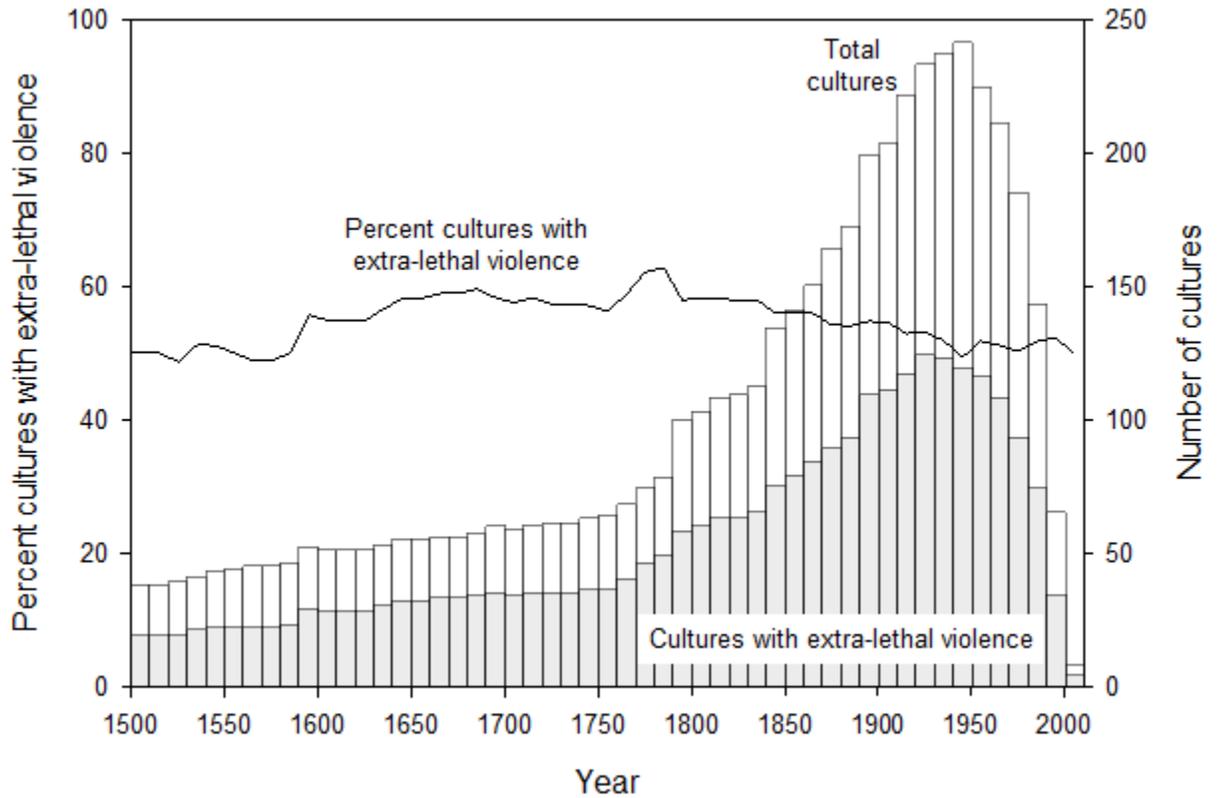


Figure 3: Occurrence of Extra-Lethal Violence in HRAF, compared to publication dates

Cultures that utilize Extra-Lethal Violence in warfare show a great deal of variation in its occurrence, use, and disuse within ethnographic material. Figure 4 shows a sample of the occurrence of Extra-Lethal Violence by culture within the context of the period of time the ethnographic record covers. This sample was derived from cultures that had confirmed inclusive dates for Extra-Lethal Violence of 100 years or less. This was done to exclude ethnographic accounts of Extra-Lethal Violence that gave little to no indication of when the discussed events occurred. This figure shows that while some cultures may have Extra-Lethal Violence across their entire ethnographic record (however long or short it may be), other cultures develop, then discard the practices of Extra-Lethal Violence at various points up to and including the ethnographic present. Taken in conjunction with the analysis of Figure 1, we conclude that Extra-Lethal Violence has decreased in frequency over the last

100 years, likely due to pacification and globalization processes that have imposed a moral and legal penalty to Extra-Lethal Violence.

