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Agreeing to fight: an explanation of the democratic peace

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abstract

In this article, we extend the well-known 'agreeing-to-disagree' and 'no-trade' results from economics and game theory to international relations. We show that two rational countries should never agree to go to war when war is inefficient and when rationality is common knowledge. We argue that this result might provide one possible explanation for the empirical finding, often referred to as the 'democratic peace', that modern democracies rarely go to war with one another. We propose that the informational properties of pluralistic institutions (as opposed to oligarchies or dictatorships) lead to better decision-making by democracies and that democracies are therefore more likely to be the rational actors necessary for the 'no-war' result. We discuss empirical evidence in support of this proposition.

keywords democratic peace, international relations, war

1. Introduction

The 'democratic peace' is one of the most widely discussed phenomena in international relations. Put simply, the democratic peace hypothesis states that democracies are significantly less likely to fight wars with each other. While widely agreed with and supported in several studies,¹ the phenomenon has not been provided with a solid theoretical basis, leading some researchers to question

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its validity.² Our contribution in this article is to present a stylized model of international conflict that provides one possible explanation for the democratic peace. The article's main point is that the occurrence of protracted warfare between two nations cannot result from mutual disagreement about the likelihood of success in a military conflict. That is, two countries characterized by a rational decision-making process cannot both be willing to bet that they will win a war. In fact, war can only result when either at least one of the combatants prefers fighting and losing a war to not fighting at all or at least one of the combatants is believed to prefer fighting and losing a war to not fighting at all. The implications of the model are broad: mutual understanding between nations (for instance, regarding the rationality of one another's political institutions and decision-making processes) can (and should) lead to reduced military conflict, regardless of nations' unilateral interests, for nations whose leaders prefer not fighting to fighting and losing. In addition, the model predicts that, in conflict, nations whose leaders understand their opponent better than they are understood by their opponent's leaders will be more successful in war.

Our model is simply the extension of a well-known result from economics and game theory. Robert Aumann's 'agreeing-to-disagree' result states that two rational decision-makers should never disagree based solely on differences in information when it is common knowledge that the decision-makers are rational. Put differently, two people should never maintain divergent beliefs based solely on having received different information. In particular, Aumann's result demonstrates that each decision-maker should take into account what information must have led the other to hold a different position and revise his or her own beliefs accordingly. This process of consideration will ultimately lead to a convergence of the two decision-makers' beliefs.³

We similarly extend this result to international relations. We show that as long as war is inefficient and the rationality of the nations' decision-making processes is commonly known, two countries should never agree to go to war with each other based simply on different beliefs about which nation will win the war. We then argue that this result can be extended to provide a basis for the democratic peace as long as democracies are more likely to satisfy the rationality assumption of the model than non-democracies. We discuss existing empirical support for this assumption, both from experiments and comparative studies. Simply put, the modest point of this is that theory and experimental evidence suggest that group decision-making will tend to find more efficient outcomes than individual decision-making. Thus, perhaps the 'democratic peace' is more appropriately referred to as the 'deliberative peace'.

The next section of the article discusses the literature that deals with the democratic peace. Section 3 discusses the theoretical literature related to our model of militarized conflict. The model and its application to the democratic peace are presented in Section 4 and conclusions are offered in Section 5.

2. The democratic peace

The democratic peace refers to two stylized facts within international relations: (1) democracies are unlikely to fight other democracies, and (2) democracies are no less likely to fight non-democracies.⁴ These two empirical regularities are supported by several studies. For instance, Oneal and Russett examine a period of more than 100 years (1885–1992) and find that Kantian variables (democracy, economic interdependence, and membership in international organizations) decrease the likelihood of military conflict between two countries.⁵ Importantly, their analysis extends over the entire period and is not unique to any particular era, such as the interwar period or the cold war. Oneal and Russett also find that conflict decreases as military strength becomes more uneven in a dyad, an empirical result that is consistent with our model. Providing support for the dyadic nature of the phenomenon (which implies that democracies are less likely to fight one another, but no less likely to fight non-democracies), Maoz and Russett find that the extent to which jointly democratic dyads are less likely to enter or escalate conflict is robust to several control variables and across several measures of conflict.⁶

Rousseau and his co-authors also find empirical support for the notion that the democratic peace is dyadic: democracies are less likely to enter a conflict with each other, but are no less likely to enter conflicts with non-democracies. Specifically, they find that initiation of conflict, conditional on an existing crisis, is not significantly influenced by the democratic nature of a nation's own institutions, but rather by an interaction between the nature of the nation's institutions and the nature of those of its potential opponent. They interpret their results as evidence that:

Once a democracy is involved in an international crisis, it carefully distinguishes the type of state with which it is bargaining and adjusts its bargaining behavior accordingly. When faced with a democratic opponent, a democracy believes that its opponent shares its desire to avoid the use of force. Without reassurances, however, democracies will be less restrained concerning the use of force.⁷

Finally, Rousseau et al., also find that a favorable balance of forces makes it more likely that a particular country will initiate conflict.

