

Why Being Wrong can be Right: Magical Warfare Technologies and the Persistence of False Beliefs*

Nathan Nunn[†]

Raul Sanchez de la Sierra[§]

January 2017

Paper prepared for the *American Economic Review Papers and Proceedings*.

Abstract. Across human societies, one sees many examples of deeply rooted and widely-held beliefs that are almost certainly untrue. Examples include beliefs about witchcraft, magic, ordeals, and superstitions. Why are such incorrect beliefs so prevalent and how do they persist? We consider this question through an examination of superstitions and magic associated with conflict in the Eastern Democratic Republic of the Congo. Focusing on superstitions related to bullet-proofing, we provide theory and case-study evidence showing how these incorrect beliefs persist. Although harmful at the individual-level, we show that they generate Pareto efficient outcomes that have group-level benefits.

* We thank Joseph Henrich for helpful comments. We thank Ariel Gomez and Lewis Dunia Butinda for excellent research assistance.

[†] Harvard University, Department of Economics, 1805 Cambridge Street, Cambridge, MA, 02138. nunn@fas.harvard.edu.

[§] University of California Berkeley, Haas School of Business. 2220 Piedmont Avenue, Berkeley, CA, 94720. rsanchezdelasierra@berkeley.edu.

Almost universally, societies have non-falsifiable beliefs about their origins, life after death, and rituals that activate supernatural processes to help navigate life. Many of such beliefs are almost certainly incorrect, but are nonetheless ubiquitous. Some religious belief systems, such as monotheistic religions, are relatively well known, but many others, such as superstitions, witchcraft, or sorcery, are much less well understood (Bulbulia et al., 2013). Yet, these belief systems are widespread within developing countries in general, and in Africa in particular, and can have implications for behavior and welfare (Gershman, 2016). Their prevalence raises an important question. Given that they are often incorrect, why do they exist and how can they persist?

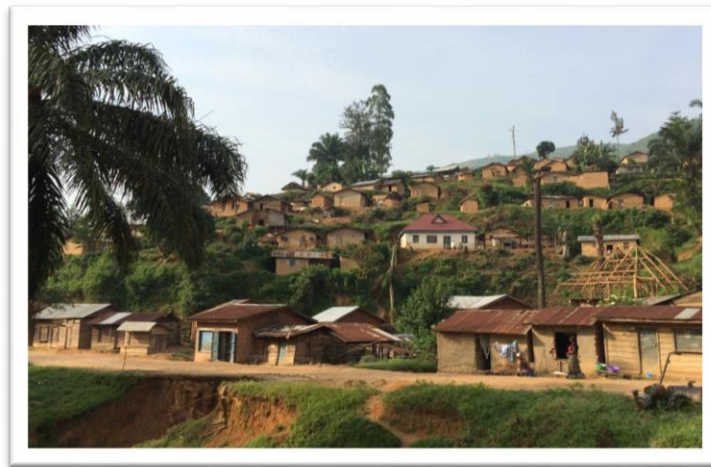
In this paper, we examine the role of magical beliefs in warfare in the context of the Eastern Democratic Republic of the Congo. The region has experienced persistent violence and large-scale conflict since the Rwandan Genocide of 1994, when Hutu militia fled Rwanda into the area. Eastern Congo became the epicenter of the First Congo Civil War (1996-1997) and the Second Congo Civil War (1998-2003). Since this time, conflict has persisted, with dozens of militant groups still operating in the region today. It is common for villages to be under the *de facto* rule of militants who collect taxes and rule through violence. For villages that are not under the control and “protection” of a militant group, it is common for them to be frequently raided (Sanchez de la Sierra, 2016).

In the face of this insecurity, beliefs in spells that protect villagers and militants against death in combat have become widespread. We turn now to a description of one of these beliefs, bulletproofing. The information we present was collected from interviews that were undertaken in the province of South Kivu, in the Democratic Republic of the Congo in March of 2015.