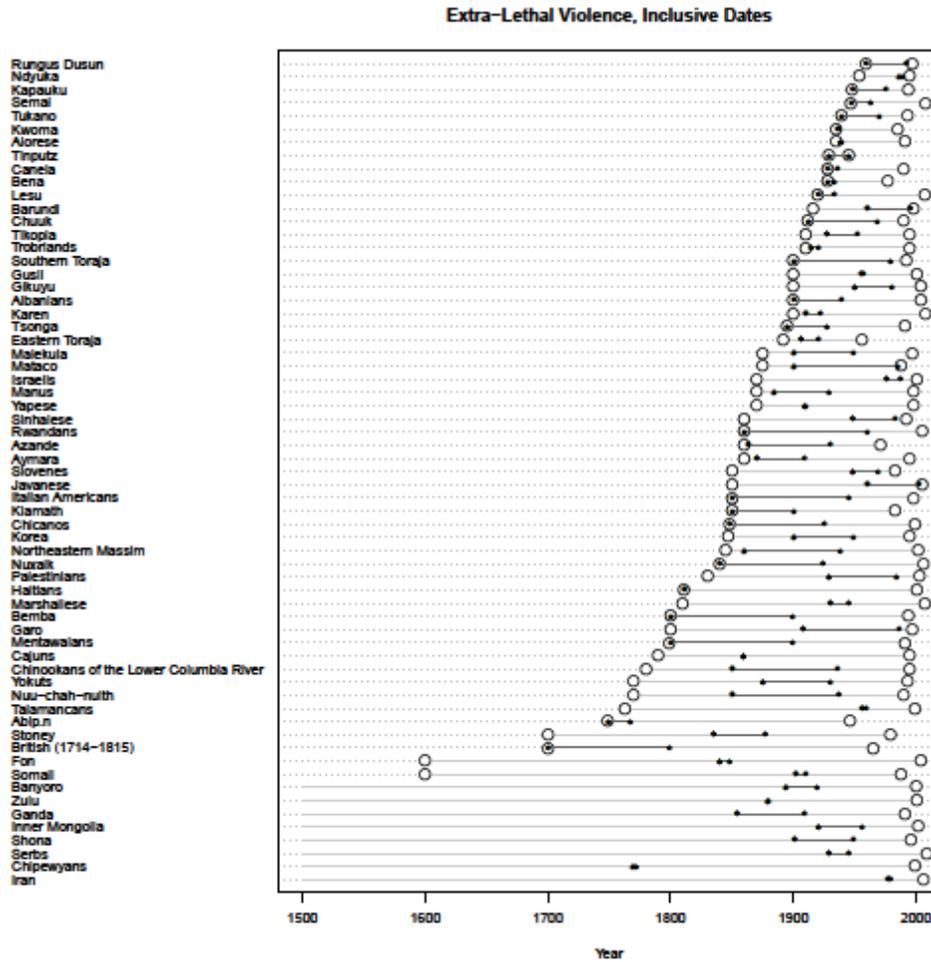
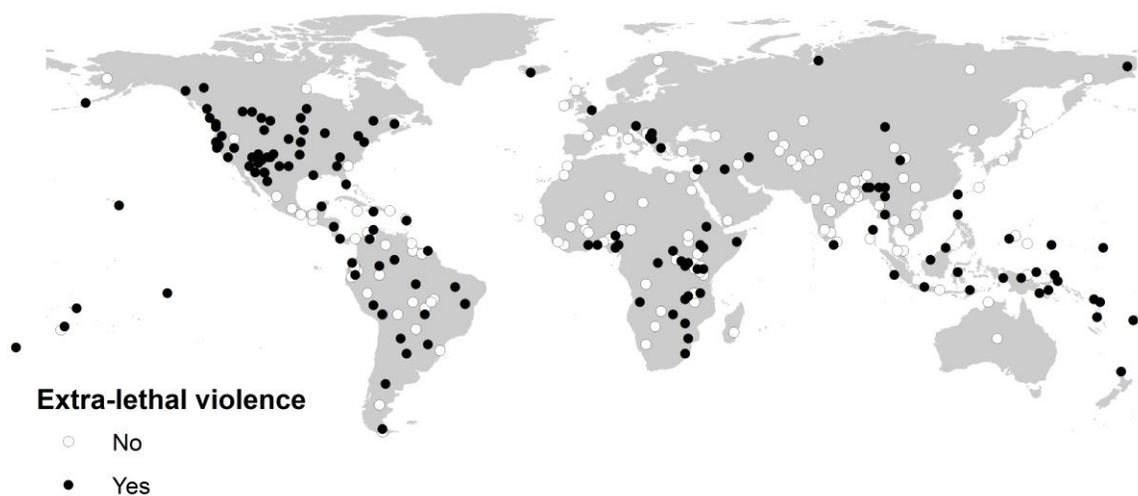


