# Cheap Talk Causes Peace: Policy Bargaining and International Conflict

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**Abstract**

Studies of bargaining and war generally focus on two sources of incomplete information: uncertainty about the probability of victory and uncertainty about the costs of fighting. We introduce a third: ideological preferences of a spatial policy. Under these conditions, standard results from the bargaining model of war break down: peace can be inefficient and it may be impossible to avoid war. We then extend the model to allow for cheap talk pre-play communications. Whereas incentives to misrepresent normally render cheap talk irrelevant, here communication can cause peace and ensure that agreements are efficient. Moreover, peace can become more likely when the proposer becomes more uncertain about the opposing state. Our results indicate one major purpose of diplomacy during a crisis is simply to communicate preferences and that such communications can be credible.

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# 1 Introduction

The past two decades of research on bargaining and war has shown that asymmetric uncertainty can lead to inefficient fighting.[1] Traditionally, this incomplete information comes from two sources: *power* and *resolve*. As a result of this uncertainty, a rival may misjudge its opponent's reservation value for war because it overestimates its own probability of victory or it underestimates how costly its opponent views fighting. These insufficient offers then lead to bargaining breakdown and physical confrontation.

Although this literature has helped scholars of international relations understand inefficient warfare, these standard sources of uncertainty overlook a critical component of crisis bargaining. Indeed, the central talking point during many international negotiations is not the ability to coerce or the desire to do so but rather the dissemination of policy preferences. To wit, current negotiations between the United States and Iran hinge on Iran's desired level of nuclearization. Following the fall of Viktor Yanukovych, the United States and Russia discussed how much influence their respective alliances should have in Ukraine. And diplomats routinely debate their preferred domestic policies that will follow the end of civil war.

Why do diplomats spend so much time discussing their preferences? In this paper, we explore the role of this type of cheap talk in resolving international crises in the shadow of war. Previous findings indicate that cheap talk is ineffective at resolving tensions because weaker types have incentive to bluff strength and steal a greater share of the peaceful settlement (Fearon (1995); Fey and Ramsay (2010)). However, when the source of uncertainty is misinformation about the opponent's preferred policy, *cheap talk can successfully convince states not to fight*.

We begin by developing a spatial model of policy preferences in the shadow of war. With complete information, the results are identical to the standard bargaining model of war—a range of mutually preferable settlements exist that reflect the probability of victory and the

[1] For a non-exhaustive list of such findings, see Fearon (1995), Powell (1999), Filson and Werner (2002), Slantchev (2003), Powell (2004), Smith and Stam (2004), Slantchev (2005), and Fey and Ramsay (2011).

costs of conflict. Thus, the standard model can adequately address negotiations over policy preferences *when no uncertainty exists*.

In contrast, adding uncertainty about these ideological positions overturns many results common to the literature on bargaining and war. First, in the standard model, all peaceful settlements are Pareto efficient. That is, after the game ends peacefully and all information is revealed, no alternative settlement exists that one state strictly prefers that does not make the other state worse off. Nevertheless, when opposing ideal points are sufficiently close together and the costs of war are sufficiently great, we show that peace is Pareto inefficient by design. Indeed, to induce all opposing types to accept a peaceful settlement, the proposer might have to overshoot a moderate type's ideal point. Although both the proposer and moderate type would prefer a less extreme policy, the uncertainty prevents the parties from striking a better deal.

Second, under the standard assumptions, proposers face the risk-return tradeoff when confronting a range of possible opponents. In this tradeoff, smaller offers yield superior peaceful divisions when bargaining succeeds but increases the probability of war. Safer offers, on the other hand, increase the probability of peace but come at the cost of increased concessions. In the extreme, the safest offer guarantees a peaceful resolution. However, with uncertainty over ideal points and sufficiently divergent preferences, we show that proposers cannot appease all of their possible opponents simultaneously. States must instead pick one group to appease and one group to induce war against.

Third, cheap talk normally fails to yield a substantive change to the bargaining outcome due to incentives to misrepresent. This is because weaker types prefer to mimic stronger types in the hope of obtaining more of the bargaining good. In contrast, the incentive to misrepresent disappears under a variety of conditions with uncertainty about ideal points. Receivers may then openly reveal their types because doing so allows the proposer to hone in on a bargained resolution that both parties find preferable to war. The communication is credible because other types have sufficiently different ideal points and therefore prefer war to obtaining the settlements necessary to appease alternative types.

The success of cheap talk in this paper relates to previous findings in the cheap talk literature. The pioneering work of Crawford and Sobel (1982) showed that with one-sided incomplete information informative communication can occur when players' preferences are not too dissimilar. The ability of cheap talk to improve outcomes has been extended to other contexts (Aumann and Hart (2003), Austen-Smith (1994), Battaglini (2002), Farrell and Gibbons (1989), Krishna (2001)) and this research comports with our result that cheap talk is most effective when there is some probability that the countries' ideal points are close. Furthermore, we show that informative information transmission is still possible with two-sided incomplete information[2].

Finally, we show that decreasing uncertainty about types has a nonmonotonic relationship on the outbreak of war. When the universe of possible opposing ideal points is sufficiently small, the proposer always prefers making the "safe" offer that all types are willing to accept; the marginal gains from making more aggressive offers fail to offset the increased probability of war and destruction of surplus. When the ideal points of possible opponents are sufficiently disparate, cheap talk reveals information and allows the parties to reach mutually preferable settlements. Yet when the domain of potential opponents falls in a middle range, bargaining fails. Here, the proposer prefers making aggressive offers that more extreme types will reject. Unfortunately, cheap talk cannot resolve the underlying dilemma in this situation because moderate types wish to mimic extremists to move the negotiated settlement closer to their preferred policy.

Our analysis complements existing research on cheap talk communication and bargaining by exploring whether such messages can improve efficiency under non-standard assumptions about the topic of contention. While incentives to misrepresent normally cloud the bargaining environment when the underlying uncertainty is over power or resolve (Fearon (1995);

[2] See Fey, Kim and Rothenberg (2007), Matthews and Postlewaite (1989), Myerson and Satterthwaite (1983), and Valley et al. (2002) for further work on the efficiency of cheap talk under two-sided incomplete information.

Fey and Ramsay (2010)), credible communication can succeed when opposing types are sufficiently varied in their policy preferences. We are not the first to show that cheap talk can affect the bargaining environment to some degree; however, we identify a new mechanism that permits credible communication—ours is not a result of domestic politics (Fearon (1994); Schultz (2001)), coordination problems (Ramsay (2011)), repeated play (Sartori (2002)), or fears of damaging a bilateral relationship on other issues (Trager (2010)). Rather, cheap talk allows rivals to calibrate their offers to avoid mutually unattractive policy outcomes.

We develop our argument linearly in the sections that follow. The next section introduces the complete information version of the model and shows how it is nearly isomorphic to the standard model. After, we add uncertainty over ideological positioning and show that this can lead to unavoidable war and inefficient peace. The following section permits the parties to exchange cheap talk communications; under some conditions, this ultimately improves efficiency. We then briefly discuss how uncertainty has a nonmonotonic relationship with the probability of war and test the robustness of our findings with two-sided uncertainty. A brief conclusion ends the paper.

## 2 Policy Bargaining with Complete Information

We begin by exploring the interaction when there is complete information. Suppose two states, denoted 1 and 2, bargain over where to set some policy on the real line. If bargaining fails then the parties fight a war. State 1 wins with probability $p \in [0, 1]$ and 2 prevails with complementary probability. The victor then unilaterally sets the policy position, but both sides pay costs $c_1, c_2 > 0$.

Consistent with standard one-shot ultimatum models of crisis bargaining, the timing is as follows. State 1 offers a policy position $x \in \mathbb{R}$. State 2 sees the offer and chooses whether to accept or reject. Accepting locks in that settlement. Rejection leads to war as described above—Nature selects a winner, the winner implements a policy, and both states suffer their respective costs. The game then ends.

