Using a sequential game to establish actions between communities could mirror the intragroup interactions mentioned by Glowacki. A prisoner's dilemma game could be played *within* a society negotiating a raid, where cooperation among the group would be akin to all agreeing to go on a raid and gain maximal resources, while cheating may lead to a smaller individual raid (Fig. 1). In this case, the cooperative act paradoxically results in warfare, and for peace to be established all members of the group must effectively defect by refusing to raid the adversary group and thus not acquiring potential resources. However, despite including a measure of intragroup collaboration, hierarchies are often in place within societies that game theory could miss. Certain additional games such as the pirate game could implement these hierarchies where members are ranked and the most prestigious chooses how to distribute the resources (Moulin, 1986).

There are other games that could also be applicable, including stag hunt and chicken. Stag hunt is similar to the prisoner's dilemma but allows for evolutionary stability within cooperation and defection. This can be seen as a positive within the models suggested above, as a game for intragroup cooperation towards resource acquisition (Skyrms, 2004). The chicken game could allow for the understanding of the norms of cowardice and appeasement *between* groups, as found similarly by Bornstein, Budescu, and Zamir (1997).

Glowacki draws on ethnographic data to inform his framework. This is a crucial step in research which is not always present. Long-term ethnographic fieldwork can inform the design of games such as the prisoner's dilemma, and help define the parameters set out in the models used to determine whether peace can be achieved. Ethnographic research exploring such factors as resource allocation, decision making, and most importantly the specific cultural norms which are alleged to facilitate and uphold peaceful interactions are needed to enable researchers to design more appropriate games and set more accurate parameters in the models. Several researchers have included community-situated research to achieve this (Henrich et al., 2005; Pisor et al., 2020) but these efforts could be strengthened by incorporating longer-term ethnography and collaboration with social anthropologists, who typically have more training and experience pertaining to gaining insider perspectives, and conducting research in a more explorative, less hypothesis-driven manner, which could reveal less well-studied aspects of societies which affect how their members cooperate.

Additionally, following Henrich et al. (2005), researchers could play games such as the prisoner's dilemma with their interlocutors, while learning about not just their choices but the context and meaning given to those choices by the players. This would give more strength and accuracy to interpretations of the choices made, and link back into improving the design of both the games and models. Ethnographic research can also be utilised in designing versions of games which are more understandable by the players (Henrich et al., 2005, 2006), which may reduce the likelihood that players take actions which appear to support or undermine theory based on misinterpretations of how the game works (Bayer, Renner, & Sausgruber, 2012), rather than the accuracy of the theory.

Altogether if these proposals are employed and their findings align with the predictions and theories Glowacki draws on, this would strengthen the validity of the concepts put forward, providing more substantial empirical evidence to support them. Game theory and ethnography can be used together to understand how people evolved to live peacefully.

## References

Axelrod, R., & Hamilton, W. D. (1981). The evolution of cooperation. *Science (New York, N.Y.)*, *211*(4489), 1390–1396.

Bayer, R.-C., Renner, E., & Sausgruber, R. (2012). Confusion and learning in the voluntary contributions game. *Experimental Economics*, *16*(4), 478–496. https://doi.org/10.1007/s10683-012-9348-2

Bornstein, G., Budescu, D., & Zamir, S. (1997). Cooperation in intergroup, N-person, and two-person games of chicken. *Journal of Conflict Resolution*, *41*(3), 384–406. https://doi.org/10.1177/0022002797041003003

Bunce, J. A., & McElreath, R. (2017). Interethnic interaction, strategic bargaining power, and the dynamics of cultural norms: A field study in an Amazonian population. *Human Nature*, *28*(4), 434–456. https://doi.org/10.1007/s12110-017-9297-8

Cohen, D., Lewin-Epstein, O., Feldman, M. W., & Ram, Y. (2021). Non-vertical cultural transmission, assortment and the evolution of cooperation. *Proceedings of the Royal Society B: Biological Sciences*, *288*(1951), 20203162. https://doi.org/10.1098/rspb.2020.3162

Gervais, M. M. (2017). RICH Economic games for networked relationships and communities: Development and preliminary validation in Yasawa, Fiji. *Field Methods*, *29*(2), 113–129. https://doi.org/10.1177/1525822X16643709

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., … Tracer, D. (2005). "Economic man" in cross-cultural perspective: Behavioral experiments in 15 small-scale societies. *Behavioral and Brain Sciences*, *28*(6), 795–815. https://doi.org/10.1017/S0140525X05000142

Henrich, J., McElreath, R., Barr, A., Ensminger, J., Barrett, C., Bolyanatz, A., … Ziker, J. (2006). Costly punishment across human societies. *Science (New York, N.Y.)*, *312* (5781), 1767–1770. https://doi.org/10.1126/science.1127333

Moulin, H. (1986). *Game theory for the social sciences*. New York University Press.