Erik Gartzke finds that the dyadic phenomenon of the democratic peace is not explained by the affinities (that is, the similarity of interests) between nations.⁸ Specifically, Gartzke uses similarity of voting patterns in the United Nations as a measure of nations' affinities and then finds that this explains part of the propensity of countries to go to war. However, even after controlling for similarities in interests, there is still a significant effect of dyadic democracy in determining conflict. Thus, the democratic character of institutions (measured at the dyad level) matter above and beyond interests in determining the occurrence of militarized conflict. The empirical examination and support for (some version of) the democratic peace is both broader and deeper than existing theoretical work

on its occurrence. Two of the main explanations for the existence of democratic peace are as follows.

1. Norms differ between democracies and non-democracies, with democratic political processes being more likely to rely on norms of peaceful resolution and compromise.
2. Political institutions in democratic countries hold leaders more directly accountable, meaning that these leaders are more likely to take into account the costs of conflict.⁹

However, opponents of the existence of the democratic peace have attacked both of these theories and cite their ad hoc nature as one of the main reasons for doubting the existence of the phenomenon.

In response to these criticisms, Bruce Bueno de Mesquita, James D. Morrow, Randolph M. Siverson, and Alastair Smith synthesize the main results associated with the democratic peace and present a theoretical basis for the phenomenon.¹⁰ They posit seven empirical observations related to the democratic peace: (1) democracies fight with non-democracies, (2) conditional on fighting a war, democracies win more frequently, (3) when conflict first arises, democratic dyads are more likely to choose peaceful resolution, (4) democracies are more likely to start wars against autocracies than vice versa, (5) conditional on starting a war, democracies suffer fewer casualties and fight shorter wars, (6) transitional democracies are more likely to fight than stable regimes, and (7) larger democracies seem more constrained to avoid war than do smaller democracies.

Bueno de Mesquita et al. present a model which they argue accounts for most of the empirical observations related to the democratic peace. In their model, leaders need to satisfy a winning coalition of the actual voting electorate in order to remain in office. In a conflict situation, the leader of an aggressive nation first decides whether to attack and, if so, what proportion of the nation's available resources to direct to the fight. If attacked, the other nation must similarly decide what proportion of its available resources to commit to the war. The country that commits the most resources wins the war. Following the war, members of the winning coalition in each country decide whether to support the incumbent leader or defect to a political rival of the leader. In their model, leaders of more democratic countries (those with larger potential participants in the election process and larger winning coalitions) will, holding all else equal, be more likely to defeat a challenger than leaders in countries with smaller electorates and winning coalitions. In the equilibrium of the game, democracies will exert more effort in a war because leaders have a greater incentive to pursue spoils of war that can be divided among the large winning coalition than autocrats, who are more likely to stay in power if they *withhold* resources from the war and divide them among their smaller winning coalition. This means that wars are more costly for democracies – accordingly, democratic leaders must be more certain of victory before initiating conflict. Also as a result, democracies devote more effort to fighting

wars, making it more unprofitable for two democracies to fight and therefore less likely. On the other hand, democracies are likely to attack non-democracies since they can expect these to respond with less effort.

Our approach is similar to that of Bueno de Mesquita et al.: we present a model of military conflict and use it to provide a theoretical basis for the democratic peace. The difference between our argument and that of Bueno de Mesquita et al. is that our explanation of the dyadic nature of the democratic peace is informational in nature and accordingly complements their interests-based approach.

In our model, nations must ‘agree’ to fight each other (motivated by the availability of capitulation as a strategy for any country that does not wish to agree) and the model provides a set of conditions that imply that war will never occur (that is, there will never be joint agreement or joint desire to fight a war) in any dyad in which these conditions are satisfied. According to our theory, mutually sustained war can happen only when both of the warring parties’ deciding bodies believe that their opponent is weaker and that their opponent’s deciding body is ‘irrational’ in the sense that it does not update its beliefs in accordance with Bayes’s rule.

3. Agreeing to disagree

Our theoretical argument relies on Aumann’s seminal result stating that two rational agents can never disagree based solely on differences in their information when the rationality of the two agents is common knowledge.¹¹ For example, suppose that two people, Ann and Bob, are trying to decide whether to bet \$5.00 on the flip of a coin. Ann will win, say, \$4.95 if the coin comes up ‘Heads’, while Bob will lose \$5.00. The payoffs are reversed if the coin comes up ‘Tails’. If Ann and Bob start out with the same beliefs about the coin (that is, the probability that it will come up ‘Heads’) and both are rational Bayesian decision-makers and these facts are common knowledge, then Aumann’s result implies that *no such bet will ever be made* – even if both Ann and Bob have different, ‘inside’ information regarding the probability of the coin coming up ‘Heads’. Aumann’s result implies that (at least) one of the two people will refuse to accept the bet.