Figure 4: Extra-Lethal Violence occurrence, as compared to inclusive dates of HRAF reporting. Open circles represent earliest and latest dates of ethnographic material, closed dots connect by line represent specific Extra-Lethal Violence dates noted in ethnographic material.

While it might be assumed that Extra-Lethal Violence would be more prevalent in areas of the world that were first contacted after the ethnographic record began, our data indicates that Extra-Lethal Violence is distributed across the entire world. Although the frequency of Extra-Lethal Violence events may be different in different parts of the world, the presence of Extra-Lethal Violence as a cultural trait in warfare exists in every major region of the world,

including Europe and the Mediterranean regions, which ethno-centrists might argue would have shed Extra-Lethal Violence behaviors long ago. Figure 5 shows the occurrence of Extra-Lethal Violence and non-Extra-Lethal Violence cultures across the globe, utilizing the center point for cultures/languages using data from Ethno Atlas. This map indicates that areas of the world with population densities sufficient to have any level of warfare have the potential to have cultures that practice Extra-Lethal Violence and cultures that do not. This evidence further supports the position suggested by prevalence of Extra-Lethal Violence across subsistence patterns; namely that Extra-Lethal Violence may occur across any climate and environment where humans live.



**Figure 5: Extra-Lethal Violence prevalence across the world.**

If Extra-Lethal Violence could be some sort of signal, even if it is a basic signal of group membership, perhaps that could be identified in the data. Of all the potential signal markers of group membership, we choose language as a proxy for group membership or relatedness. If Extra-Lethal Violence was only committed on people and groups who were mutually intelligible linguistically, or if it was exclusively committed on those who spoke a different language perhaps would shed light on when Extra-Lethal Violence might occur. Could Extra-

Lethal Violence be strictly applied in internal war; an outpouring of the personal, intimate system of feuding, murders, and escalating emotional reactions of knowing ones victims quite well? Could Extra-Lethal Violence only manifest in external war, where Extra-Lethal Violence serves to assist in the dehumanization and demonization of victims by demonstrating just how much contempt and lack of concern for a people not one's own. However, comparing linguistic relatedness yielded no significant outcomes. In total, 581 events in the ethnographic record had sufficient information to establish both aggressor and victim group membership, and therefore linguistic affiliation. The data indicates that language is not a significant predictor of Extra-Lethal Violence; cultures that practice Extra-Lethal Violence are generally likely to do it linguistically related groups as well as unrelated groups. While there are anecdotes within the ethnographic record about either not committing Extra-Lethal Violence against related groups (similar language, related by marriage, common ancestor) as well as unrelated groups (other groups are not 'human' enough and not worthy), in reality ethnographic accounts include breaking these proscriptions on multiple occasions, indicating Extra-Lethal Violence can be used in nearly any aggressive circumstance.