O'Neill, B. (1994). Chapter 29: Game theory models of peace and war. In R. Aumann & S. Hart (Eds.), *Handbook of game theory with economic applications* (Vol. 2, pp. 995–1053). Elsevier. https://doi.org/10.1016/S1574-0005(05)80061-X

Pisor, A. C., Gervais, M. M., Purzycki, B. G., & Ross, C. T. (2020). Preferences and constraints: The value of economic games for studying human behaviour. *Royal Society Open Science*, *7*(6), 192090. https://doi.org/10.1098/rsos.192090

Skyrms, B. (2004). *The stag hunt and the evolution of social structure*. Cambridge University Press.

# The role of religion in the evolution of peace

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### Abstract

Glowacki's account overlooks the role of religion in the regulation of cooperation, tolerance, and peace values. We interrogate three premises of Glowacki's argument and suggest that approaching religion as an adaptive system reveals how religious commitments and practices likely had a more substantial impact on the evolution of peace and conflict than currently presumed.

We agree with Glowacki that concentrating on tolerance and cultural technologies is helpful to understand and support the conditions of peace. In our own research, we too have found that

human communities struggle to create peace but are capable of strategic violence (e.g., Kiper & Sosis, 2021), leaving us with questions about the evolution of peacemaking and conflict prevention. Notably, what is the role of religion in the evolution of peace? Glowacki suggests that a crucial step in peacemaking in early human prehistory was when small-scale societies started using religion as a form of cultural knowledge – beliefs, values, and customs – to enable positive group interactions. We agree that religion likely facilitated cooperation among early human communities, but it also likely encouraged conflict (Alcorta & Sosis, 2022). Here, we take a closer look at the role of religion in the evolution of peace and assess three premises in Glowacki's argument.

## Religion and intergroup interactions

According to Glowacki, early small-scale societies valued religions as sources of information and understanding. Those communities that interacted with each other to share and gain this knowledge were able to achieve higher fitness benefits from intergroup cooperation than communities that did otherwise. Although there is evidence of extant foragers intermarrying with neighboring pastoralists and agriculturalists, and thus engaging in cultural exchange and learning (Ikeya et al., 2009), the role of religion in these interactions is variable. Oftentimes, the syncretism that facilitates intergroup exchange is the *outcome* rather than the *cause* of that interaction. For instance, many foragers, such as the Aboriginal peoples of Australia, have syncretized their religion with Christianity, but this is a consequence of colonization (e.g., Cox & Possamai, 2016). In these cases, shared religious understanding has facilitated peaceful interactions that we can observe today, but that peace resulted from earlier, violent encounters between colonizers and indigenous communities. On the whole, valuing other religions results from long-standing group contact, rather than functioning as an impetus for it.

Similarly, it is true that some groups use their religion to increase between group interactions and experience higher payoffs than those whose religion centers on increasing within group cooperation. However, this is often not the case. Successful religious communities usually maintain costly rituals *so that* outsiders cannot freeride on their within group cooperation (Shaver & Sosis, 2018). Religious communities with high intragroup cooperation tend to be closed off to others and interact with outsiders in the most neutral way possible, often without invoking religion. In short, the use of religion for positive between group exchanges may be an exception for syncretized, mystical, and modern religious systems. And most religions are used for increasing *within* group cooperation or *positive peace* for the in-group while between group interactions are religiously neutral to prevent conflict or manifest *negative peace* with out-groups. Recognizing these distinctions complicates claims that peace in early human communities resulted from shared religious knowledge.