II. Motivating example: Ethnography of Bulambika

Although we have accumulated a large number of examples, we focus our discussion here on the village of Bulambika (Bunyakiri) in the province of Sud Kivu. The village, which is shown in Figure 1, is typical of villages in the area. Until 2012, the area had been exposed to attacks by Hutu militias who operated with impunity in the absence of state forces to repel them (the Front Démocratique de Libération du Rwanda). The Hutu militias, hiding in the forest and the hills, would regularly engage in pillage, rape, and killings in Bulambika and neighboring villages. Villagers could not work in their fields far from the village due to the high risk that they would be attacked. In January, the FDLR killed 13 villagers in the neighboring village of Lumendje, and May 2012, they killed gruesomely 32 villagers in the neighboring village of Kamananga, leaving behind their mutilated bodies. Many of the villagers, including those we spoke with, had experienced the trauma of having friends and family murdered, and of directly witnessing violence.

Figure 1. The village Bulambika in the Kalehe Territory of the DRC (March 2015)



One evening in of 2012, an elder of the village had a dream. In his dream, the ancestors of his tribe taught him to use supernatural forces to bulletproof the young men in the village and help them confront the source of the village insecurity. The protection would make those who had been bestowed protection immune to the bullets of the machine guns used by the FDLR. Any bullets fired at them would either miss or bounce off.

This elder had a history of having similar dreams and was believed by villagers to have the ability to be informed about such powers.¹ To obtain the necessary ingredients to implement the bulletproofing spell, the elder had to travel to a distant tropical forest. There, he searched for the roots, plants, and animal organs that the ancestors had instructed him to obtain. Upon his return, the elder tested the newly produced powder. He asked other villagers to shoot at a goat to whom he had administered the powder. The goat survived, and this proved to the villagers that the newly discovered “*gri-gri*” was effective.²

To become bulletproof one had to participate in a ritual that was typically performed in the forest. The bulletproofing protection requires that certain conditions be followed in order for the protection to be in place. Failing to respect the conditions would cause the protection against bullets to stop working. The “*gri-gri*” only lasts for a short period of time, often hours or days.

After the discovery, the elder would perform the protection rituals on those who volunteered to protect the village and fight back against the Hutu militants. In general, these were the young men of the village. Now when the village (or other villages in the area) were raided by the Hutu militia, rather than fleeing, the young men would stay, undergo the ritual to activate the bulletproofing spell, and fight against the FDLR, and follow them deep in the forest. The *gri-gri* quickly spread throughout the area of Bunyakiri, where it became one of the adaptations of the *gri-gri* that a defense group called the Raia Mutomboki was using against the Hutu militia. Raia Mutomboki, which means “angry population” in Swahili, is a group that formed from multiple villages in the region to defend the population against attacks by the FDLR. Initially, the defenders of the villages did not have guns. The villagers only had machetes and their *gri-gri* to fight the FDLR. Over time, they began to kill their enemies, from whom they also obtained firearms.

¹ While he was not the only person who had access to supernatural powers to provide bulletproofing. He was one of a growing economy of emerging witch-doctors, who were discovering secrets that helped the youth of the area mobilize against the threats and the attacks they were subject to.

² Magical spells are also called “*dawa*,” which means “the medicine.”

Some of those from the villages that stayed to fight were shot and died. But, the cause of their death did not prove the spell to be false. Given the set of conditions that had to be respected, it was obvious that if they died, it must have been because they did not follow some of the conditions. By the time we arrived in the village in March of 2015, the village of Bulambika (and the others in the area) had been freed and had experienced peace for the past two years.

This case provides one example for why false beliefs might persist. The bulletproofing ritual allowed the community to mobilize combatants by altering their beliefs about the likelihood that they would die in combat. While, at the individual level, this false belief is costly – it causes individuals to under-estimate the risk of combat – it nonetheless allowed the community to mobilize against the aggressors, and successfully eradicate them. Thus, although detrimental for some, it was beneficial for the community. We now turn to a formal illustration of this explanation.

III. Theoretical Structure

Consider a simultaneous move game where N players (i.e., citizens who are each potential defenders of the village) each chooses the amount of effort to allocate towards protecting their village, e_1, e_2, e_3 , etc. Denote output (i.e., success in freeing the village) by $q(e_1, \dots, e_N)$. Output occurs through team production. Thus, it is increasing in the effort levels of all players, $\partial q(\cdot) / \partial e_i > 0$ for all i , and by definition $\partial q(\cdot) / \partial e_i \partial e_j \neq 0$. Moreover, we assume that greater effort by one villager increases the marginal product of other villagers, $\partial q(\cdot) / \partial e_i \partial e_j > 0$. One is better able to defend the village if others are fighting alongside him/her as well.

