Offsetting Uncertainty: Reassurance with Two-Sided Incomplete Information 📊

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Abstract: *Conventional models of bargaining and reassurance under incomplete information assume that actors' behavioral signals are objectively cooperative or noncooperative. Even if actors are uncertain of each other's preferences, they know what types of actions the other will view as cooperative. Yet on many real-world issues, cooperation is subjective, and what constitutes a cooperative action is conditional on the receiver's preferences. We present a formal model showing that in these cases, two-sided incomplete information actually incentivizes honest behavior and facilitates credible signaling. Because uncertain senders do not know whether a particular action will be interpreted as cooperative, they have little incentive to misrepresent, and instead honestly pursue their true goals. Thus, where cooperation is subjective, mutual uncertainty is "offsetting," such that credible signals allow actors to quickly and accurately update their beliefs. We illustrate this logic through a case study of the Sino–Soviet split, and highlight the model's implications for contemporary U.S.–China relations.*

In 1956, Soviet Premier Nikita Khrushchev gave his famous "Secret Speech," denouncing Stalinism and announcing comprehensive liberalization of Soviet domestic policy and pursuit of "peaceful coexistence" with the West. This speech irrevocably alienated Chinese Communist Party Chairman Mao Zedong, whose radical ideology dictated confrontation with the West and "continuous revolution" at home, and precipitated a severe deterioration of Sino–Soviet relations. Puzzlingly, Khrushchev was well aware at the time of the Secret Speech that Mao's support was indispensable to him both at home and abroad, and he was concurrently undertaking enormous and extremely costly efforts to cultivate Sino–Soviet cooperation.

Why did Khrushchev openly express ideological preferences at odds with Mao's, despite his clear dependence on Mao's support? We argue that Khrushchev did so largely because he simply did not know Mao's preferences. The dominant presence of Khrushchev's predecessor, Joseph Stalin, had previously prevented *any* communist leader from openly deviating from Stalinist orthodoxy, leaving both Mao and Khrushchev uncertain of each other's true convictions. Unaware of Mao's preferences, and thus unsure which policies Mao would consider cooperative, Khrushchev opted simply to pursue his genuine goals of domestic moderation and peaceful coexistence with the West.

The Sino–Soviet split illustrates previously unrecognized conditions under which credible reassurance signals are possible. Specifically, we argue that *mutual* uncertainty can provide strong incentives for actors to honestly reveal their true preferences, rather than misrepresenting them. This enhances the credibility of behavioral signals and allows initially uncertain actors to accurately update their beliefs about each other's intentions.

Our argument represents an important qualification to the conventional wisdom on interstate signaling, which suggests that successful reassurance is extremely difficult, particularly during power shifts. Rising states whose preferences are incompatible with those of other

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great powers have strong incentives to misrepresent in order to avoid containment and continue gaining power for the future (Copeland 2000; Debs and Monteiro 2014; Haynes 2019b; Levy 1987; Powell 1996, 1999; Wolford, Reiter, and Carrubba 2011). This incentive to misrepresent makes it particularly difficult to infer a rising state's future intentions from its present behavior, since both compatible and incompatible risers are likely to behave cooperatively.[1]

Although such incentives to misrepresent do impede credible signaling, the conditions under which they obtain have been underspecified. Dynamic signaling models generally employ two assumptions that are often violated in reality. We show that when these assumptions are jointly relaxed, incentives to misrepresent become far less severe, thereby facilitating credible reassurance signals even under shifting power. The first common assumption is that incomplete information is only one-sided—the receiver is uncertain about the sender's intentions, but the sender is fully informed of the receiver's. This simplification may obscure important dynamics that operate under mutual uncertainty. A second and even more pervasive assumption is that actors have common knowledge about which actions constitute cooperation and defection in the eyes of the receiver. At the very least, senders know in which direction they must shift their policies in order to appear more cooperative.

Relaxing the latter assumption is both realistic and consequential. On certain issues, like human rights norms or international economic regimes, cooperation is subjective: Uncertainty about another state's preferences simultaneously entails uncertainty over which actions it would interpret as cooperative or noncooperative. We argue that under these conditions, when actors are highly uncertain about what constitutes cooperative behavior, they have little incentive to incur the costs of misrepresenting their intentions. Thus, mutual uncertainty of this type can be "offsetting," effectively facilitating credible signaling.