## 6. Discussion

Having established Extra-Lethal Violence in warfare as a common behavior across time, space, and cultures, we can now turn our attention to what conditions might favor Extra-Lethal Violence as an accepted practice within a culture. Previous discussions have cited the ability of Extra-Lethal Violence to produce some sort of trophy or proof to confirm warriors' claims of victory over individuals or groups (Abler, 1992; Keeley, 1997). This would seem to help reduce free loading within societies that place value on martial prowess. However, other cultures with high rates of conflict do not use Extra-Lethal Violence in any sense; the Yanomamö of South America allow males to self-identify as to who participated in a homicide and therefore should go through the *unokaimou* ritual, gaining prestige (Chagnon, 1988). Other cultures, such as the Turkana of Africa, rely on eye witness accounts and gossip to confirm or sanction warriors' claims about actions on the battlefield (Zefferman & Mathew, 2015). Even non-lethal actions can be considered important in warfare, such as counting coup among various Native American groups, where warriors were encouraged and rewarded within their culture for having the bravery to touch their enemies without killing them, thus exposing themselves to great risk for little tactical gain (Keeley, 1997). These examples demonstrate that Extra-Lethal Violence is not the only way for a person to indicate their ability and willingness to inflict lethal violence on others or a culture to value such martial abilities, but Extra-Lethal Violence does fit into a similar category; warriors who are courageous and signal their willingness to take personal risks are able to clearly indicate this willingness through evidence or testimony that the group considers acceptable. Extra-Lethal Violence may be more than a simple case of confirmatory behavior to inform others that a person or group was victorious over another. One issue lies in the time and effort, and therefore potential exposure to danger, Extra-Lethal Violence requires of the aggressors. Rather than kill an enemy in as efficient a manner as possible, thus preserving

time and energy and maintaining some readiness to defend or attack another enemy, Extra-Lethal Violence requires time, attention, and an exposure to counterattack at both the individual and group level. Other behaviors in warfare that seem to fit this description would be looting after a battle. The practice of stopping to retrieve moveable wealth instead of taking additional personal risks is likely as old as material wealth itself, and occurs at all levels of war and social complexity (Keeley, 1997). It has been noted elsewhere that in small scale societies, a lack of material goods leads to a lack of looting (Glowacki & Wrangham, 2013). But our research shows that nearly a third of cultures that practice Extra-Lethal Violence also practice hunter-gather subsistence patterns. If we include horticulture also as 'small scale societies' (Gat, 1999), then nearly two thirds of societies in this sample are small scale societies. This falsifies our first prediction, that Extra-Lethal Violence could decrease as cultures have increased amounts of moveable wealth, based on subsistence. This suggests that Extra-Lethal Violence trophy taking is not a strict material system of looting in cultures that lack large amounts of moveable wealth. If Extra-Lethal Violence were an early form of looting, we would also expect to see a significant drop in Extra-Lethal Violence (or at least in trophy taking) as societies increase their material culture complexity. However, one fifth of cultures that practice Extra-Lethal Violence are classified as agriculturalists, intensive agriculturalists, or have commercial economies. Looting in these cultures could produce much more useful or beneficial materials to use in the future. However, the variety of subsistence and complexity among cultures that practice Extra-Lethal Violence (or trophy taking) precludes this from being explained away as some sort of modified looting behavior.

While trophy taking may be one of the most common behaviors in the ethnographic record that fits the definition of Extra-Lethal Violence, leaving Extra-Lethal Violence displays such as peri- and post-mortem mutilated corpses is one of the rarest. Only 2.4% (39 of 1627) of

all Extra-Lethal Violence acts included only displays on the battlefield or at the location of victim death. While the prevalence of this behavior does seem exceedingly low, it should be noted that a trophy hand taken back to the aggressor's community leaves a handless body on the landscape for the victim group to find. Of the 149 cultures in the data set, twenty-eight cultures (18.8%) mention specific proscriptions about certain forms of Extra-Lethal Violence behavior; some specified who could not be targeted for Extra-Lethal Violence acts, or who of the aggressor group could not participate in committing Extra-Lethal Violence acts. These proscriptions demonstrate that although there are specific rules governing this behavior, the behavior itself is both allowed and is considered a normal behavior within the culture itself.