We defer a more precise discussion of Aumann’s result to later in the article, but the intuition behind the result is simple: two people should not bet against each other in a zero-sum situation based solely on the belief that they are correct and the other party is wrong. Rational decision-makers will realize that both people *cannot* be correct and therefore that (at least) one of the two must have incorrect beliefs. Essentially, the beliefs of both parties converge as they take into account *the information that the other side must have received in order to be willing to make the bet*.¹²

4. A model of war

This section presents a simple, stylized model of protracted military conflict. There are two primary assumptions of the model: war is both risky and inefficient. War is risky in the sense that the victor is not known at the beginning of the conflict. War is inefficient because the final assignment of property rights could be established without the loss of life brought about by military conflict.

For simplicity, we consider protracted military conflict between two nations, A and B. At the first stage of the model, each nation privately observes a signal of their likelihood of winning a war with the other nation. After observing these signals, the nations simultaneously decide whether to fight (f) or defer (d). If either nation chooses to defer, then war does not occur. If both nations decide to fight, however, war occurs, and the winner is determined. The key requirements we impose on the nation's payoffs are:

- Both nations prefer to defer than to fight and lose and
- War represents a less than zero-sum bet by the combatants.

A representation of the game is shown in Figure 1.¹³

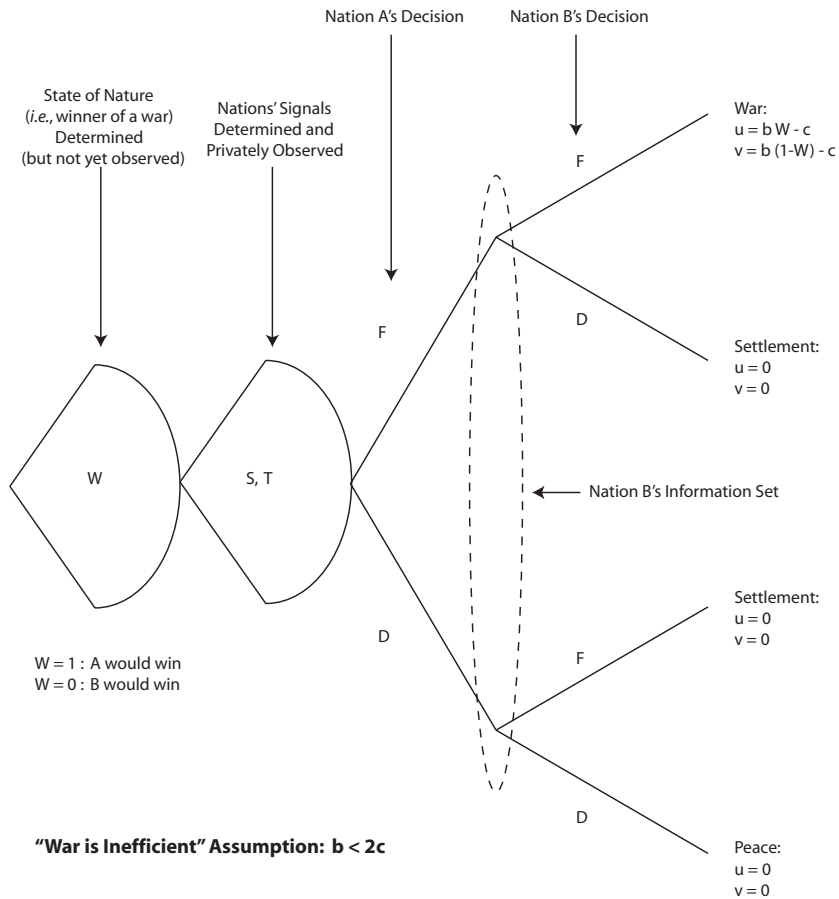
A key assumption in our model is that war is costly. Each nation incurs a fixed cost if war occurs. The spoils of victory may exceed this cost (if they did not, then it is obvious that no nation should ever go to war), but the *sum* of the two nations' payoffs from war (regardless of the victor) is less than zero. That is, *ex post*, the defeated nation would be willing to compensate the victorious nation in order to have not gone to war in the first place. Given the costliness of conflict, the combatants must believe that they have a high likelihood of winning the war.