Unlike the standard model, the players have spatial payoffs. In particular, states 1 and 2 have respective ideal points $\hat{x}_1$ and $\hat{x}_2$. Without loss of generality, we assume that $\hat{x}_1 < \hat{x}_2$. Thus, each payoff for a peaceful resolution is the Euclidean distance between the player's ideal point and the implemented policy, or $-|x - \hat{x}_1|$ for state 1 and $-|x - \hat{x}_2|$ for state 2. The payoffs are analogous for policies implemented through war except we subtract $c_1$ from state 1's payoff and $c_2$ from state 2's payoff.

We can now solve for the game's subgame perfect equilibrium (SPE). An SPE is a set of strategies, one for each player, such that the strategies form a Nash equilibrium in every subgame.

**Proposition 1.** *In every SPE, state 1 offers* $x = \max\{\hat{x}_1, \hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2\}$ *and state 2 accepts if* $x \in [\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2, \hat{x}_2 + (\hat{x}_2 - \hat{x}_1)(p) + c_2)$*. The game ends peacefully. Off the path, both states select their ideal points if they win a war.*

*Proof.* Post-war unilateral policy decisions are trivial—the winner only needs to maximize his own utility function and so selects his own ideal point. This gives state 1 a war payoff of $-|\hat{x}_1 - \hat{x}_1|(p) - |\hat{x}_2 - \hat{x}_1|(1-p) - c_1 = -(\hat{x}_2 - \hat{x}_1)(1-p) - c_1$ and state 2 a war payoff of $-|\hat{x}_1 - \hat{x}_2|(p) - |\hat{x}_2 - \hat{x}_2|(1-p) - c_2 = -(\hat{x}_2 - \hat{x}_1)(p) - c_2$. Thus, state 2 is willing to accept any $x \in [\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2, \hat{x}_2 + (\hat{x}_2 - \hat{x}_1)(p) + c_2]$.[3] If $\hat{x}_1 \in [\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2, \hat{x}_2 + (\hat{x}_2 - \hat{x}_1)(p) + c_2]$, 1 chooses $x = \hat{x}_1$; any other offer leads to a peaceful settlement further from state 1's ideal point or war, both of which are strictly worse. If $\hat{x}_1 \notin [\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2, \hat{x}_2 + (\hat{x}_2 - \hat{x}_1)(p) + c_2]$, state 1's optimal acceptable offer equals $\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2$; anything else is an unnecessary concession. Offering anything outside that region leads to war. Thus, making the optimal acceptable offer yields a greater payoff if:

[3] For all our proofs, we assume that state 2 accepts with probability 1 when indifferent. However, in every equilibrium, state 2 must accept $\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2$; otherwise, consistent with standard ultimatum games, state 1 has no optimal strategy. If $x = \hat{x}_2 + (\hat{x}_2 - \hat{x}_1)(p) + c_2)$, state 2 is indifferent between accepting and rejecting. Consequently, the game has infinitely many equilibria. That said, such an offer occurs off the path. In turn, the equilibrium outcome is unique.

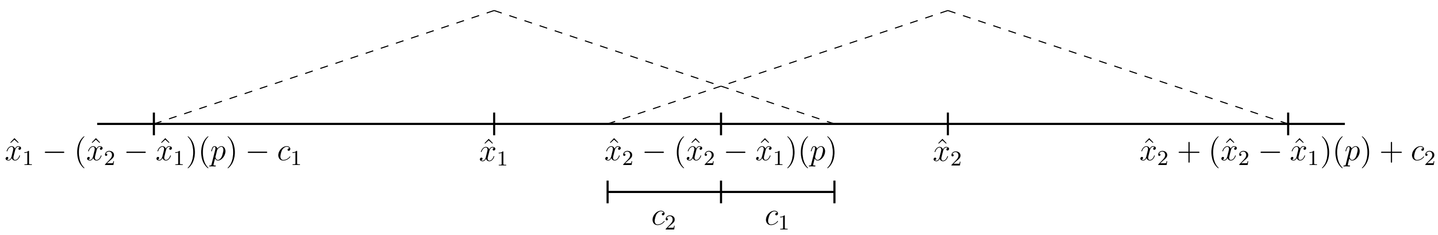


Figure 1: The bargaining problem. The tents surrounding each player's ideal point represents the range of policy choices that player prefers to war. The overlap around $\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p)$ reflects how mutually preferable settlements always exist.

$$-|\hat{x}_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2 - \hat{x}_1| > (\hat{x}_1 - \hat{x}_2)(1 - p) - c_1,$$

which reduces to

$$c_1 + c_2 > 0.$$

This is true since the costs are individually greater than 0. □

Figure 1 illustrates the results geometrically. Each player has an ideal point on the real line. In deciding whether to accept or reject an offer, the parties must consider the average ideal point generated through conflict and their costs of war. These factors imply that each side individually prefers a range of settlements surrounding its ideal point, which the tents reflect. As in the standard bargaining model, the costs of war also imply that a range of *mutually* preferable settlements exist as well. Observing that any $x \in [x_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2, x_2 + (\hat{x}_2 - \hat{x}_1)(p) + c_1]$ is mutually acceptable, state 1 selects the policy in the set closest to its ideal point, which is $x_2 - (\hat{x}_2 - \hat{x}_1)(p) - c_2$ in Figure 1, as its ultimatum offer.

Note that this model is nearly isometric to the standard bargaining model of war. Indeed, substituting $\hat{x}_1 = 0$ and $\hat{x}_2 = 1$ into the model yields the traditional setup. The lone difference is that the model permits offers to be below 0 and above 1. With complete information, forcing all offers to be between 0 and 1 does not affect the results. After all, everything outside of the unit interval is Pareto dominated by a value in the unit interval and thus the states would never choose such values.

However, concluding that the standard model suits the universe of interstate crises based on the near isomorphism is a mistake. Indeed, as the introduction of the paper previewed, the standard model cannot adequately cover spatial policy preferences if the players have uncertainty about the other's ideal point. We show why and illustrate some key findings regarding that in the next section.

# 3 Uncertainty over Ideal Points

Consider the following extension to the complete information model. Nature now begins the interaction by selecting state 2's ideal point; it picks $\underline{\theta}_2$ with probability $q$ and chooses $\bar{\theta}_2$ with complementary probability. Without loss of generality, we assume $\bar{\theta}_2 > \underline{\theta}_2$ and $\bar{\theta}_2 > \hat{x}_1 = 0$. State 2 observes its ideal point but state 1 only knows the prior distribution. State 1 then offers a policy position $x \in \mathbb{R}$, which state 2 accepts or rejects. The game ends and the players realize their payoffs in the same manner as the complete information model.

Before listing our key results, some notation will prove useful. As the complete information proof showed, the set of policies the "low" type prefers to war is $[\underline{\theta}_2 - (\underline{\theta}_2 - x_1)(p) - c_2, \underline{\theta}_2 + (\underline{\theta}_2 - x_1)(p) + c_2]$. By analogous argument, the set of policies the "high" type prefers is $[\bar{\theta}_2 - (\bar{\theta}_2 - x_1)(p) - c_2, \bar{\theta}_2 + (\bar{\theta}_2 - x_1)(p) + c_2]$. To clean up the notation, we refer the low type's acceptance set as $A(\underline{\theta}_2)$ and the high type's as $A(\bar{\theta}_2)$. Note that the acceptance set of a type further away from state 1's ideal point is larger than a type closer. This is because more extreme types suffer a comparatively worse fate if they lose a war and are thus more willing to tolerate more peaceful settlements.

Since we are now looking at an extensive form game with incomplete information, we use perfect Bayesian equilibrium (PBE) as our solution concept. A PBE is a set of strategies and beliefs, where are strategies sequentially rational and beliefs are updated via Bayes' rule wherever possible. We are now ready for our main results.

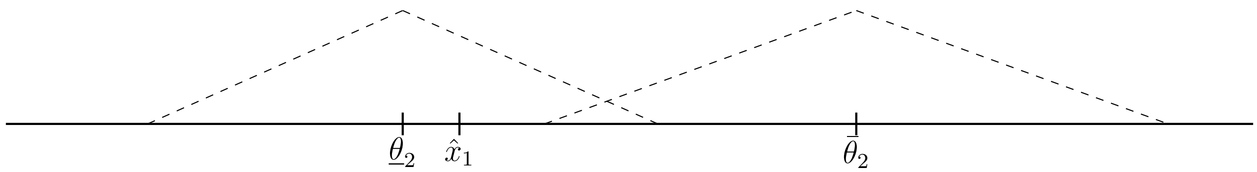


Figure 2: An illustration of Proposition 3's problem. State 1 faces a risk-return tradeoff: it can either appease both types of 2 by offering an amount in the intersection of the tents or it can attempt to implement its ideal point and suffer war against the high type.