Extra-Lethal Violence could be a behavioral response to significant differences in the size of combatant groups. With chimpanzees, conflicts follow the imbalance of power theory (Manson et al., 1991; Wrangham, 1999). In chimpanzee confrontations, chimps do not become physically violent unless one group outnumbered the other by a ratio of four to one (Wrangham, 1999). Human behaviors in warfare show a much larger variation in the willingness of groups to engage in violent confrontation. Conventional military wisdom suggests that for an attack to succeed, commanders should seek engagement when attackers outnumber the defenders by a ratio of three to one (Epstein, 1988). However, a review of this principle shows numerous instances where this ratio is violated and yet attackers prevail, as well as examples of when the ratio is exceeded and yet the attack fails (Epstein, 1988). It is possible that cultural norms of training, strategy, or technology might account for the difference in preference for attack between chimpanzee and human conflicts. Could Extra-Lethal Violence have a similar impact on the outcome of these battles, where Extra-Lethal Violence might serve as either a psychological edge for groups that are evenly matched or outnumbered, or occur when aggressors have such an overwhelming

superiority that they can conduct Extra-Lethal Violence on their victims with impunity? We compared the ratios of aggressor groups and victim groups when exact numbers were given. In comparing the ratio between aggressor and defender combatants, we found no discernable pattern in the frequency distribution ratios in Extra-Lethal Violence events (n=18). There was also no discernable pattern in the frequency distribution of ratios of aggressor to Extra-Lethal Violence victims (n=40). Figure 6 shows the relationship between aggressor and victim group size.

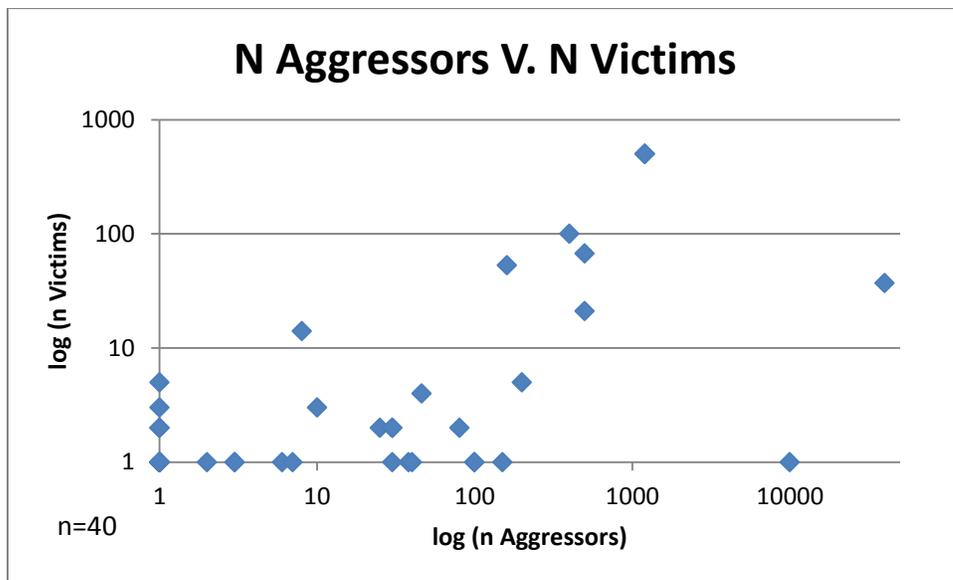


Figure 6: Comparison of Aggressor and Victim numbers, when given (n=40).

Considering that Extra-Lethal Violence encompasses more behaviors than trophy taking, we must consider other explanations than proof taking or some form of proto-looting. It is at this point we can turn to costly signaling theory to explain Extra-Lethal Violence. Headhunting has been cited both as an example of CST (Smith & Bliege Bird, 2005) and as a common example of extreme behavior in war (Abler, 1992; Fujii, 2013; Gat, 1999; Keeley, 1997). Logically, this behavior does meet the premises of CST: we can assume that individuals vary in their physical and martial abilities, observers can benefit from

understanding the honest signal of headhunting, and signalers can benefit from the signal, through prestige, deterrence, or some other benefit. Scaled to the next level of selection, CST can explain Extra-Lethal Violence at the group level as well: groups can benefit from signaling to other groups of their ability to inflict Extra-Lethal Violence on victims, and can avoid future confrontation through deterrence, and that these signals of dominance in war are difficult to create and maintain over time. This argument also meets another criteria for CST to become evolutionarily stable, namely that the interests of signalers and observers need not be shared, and can in fact be diametrically opposed (Smith & Bliege Bird, 2005).