## Group motivations for peace

Glowacki posits that group motivations for peace likely emerged after early human communities experienced shocks to their culture brought about by intergroup violence. We agree but we disagree that these "shocks" only spurred conscientious motivations. Instead, Glowacki's observations support a systems approach, where negative feedback from raids and revenge cycles led to the cultural evolution of multiple factors contributing to peace, including changes to the religious system itself. Elsewhere we have shown that the religious system is an adaptive complex, comprised of local variants of the core building blocks of any religion, including authorities, meanings, moral obligations, myths, rituals, the sacred, taboos, and supernatural agency beliefs (e.g., Kiper & Sosis, 2020). These serve various psychological and social functions, rendering religion as an adaptive mechanism that can promote cooperation and coordination (Sosis, 2019). The critical factors that allow for adaptivity are feedback. If the population survives and experiences health and reproductive fitness, the religion remains in equilibrium. However, if the population experiences disease, lowered fitness, or death, the adherents enact changes to the religion (for a review, see Purzycki & Sosis, 2022). Therefore, intergroup violence in the form of "shocks" to the system would have initiated changes other than motivations for peace, including alterations to the core building blocks of religion, ranging from newfound roles for authorities to supernatural agency beliefs.

For instance, in communities throughout postconflict regions of the Balkans, shocks to local systems brought about by war contributed to various cultures of transitional justice (Kiper, 2019). But these shocks were not equivalent for all communities. Some reported that the wars were caused by ethnoreligious nationalism and thus rejected religion after the wars (Kiper, 2022a). Other communities with (exclusive) sacred lands experienced increased religiosity and greater willingness to renew conflicts, while others without (or with inclusive) sacred lands experienced similar rates of religiosity but less willingness to renew conflicts (Kiper, 2022b).

## Modeling war and peace

Glowacki convincingly argues that initiating intergroup violence for personal gain may be individually advantageous but communally detrimental. This creates a security dilemma where individuals may be better off defecting while the entire group benefits more from cooperation. Thus, "achieving peace requires solving -an iterated cooperative problem like -the prisoner's dilemma that -each member of a group plays repeatedly in -encounters with any member of another group" (target article, sect. 2.4, para. 5).

Despite its validity, the conclusion depends on whether cooperative behaviors are predicted by self-interested agents in pairwise interactions. This is unlikely for most human communities, especially prehistorical small-scale societies. For agents would have rarely acted alone but participated in collectives. Shared behaviors would have emerged from these collectives such as religious rituals. In turn, these behaviors would have resulted in considerable diversity between groups, as they adapted to local environments and modified their behavioral strategies. The religious system would have also fostered strong in-group commitments, where individuals may have prioritized the group over individual gains, and even motivating extreme acts of altruism or self-sacrifice. Given that early human communities had religion, as Glowacki acknowledges, group-level behaviors likely transpired that did not resemble the prisoner's dilemma.

## References

Alcorta, A., & Sosis, R. (2022). *Evolutionary perspectives on religion and violence. Cambridge Elements Series*. Cambridge University Press.

Cox, J., & Possamai, A. (Eds.). (2016). *Religion and non-religion among Australian aboriginal peoples*. Routledge.

Ikeya, K., Ogawa, H., & Mitchell, P. (2009). Introduction. In K. Ikeya, H. Ogawa, & P. Mitchell (Eds.), *Interactions between hunter-gatherers and farmers: From prehistory to the present (Senri Ethnological Studies 73)* (pp. 1–11). National Museum of Ethnology.

Kiper, J. (2019). Cultivating peace in the heart of the Balkans. Sapiens – Anthropology: Everything Human, February 22, 2019 issue. Retrieved from https://urlwww.sapiens.org/culture/yugoslav-wars-veterans/

Kiper, J. (2022a). Religiosity after the Bosnian war: Identity fusion, sacred values, and reconciliation among veterans and the greater populations of Serbia and post-conflict regions of Bosnia–Herzegovina. *International Association for the Cognitive and Evolutionary Sciences of Religion Conference*, Aarhus University, Aarhus, Denmark, September 21, 2022.

Kiper, J. (2022b). Remembering the causes of collective violence and the role of propaganda in the Yugoslav wars. *Nationalities Papers*, 1–24. doi:10.1017/nps.2022.53

Kiper, J., & Sosis, R. (2020). The systemics of violent religious nationalism: A case study of the Yugoslav wars. *Journal for the Study of Religion, Nature and Culture*, 14(1), 45–70.

Kiper, J., & Sosis, R. (2021). The roots of intergroup conflict and the co-option of the religious system: An evolutionary perspective on religious terrorism. In J. Liddie & T. Shackelford (Eds.), *handbook of evolutionary perspectives on religion* (pp. 265–281). Oxford University Press.

