Divergent Beliefs in "Bargaining and the Nature of War"

A REPLY TO FEY AND RAMSAY

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Mark Fey and Kristopher Ramsay (2006) take issue with the presentation of how players' beliefs diverge in "Bargaining and the Nature of War" (Smith and Stam 2004). In that article, the authors constructed a model of bargaining between two nations in which the nations have noncommon priors about the probability with which either nation would eventually prevail, should a war between them continue to a decisive conclusion. The players' divergent beliefs make up one of the fundamental potential causes of war in the model. Fey and Ramsay argue that Smith and Stam's departure from the standard common priors assumption is an unnecessary deviation from convention. The authors disagree, arguing that their different approach to modeling disagreement between rational actors provides a useful way to approach the empirical puzzle they set out to explore, namely, how rational actors with divergent beliefs might settle their disagreements in the context of war.

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In their comment article, Mark Fey and Kristopher Ramsay (2006 [this issue]) take issue with our recent article "Bargaining and the Nature of War" (Smith and Stam 2004). In that article, we constructed a model of bargaining between two nations in which the nations have noncommon priors about the probability with which either nation would eventually prevail, should a war between them be fought to a decisive conclusion. In "The Common Priors Assumption: A Comment on 'Bargaining and the Nature of War,'" Fey and Ramsay argue that our departure from the standard common priors assumption is an unnecessary deviation from convention. We disagree, arguing

below that our different approach to modeling disagreement between rational actors provides a useful way to approach the empirical puzzle we set out to explore, namely, how rational actors with divergent beliefs might settle their disagreements in the context of war.

The common priors assumption is almost universally employed by modelers working within the Harsanyi framework when developing games characterized by uncertainty (Aumann 1976, 1998; Harsanyi 1967-1968, 1995). The Harsanyi framework is built around the conjecture that beliefs about the world can be in partitioned into many different states. These states might reflect the players' different preferences or, more relevant here, different beliefs about the probability that some particular state of nature exists, in our example, the probability that a nation will win a battle in a war. In this framework, there is assumed to be a probability distribution composed of all possible states. A common approach that modelers adopt when using the Harsanyi framework is to assume that different players see different pieces of information about what the "true" state of the world is. These informational differences are what create the players' divergent beliefs, even though the players start with common prior beliefs over the distribution of states (the common priors assumption [CPA]). In this framework, disagreement occurs when one player observes something the other does not, and hence their beliefs about the state of the world diverge. Most economic models of incomplete information use the CPA because it converts belief problems into problems of available information. The approach has proved a tractable framework in which to write down substantively interesting models. Yet, as Fey and Ramsay acknowledge, there are other logically consistent ways to model belief problems, including beginning the exercise by assuming that the players do not share common prior beliefs, the approach we adopt in our original article.

The disagreement between Fey and Ramsay (2006) and us is not that either model is logically inconsistent, as Fey and Ramsay acknowledge, but which model is most appropriate given the theoretical problems we want to explore. It is to this end that we direct our comments. We start by arguing that the choice between the CPA and divergent priors is just that, a choice. We then discuss that the solution proposed by Fey and Ramsay is not really all that different from that which we original conceptualized. Finally, we close by arguing that one's choice of modeling technique should be driven not by convention but by the nature of the puzzle at hand.

Fey and Ramsay (2006) argue that relaxing the CPA is unnecessary. Indeed, Fey and Ramsay show that divergent beliefs can be established within the CPA. But the issue at stake is more nuanced than simply demonstrating under what set of assumptions we can coherently demonstrate divergent beliefs. More important, the different ways through which the actors' beliefs diverge lead to important differences in our theoretical approaches. In our approach, for example, we show that divergent beliefs can be modeled in a coherent setting while assuming zero informational differences between players. So while Fey and Ramsay, as is typical, fix the players' priors and allow informational differences to drive the actors' disagreements (in terms of what states players can distinguish), we assume completely common information and allow

priors to vary, with the actors' differing theories of war driving their disagreement. Which setup one prefers is a modeling choice. Both can be used in a coherent framework. The implications of the choice turn out to be significant, however. The CPA approach tends to privilege explanations grounded in bargaining protocols, credibility, and bluffing. Our approach points in the direction of research into where the players' beliefs come from in the first place. For us, the importance of beginning with different assumptions is that the two approaches lead to somewhat different conclusions about what the important features of international conflict are.

Fey and Ramsay (2006) begin by painting something of a caricature of our argument: that states choose to fight essentially because they disagree. The same sort of caricature could also be made of the CPA approach. While it is possible to simply state that states believe that they want to fight (as Fey and Ramsay paint our story), it is just as possible to assume that states simply prefer fighting to peace or have information that informs them that fighting is in their best interests. Whether beliefs exist that lead nations to fight is not the issue. More important for the modeling endeavor is how the informational differences resolve through war and how such divergent beliefs or disagreements occur in the first place.