CST suggests that signalers and observers all benefit from the knowledge these honest signals provide. This may lead to a continual escalation of signaling can occur to continually challenge all signalers in their competition to signal their quality to observers (Arak & Enquist, 1995; Guilford & Dawkins, 1993). Extra-Lethal Violence might fit the pattern laid out by CST if the signals could be demonstrated as being both costly and honest signals about a person or groups quality. We can assume martial or physical prowess varies amongst combatants and between groups that engage in warfare with each other. Extra-Lethal Violence can also be considered costly to produce: it requires the time, opportunity, focus, and effort on the battlefield, where the signaler is still under the potential threat for individual or group counterattack that could easily be lethal toward an unwary signaler. Even after a battle is over, the extra effort invested in an extra-lethal violent act is not without a significant energetic cost and takes time. Lingering on the battlefield to spend more effort and time leaves the entire group open to counterattack by other groups that may be nearby. But the successful signaler, one who can mutilate a corpse with impunity, take a trophy, or otherwise impose their extra-lethal will on a loser, can then signal quite clearly that they are victorious, in the face of all these risks and potential costs. This signal

then can convey a clear meaning to both within group members and opposing group members about the quality of the signaler.

If Extra-Lethal Violence truly does conform to CST, then we must consider the issue of costliness between signalers. In theory, Extra-Lethal Violence should then have some relative cost to the signaler, and that lower quality signalers should then pay a relatively higher cost in order to convey the same signal to observers (or to seek alternative forms of signaling that might otherwise be considered deceptive). How then, might Extra-Lethal Violence stabilize around behaviors within the spectrum of Extra-Lethal Violence that make the cost for lower quality signalers consistently higher, as well as to provide a check against deception? One solution seen in general in warfare is trophy taking. The taking of loot, more specifically items off of a dead enemy, could be considered a signal that you have killed that specific person. Whether it be personally identifiable artifacts such as a piece of clothing or weapon associated with that person, or essential items needed for life sustainment (such as water carriers in a desert, weapons on the battlefield, etc.), these items provide a certain reassurance to an individual's claim to have killed that person. But ultimately these items could be faked; extra supplies, discarded weapons, or other items lost could be recovered by any number of ways that are not the result in the death of the original owner. A body part taken as a trophy would be a stronger signal that the person was killed, it cannot be accidentally dropped, stolen, or wrested from a person that is still alive. A body part taken requires some level physical dominance over that person; possibly killed, almost certainly injured or otherwise incapacitated. Often the theme of 'proof' is cited in the ethnographic record as a cause for various forms of trophy taking: "the women have so decided a preference for a man who has been able to give proof of his bravery by killing one of the enemy" (Gomes, 1911), "a desire on the part of warriors to have tangible results of their valor" (Boehm, 1983), and "warriors think it necessary to bring home the SCALPs of those

they have killed or disabled, as visible proofs of their valour; otherwise they are afraid that their relations of the combat and the account they give of their individual prowess might be doubted or disbelieved” (Heckewelder, 1876). A body part as a trophy therefore provides a more costly, and more honest, signal of the actions of the signaler; they have likely met and defeated another person on the battlefield.

But this form of trophy taking could be just as easily faked without further constraints. A single human body could provide innumerable ‘trophies’ that claim victory. Rather than returning with a random piece of flesh or bone as a trophy taking signal, cultures tend to fixate on specific body parts as a standard trophy taken in combat; Jivaro head hunting, scalping by various Native American cultures and African Azande removed genitalia. Across the ethnographic record, nearly all cultures that engage in Extra-Lethal Violence trophy taking fixate on a very limited number of trophies that are considered acceptable (median=1, average= 1.36, maximum= 8, and any more than 1 tended to revolve around similar body parts, i.e., hands and fingers, or heads and scalps). This fixation of trophy taking on particular or related body parts limits the number of trophies taken per body, improving the honesty of the signal of trophy taking. Further, there seems to be a strong preference for body parts that are undeniably human, and potential so far as to identify individuals killed. Of the 1,222 trophy taking events, 99.26 % (1213) were focused on body parts that would be recognizable as human through the first three stages of decomposition: fresh, bloated, and decay (Goff, 2009), (scalp, head, fingers, hands, arms, feet, legs, or whole body). Of 99 cultures that practice some form trophy taking, 94 take those uniquely human trophies. As a further constraint to improve the honesty of trophy taking as a signal, there is an equally strong prevalence for taking trophy body parts that are singular on the human body. The vast majority of events (1203 of 1222 – 98.45%) and cultures (97 of 99 – 97.98%) that include trophies take unique body parts (face, scalp, head, body, male