Preferences are symmetric and are given by $U_i = V(q(e_1, \dots, e_N), e_i)$ for all $i = 1, \dots, N$. That is, the payoff of every citizen depends on the public good that is jointly produced, as well as his/her own effort. Each player's utility is increasing in the amount of public good that is produced and decreasing in the amount of effort exerted: $\partial U_i / \partial q > 0$; $\partial U_i / \partial e_i < 0$.

Given these assumptions, players' efforts are strategic complements. One property of the Nash equilibrium in this type of games is well understood: effort levels will be below the efficient levels (e.g., Alchian and Demsetz, 1972; Holmstrom, 1982; Eaton and Eswaran, 2002).

A belief in the efficacy of bullet-proofing serves to decrease the *perceived* costs of effort to an individual. If one believes that they are protected from the enemy's bullets, then the perceived costs of greater bravery and effort is less. This results in greater effort provision by all individuals and a provision of the public good that is closer to efficient.

The following example provides a simple illustration. Assume there are two players, and that each chooses the level of effort: $e_i \in (0,1]$. Total output is given by $\sqrt{e_1 e_2}$, and the perceived cost of effort is $\gamma_i \left[\frac{1}{2} e_i^2 \right]$, for $i=1, 2$. The parameter γ_i indicates individual i 's biased belief in the cost. Given that $\frac{1}{2} e_i^2$ is the true cost of effort, a value of γ_i less than one indicates that the player underestimates the true cost of effort. False beliefs about bulletproofing serve to lower γ_i . In this setup, each player's best response function is: $e_i^* = \left[\frac{1}{2\gamma_i} \right]^{2/3} e_j^{1/3}$ for player $i \neq j$. In the Nash equilibrium, $e_i^* = \frac{1}{2\gamma_i}$ for $i = 1, 2$. Both player's best response functions (and the resulting Nash equilibria) are shown in Figures 1a-1c for differing values of γ_i . Without false beliefs (Figure 1a), each player's effort is equal to 0.5 and each player's payoff 0.125. It is straightforward to check that this is not Pareto efficient. Instead, Pareto efficiency is achieved when both players exert maximal effort, $e_1^* = e_2^* = 1$. In this case, the payoff of each player is 0.5 (rather than 0.125).

As shown in Figures 1b and 1c, stronger beliefs in bulletproofing (a decrease in γ_i) shifts the player's best response functions upwards, so that for a given level of effort of the other player, the chosen level of effort is higher. The case where the beliefs in bulletproofing generates a value of γ_i equal to 0.75 (i.e., costs are underestimated by both players by 25%) is shown in Figure 1b. Thus, the false belief results in effort levels that are greater and closer to Pareto efficient levels. If

bulletproofing results in a value of γ_i of 0.5 (i.e., costs are underestimated by 50%), then $e_1^* = e_2^* = 1$ and Pareto efficiency is achieved.³ Thus, false beliefs in bulletproofing, as long as they are not too extreme, result in higher levels of effort being exerted and to higher payoffs to both players.

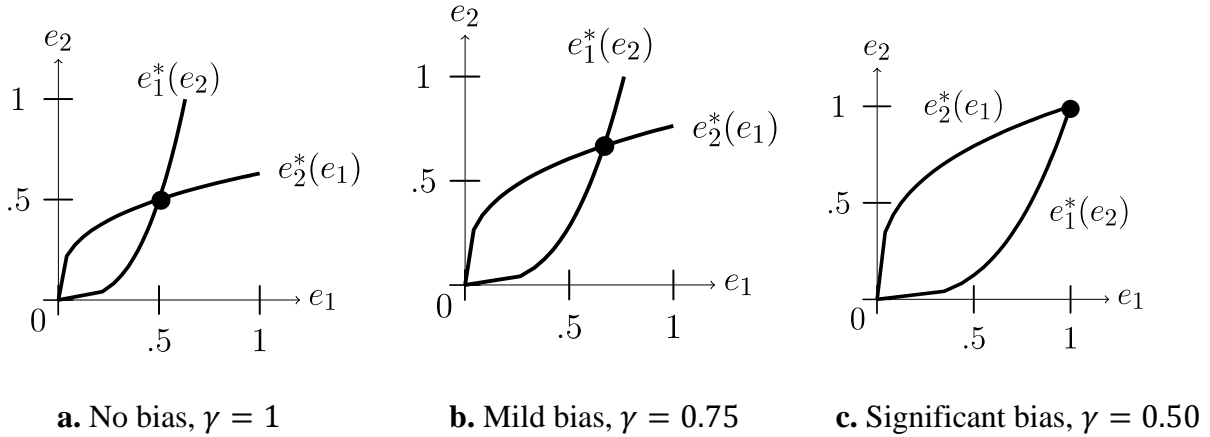


Figure 2. Best response functions of player 1, player 2, and Nash equilibria for different misunderstandings of the cost of fighting due to a belief in bulletproofing.