Our argument is an important contribution to the literature on the security dilemma, the phenomenon wherein conflict can occur between states with compatible preferences due to intractable uncertainty about each other's intentions. We show that when cooperation is

subjective, mutual uncertainty can be readily overcome, thereby alleviating the security dilemma. In fact, under dynamic power, one-sided uncertainty in which the rising state is completely informed is the more intractable condition that is likely to produce unwanted conflict between compatible states.

This suggests one reason that American policy makers remain so deeply uncertain of China's intentions: Chinese leaders are keenly aware of American preferences, which have long been manifested in the norms and institutions of the postwar international order. China has therefore known which actions the United States would view as cooperative, allowing China to effectively misrepresent any revisionist preferences it might hypothetically hold. Conversely, the wavering U.S. commitment to liberal internationalism under Donald Trump might actually serve to reveal information about China's preferences. To the extent that Trump's foreign policy preferences are fluid and uncertain, Chinese leaders will be less confident about which policies the Trump administration would interpret as cooperative. Given such uncertainty, China is more likely to see misrepresentation as futile, and thus less inclined to incur the opportunity costs of delaying pursuit of its true goals. Thus, the emerging fluidity of American foreign policy preferences, while potentially destabilizing, might also increase the credibility of Chinese foreign policy signals.

Below, we review the literature on interstate signaling. We then present a dynamic model of reassurance with two-sided incomplete information, in which cooperation is subjective—whether a sender's action is perceived as cooperative by the receiver is endogenous to the receiver's own preferences. Finally, we present a case study of the Sino–Soviet split to illustrate the model's core theoretical results, and discuss the model's implications for contemporary U.S.–China relations.

Varieties of Uncertainty in International Relations

Asymmetric information is widely regarded as a central cause of conflict in international politics.[2] Accordingly, there is an enormous literature examining when and how states can credibly signal their intentions and alleviate

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[1]We define *preferences* as the primitive goals that inhere to an actor and are exogenous to the incentives and constraints of its external environment. *Intentions*, in contrast, are the future actions an actor will take given some set of external incentives and constraints (Glaser 2010, 38). Two actors' preferences are *compatible* to the extent that the realization of one's preferences advances (or at least does not impede) the other's. Similarly, an action is a *cooperative* signal to the extent that it advances the receiver's preferences, whereas *noncooperative* signals undermine them.

[2]Foundational works include Jervis (1976) and Fearon (1995). Although recent work has qualified this claim (Arena and Wolford 2012; Debs and Weiss 2016; Haynes 2019a; Wolford, Reiter, and Carrubba 2011), it clearly remains the conventional wisdom among international relations scholars. See Fey and Ramsey (2011) for a general discussion.

uncertainty (Trager 2016). There are two general mechanisms by which incomplete information promotes conflict. First, the security dilemma literature argues that "tragic" conflict can occur, even between states with compatible preferences, due to uncertainty about each other's goals and fear that cooperation will be exploited (Glaser 2010; Jervis 1976). Second, the bargaining literature argues that uncertainty engenders the possibility of conflict due to overconfidence by one or both sides about their probability of victory (Debs and Monteiro 2014; Fearon 1995).

Both the security dilemma and bargaining literatures examine how uncertainty can be mitigated through costly signals (Fearon 1997; Kydd 2005).[3] However, credible signaling is generally held to be more difficult under two-sided than one-sided incomplete information (Jervis 1976; Kydd 2005; Langlois and Langlois 2009, 2012; Powell 1996). Dynamic bargaining models typically incorporate only one-sided uncertainty with an incompletely informed receiver and a completely informed sender (Debs and Monteiro 2014; Powell 1996, 1999; Wolford, Reiter, and Carrubba 2011).[4] But scholars commonly assume, often implicitly, that obstacles to credible signaling under one-sided uncertainty can be straightforwardly extended to operate in both directions under mutual uncertainty, exacerbating informational asymmetries and the likelihood of conflict.[5] Likewise, mutual uncertainty is commonly held to exacerbate the security dilemma because even compatible actors may be too fearful to risk cooperation. If one side is completely informed of the other's benign intentions, it would be willing to cooperate unilaterally in order to reassure the other (Jervis 1976; Kydd 2005).