A necessary condition for rational actors to be willing to fight a war in our model is that they believe the probability that they will emerge victorious is strictly greater than 50 percent. This implies that a necessary condition for war to occur is that both nations must believe that their probability of winning the war is greater than 50 percent. Our main result is that such beliefs (which are, of course, contradictory, since the true probability that each country will win the war must sum to exactly one) cannot be sustained in any equilibrium when both nations' choices are the result of a rational decision-making process, implying that war cannot be an equilibrium outcome when the rationality of both players is common knowledge.

Definition 1: War is inefficient if it is known with certainty ex ante that the sum of the combatants' payoffs following a war will be strictly less than the sum of their payoffs in lieu of a war.

According to our definition, war being inefficient implies there is a prewar concession that both players would prefer to any realized postwar settlement. This is because war is akin to 'leaving money on the table': protracted military conflict imposes significant and avoidable costs on both participants in search of an assignment of property rights that is attainable without warfare.

Patty & Weber: Agreeing to fight



Representation of the Game

Figure 1

Theorem 1: Suppose that war is inefficient, both players are rational, this rationality is common knowledge, and war requires both players' consent. Then war is never an equilibrium outcome.

Proof: Suppose, contrary to the theorem, that war is an equilibrium outcome. Then it must be the case that the expected utility of war is no less than the expected utility of peace for both players, since either player may force the peaceful outcome by deferring. By the supposition that war is inefficient, the true

expected utility of war is less than the expected utility of peace for at least one (and perhaps both) of the two players. Hence, at least one player must strictly prefer deferring to going to war, implying that war between rational players cannot be supported in equilibrium, as was to be shown.

Notice that the theorem requires four conditions to be satisfied. First, war is assumed to be inefficient. As stated above, war is inefficient if there is a prewar concession that would make both nations strictly better off than if they go to war. This seems likely in most cases, since the realized outcome of a war (the allocation of territory, wealth, rights, and so on) can be implemented prior to the war without the loss of life and resources that defines the occurrence of militarized conflict.

Second, both players are assumed to be rational. The 'players' in our model correspond to the decision-making bodies in each of the two countries. Rationality implies that these bodies form (updated) beliefs based on all available information and in accordance with Bayes's rule. Essentially, this means that both nations' decision-making bodies recognize that the occurrence of war implies that the other nation is willing to fight and that this willingness *may* be informative in its own right. While there are plenty of reasons to doubt that 'group rationality' occurs in practice (or that it is even a meaningful concept),¹⁴ an explanation of war that rests upon the inherent 'irrationality' of group decision-making is dubious for at least two reasons. First, since we have no reason to suspect that certain groups or decision-making institutions are 'more rational' than others (as demonstrated by Arrow's possibility theorem¹⁵), a purveyor of such a theory would be hard pressed to explain the empirical regularities within international and domestic politics. Second, and more specific to the goals of this article, the avoidance of war within this framework is a common-value goal within each nation. In such environments, there are a variety of reasons to suspect that majority-rule-based (that is, 'democratic') institutions will tend to make 'rational' decisions.¹⁶

Third, common knowledge of the players' rationality implies that each player knows that the other player is rational, that the other's knowledge of one's own rationality is known by each player, and so forth. This is, in our opinion, the 'soft underbelly' of rational avoidance of conflict in the real world. Even if both nations' decision-making bodies make rational decisions, but believe that there is a miniscule probability that the other nation's decision-makers do not make rational decisions, the convergence process outlined by Aumann can 'unravel'. Our institutional argument, then, is that the transparency and regularity of democratic institutions (as opposed to the relatively opaque and capricious nature of many authoritarian governments) comes closer to inducing such common knowledge of rationality *at a dyadic level*.

Our requirement that war be mutually agreed upon in order to occur might be interpreted as requiring that either nation can agree to a concession that resolves the potential conflict without war. Such an interpretation would restrict the

domain of the theorem to protracted military conflicts: wars in which both sides actually fight one another. A more appropriate interpretation (at least in our opinion) is that the restriction focuses the attention of the article on the type of conflict that is both the most important and the most puzzling: situations in which neither nation will accept a reasonably generous settlement.

4.1. Discussion

The purpose of our model of warfare is to illuminate one possible explanation for the democratic peace. To do so, we argue that the key assumptions of the above model and result (most specifically, common knowledge of rationality) are more likely to be satisfied by democratic dyads.¹⁷ More specifically, Aumann's 'agreeing-to-disagree' result illuminates that *the most important characteristic of a dyad in the avoidance of inefficient militarized conflict is the existence of a high degree of mutual certainty regarding the rationality of the nations' decision-making processes.* Finally, characteristics such as transparency and the rule of law that distinguish democratic institutions promote the achievement and sustenance of such mutual certainty. We support this argument with two kinds of empirical evidence. The first collection of evidence is drawn from political economy and examines whether, *ceteris paribus*, democratic institutions tend to produce better decisions than autocratic ones. The second collection of evidence, drawn from behavioral economics and social psychology, documents the positive influence of group size on the performance of collective decisions and judgments.