In the presence of group-level selection, villages with the false belief of bulletproofing will be more likely to survive, and therefore we would expect this belief to spread throughout the population. Group-level imitation of successful groups would also have the same consequence (Boyd and Richerson, 2002).⁴ Thus, in an evolutionary setting where groups compete for survival, such false beliefs increase the average fitness of villages that hold them. Eastern Congo, like many other war-torn parts of the world, has characteristics that make it particularly likely that group-level selection is strong (see Henrich, 2004). The groups (i.e., rural villages, lineages, and armed units) are small and homogenous. They also have relatively low levels of migration between the groups. In militia groups, individuals are typically prevented from leaving the group. In rural areas,

³ Note that it is necessary that both players have the false belief for the Pareto efficient outcome to be achieved.

⁴ For example, one could assume, as in Boyd and Richerson (2002), that an individual's belief about bulletproofing γ_i is influenced by a comparison of their payoff with that of a randomly chosen person (either from within the group or outside of the group). If the payoff of the other person is higher, that person's bulletproofing belief is adopted with some positive probability that is increasing in the difference in their payoffs. In such a setting, socially beneficial beliefs can spread, even if they are individually suboptimal.

there is little migration between villages. Most migration is to urban centers. Lastly, because of the high rates of between-group conflict, selection between groups is very strong. With these characteristics, strong group-selection forces can induce false beliefs to spread and persist.

IV. Implications and Further Discussion

We have focused on one example of a situation where false beliefs were socially beneficial and thus could arguably be sustained with group-level competition. Although this is just one example, beliefs about bulletproofing and other similar beliefs about protection are widespread in Eastern DRC. The spells are continuously fine-tuned and adapted to the changes in the (natural and supernatural) warfare technology of the enemies. This is done through explicit research and development by elders and individuals who can communicate with dead ancestors of the tribe. For example, the *anti-balle* (bullet proofing) evolved from the *anti-machete* and *anti-gun*, aimed at rendering machetes and traditional guns ineffective. Yet, as machine guns became widespread, the *anti-gun* was rendered obsolete due to the speed with which bullets are shot. This motivated the development of the *anti-balle*, which protects fighters against bullets, no matter their speed.

Bulletproofing spells are just one of many magical warfare technologies used by armed groups in Eastern DRC. Over the past few years, we have collected information about the universe of rituals and spells that armed groups use in North and South Kivu. We have documented the existence of a total of 46 different military spell variants. These 46 spells arise from 17 recognizable different major lineages of inventions. Each spell can serve multiple functions. One of these is bulletproofing. Others include: scaring the enemy, distracting the enemy, providing invisibility during combat, preventing soldiers from leaving the group, facilitating communication within the group, increasing the compliance of the civilian populations, and even stopping helicopters in the air. These forms of magic are widespread among the militant groups in the

region. Among 53 active armed groups for which we were able to obtain information on their magical warfare technology (not including their factions), 46 rely on *gri-gri*. Interestingly, the 7 that do not are of Rwandese origin or affinity (Nyatura, M23, CNDP, FDLR, Mudundu 40, Ngumino, and Masunsu). Although further research is needed, these spells have consequences similar to bullet-proofing. They reduce the perceived costs (or increase the perceived efficacy) of effort in conflict, helping to approach the socially efficient levels of effort for the group.