This conventional wisdom is predicated on a particular form of incomplete information, which does not always obtain in the context of interstate reassurance.[6] This has obscured ways in which a sender's own uncertainty can increase the credibility of its signals. Existing models generally assume that actors know which types of behaviors constitute cooperative and noncooperative sig-

nals. Actors at least know *directionally* which actions are more or less cooperative. In the case of bargaining models, actors compete over a finite asset, the distribution of which is zero sum. Actors therefore know that more generous offers will be unproblematically interpreted as more cooperative signals, whereas smaller offers are objectively less cooperative.

Similarly, security dilemma models conceive of actors as being objectively either "expansionist" or "security-seeking," where security seekers place low value on territory they do not possess and expansionists value others' territory highly (Glaser 2010; Kydd 2005; Schweller 1994). By this definition, the expansionist sender is hostile from the perspective of all other actors, regardless of their preferences, and knows itself to be so. Thus, in these models, "cooperation" and "defection" are straightforward. By taking actions that are objectively costly to an expansionist—(e.g., arms control, exclusively defensive investments, or incurring audience costs for any act of aggression)—states can send clear cooperative signals indicating their compatibility with *all* other states.

This conception is limited, however, because "expansion" and "aggression" are not inherently noncooperative (Yoder and Haynes 2015). For example, aggression toward a common threat could be viewed by third parties as cooperative behavior, as communist regimes often viewed Soviet expansion during the Cold War. A similar principle applies to the concepts of "revisionism" or "greed" that are widespread in the signaling literature. Whereas states that inherently prefer the status quo international order would obviously consider revisionist actions noncooperative, any state whose preferences deviate from the status quo would see revision toward its ideal order as a cooperative action (Schweller 1994).

Indeed, there are many important issue areas in which a sender's goals may be compatible with some receivers' preferences, but incompatible with others'. On such issues, without prior knowledge of the receiver's preferences, it is not obvious what types of actions will be interpreted as cooperative. Consider, for example, preferences for two alternative norms: the primacy of Westphalian sovereignty versus the primacy of human rights. One state's policy of humanitarian intervention will be interpreted as a cooperative signal by an observer that prefers the latter norm, but a hostile signal by one that prefers strict adherence to Westphalian sovereignty. Alternative examples of such issues abound. On matters like sovereign lending, multilateral rules of economic cooperation, maritime law, or (as in our case study below) national ideology, whether any particular policy is interpreted as friendly or hostile depends entirely on the receiver's subjective preferences.

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[3]In addition, there is a burgeoning literature on psychological mechanisms of interstate communication and belief formation that falls outside this rationalist framework (Yarhi-Milo 2014; Yarhi-Milo, Kertzer, and Renshon 2018). These subjective signaling mechanisms are complementary to the objective ones discussed here.

[4]For exceptions, see Langlois and Langlois (2009, 2012).

[5]For example, Powell (1996, 753) speculates that introducing two-sided uncertainty into his dynamic reassurance model would exacerbate the effects of incomplete information, making war more likely.

[6]On reassurance in the context of crisis bargaining, see Kydd and McManus (2017).

One recent study found that "policy disputes" over such issues have become increasingly frequent, and now represent a plurality of all militarized interstate disputes (Bils and Spaniel 2017). Thus, in many salient contexts, uncertainty about substantive policy preferences differs starkly from the uncertainty captured by the bargaining and security dilemma literatures.

Bils and Spaniel (2017) recently examined the former sort of uncertainty in a static bargaining context. Our model below introduces the same type of uncertainty to a dynamic reassurance context. Whereas Bils and Spaniel model the distribution of power as exogenous and fixed, in our model the sender's capabilities are endogenous to the receiver's strategy. Consequently, our model captures reassurance, in which the sender's incentive is to exaggerate the similarity of its preferences with the receiver's in order to avoid punishment that would diminish its subsequent bargaining leverage. In contrast, Bils and Spaniel's static model captures a bargaining context, in which the sender's incentive is to exaggerate the divergence of its preferences with the receiver's (up to a certain point), in order to extract policy concessions that approach the sender's ideal point.