Several studies have documented the regularity with which more participatory democracies are likely to produce outcomes favorable to most voters. Werner Pommerehne discusses several results, obtained by him and his co-authors, indicating that more direct democracies are more likely to produce results consistent with voter's preferences.¹⁸ For instance, one such set of studies finds that more direct and participatory democracies are more likely to produce outcomes closer to the median voter's preferences. Another finds that Swiss municipalities with more direct democracies are more efficient at public-good provision (in this case, garbage collection). In addition, government spending is significantly higher in representative democracies than in direct democracies.¹⁹

Feld and Savioz question one of the assumptions in most of the above studies, that less spending is better, and conducted a study to address this concern.²⁰ Specifically, they compare the economic performance of Swiss cantons with and without elements of direct democracy (direct approval of fiscal matters by voters). Using GDP as the measure of economic performance, they find that cantons with direct participation perform better (between 5 percent and 15 percent better) than those without.

Second, democratic decision-making processes generally include participation by a much larger number of people than analogous processes within autocratic governments. Accordingly, if large groups are more likely to behave rationally

than individuals or small groups, then democracies are likely to benefit from these advantages of size. In fact, there is considerable experimental evidence that groups perform better than individuals across a wide variety of tasks. Social psychologists, organizational researchers, and behavioral economists have addressed the question of whether groups behave more ‘rationally’ across a wide variety of decision problems and estimation tasks. While the studies vary greatly in the tasks they use and in the composition and size of groups, a common result across a majority of the research is that groups are generally better than the average individual.

In a meta-analysis within the psychological literature, Gayle Hill surveyed 139 studies of group versus individual performance, focusing on studies in which group performance of a task was compared with the performance of individuals of the same task and in which assignment to the group versus individual condition was random.²¹ Overall, Hill reported consistent evidence that groups performed better than the average individual performance, though not quite as well as the best group member. In tasks involving learning, groups consistently outperform individuals, making fewer errors and making better use of available information. Similarly, groups performed better in abstract problem solving, such as solving anagrams and spatial problems, though most of the difference could be explained by the fact that the group performed as well as the best member. However, in some tasks, such as difficult crossword puzzles, *groups performed better than the best individual members*. Not surprisingly, but most relevant to our analysis, groups also fared better on tasks that required the realization of an insight to solve the problem. This is significant for our analysis because the main intuition behind Aumann’s result (that at least one of two optimistic players must be overly so and that the players themselves should know this if their rationality is common knowledge) is easy to follow once the logical insight is obtained.

In related work, Frederick Miner, Jr also found that groups performed better than individuals in a complex decision task (involving a simulation of a ‘Winter Survival’ situation), but not quite as well as the best individual in the group.²² This result was replicated by Robert Cooke and John Kernaghan, who found that the result that groups perform better than individuals, though not better than the best individual in the group, obtained across several different aggregation rules for measuring the performance of individuals.²³

In more recent work comparing the performance of groups and individuals in economic situations, Douglas Davis and David Harless found that groups learned more quickly than individuals in a monopoly pricing task, producing higher average profits than ‘nominal groups’ comprised of equal numbers of individuals.²⁴ Alan Blinder and John Morgan examined differences between group and individual decision-making in a task in which the objective was to identify a change in a random process underlying a series of observations, such as trying to figure out when an underlying causal process in the economy has changed.²⁵ They found that groups do a better job (and earn significantly more money) than individuals.

The argument that links our result above to the democratic peace is straightforward. Decision-making in democratic institutions involves the participation of more individuals, transparency, and procedural regularity. Accordingly, democratic dyads are less likely to agree to disagree for two interrelated reasons. First, the above research clearly suggests that democracies are more likely to satisfy the rationality requirement in our model. This ‘first-order’ difference between democracies and autocracies is necessary, but not truly sufficient for the application of our theory to the democratic peace. Common knowledge of the two nations’ rationalities within a dyad (a ‘second-order’ difference, in the sense that it applies at the dyad level) is also required. Accordingly, equally important, though slightly more subtle, is the fact that decision-making within democratic institutions is generally more observable – in terms of this article’s application, the justifications for militarized conflict within a democracy are more apparent (as are, arguably, the true interests of the decision-makers populating democratic institutions). Accordingly, the common knowledge of rationality between two nations assumed to be rational will be more likely to hold when the two nations are both characterized by democratic decision-making processes.