These magical beliefs emerge from a culture where spells are widespread. In addition to military spells of all armed groups, we collected the universe of civilian spells that we could document to exist, or have existed, in the territories of Walikale, Masisi, Rutshuru, Nyiragongo, and the city of Goma, comprising most of North Kivu (excluding the “Grand Nord”). We documented the existence of 39 well-known spells. While the spells serve a range of functions, many of them provide individuals with a greater sense of security and confidence, which can serve to increase the effort provision of villagers for activities that are strategic complements and therefore otherwise underprovided in equilibrium, but also to reduce their anxiety and thus improve their performance. For example, most of the spells provide protection, whether it be from drought, disease, attacks on the village, or even to harm potential thieves – and thieves also believe in their efficacy, which acts as a deterrent. Also common are spells of monitoring (i.e., to find lost items, to find out who is a thief, to know when someone is coming, and to find witches), and spells of production (to increase productivity, and to decrease their productivity of one’s business competitors). As in bulletproofing, while these beliefs would lead to effort levels that are individually suboptimal, if effort levels are strategic complements, then they could lead to socially efficient effort levels and could persist as a result of group-level competition. The final type of spell that is common are spells to harm others (to make someone crazy, to harm someone in order to obtain money, to render someone infertile, or to inflate the foot of others). Although they can

potentially be used for coercive purposes, these spells may have benefits that also fit within the framework of this paper. For example, the knowledge of such spells may induce individuals to behave in a more socially beneficial way, e.g., to not steal from or harm others. These spells effectively increase the perceived cost of bad behavior. Thus, individuals will exert less effort into activities that exert negative externalities on others. In equilibrium, theft levels, though individually optimal, will be higher than is socially optimal. Beliefs in such spells will increase the perceived cost of theft (and similar bad behaviors), reducing individual effort on these activities, moving the society closer to the social optimum.

A common characteristic of most spells is their behavioral prescriptions (the “conditions”), which must be respected by the subjects in order for the spells to be effective. We view these conditions as playing two functions. First, conditions serve to make the belief harder to falsify. For the example of the bulletproofing spell, the death of a fellow combatant is consistent with the belief being false, but it is also consistent with the belief being correct and the combatant having violated one of the conditions, which is private information of the fellow combatant. Many of the common conditions have the feature that their adherence by others is difficult to observe (you cannot drink rainwater, cannot eat cucumbers, etc.), and often ambiguous (they might be partly violated). Second, conditions also result in the regulation of behaviors by increasing the perceived costs of behaviors that damaging for society. Common conditions are that the individual cannot steal from civilians, rape, kill, etc. Thus, through the conditions, such beliefs serve to reduce the prevalence of undesired actions, which are often socially inefficient. These conditions, especially for spells of armed groups, evolved over the years together with the objective of armed groups: initially, many popular militia had stringent conditions against abusing the population, eroding as some groups lost ties to the population and their goals changed from self-defense to become more mercenary. Observing the conditions results in socially beneficial, individually suboptimal actions.

IV. Conclusions

The purpose of this paper is to explore the answer to a simple question: How can false beliefs persist? We provided one answer to this question through a description of the traditional belief of bulletproofing in the Eastern Democratic Republic of Congo. Using a case study and a simple theoretical framework, we have shown how such a (false) belief can be beneficial for the group, and how inter-group competition can result in its persistence. This can account for why beliefs about protection in combat are ubiquitous in the DRC and other conflict ridden locations.

We also discussed the universe of (false) beliefs in our setting, and conjecture that many of them have similar properties. While they are individually costly, they move effort towards socially optimal levels. Through inter-group competition, these beliefs are likely to persist.

References

- Boyd, Robert and Peter J. Richerson. 2002. "Group Beneficial Norms Can Spread Rapidly in a Structured Population," *Journal of Theoretical Biology*, 215(3): 287-296.
- Bulbulia, Joseph et al. 2013. "The Cultural Evolution of Religion," In *Cultural Evolution: Society, Technology, Language, and Religion*, Peter J. Richerson and Morten H. Christiansen (eds), pp. 381-404. Cambridge: MIT Press.
- Gershman, Boris. 2016. "Witchcraft Beliefs and the Erosion of Social Capital: Evidence from Sub-Saharan Africa and Beyond," *Journal of Development Economics*, 120: 182-210.
- Henrich, Joseph. 2004. "Cultural Group Selection, Coevolutionary Processes and Large-Scale Cooperation," *Journal of Economic Behavior & Organization*, 53(1): 3-35.
- Sanchez de la Sierra, Raul. 2017. "On the Origin of States: Stationary Bandits and Taxation in Eastern Congo," Working paper, University of California Berkeley.
- Sanchez de la Sierra, Raul, Gauthier Marchais, and Soeren Henn. 2016 "The Political Economy of Indirect Rule: Armed Groups in Eastern Congo," Unpublished working paper.