In their conclusion, Fey and Ramsay (2006) agree with Morris (1995) and Gul (1998) that not all problems are informational. It is this set of noninformational problems that are best suited to a noncommon prior setup. Fey and Ramsay then argue, however, that the flaw in our approach is that the basic problem at the heart of our model is informational and hence is best modeled using the CPA approach. We see no evidence or justification for this claim. Rather, we argue that the bargaining problem that leads to war is the result of a priori differences in beliefs—differences driven not by informational disparities but rather by differences in tightly held theories about the nature of some future war. This is an important empirical and theoretical distinction as it points future research into the direction of how the players develop their views of the world, while the CPA approach leads one to focus more on how information is conveyed.

We also find Fey and Ramsay's (2006) references to Aumann (1998) poorly motivated. While it is impossible to refute the rigor and coherence of Aumann's arguments, they have an air of circularity. Aumann demonstrates formally that if people have common priors, then the revelation of information about either player's current beliefs must cause convergence in their posterior beliefs. In this debate over the CPA, Aumann's argument has often been asserted as a reason for the need for a common prior assumption. It is unclear to us, though, why this necessarily follows. We do not dispute that a coherent framework of beliefs based on CPA exists. Instead, we take issue with Fay and Ramsay's claim that the CPA approach is the only such coherent framework for modeling disagreement.

We do not deny that the CPA is a useful modeling assumption that helps keep many problems tractable. We also agree that it provides an attractively complete story about belief divergence and convergence. The problem we face is that, while the CPA modeling approach is elegant, the real world is rife with examples that run counter to the logic of the common priors assumption. For example, in a jury trial,

jurors are typically given explicit instructions to attend only to the information presented in the trial and to base their individual and collectives decisions solely on the instructions from the judge. In effect, under the law, jurors all have common priors, and yet hung juries or split decisions occur regularly.

There is ample evidence from the real world that even when faced with identical information and perfect knowledge about each other's beliefs, players find themselves in disagreement. In short, while the CPA modeling approach provides an elegant solution to a vexing problem, it is unclear why we should assume that everyone's brain is wired to converge to the same beliefs in the ideal manner as envisioned by the CPA setup. For us, the question that ultimately drives our choice to adopt an unorthodox approach is an empirical one—it is not a problem of theoretical elegance, although the choice ultimately does have important theoretical implications. Most important, the two approaches lead to divergent conclusions about the nature of international relations. If it were the case that the predictions and subsequent implications for future work were the same for the two approaches, then we would happily agree that we should all choose the approach that is most consistent with past research and modeling precedent. We believe that this is not the case.

Instead, we believe that people commonly hold different beliefs about observable processes despite being exposed to the same information. The debate here is part of a larger discussion within the economic theory literature about the role and nature of beliefs (see, e.g., the literature cited in Fay and Ramsay [2006] and Smith and Stam [2004]). For us, the most compelling argument in favor of our approach is that it more closely approximates reality as well as directing us toward new research questions. We have always thought it interesting that with access to the same information and arguments, if the CPA assumption is true, then individuals' beliefs should ultimately, always converge. This clearly does not happen, as evidenced by the debate the authors are engaged in. Proponents of the CPA argue that this is because of differences in the authors' viewpoints for the problem, as Fey and Ramsay (2006) argue in their current article. This argument very much takes the format of a hierarchical framework, where the disagreement at hand is pushed away from the immediate issue under consideration to a higher level set of disagreements about which lenses people have access to or choose to use.

In the context of the CPA, Fey and Ramsay (2006) create disagreement, or divergence in beliefs, by allowing all players to look at the same object but through different lenses. Which lens a person uses is shaped by a person's life experiences. Conditional on these different lenses, both Fey and Ramsay's current model and our original model appear very similar. We assume people have different theoretical perspectives, while Fey and Ramsay consider life experiences. These conceptualizations are very similar, and with respect to the current problem—beliefs about the prospects of victory—they look very similar. Hence, both approaches can be seen as a disagreement between players at some higher level. While we work directly within the context of the immediate disagreement over beliefs, Fay and Ramsay's approach carries the hierarchical framework work-around directly. One might regard the dispute as to whether it is better to work in a reduced form or carry the additional

baggage of a structural approach. Both theoretical approaches—the different life experiences and the different theoretical approaches—largely punt the problem of the underlying disagreement to a higher level. In our setup, however, we make this set-aside explicit and therefore provide an important stepping-off point for future work. As Fey and Ramsay point out, our modeling effort in some ways ends up posing more questions than it answers. While Fey and Ramsay see this as a sign of failure, we see this as a sign of progress. In terms of explaining the breakdown of bargaining between states, we believe there are much fewer differences between the approaches than Fey and Ramsay acknowledge, although the two approaches importantly do point in different directions in terms of where the greatest explanatory power lies and, as a result, where our future research efforts should head.

As Fey and Ramsay (2006) recognize, our approach is logically consistent. After consistency, modeling choices come down largely to taste, usefulness, and empirical veracity. In our framework, we privilege what we see as usefulness and empirical correspondence to actually behavior and how wars actually progress over prior convention and adherence to modeling precedent.

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