genitalia, heart, mandible). The prevalence, and preference, for singular and identifiable human body parts as trophies preserves trophy taking as a costly and honest signal in war. This position is further supported by comparing the prevalence of which trophies are taken by the percentage weight of the body. Figure 7 shows the preference for lighter, yet unmistakably human, body parts to be taken as trophies.

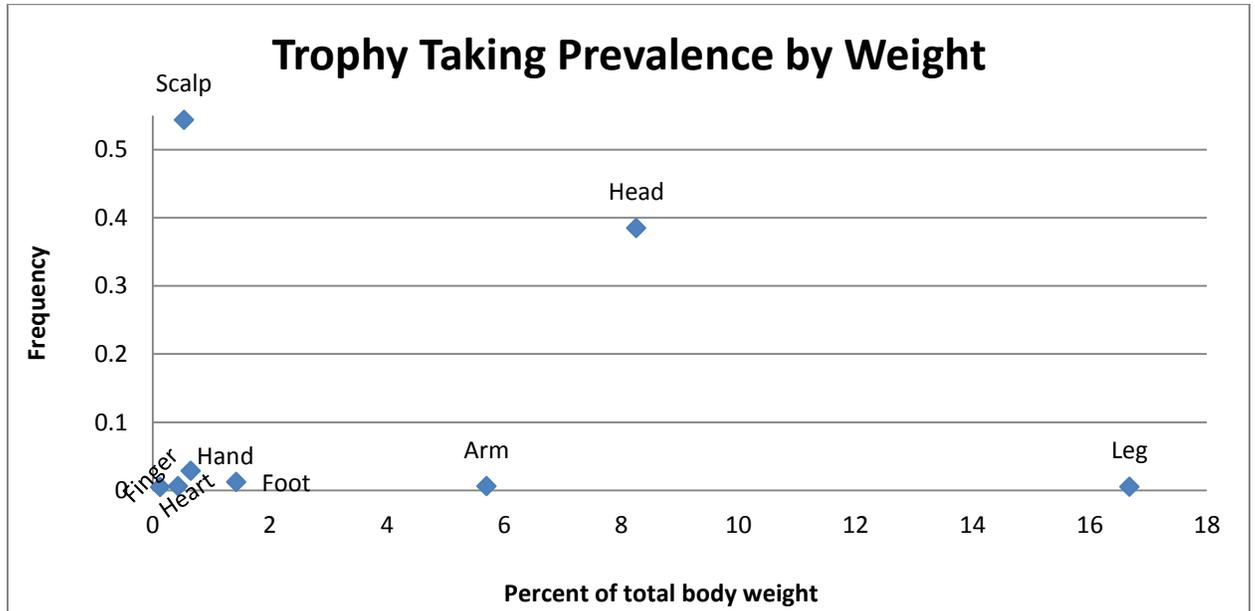


Figure 7: Percentage of Body weight by frequency of taking. This shows a clear preference for identifiably human body parts, and a certain economy of effort by preferring a lighter head or scalp to heavier arms or bodies. Weights for head, hands, arm, foot, and leg from (Plagenhoef, Evans, & Abdelnour, 1983), Weight for heart taken from (Molina & DiMaio, 2012). Not shown: the prevalence for taking of the entire body as a trophy. This occurs 12 times, accounting for .9% of total trophy taking events.