**Proposition 2.** *Suppose that both types of state 2 prefer 0 to war (i.e., $0 \in A(\underline{\theta}_2) \cap A(\bar{\theta}_2)$). Then state 1 offers $x = 0$ and both types accept.*

The proof is trivial and the logic is a simple extension to the corner solution of Proposition 1. As is true of all parameter spaces, the winner of the war implements his ideal point since there are no other relevant considerations at the end of the game. Because the costs of war are sufficiently great, both types prefer implementing 0 to war. In turn, state 1 knows it can offer its ideal point and have state 2 accept it with certainty. All other offers are suboptimal—they will either lead to war or acceptance of a policy further away, both of which are worse than obtaining 1's ideal point.

In contrast, state 1 faces a greater dilemma when it cannot simply propose a policy of 0 and expect all types to accept.

**Proposition 3.** *Suppose that the set of policies that both types of state 2 prefer to war is non-empty and that the low type prefers 0 to war (i.e., $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) \neq \emptyset$ and $0 \in A(\underline{\theta}_2)$). Then state 1 offers $x = 0$ if $q > \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1}$ and offers $x = \bar{\theta}_2(1-p) - c_2$ if $q < \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1}$. In the latter case, peace can be Pareto inefficient.*

See the appendix for proof. Figure 2 illustrates state 1's dilemma. The set of settlements both types of state 2 are willing to accept intersect. Consequently, if state 1 wants to guarantee the peace, it can simply offer an amount within that space. Alternatively, because state 1's ideal point falls in the low type's acceptance set, it can attempt to demand its most preferred policy. This will pay off whenever state 1 was actually facing the low type. However, the high type will punish this aggressive bargaining strategy with war.

Consequently, state 1 must weigh the risk for demanding its ideal point versus the potential reward for succeeding. As the cutpoint in Proposition 3 shows, the probability that state 2 is the low type and the costs of war heavily determine which option state 1 will choose. As $q$ increases, the gamble pays off more often and encourages state 1 to pursue the aggressive bargaining stance. On the other hand, as state 1's costs of war grow arbitrarily large, the right side of the inequality goes to 1 and state 1 will assuredly pick the safer offer. This is because the punishment for guessing wrong is so high that state 1 prefers picking an offer that is sure to preserve the substantial surplus.

While the risk-return tradeoff is well-known to crisis bargaining researchers, this model breaks from standard results in two significant ways. First, and as Figure 2 illustrates, the two types of receiver need not be on the same "side" of the bargaining issue. As diagrammed, the low type prefers a policy to the left of state 1, while the high type prefers a policy to the right. In this manner, although the types do not agree with each other in a meaningful way, state 1 must still decide whether it wants to appease both types or make more aggressive demands.[4]

Second, peace is not always Pareto efficient. If $q > \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1}$, state 1 offers $x = 0$. Peace—if it prevails because state 2 is the low type—is efficient here since state 1 receives its ideal point. (War with the high type is inefficient, of course.) However, consider the outcome if if $q < \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1}$ and state 1 offers $x = \bar{\theta}_2(1-p) - c_2$. Both types accept. Peace is now Pareto efficient with the high type; state 1 receives its most preferred outcome within the high type's peace constraint, so any other policies would either lead to a worse peaceful outcome for state 1 or war. As for the low type, if $\underline{\theta}_2 \in A(\bar{\theta}_2)$, any deviations from the equilibrium offer either lead to increased war or a strictly worse peaceful payoff for state 1.

But consider the outcome when $q < \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1}$ and $\underline{\theta}_2 \notin A(\bar{\theta}_2)$, as situated in Figure 2. State 1's equilibrium offer is the leftmost point of the high type's acceptance set. The low type accepts this offer. Yet, in a counterfactual world where all information has been

[4]Notably, though, the same risk-return tradeoff still exists if $\underline{\theta}_2$ meets the requirements of the proposition and falls to the right of $x_1$.

revealed, both the low type and state 1 prefer shifting the implemented policy to the left. In other words, peace is inefficient. The issue is that such settlements cannot simultaneously induce the high type's compliance, forcing state 1 to accept inefficient peace to a higher probability of war.

Fortunately, as we will later demonstrate, cheap talk can alleviate this problem some of the time.

**Proposition 4.** *Suppose that the set of policies that both types of state 2 prefer to war is non-empty and that both types prefer war to a policy of 0 (i.e., $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) \neq \emptyset$ and $0 \notin A(\underline{\theta}_2) \cup A(\bar{\theta}_2)$). Then state 1 offers $x = \underline{\theta}_2(1-p) - c_2$ if $q > \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1+c_2}$ and offers $x = \bar{\theta}_2(1-p) - c_2$ if $q < \frac{c_1+c_2}{(1-p)\underline{\theta}_2+c_1+c_2}$. In the latter case, peace can be Pareto inefficient.*

See the appendix for proof. The intuition is identical to that of Proposition 3. The key difference here is that state 1's ideal point does not fall in either type's acceptance set. (Visually, this is shifting the high type's and the low type's ideal points further to the right in Figure 2.) Thus, state 1 must now decide whether to appease just the low type by offering the point in the low type's acceptance set closest to state 1's ideal point or the analogous point for the high type. If it offers just enough to induce the low type to accept, the high type rejects. But if it offers enough to buy off both types, it pays a premium to the low type. As a result, state 1 is more likely to make the aggressive offer if the probability it is facing the low type is high or if the costs of war are low.

Given Proposition 3's similarity to Proposition 4, a careful reader may wonder why we present both results. As we will show later, the difference in the parameter spaces is non-trivial—cheap talk can only work under Proposition 3's parameter space.

The last case concerns situations where the acceptance sets of the two types do not overlap. Here, we focus on the non-corner solution, as solving for the corner case does not add any additional theoretical insight that the following proposition does not already address.

**Proposition 5.** *Suppose that the set of policies that both types of state 2 prefer to war is*

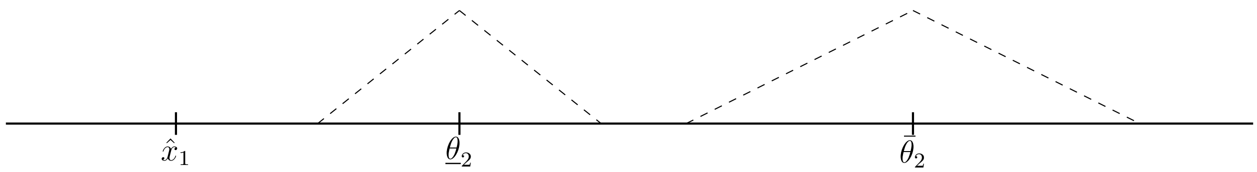


Figure 3: An illustration of Proposition 5's problem. Because the acceptance sets of the two types of state 2 do not overlap, any offer state 1 proposes leads to war with positive probability.

*empty and that both types prefer war to a policy of 0 (i.e., $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) = \emptyset$ and $0 \notin A(\underline{\theta}_2) \cup A(\bar{\theta}_2)$). Then state 1 offers $x = \underline{\theta}_2(1-p) - c_2$ if $q > \frac{1}{2}$ and offers $x = \bar{\theta}_2(1-p) - c_2$ if $q < \frac{1}{2}$.*

See the appendix for proof. The critical finding here is that state 1 cannot obtain peace with certainty no matter what offer it makes. This is in stark contrast to the standard risk-return tradeoff that in the literature and that we saw in the previous two propositions. In those situations, state 1 could always buy off all types of state 2, though it may prefer a more aggressive bargaining position because the risk is worth the reward. Here, however, state 1 is not trading off risk for more advantageous settlements. Rather, if it makes the first type of offer, one type will accept and the other side will reject. But if it makes the second type of offer, the other type accepts but the original type now rejects. In other words, state 1 faces a no-win situation.