5. Conclusion

We have presented a model of international militarized conflict that centers attention on information and decision-making. The theory’s main insight is that a dyad of nations possessing rational decision-making processes and common knowledge of this mutual rationality will never agree to fight a war when the possibility of a more efficient means of resource reallocation is available. This result relies on Aumann’s ‘agreeing-to-disagree’ result. Far from an abstract theorem, we believe that Aumann’s result carries important implications concerning the decision processes that must logically precede and coincide with protracted, bilateral military conflict. The most powerful aspect of Aumann’s result, however, may be seen by turning it upside down: even if two nations each make rational decisions about whether to go to war, prolonged and mutual military conflict can occur in equilibrium *unless the rationality of the decision-making bodies of the nations involved in the conflict is common knowledge*. We have argued that this implication highlights a deliberative side of the democratic peace: decision-making and political preferences are more transparent (and transparently formalized) in democracies than in autocratic regimes. Accordingly, the achievement of a common knowledge of rationality within jointly democratic regimes is more likely to be accomplished than with (jointly or partially) autocratic dyads.

Of course, common knowledge of rationality between two nations requires that the nations within the dyad do, in fact, make rational decisions with respect to pursuing militarized conflict. Accordingly, we have referenced a wide array of both experimental and empirical evidence suggesting that more inclusive

decision-making processes tend to produce better decisions in common-value situations.

In sum, while our theory is clearly stylized, it offers an informational justification for three empirical regularities:

1. Democratic dyads will be less likely to experience war than other dyads.
2. Democracies need not be characterized by a monadically lower level of militarized conflict than other regime types.
3. Democracies will make better decisions and accordingly experience greater success within a militarized conflict.

Of course, our theory is a simplification of the real world. It is unlikely that Aumann's result directly replicates any real situations, and Milgrom and Stokey even provide a counterexample to their own result by showing that speculative trade should never take place (when in fact it does).²⁶ However, the simplicity of our main point also makes it intuitively plausible: groups are more likely to behave rationally than individuals because they have more information to aggregate and because it often only takes one person to point out the correct decision; because they are more rational, groups should be less likely to make 'bad bets' than individuals. The quality of a bet depends on the rationality of the bettor on the other side – if larger groups and more inclusive decision-making processes make more rational decisions, they will also be more likely to recognize the increased rationality of a bet placed by a bettor with a larger or more inclusive decision-making process. In sum, large groups have two orders of advantage over smaller groups and individuals – their decision-making is better in static environments (such as solving a crossword puzzle) and more likely to recognize when a situation has strategic components (such as placing a bet or going to war).

We view our theory as complementing other explanations, including the normative (democracies favor pacifism, especially toward other democracies) and the structural (democracies are more constrained by their institutions and therefore less able to go to war). In particular, our theory adds to the existing literature in that it makes no normative claims of democratic 'goodness' – rather, the observed performance advantage possessed by groups over individuals and the institutional characteristics such as transparency and the rule of law that characterize democracies result in a strategically induced aversion to war within democratic dyads. We do not argue that democracies are peace loving and will therefore always try to find a peaceful resolution. On the contrary, our theory is consistent with the assumption that democracies and autocracies are, *ceteris paribus*, equally willing to 'bet on war' if they believe that they will win and they believe their opponent is making an irrational bet. Indeed, this is consistent with much of the empirical research. Similarly, in our theory, all countries (regardless of their decision-making institutions) are equally free to choose to go to war. Even without additional structural constraints, however, our theory predicts that democratic dyads will be unlikely to go to war with each other.

At this point, it is important to recall that our theory does not predict that democracies will never go to war against one another. Aumann's result implies that two people will never bet on the outcome of a sporting event if they each care only about their own monetary return from the bet. Similarly, in our argument, two 'rational' countries should never bet against each other in war if they only care about the final allocation of resources within the dyad. Of course, just as it might be the case that two rational people may bet on the game if they derive pleasure from betting or it makes the event more enjoyable for other reasons, it may also be the case that two rational democracies are willing to go to war against each other for reasons other than the material gains of war. If either nation has another reason (or reasons) for going to war, then war may no longer be inefficient. In such a case, the agreeing-to-disagree result no longer holds. However, the fact that the data support the contention that democracies tend not to lose wars implies that this is rarely the case.