Purzycki, B., & Sosis, R. (2022). *Religion evolving: Cultural, cognitive, and ecological dynamics*. Equinox Press.

Shaver, J., & Sosis, R. (2018). Costly signaling in human cultures. In H. Callan (Ed.), *International encyclopedia of anthropology: Evolutionary and biosocial perspectives in anthropology* (pp. 86–99). Blackwell.

Sosis, R. (2019). The Building Blocks of Religious Systems: Approaching Religion as a Complex Adaptive System. In G.Y. Georgiev, J.M. Smart, C.L. Flores Martinez, & M. Price Evolution (Eds.), *Development & complexity: Multiscale models of complex adaptive systems* (pp. 421–449). Springer.

# Peace is a form of cooperation, and so are the cultural technologies which make peace possible

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### Abstract

While necessary parts of the puzzle, cultural technologies are insufficient to explain peace. They are a form of second-order cooperation – a cooperative interaction designed to incentivize first-order cooperation. We propose an explanation for peacemaking cultural technologies, and therefore peace, based on the reputational incentives for second-order cooperation.

This is an insightful analysis of the evolution of peace, using the lens of game theory. We propose to complement it, by exposing the cooperative dilemma underlying peacemaking cultural technologies. While necessary parts of the puzzle, cultural technologies are insufficient to explain peace – they replace one cooperative dilemma with another. We propose a solution based on prosocial reputation. Cultural technologies, such as informal leadership, may be designed to amplify reputational incentives – in which case they replace a difficult cooperative dilemma with one which is easier. This is not just theoretical nitpicking. Taken together, the author's account and our complement can generate testable predictions regarding the conditions under which peacemaking cultural technologies, and therefore peace, may evolve.

As the author rightfully points out, peace is the solution to a cooperative dilemma. In small-scale societies as well as in decentralized urban gangs, war, like defection, exacts a toll on the entire group; yet it is beneficial for certain individuals. If nothing keeps these individuals in check, war is the only Nash equilibrium.

Implicit in this account however, is that peace cannot be explained by reputation – or other canonical explanations for cooperation, such as kin altruism (Hamilton, 1963) and reciprocity (Axelrod & Hamilton, 1981). In the iterated prisoner's dilemma that the author considers, cooperation is a Nash equilibrium when the benefit of a prosocial reputation exceeds the temptation to cheat (Nowak & Sigmund, 1998; Panchanathan & Boyd, 2003). War ends up being the only Nash equilibrium because certain individuals find it beneficial to cheat *even* when considering the reputational cost of deviating from peaceful behavior. In other words, peace can be characterized as the solution to a *hard-to-solve* cooperative dilemma – a cooperative dilemma for which reputation provides insufficient incentives.

To achieve peace, humans need to create additional incentives. The author rightfully insists on the central role played by cultural technologies – norms, social structures, mechanisms, and institutions, which change the underlying incentive structure (Henrich & Muthukrishna, 2021; North, 1991; Ostrom, 1990; Powers, Van Schaik, & Lehmann, 2016). Humans rely on cultural technology to change the rules of the game, and invent peace. To quote the author, peace becomes a possible solution when "decentralized societies begin to develop internal social structures, including age or status groups, or informal but powerful leadership" (target article, sect. 4, para. 2).

Yet, the author does not mention that cultural technologies are themselves the solution to a cooperative dilemma. Age, status groups, and informal leaders need not necessarily work toward the objectives of the group. Instead, they can advance their own objectives. As the author acknowledges, even though they often promote cooperation within the group (Garfield, Syme, & Hagen, 2020), for example, by working toward peace (Fry et al., 2021; Glowacki & Gonc, 2013), informal leaders sometimes use their power and influence to promote their self-interest at the expense of the collective (Singh, Wrangham, & Glowacki, 2017).

Cultural technologies are a form of *second-order cooperation* – a cooperative interaction aimed at promoting cooperation (Ostrom, 1990; Persson, Rothstein, & Teorell, 2013; Yamagishi, 1986). In and of themselves, they are insufficient to explain peace. Cultural technologies allow humans to solve the first-order cooperative dilemma. Yet, they introduce another, second-order cooperative dilemma in its place. It seems we are back to square one.

Our solution is to view cultural technologies as technologies specifically designed to leverage reputation. Cultural technologies need not lead us back to our starting point, because second-order