Figure 3 illustrates the problem. If state 1 wishes to appease the low type, its optimal offer is the leftmost point of the low type's acceptance set; if it wishes to appease the high type, its optimal offer is the leftmost point of the high type's acceptance set. But because the acceptance sets do not overlap, neither of these offers can simultaneously satisfy both types. Either state 1 offers a moderate policy and provokes the wrath of the extremist type, or it offers an extreme policy and provokes the wrath of the moderate type.

Unlike with the risk-reward tradeoff, state 1's optimal choice is *not* a function of the costs of war or the distance between the various ideal points. Instead, it simply appeases the the most likely type. The reason that the other factors do not matter is because state

1 is forced to pay its own cost of war, lose out on stealing the surplus from state 2's costs, and suffer the same policy loss in equal quantities regardless of the realized type. As such, state 1 simply chooses to lose that equal amount the smaller portion of the time.[5]

Also, note that Proposition 5 makes no assumptions about whether the low type's ideological position is to the right of state 1's (as pictured in Figure 3) or to the left. Thus, state 1 may be stuck fighting a war because it cannot discern which side of the policy aisle its opponent is on.

## 4 The Utility and Limitations of Cheap Talk

The previous section explored the game's equilibria if state 2 does not have the ability to send messages to state 1. Although the interaction sometimes ends peacefully, inefficiency can result due to suboptimal peaceful settlements and due to having a positive probability of war. The question then becomes whether the states can resolve some of that inefficiency through communication.

There is reason to be skeptical that cheap talk could work. Recall that the winner of a war always implements its ideal point. In turn, the incentives to truthfully reveal this ideal point *ex ante* are not clear. After all, the set of policies that the rival state prefers to war depends on the original state's ideal point. As a result, in the bargaining phase, it appears that states would want to communicate more extremist preferences compared to their rival's ideal point. If successful, this would shift the bargaining range closer to the bluffer's actual ideal point and increase the utility of a settlement.

However, in this section, we show that cheap talk works despite this incentive to misrepresent. To explain why, we now introduce the following extension to the interaction that allows for cheap talk. This time, after Nature draws state 2's type, state 2 sends a message

[5] In the corner case, state 1 faces a similar tradeoff. First, it can demand its own ideal point and receive peace from the low type but war with the high type. Second, it can offer the leftmost point of the high type and receive peace from the high type but war with the low type. Either way, war occurs with positive probability.

$m \in \{\underline{\theta}_2, \bar{\theta}_2\}$ to state 1 after it observes its type. The game then proceeds as before. Consistent with the concept of cheap talk, the message that state 2 sends does not directly affect either player's payoff. Rather, any effect must be an indirect result of the inference state 1 draws from the particular message.

Whereas the game without cheap talk featured unique equilibrium outcomes, the cheap talk game yields multiple equilibrium outcomes. The critical difference is that state 1 did not have to update its beliefs about state 2 as the game progressed previously. This was because state 1 did not take any type-dependant decisions after state 2 moved. In contrast, with cheap talk, state 1 must propose an offer immediately following a manipulable signal from state 2. Unfortunately, this means that multiple equilibria can result since the inferences state 1 draws off-the-path can justify various different messaging strategies.

Rather than detail all equilibria (which would include babbling message strategies common to this type of game), we instead search for *separating* equilibria. A separating equilibrium requires the two types of state 2 to send different signals. Since the game only has two types, this functionally reveals all information and allows the players to continue the game as though they had complete information. These messages can therefore be *influential* in that they alter the strategy that state 1 then pursues. Consequently, our exploration of separating equilibria requires us to check whether each type of state 2 would prefer to effectively play the complete information game as if it were its own type or would rather pretend to be the opposite type.

We break down the parameter space in the same order as the previous section's propositions.

**Proposition 6.** *Suppose that both types of state 2 prefer 0 to war (i.e.,$0 \in A(\underline{\theta}_2) \cap A(\bar{\theta}_2)$). Separating equilibria exist, but none are influential: state 1 offers $x = 0$ and both types accept regardless of the message.*

We omit the proof because it is trivial. Recall that when both types of state 2 prefer 0 to war, state 1 does not tailor its strategy according to the type it suspects it is facing.

Rather, state 1 knows that it can successfully implement its ideal point regardless of type and thus picks $x = 0$. Accordingly, separating equilibria exist—since the types receive the same offer regardless of state 1's inference from the message, both types are indifferent among all messaging strategies. However, while these signals are informative, they are not influential—the probability of war is 0 with or without cheap talk.

Note that the rivals state 1 faces in this parameter space might be best described as "friends." After all, the parties are so closely aligned in their preferences that war is never reasonable option. Fittingly, friends are willing to tell the truth.

**Proposition 7.** *Suppose that the set of policies that both types of state 2 prefer to war is non-empty, that the low type prefers 0 to war, and that the low type's ideal point is closer to 0 than leftmost point in the high type's acceptance set (i.e., $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) \neq \emptyset$, $0 \in A(\underline{\theta}_2)$, and $\underline{\theta}_2 < \frac{\bar{\theta}_2(1-p)-c_2}{2}$). A separating equilibrium exists. Upon receiving the message of the low type, state 1 offers $x = 0$; upon receiving the message of the high type, state 1 offers $x = \bar{\theta}_2(1-p) - c_2$. Peace prevails with certainty.*

See the appendix for proof. Figure 2 provides the intuition. With the types revealed, state 1 can propose its ideal point against the low type and propose the leftmost point in the high type's acceptance set against the high type. If the low type deviates to sending the high type's message, state 1 still makes an acceptable offer but said has shifted further away from the low type's ideal point than state 1's original proposal. Thus, the low type is satisfied revealing its type. The high type, meanwhile, would receive an unacceptable offer if it mimicked the low type's message, which in turn yields its war payoff. By separating, however, it already receives its reservation value for war. Consequently, the high type has no profitable deviation either.

It is hard to understate the usefulness of cheap talk in this parameter space. According to Proposition 3, when $q$ is high, state 1 gambles that state 2 is the low type and demands its own ideal point. War occurs with positive probability because the high type rejects. However, with cheap talk, peace always prevails—the high type can signal that it needs more to be satisfied, and the low type has no incentive to mimic because the high type is comparatively extreme.

Meanwhile, when $q$ is low, state 1 makes the safe offer of $x = \bar{\theta}_2(1-p) - c_2$ without cheap talk. Both types accept. Yet this result is also inefficient since both state 1 and the low type prefer shifting to the left. Cheap talk again comes to the rescue. Revealing itself as the low type allows state 1 and the low type to reach one of the Pareto improving settlements. The high type has no desire to interfere in the information transmission process here because it wants state 1 to keep providing more extreme offers. Thus, cheap talk improves efficiency regardless of state 1's initial belief, either by reducing deadweight loss of war or allowing for smarter bargains.

As a final note about this parameter space, the low type here could also be described as a "friend" since its ideal point closely aligns with state 1's. This relatively close relationship means that the low type actively wants to flag itself as a friend, reassure state 1, and reach an efficient settlement. This is in sharp contrast with the standard bargaining model of war, in which states desperately wish to convey strong resolve and obtain better deals for themselves.

**Proposition 8.** *Suppose that the set of policies that both types of state 2 prefer to war is non-empty, that the low type prefers 0 to war, and that the low type's ideal point is further from 0 than the leftmost point in the high type's acceptance set (i.e., $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) \neq \emptyset$, $0 \in A(\underline{\theta}_2)$, and $\underline{\theta}_2 > \frac{\bar{\theta}_2(1-p)-c_2}{2}$). No separating equilibrium exists.*

See the appendix for proof. Proposition 8 maintains the same parameters as Proposition 7 except the low type now prefers the high type's leftmost point in the acceptance set to state 1's ideal point. This subtle change leads to bargaining breakdown and positive probability of war that cheap talk is powerless to stop.