Finally and as discussed previously, there is another very plausible scenario in which (even with the presumption that democracies are best approximated as making rational decisions) two democracies agreeing to fight a war *is* consistent with our theory. This occurs when one or both democracies *do not believe that the other nation is a democracy*. In this case, the common knowledge of rationality required for Aumann's result is not satisfied. John Owen presents evidence that this might be the case: he discusses several instances in which countries that may be considered democracies have fought each other, but only when the majority of citizens in one of the countries perceived the other not to be democratic.²⁷

Thus, our theory proposes that it is not democracy per se that leads to democratic peace, but that dyads comprised of nations with more rational leaderships and better understandings of this rationality are less likely to fight one another. Therefore, similarly to the arguments of Tom Schwartz and Kiron Skinner, we argue that the 'democratic' peace is not necessarily (at least theoretically) limited to democracies.²⁸ Other causal factors might include the degree of rule of law, transparency of national decision-making processes, the extent to which nations' media firms are allowed to report honestly and impartially domestic and foreign affairs, the duration of diplomatic relations between two states, the dyadic stability of government leadership (properly construed to include career bureaucrats and the civil service as well as the political leaders of nations within a dyad), and the extent of cultural and economic ties between two nations. We hope that future work on the democratic or deliberative peace will explore the role of these informational aspects in determining the occurrence of mutually pursued militarized conflict.

notes

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1. A few examples include John R. Oneal and Bruce Russett, 'The Kantian Peace: The Pacific Benefits of Democracy, Interdependence, and International Organizations, 1885–1992', *World Politics* 52 (1999): 1–37; David L. Rousseau, Christopher Gelpi, Dan Reiter and Paul K. Huth, 'Assessing the Dyadic Nature of the Democratic Peace', *American Political Science Review* 90 (1996): 512–33; Stuart A. Bremer, 'Dangerous Dyads: Conditions Affecting the Likelihood of Interstate War, 1816–1965', *Journal of Conflict Resolution* 36 (1992): 309–41; William J. Dixon, 'Democracy and the Peaceful Settlement of International Conflict', *American Political Science Review* 88 (1994): 14–32; B. Russett, 'The Fact of the Democratic Peace', in *Debating the Democratic Peace*, edited by Michael E. Brown, Sean M. Lynn-Jones and Steven E. Miller (Cambridge, MA: MIT Press, 1996).
2. Joanne S. Gowa, *Ballots and Bullets* (Princeton, NJ: Princeton University Press, 1999); Thomas Schwartz and Kiron K. Skinner, 'The Myth of the Democratic Peace', *Orbis* 46 (2002): 159–72.
3. This result has been extended to speculative trade to show that no such trade should occur based on differences in information. See, for example, Paul Milgrom and Nancy Stokey, 'Information, Trade, and Common Knowledge', *Journal of Economic Theory* 26 (1982): 17–27.
4. Rousseau et al., 'Assessing the Dyadic Nature of the Democratic Peace'; Russett, 'The Fact of the Democratic Peace'; Erik Gartzke, 'Kant We All Just Get Along? Opportunity, Willingness and the Origins of the Democratic Peace', *American Journal of Political Science* 42 (1998): 1–27.

While most of the empirical literature points to a strong effect of democracy (most of the large-sample studies are in agreement that democracies do not fight one another), there is not unanimity among international relations scholars about the validity of the democratic peace. A group within the field, the realist school, argues that domestic institutions do not have the type of effect necessary on international relations for the democratic peace to obtain. Instead, they claim, international conflict is uniquely determined by the distribution of military capabilities and security concerns between countries. However, the studies supporting the realist contention suffer from methodological flaws or small samples. See Rousseau et al., 'Assessing the Dyadic Nature of the Democratic Peace'.

5. Oneal and Russett, 'The Kantian Peace: The Pacific Benefits of Democracy, Interdependence, and International Organizations, 1885–1992'. The democratic peace is often associated with the term 'Kantian peace' due to Kant's argument that the blossoming of democracy, trade, and international cooperation would lead to a decline in the frequency of war.
6. Zeev Maoz and Bruce Russett, 'Normative and Structural Causes of Democratic Peace, 1946–1986', *American Political Science Review* 87 (1993): 624–38.
7. Rousseau et al., 'Assessing the Dyadic Nature of the Democratic Peace', p. 527.
8. Gartzke, 'Kant We All Just Get Along? Opportunity, Willingness and the Origins of the Democratic Peace'.
9. Maoz and Russett, 'Normative and Structural Causes of Democratic Peace, 1946–1986'; Bruce Russett, 'Why Democratic Peace?' in *Debating the Democratic Peace*, edited by Michael E. Brown, Sean M. Lynn-Jones and Steven E. Miller (Cambridge, MA: MIT Press, 1996).