The model below, called the "dual-uncertainty game," shows that mutual uncertainty about which actions the other will interpret as cooperative can actually be self-negating. If a sender does not know whether any particular signal will be seen as cooperative or noncooperative, it has little incentive to bear the costs of taking dishonest actions that contradict its true preferences in order to deceive the receiver. Absent such incentives to misrepresent, senders' signals become highly credible, allowing the receiver to confidently update its beliefs about the sender's preferences and form a more appropriate policy toward the sender in response. Dynamic models with one-sided uncertainty fail to capture this mechanism because the completely informed actor knows precisely what actions will be seen as cooperative, and thus how to most effectively dupe the uncertain receiver into accommodating policies that the sender can later exploit. Our findings are also an important addition to the security dilemma literature, which has commonly argued that intractable mutual uncertainty is a key condition that drives tragic conflict under anarchy. We identify a crucial set of conditions under which the security dilemma can be mitigated: When uncertainty concerns actors' substantive policy preferences, mutual uncertainty is far from intractable—indeed, credible communication can be quite straightforward. Thus, in a wide range of circumstances, the consequences of incomplete information under anarchy are less severe than previously imagined.

Model

The dual-uncertainty game, represented in Figure 1, has two players, Sender (S) and Receiver (R). Each can be one of two types. Sender is type A (S_A) with probability $\sigma \in (0, 1)$ and type B (S_B) with probability $1 - \sigma$, whereas Receiver is type A (R_A) with probability $r \in (0, 1)$ and type B (R_B) with probability $1 - r$. Like-typed actors are "compatible," whereas unlike actors are "incompatible." Conceptually, compatible actors can realize their goals simultaneously—one actor's pursuit of its true preferences advances the other's. For incompatible actors, however, Sender's achievement of its goals detracts from Receiver's, and vice versa. Here, σ and r are common knowledge, so although both players know their own type, they can only probabilistically guess the other player's.

The game begins with S signaling its type. S signals type A by playing α or type B by playing β. We conceptualize Sender's signal broadly as its actions on issues of consequence to Receiver. This encompasses a wide range of behaviors, including trade practices, economic development strategies, alliance memberships, adherence to norms of human rights and use of force, ideological dissemination, and many others. Signaling honestly is costless for both types, but misrepresentation incurs cost $m > 0$. Thus, for S_A, playing β reduces its ultimate payoff by m, whereas playing α incurs no cost.[7]

This specification is consistent with the vast majority of research on credible signaling, which is built on the axiom that signals are only credible to the extent that they are costly.[8] The m parameter captures the inherent opportunity costs that result from adopting a policy that does not align with Sender's true preferences. Normalizing the cost of honest signals to zero simply assumes that, all else equal, actors prefer policies that immediately advance their true goals compared to alternatives that do not, or do so to a lesser extent. Signals can, of course, carry indirect payoffs stemming from other actors' responses, but these costs would be borne regardless of whether the signal is honest or dishonest. Functionally, therefore, m captures the cost of forgoing one's true preferences, holding the responses of other actors constant.

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[7]For simplicity, we assume that S's action has no direct effect on R's payoff. This assumption is unrealistic, but also entirely inconsequential, as any such effect would be "sunk" and thus irrelevant to R's subsequent strategy.

[8]Classic works include Schelling (1966) and Spence (1973). For a recent review, see Trager (2016). Several recent works have demonstrated the potential for costless, "cheap-talk" signals to be credible under certain conditions (Bils and Spaniel 2017; Kurizaki 2007; Sartori 2005; Trager 2010; Yarhi-Milo 2013). However, these remain a relative minority in the vast literature on credible signaling.