Figure 4 illustrates the problem. If the types separate, state 1 is free to implement its ideal point against the low type and will offer $x = \bar{\theta}_2(1-p) - c_2$ versus the high type. Thus, if the low type reports dishonestly, it instead receives the high type's reservation value for war.

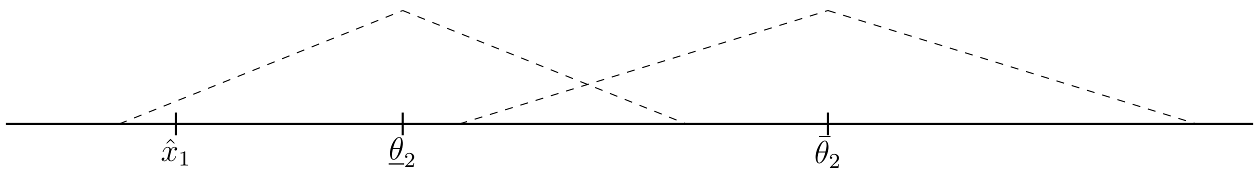


Figure 4: An illustration of Proposition 8's problem. Note that the distance between the low type's ideal point and state 1's ideal point is greater than the distance between the low type's ideal point and the leftmost point of the high type's acceptance set. Due to this, no separating equilibria exist—the low type has incentive to mimic the high type to obtain a settlement that reflects the high type's reservation value for war.

Whereas this was unadvisable for Proposition 7 parameters, now the high type's reservation value is close to the low type's ideal point whereas state 1's ideal point is very far away. As a result, the low type prefers mimicking the high type's behavior.

In turn, the equilibrium outcome matches that of Proposition 3. If $q$ is high, state 1 gambles by demanding its ideal point. Like the traditional crisis bargaining model, the low type's incentive to misrepresent as the high type prevents the high type from signaling its need for a larger peaceful share. Meanwhile, if $q$ is low, state 1 proposes the safe offer of $x = \bar{\theta}_2(1-p) - c_2$. Both types accept. The peaceful settlement versus the low type is Pareto inefficient, as the parties would still mutually prefer shifting the deal to the left. However, state 1 cannot credibly commit to offering one of those settlements upon information revelation, instead preferring to drastically alter the terms of settlement. This leads to the breakdown in communication. Consequently, the outcome is inefficient for these parameters regardless of $q$ either because of the costs of war or due to a suboptimal peace.

Note that the change in parameter space from Proposition 7 to Proposition 8 effectively makes the low type increasingly less friendly. The growing antagonism prevents truth telling.

**Proposition 9.** *Suppose that the set of policies that both types of state 2 prefer to war is non-empty and both types prefer war to a policy of 0 (i.e.,* $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) \neq \emptyset$ *and* $0 \notin A(\underline{\theta}_2) \cup A(\bar{\theta}_2)$*). No separating equilibrium exists.*

See the appendix for proof. Although this parameter space is similar to that of Proposition 8, the critical insight here is that truth telling now ensures that both parties receive their reservation values for war. But because the set of policies that both types prefer to war is non-empty, the low type prefers strictly prefers receiving an offer of the high type's leftmost point in its acceptance set in all non-knife-edge cases. As a result, and like with the standard risk-return tradeoff, the low type's incentive to misrepresent overrides any possibility of effective cheap talk communication.

**Proposition 10.** *Suppose that the set of policies that both types of state 2 prefer to war is empty and that both types prefer war to a policy of 0 (i.e.,* $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) = \emptyset$ *and* $0 \notin A(\underline{\theta}_2) \cup A(\bar{\theta}_2)$*). Then a separating equilibrium exists.*

Once more, see the appendix for proof. Figure 3 illustrates the fundamental logic. When the types have sufficiently desperate ideal points, state 1 can only appease one with its offer. Both types anticipate this ahead of time and know they will go to war without communication. However, the high type can declare its ideological position without fear of manipulation from the low type because a low type mimicking receives an extreme (and intolerable) offer as a result. Meanwhile, the low type can also declare its ideological position without fear of manipulation from the high type since low types prefer relatively moderate offers.

Consequently, in the separating equilibrium, state 1 can successfully offer each type its reservation value. Peace succeeds with probability 1, and state 1 receives all of the surplus. This is in direct contrast to the outcome without cheap talk, which guaranteed some probability of war no matter the proposal state 1 made. In other words, cheap talk succeeds when the bargaining problem is at its worst.

In addition, the parameters of Proposition 10 represent the most unfriendly of situations—state 1 could hardly be described as friends with the low type and has a very antagonistic relationship with the high type, while the low type and the high type are not friendly either. And yet, just like the earlier situations in which state 1 had a friend, communication succeeds. Cheap talk only fails in more moderate circumstances.

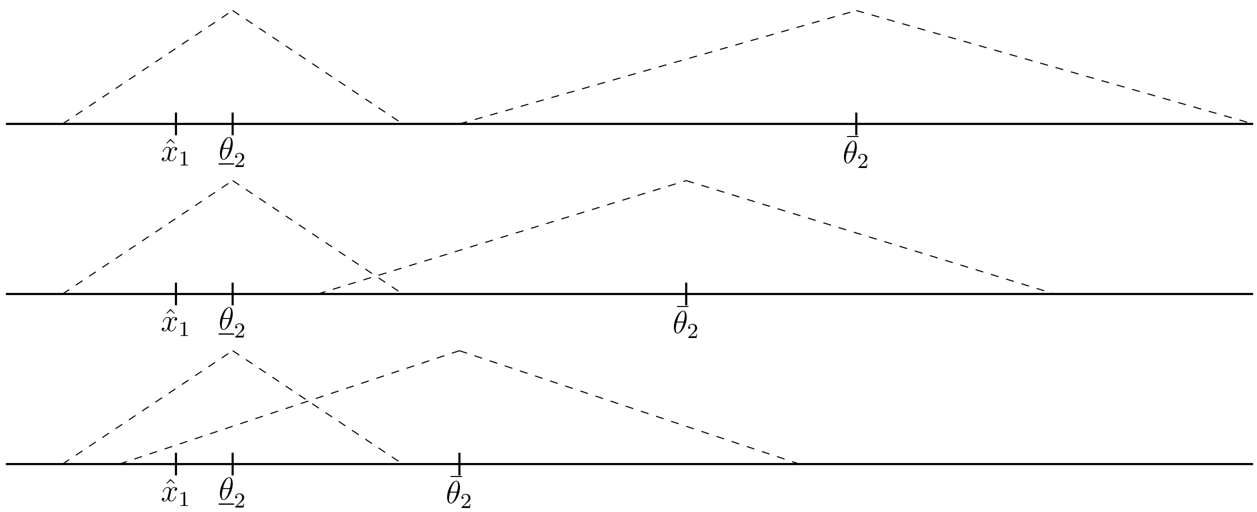


Figure 5: A progression of deceasing uncertainty about state 2's ideal point. With cheap talk, peace results in the first and last cases but can fail in the second.

# 5 Uncertainty and the Prevalence of Conflict

The cheap talk model generates an interesting comparative static regarding information and the outbreak of war. Note that the difference between $\bar{\theta}_2$ and $\underline{\theta}_2$ is a useful measurement of the extent of uncertainty that state 1 faces. When the distance is great, state 1 must consider a wider range of opposing preferences; state 2's ideal point could be very close to state 1's or state 2's preference could be remarkably extreme. On the other hand, as the difference between $\bar{\theta}_2$ and $\underline{\theta}_2$ grows smaller, state 1 has a narrow range of opposing possibilities; state 2 could be extreme or slightly more extreme, for example. In fact, as $\bar{\theta}_2 - \underline{\theta}_2$ goes to 0, the game converges to the complete information model we originally covered.

In the standard bargaining model of war and the spatial game without cheap talk, reducing uncertainty in this manner monotonically reduces the probability of war. This is not the case with uncertainty about ideal points and cheap talk, however. Consider the progression in Figure 5. When uncertainty is great as in the top of the figure, the states play the equilibrium from Proposition 10; both types of state 2 credibly reveal their ideal points, and state 1 implements a peaceful bargain in either case. The probability of war is 0.