10. Bruce Bueno de Mesquita, James D. Morrow, Randolph M. Siverson and Alastair Smith, 'An Institutional Explanation of the Democratic Peace', *American Political Science Review* 93 (1999): 791–807; Bruce Bueno de Mesquita, Alastair Smith, Randolph M. Siverson and James D. Morrow, *The Logic of Political Survival* (Cambridge, MA: MIT Press, 2003).
11. Robert J. Aumann, 'Agreeing to Disagree', *Annals of Statistics* 4 (1976): 1236–9.
12. This is why the common knowledge of rationality is so important: if one decision-maker believes that the other one might be crazy (conceptualized here as *wanting* to lose the bet), then the beliefs do not necessarily converge, and a bet (that is, a 'war') might occur. This is exactly how the result, we believe, fits in with the notion of the democratic peace as a 'deliberative peace'. For an early application of this logic to asymmetric information in exchange situations, see George A. Akerlof, 'The Market for "Lemons": Quality Uncertainty and the Market Mechanism', *Quarterly Journal of Economics* 84 (1970): 488–500.
13. For reasons of simplicity, we do not formally define the strategies and beliefs that would be used for a full game-theoretic treatment of the game represented in Figure 1. Our goal in this article is to bridge three literatures (economic theory, social psychology, and international relations) in an attempt to offer a contribution to the discussion of the democratic peace. We have chosen a more compact representation of the problem so as to maximize our focus on the key aspects of Aumann's results and their relation to the monadic and dyadic properties of political institutions. We thank a referee for useful discussions and comments along these lines.
14. This point has been made by many authors. Two famous discussions of this are William H. Riker, *Liberalism Against Populism: A Confrontation Between the Theory of Democracy and the Theory of Social Choice* (New York: Waveland, 1982) and Kenneth Arrow, *Social Choice and Individual Values* (New Haven, CT: Yale University Press, 1951).
15. Arrow, *Social Choice and Individual Values*.
16. This is the basis of a large literature on 'Jury theorems', which examines the impact of institutions, preferences, and behavior on group information aggregation. Some examples of this literature include Bernard Grofman, Guillermo Owen and Scott L. Feld, 'Thirteen Theorems in Search of the Truth', *Theory and Decision* 15 (1983): 261–78; Bernard Grofman and Scott L. Feld, 'Rousseau's General Will: A Condorcetian Perspective', *American Political Science Review* 82 (1988): 567–76; Krishna K. Lahda, 'The Condorcet Jury Theorem, Free Speech and Correlated Votes', *American Journal of Political Science* 36 (1992): 617–34; David Austen-Smith and Jeffrey S. Banks, 'Information Aggregation, Rationality and the Condorcet Jury Theorem', *American Political Science Review* 90 (1996): 34–45; Christian List and Robert E. Goodin, 'Epistemic Democracy: Generalizing the Condorcet Jury Theorem', *Journal of Political Philosophy* 9 (2001): 277–306.
17. While we believe that democratic institutions are quite possibly better (that is, more rational) decision-making entities with regard to decisions such as when to initiate or actively pursue militarized conflict than autocracies, as argued above, this is neither a sufficient nor the most useful theoretical justification for the democratic peace.
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19. Werner W. Pommerehne and Friedrich Schneider, 'Unbalanced Growth Between Public and Private Sectors: An Empirical Examination', in *Public Finance and Public Employment*, edited by Robert H. Haveman (Detroit, MI: Wayne State University Press, 1982).
20. Lars P. Feld and Marcel R. Savioz, 'Direct Democracy Matters for Economic Performance: An Empirical Investigation', *Kyklos* 50 (1997): 507–38.
21. Gayle W. Hill, 'Group Versus Individual Performance: Are $N + 1$ Heads Better Than One?' *Psychological Bulletin* 91 (1982): 517–39.
22. Frederick C. Miner, Jr, 'Group Versus Individual Decision Making: An Investigation of Performance Measures, Decision Strategies, and Process Losses/Gains', *Organizational Behavior and Human Performance* 33 (1984): 112–24.
23. Robert A. Cooke and John A. Kernaghan, 'Estimating the Difference Between Group Versus Individual Performance on Problem-Solving Tasks', *Group and Organization Studies* 12 (1987): 319–42.
24. Douglas D. Davis and David W. Harless, 'Group vs. Individual Performance in a Price-Searching Experiment', *Organizational Behavior and Human Decision Processes* 66 (1996): 215–27.
25. Alan S. Blinder and John Morgan, 'Are Two Heads Better than One? An Experimental Analysis of Group Versus Individual Decision Making', *Journal of Money, Credit and Banking* 37 (2005): 789–811.
26. Milgrom and Stokey, 'Information, Trade, and Common Knowledge'.
27. John R. Owen, 'How Liberalism Produces Democratic Peace', in *Debating the Democratic Peace*, edited by Michael E. Brown, Sean M. Lynn-Jones and Steven E. Miller (Cambridge, MA: MIT Press, 1996).
28. Schwartz and Skinner, 'The Myth of the Democratic Peace'.