Having established Extra-Lethal Violence as likely a signal, the next question to consider is who the intended recipients of the Extra-Lethal Violence signal might be, both between and within cultures. On the surface, it would seem that trophy taking is a signal to within-group members, who would receive the signal of a trophy and react to it in a manner consistent with CST. Indeed, the sheer prevalence of trophy taking as an event and as a cultural

practice (see above) would seem to indicate this can be a strong within group signal. However, the converse of a head taken as a trophy is a headless corpse somewhere on the landscape for the unfortunate victim's group to likely find later. In this regard, trophy taking has equal efficiency in signaling to both within group members and other groups of the physical and martial abilities of combatants in a community that utilizes Extra-Lethal Violence as a tactic in warfare. This would also be in keeping with idea of broadcast efficiency, namely that a signal with a larger number of recipients or longer lasting signal will be selected for over less efficient forms of signaling (Smith & Bliege Bird, 2005). This also explains why taking the entire body as a trophy is uncommon in the ethnographic record. It is both heavy and cumbersome to move, as well as lacks any signal to the victim group, the person simply disappeared.

The reverse of trophy taking is nearly non-existent in the ethnographic record. The occurrence of intentional Extra-Lethal Violence displays (peri-or post-mortem mutilations) in vicinity of the victims death without any trophy taking is exceedingly small; only 2.39% of events (39 of 1626) included such displays, with 14.67% (22 of 149) cultures that commit Extra-Lethal Violence committing all 39 of these Extra-Lethal Violence acts. These acts are clear displays to out-group members, as the signal is not received by within group members except through verbal 'reports' by victorious combatants (and are thus potentially faked, and no longer costly signals). This uni-directional signal (toward out-groups) form of Extra-Lethal Violence, and its subsequent lack of prevalence in the ethnographic record is again in keeping with the CST issue of broadcast efficiency; different forms of Extra-Lethal Violence will be more or less favored based upon their number of recipients reached per act or cost (Smith & Bliege Bird, 2005).

## 7. Conclusion

In this paper we have defined Extra-Lethal Violence so as to be useful across cultures for ethnographic analysis; Extra-Lethal Violence is an act of interpersonal, lethal aggressive behaviors that go beyond the necessary force to kill an individual. This behavior, especially in the context of polyadic confrontations (warfare) is especially dangerous, where other aggressive, lethal actors are actively engaged as well. We effectively falsified the prediction that Extra-Lethal Violence is an abnormal, rare behavior. Nearly half of societies in HRAF have practiced Extra-Lethal Violence, and that these cultures cut across all forms of subsistence, geographic boundaries, and well into the 20<sup>th</sup> Century. We also falsified the prediction that Extra-Lethal Violence was a form of early looting, predating moveable wealth. Extra-Lethal Violence is practiced by cultures such as agriculturalists, industrialized societies, and pastoralists, all with large amounts of moveable wealth. Our data was insufficient to conclusively prove that Extra-Lethal Violence is either a tactical or strategic tactic to either balance engagements when outnumbered or as an unopposed act due to overwhelming forces. Finally, we were able to substantiate our prediction that Extra-Lethal Violence can be explained by CST: Extra-Lethal Violence is costly to produce, difficult to fake, send clear information about the signaler to recipients, and generally has very high broadcast efficiency. Rather than a deviant or maladaptive behavior that only occurs in extreme or 'uncivilized' situations, Extra-Lethal Violence is another tool humans will reach for when striving to survive and thrive against other humans. Our goal was to provide insight into intra- and inter-cultural aggression and generate discussion about future analysis to predict when and under what circumstances Extra-Lethal Violence might occur.

## **8. Future Research**

This analysis focused on Extra-Lethal Violence in intergroup conflict, where HRAF coding was able to identify distinguishable groups of people within the ethnographic record and code for it. At present, there remains another thirteen thousand keyword hits within HRAF that may be considered as Extra-Lethal Violence to investigate that would include within-group Extra-Lethal Violence acts. The attrition rate for false positives in this analysis was 47.3%. Even at that rate, there are still potentially nearly seven thousand Extra-Lethal Violence events in HRAF. A larger analysis of all Extra-Lethal Violence may yield an ability to correlate or predict this behavior in a broader cultural context in warfare.

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