Uncertainty decreases from the top part of the figure to the middle part of the figure, as the distance between $\bar{\theta}_2$ and $\underline{\theta}_2$ shrinks. However, these parameters call for the equilibrium strategies under Proposition 8; if $q$ is sufficiently high, this leads state 1 to make the aggressive demand that the high type rejects. Under these conditions, the probability of war is positive. Thus, decreasing uncertainty has caused an increase in conflict.

Lastly, uncertainty decreases again from the middle part of the figure to the bottom. Now $\bar{\theta}_2$ and $\underline{\theta}_2$ are close together, meaning that state 1 faces very little noise about state 2's true preference. Note that the acceptance sets for both types include 0. As a result, per Proposition 6, state 1 demands its own ideal point and successfully resolves the crisis without war. Decreasing uncertainty this time led to a decrease in the probability of conflict.

This progression has interesting implications regarding the effectiveness of diplomacy. Intuitively, we might believe that diplomacy would be most effective when an actor believes its rival is likely to have relatively harmonistic preferences and become increasingly less useful as doubt sets in. After all, close ideal points incentivize cooperation between actors. In turn, we would suspect that cooperation would begin to fail as the situation looks increasingly bleak.

The model qualifies this intuition. Actors with harmonistic preferences indeed resolve their tensions without violence. Increasing doubt leads to conflict as well; even friendly types have incentive to bluff more intense preferences since it can yield minor policy concessions from their rivals. However, diplomacy begins succeeding again when the doubt is great. Although the potential for conflict appears greater here, the logic of bargaining overrides the desire to fight. Indeed, peaceful settlements preserve the surplus, leaving a greater pool of resources to share. Friendlier, more moderate types thus have incentive to signal that they do not have extremist preferences so that their rivals will offer reasonable settlements. The takeaway here is that the relationship between uncertainty and war is not always straightforward.

## 6 Robustness: Two-Sided Incomplete Information

The above propositions showed that states can effectively use cheap talk when uncertainty exists about ideal points. However, throughout, we assumed that the proposer's ideal point was known to everyone. This is a strong assumption since diplomacy regularly involves two-sided communication. In turn, bargaining could conceivably fail if moderate types of state 1 would always wish to mimic extremist types to drive a better bargain; after all, state 2 would be more willing to settle on disadvantageous terms if it believes that a winning state 1 would implement a policy far away from state 2's ideal point. A natural question then is whether cheap talk diplomacy can still succeed in an environment with two-sided incomplete information.

In this section, we show that the answer is yes. To see why, consider the same cheap talk game as before with the following modifications. Nature still begins the game by drawing state 2's type from the previous distribution but also draws state 1's type as $\underline{\theta}_1$ or $\bar{\theta}_1$ from some commonly known distribution. Both observe their own type but only have the prior about the other. As before, state 2 sends a message $m_2 \in \{\underline{\theta}_2, \bar{\theta}_2\}$.[6] They engage in the ultimatum bargaining game as usual.

As with the game with one-sided incomplete information, such an interaction typically admits a large number of equilibria due to off the path beliefs. Two-sided incomplete information only exacerbates the problem. While we have worked out a number of cases in which peace talk reduces the probability of war—some trivial, others not, we present the proposition below as proof of concept. That is, we show that cheap talk's ability to reduce war is not an artifact of only having one-sided incomplete information. Rather, cheap talk can succeed even when both parties are uncertain of the other's preferences.

**Proposition 11.** *Suppose that the types are ordered such that both types of state 1 prefer policies to the left of both types of state 2, state 1's possible ideal points both fall in the*

[6] Note that state 1 does not send a message here. This is inconsequential—because state 1 immediately makes an offer after receiving state 2's message, the revelation principle implies that the offer choice absorbs any possible cheap talk.

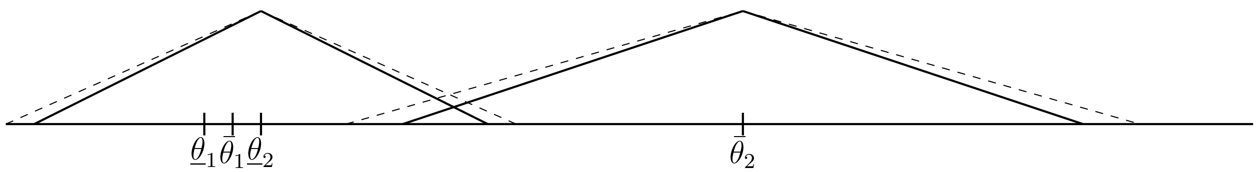


Figure 6: The set of proposals the two types of state 2 are willing to accept versus the low type of player 1 (dashed) and the high type (solid).

*acceptance sets for the low type of state two but not the high type, the leftmost point of the high type of state 2's acceptance set is sufficiently extreme, the intersection of the sets of outcomes mutually preferable to war for the high type of state 2 versus the low type and high type of state 1 is non-empty, and the low type of state 2 is sufficiently high (i.e.,* $\underline{\theta}_1 < \underline{\theta}_1 < \underline{\theta}_2 < \bar{\theta}_2$, $\underline{\theta}_1 \in A(\underline{\theta}_2|\underline{\theta}_1), \bar{\theta}_1 \in A(\underline{\theta}_2|\bar{\theta}_1)$, $\underline{\theta}_1 \notin (\bar{\theta}_2|\underline{\theta}_1), \bar{\theta}_1 \notin A(\bar{\theta}_2|\bar{\theta}_1)$, $\bar{\theta}_2 > \frac{2\underline{\theta}_2 - \theta_1(1+p)+c_2}{1-p}$, $p(\bar{\theta}_1 - \underline{\theta}_1) < c_1 + c_2$ *and* $q > \frac{c_1+c_2}{(1-p)(\bar{\theta}_2 - \underline{\theta}_1)+c_1}$*. Informative equilibria exist, and all such equilibria reduce the probability of war.*

The appendix contains a complete proof, but Figure 6 illustrates the logic and helps show that the large number of conditions does not create a trivial case.[7] Note that both $\underline{\theta}_1$ and $\bar{\theta}_1$ fall within the acceptance set of the low type of state 2 and the low and high types of state 1 are close enough together ($p(\bar{\theta}_1 - \underline{\theta}_1) < c_1 + c_2$) that the sets mutually preferable to war versus the high type of player 2 are non-empty. Thus, if state 1 knew it was facing the low type of state 2, it could always demand its ideal point and achieve its best possible outcome. In contrast, neither of state 1's possible ideal points in the high type of state 2's acceptance set. Thus, state 1 must offer some concessions to induce the high type of state 2's compliance. However, state 1's high prior that state 2 is the low type ($q > \frac{c_1+c_2}{(1-p)(\bar{\theta}_2 - \underline{\theta}_1)+c_1}$) implies that state 1 prefers taking the risk of only attempting to appease the low type. War therefore occurs with probability $1 - q$.

Now consider whether the types of state 2 would be willing to separate in the cheap talk game. If the low type reveals itself, state 1's behavior remains the same—it continues

[7]Such a large number of conditions is unavoidable in describing any equilibrium of this game because the two-sided incomplete information leads to many potential off-the-path beliefs. This in turn limits the parameter set that any single set of equilibrium strategies can describe.

offering its own ideal point. If the low type were to instead mimic the high type, state 1's offer must be within the high type's acceptance set. But even the most desirable policy for the low type in the high type's acceptance set is worse than receiving the state 1's ideal point as the low type; $\bar{\theta}_2 > \frac{2\underline{\theta}_2 - \theta_1(1+p)+c_2}{1-p}$ ensures this.[8] So the low type is willing to separate.

Meanwhile, the high type receives its war payoff against both opposing types if it tries to deviate to sending the low type's signal. However, state 2 can never earn less than its war payoff in equilibrium—it can always guarantee its war payoff by rejecting as a pure strategy regardless of the history of the game. So state 2 must receive at least its war payoff and is therefore willing to separate.

That takes care of the credible signaling. The question remains whether the equilibrium strategies lead to a reduced probability of war as Proposition 11 claims. Note cheap talk does not affect the probability of peace versus the low type of state 2 because it always accepts regardless of the messages. Thus, if cheap talk reduces the probability of war, it must be against the high type of state 2. However, this must be true. Without cheap talk, the high type of state 2 always fights a war. With cheap talk, state 1 functionally play a game of one-sided information against the high type of state 2. The appendix shows that war cannot occur with probability 1 in such a game due to war's inefficiency. So cheap talk must reduce the probability of war for the high type of state 2.

Note that the results here are fairly strong. Proposition 11 makes the claim that cheap talk reduces the probability of war for *all* equilibria in these parameters. Under normal circumstances, asymmetric uncertainty about the proposer yields to a large number of equilibria due to off-the-path beliefs. Some of these beliefs survive various equilibrium refinements and some do not. Cheap talk reduces the probability of war in all of these cases, even those that survive the strictest of refinements.

To be clear, cheap talk does not always work with two-sided incomplete information. Parameter spaces like those of Propositions 8 and 9 fail to yield a separating equilibrium,

[8] Figure 6 illustrates this with the acceptance sets overlapping. Analogous results hold if the acceptance sets do not overlap, such as in Figure 3.

while mechanisms similar to Proposition 6 succeed with two-sided incomplete information.[9] Our key takeaway point from this section, however, is that our cheap talk results carry over to more realistic two-sided incomplete information structures and are not an artifact of the one-sided incomplete information setup we originally analyzed.

# 7 Conclusion

This paper relaxed a regular assumption used in research on the bargaining model of war: that the preferences of states over outcomes is common knowledge. While uncertainty about ideal points appears isometric to uncertainty about power at first, deeper analysis reveals that standard results break down: peace may be inefficient, war may be inevitable, and cheap talk communications can be revealing. Since diplomacy often entails a discussion of what states want, our theoretical results suggest that uncertainty about ideal points should stand on equal ground with uncertainty about power or resolve.

That said, our model was only a first pass at what ideal points and war have to offer. We have introduced the core mechanics and worked through cheap talk results. The literature on the bargaining model of war is comparatively vast, with work on bargaining and learning while fighting (Wagner (2000); Filson and Werner (2002); Slantchev (2003); Powell (2004); Smith and Stam (2004)), domestic policy considerations (Schultz (2001); Wolford (2007); Goemans and Fey (2009); Wolford (2012)), coalition building (Wolford (2014)), general results from mechanism design (Fey and Ramsay (2007); Fey and Ramsay (2010); Fey and Ramsay (2011)), and more. Given the differences we discovered in this paper, it may be worth revisiting these findings to see if they are robust to this alternative specification.

Our model also opens up the possibility of a new test of the bargaining model of war. Many theories of inefficient behavior in international relations, including ours, rely on asymmetric uncertainty about some fundamental underlying parameter. Unfortunately, clear

[9] Of course, trivial babbling equilibria with positive probability of war also exist in the same parameter spaces as where cheap talk works.

measures of uncertainty over power and resolve are not forthcoming.[10] This is problematic because the absence of such factors in empirical models risks omitted variable bias. However, a number of scholars have developed useful measures of ideal points using voting data from the United Nations General Assembly (Strezhnev and Voeten (2013)). Researchers ought to consider using such similarity scores as the source of incomplete information in their empirical models.

# Appendix: Proofs

We first state a lemma about the potential equilibrium offers of state 1. We omit the proof since it follows similar logic as in the proof of Proposition 1.

**Lemma 1.** *There are two possible offers that could be optimal for state 1 to make*

$$\underline{x} = \begin{cases} \max\{0, \underline{\theta}_2(1-p) - c_2\} & \text{if } 0 \leq \underline{\theta}_2 \leq \bar{\theta}_2 \\ \min\{0, \underline{\theta}_2(1-p) + c_2\} & \text{if } \underline{\theta}_2 \leq 0 \leq \bar{\theta}_2 \end{cases}$$

$$\bar{x} = \bar{\theta}_2(1-p) - c_2.$$

The optimal acceptance strategy for state 2 given any offer $x$ is discussed earlier, so to demonstrate that the propositions hold we focus on showing that the proposal strategy for state 1 in each proposition is optimal.

**Proof of Proposition 3.** We conjecture that state 1's optimal proposal strategy is:

[10] Researchers have crafted some clever alternatives, including leader tenure as a proxy (Wolford (2007); Rider (2013); Spaniel and Smith (2014)), alliance complications (Huth, Bennett and Gelpi (1992)), and revised intelligence estimates (Kaplow and Gartzke (2013)).

$$x^* = \begin{cases} 0 & \text{if } q \geq \frac{c_1+c_2}{(1-p)\bar{\theta}_2+c_1}, \\ \bar{x} & \text{else.} \end{cases}$$

By Lemma 1 we know that $x^* \in \{\bar{x}, \underline{x}\}$. The expected utility to state 1 for each offer is:

$$U_1(\underline{x}) = (1-q)(-(1-p)\bar{\theta}_2 - c_1)$$
$$U_1(\bar{x}) = -(1-p)\bar{\theta}_2 + c_2.$$

We want to know when $U_1(\underline{x}) \geq U_1(\bar{x})$, i.e.:

$$(1-q)(-(1-p)\bar{\theta}_2 - c_1) \geq -(1-p)\bar{\theta}_2 + c_2.$$

Reducing and solving for $q$ gives:

$$q \geq \frac{c_1+c_2}{(1-p)\bar{\theta}_2+c_1}.$$

Therefore, the proposal strategy is optimal and so the proposition holds. □

**Proof of Proposition 4.** To show that the proposition holds we want that state 1's optimal proposal strategy is given by:

$$x^* = \begin{cases} \underline{x} & \text{if } q \geq \frac{c_1+c_2}{(1-p)(\bar{\theta}_2+\underline{\theta}_2)+c_1+c_2} \\ \bar{x} & \text{else} \end{cases}$$

By Lemma 1 the only possible offers in equilibrium are $\underline{x}$ or $\bar{x}$. The expected utility of each offer to state 1 is:

$$U(\underline{x}) = q(-(1-p)\underline{\theta}_2 + c_2) + (1-q)(-(1-p)\bar{\theta}_2 - c_1),$$
$$U(\bar{x}) = -(1-p)\bar{\theta}_2 + c_2.$$

To determine when $\underline{x}$ is the optimal offer we need to when the inequality $U(\underline{x}) \geq U(\bar{x})$ holds:

$$q(-(1-p)\underline{\theta}_2 + c_2) + (1-q)(-(1-p)\bar{\theta}_2 - c_1) \geq$$
$$-(1-p)\bar{\theta}_2 + c_2.$$

Solving the above inequality for $q$ yields:

$$q \geq \frac{c_1 + c_2}{(1-p)(\bar{\theta}_2 + \underline{\theta}_2) + c_1 + c_2}.$$

Therefore, the conjectured proposal strategy for state 1 is optimal. □

**Proof of Proposition 5.** We will show that state 1's optimal proposal strategy is given by:

$$x^* = \begin{cases} \underline{x}, & \text{if } q \geq \frac{1}{2} \\ \bar{x}, & \text{else} \end{cases}$$

By Lemma 1 $x^* \in \{\bar{x}, \underline{x}\}$. Since $0 \notin A(\underline{\theta}_2)$ then $\underline{x} = \underline{\theta}_2(1-p) - c_2$. Setting up the inequality $U(\underline{x}) \geq U(\bar{x})$ gives:

$$q(-(1-p)\underline{\theta}_2 + c_2) + (1-q)(-(1-p)\underline{\theta}_2 - c_1)$$

$$\geq$$

$$q(-(1-p)\underline{\theta}_2 - c_1) + (1-q)(-(1-p)\bar{\theta}_2 + c_2).$$

Which reduces to

$$(2q-1)(c_1 + c_2) \geq 0.$$

Since $c_1, c_2 > 0$ then this inequality holds if $q \geq \frac{1}{2}$, as required. □

**Proof of Propositions 7 and 8.** If we have a separating equilibrium then after observing $m = \underline{\theta}_2$ state 1's optimal offer is $x^* = 0$ and after observing $m = \bar{\theta}_2$ her optimal offer is $x^* = \bar{\theta}_2(1-p) - c_2$. Then it is optimal for the $\bar{\theta}_2$ type of state 2 to play the separating strategy if its payoff from accepting $\bar{x}$ is greater than its war payoff from rejecting the offer $x = 0$, this is true when:

$$-p\bar{\theta}_2 - c_2 \leq -|\bar{\theta}_2(1-p) - c_2 - \bar{\theta}_2|.$$

Since $0 \notin A(\bar{\theta}_2)$ then this condition always holds (the inequality is, in fact, an equality). Next we need to know when it is optimal for the $\underline{\theta}_2$ type to follow the separating strategy. It will be optimal for $\underline{\theta}_2$ to truthfully reveal it's type if accepting $x^* = 0$ gives a higher payoff than accepting $x^* = \bar{x}$:

$$-|0 - \underline{\theta}_2| \geq -|\bar{\theta}_2(1-p) - c_2 - \underline{\theta}_2| \tag{1}$$

Then rearranging (1) gives us that the $\underline{\theta}_2$ type of player 2 will play $m = \underline{\theta}_2$, and we will have a separating equilibrium, if

$$\underline{\theta}_2 \in [0, \frac{(1-p)\bar{\theta}_2 - c_2}{2}].$$

If $\underline{\theta}_2$ is not in the above interval then (1) will not hold and the $\underline{\theta}_2$ type will want to deviate and mimic the $\bar{\theta}_2$. So there will not be a separating equilibrium. □

**Proof of Proposition 9.** Since, $x \notin A(\underline{\theta}_2)$ we have that $\underline{x}^* = (1-p)\underline{\theta}_2 - c_2$ if $m = \underline{\theta}_2$, else if $m = \bar{\theta}_2$ then $\bar{x}^* = (1-p)\bar{\theta}_2 - c_2$. Since $A(\underline{\theta}_2) \cap A(\bar{\theta}_2) \neq \emptyset$, the utility from $\bar{x}^*$ is always greater than the utility from $\underline{x}^*$, i.e.

$$-|(1-p)\bar{\theta}_2 - c_2 - \underline{\theta}_2| > -|(1-p)\underline{\theta}_2 - c_2 - \underline{\theta}_2|,$$

always holds. This means that the $\underline{\theta}_2$ type of state 2 will always want to deviate and mimic the extremist type, choosing $m = \bar{\theta}_2$, therefore, there is not a separating equilibrium. □

**Proof of Proposition 10.** Assume that $m(\bar{\theta}_2) = \bar{\theta}_2$ and following this message $x = \bar{x}$, furthermore assume that $m(\underline{\theta}_2) = \underline{\theta}_2$ and following this message state 1 chooses $x = \underline{x}$. Based on Proposition 1 these are the optimal offers for state 1 to make after observing the messages and updating about state 2's type. Therefore, all that remains is to check that each type of state 2 does not want to deviate from these separating messages. If the $\underline{\theta}_2$ type deviates and sends the message $\bar{\theta}_2$ then state 1's offer will be $x = \bar{x}$, which state 2 will reject. It receives its war payoff as a result. If the $\underline{\theta}_2$ type does not deviate and sends the truthful message, then it will get the offer $x = \underline{x}$, which it will then accept. Since accepting the offer $\underline{x}$ gives the $\underline{\theta}_2$ type a higher utility than the war payoff, it will not deviate.

The argument is analogous for the $\bar{\theta}_2$ type of state 2. Therefore, neither type of state 2 wants to deviate from sending the truthful message. After observing the truthful message, it is always optimal for state 1 to choose an $x$ which will be accepted. So the separating equilibrium is always peaceful. □

**Proof of Proposition 11:** We begin by describing the equilibrium of the game with no cheap talk. Consider state 1's proposal. If each type demands its ideal point, the low type of state 2 must accept because those ideal points fall in the corresponding acceptance sets. State 1 earns 0 in this case against the low type. Consequently, no other offer exists that delivers a greater payoff against the low type of state 2. The catch is that the high type of state 2 rejects these offers with certainty because they do not fall in its acceptance set. Thus, if any other offer is better, it must be because the high type of state 2 accepts with positive probability.

However, note that the best possible circumstances here is for the high type of state 2 accept with certainty if offered the leftmost point of its acceptance set versus the low type of state 1, or $\bar{\theta}_2 - (\bar{\theta}_2 - \underline{\theta}_1)(p) - c_2$. Because this value falls in both of the low type of state 2's acceptance sets, the low type of state 1 would earn $-(\bar{\theta}_2 - \underline{\theta}_1)(1-p) + c_2$ with certainty. Doing so is worse than simply demanding its own ideal point if:

$$q(0) + (1-q)[-(\bar{\theta}_2 - \underline{\theta}_1)(1-p) - c_1]] > -(\bar{\theta}_2 - \underline{\theta}_1)(1-p) + c_2$$

$$q > \frac{c_1 + c_2}{(1-p)(\bar{\theta}_2 - \underline{\theta}_1) + c_1}$$

This holds for the parameters. So both types of state 1 offer their ideal points in equilibrium without cheap talk.

We must now consider the equilibrium of a cheap talk game. Since we are searching for separating equilibria during the messaging stage, we can describe the equilibria of a one-sided game of incomplete information in which state 1 knows state 2's type but state 2 does not know state 1's type. Against the low type of state 2, state 1 offers its ideal point and induces the both types of state 2 to accept for the same reasons as before. So the equilibrium is peaceful and the low type receives a policy of the revealed type of state 1.

Two things must be true about the equilibrium against the high type. First, the high type must receive at least its war payoff in equilibrium. This is simple to prove by contradiction. If not, the high type of state 2 could deviate to rejecting as a pure strategy regardless of the history and its beliefs and earn a greater payoff. But this violates equilibrium's optimality conditions. Second, war cannot occur with certainty. Again, simple proof by contradiction reveals why. If war occurs with certainty, then it must also occur with certainty for the high type of state 1. State 1 receives its war payoff as a consequence. But by the results from Proposition 1, there exist offers that are mutually preferable to war for these two types. Moreover, the high type of state 2 would prefer such offers to war if they came from the low type of state 1 as well. As a result, the high type of state 2 must accept such offers. In turn, the high type of state 1 could profitably deviate to making a such a peaceful offer, again contradicting the optimality conditions of equilibrium.

Now consider the messaging stage. Suppose the types separate. If the high type of state 2 deviates to mimicking the low type, it receives an offer outside of its information. In turn, it rejects and receives its war payoff. But the above showed that the high type must receive at least its war payoff if it separates, so this is not a profitable deviation. If the low type of state 2 deviates to mimicking the high type, because state 1 cannot make an offer in equilibrium certain to be rejected[11], it receives an offer from inside of the high type of state 2's acceptance set. The most attractive of such offers is the leftmost point of the high type's acceptance set, which generates a payoff of $-|\bar{\theta}_2 - p(\bar{\theta}_2 - \theta_1) - c_2 - \underline{\theta}_2|$. In contrast, the worst it could receive by separating is $-|\underline{\theta}_1 - \underline{\theta}_2|$. This is not a profitable deviation if:

$$-|\underline{\theta}_1 - \underline{\theta}_2| > -|\bar{\theta}_2 - p(\bar{\theta}_2 - \underline{\theta}_1) - c_2 - \underline{\theta}_2|$$

$$\bar{\theta}_2 > \frac{2\underline{\theta}_2 - \underline{\theta}_1(1+p) + c_2}{1-p}$$

[11]This is because the acceptance for the low type and high type of state 1 versus the high type of state 2 overlap due to $p(\bar{\theta}_1 - \underline{\theta}_1) < c_1 + c_2$. Without this condition, trivial equilibria exist in which the low type state 1 makes an unacceptable offer and cannot profitably deviate because state 2 believes that it is the high type if it makes any other offer, and all acceptable offers versus the high type are unacceptable to the low type.

The inequality holds under Proposition 11's parameters. So the low type would not want to deviate from separating either.

Consequently, cheap talk reduces the probability of war. Peace is guaranteed if Nature draws the low type of state 2 regardless of a messaging phase. However, the probability of war is strictly lower for the high type of state 2 with cheap talk than without. Thus, the overall probability of war decreases. □

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