FIGURE 1 Game Tree
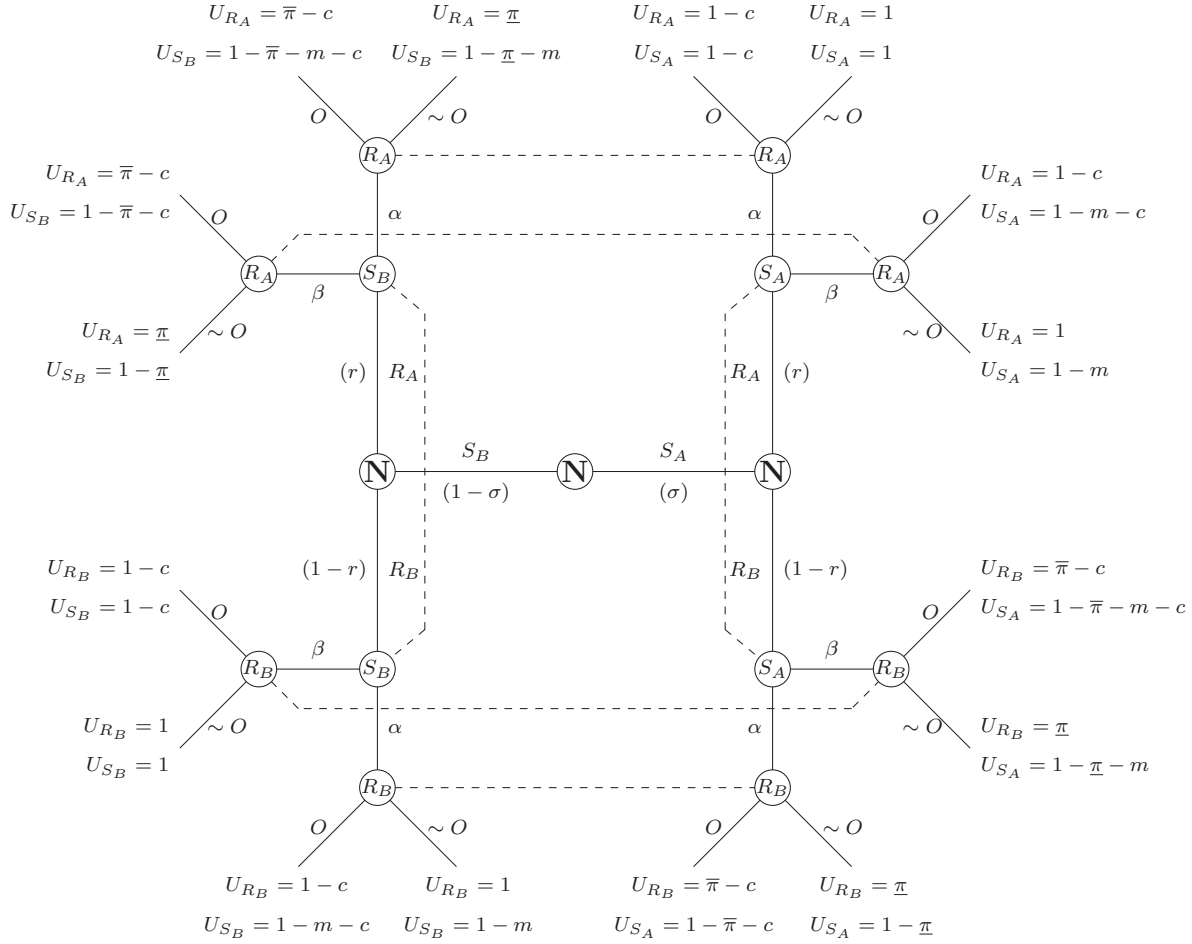
Following S's signal, R updates its posterior beliefs, which are denoted σ'. R then decides whether to oppose (O) or accommodate ($\sim O$) Sender. Playing O imposes uniform costs $c \in (0, 1)$ on both players, whereas playing $\sim O$ entails no costs for either.[9] Finally, following R's action, the two players distribute a good normalized to a value of 1. If R and S are compatible, both enjoy the good simultaneously, and potential losses in utility derive only from the costs of misrepresentation m and costs of opposition c. If the players are *in*compatible, they divide the good according to the balance of relative power between them, with π representing R's power and $1 - \pi$ representing S's power.[10] Importantly, playing O

enhances R's posterior power level, yielding $\overline{\pi}$, whereas accommodating Sender leaves it with $\underline{\pi}$. Let $\overline{\pi} - \underline{\pi} \equiv \pi^*$, which represents S's vulnerability to R's opposition.

In sum, the model captures the salient trade-offs of the strategic situation. For Receiver, opposing Sender is costly but yields a relatively favorable balance of power, which benefits R if S turns out to be incompatible. Conversely, accommodation is costless but leaves R with a less favorable posterior balance of power, which reduces its payoff if S is incompatible. A similar trade-off obtains for Sender, which enjoys a more advantageous future bargaining position if it can induce Receiver to cooperate in the present. To the extent that Sender believes its preferences are incompatible with Receiver's, it therefore has incentives to misrepresent by signaling against type. But

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[9]The term c broadly represents the costs of conflict, whether war or more limited peaceful competition.

[10]For tractability, we assume efficient second-round bargaining between incompatible actors, which compresses a two-stage interaction into a single period. This allows us to focus on the first-round reassurance interaction of interest, while still capturing the core intuition of standard power shift models: That incompatible actors

want to maximize their power against each other in order to gain a relative advantage in bargaining, or fighting, in the future. Doing so, however, incurs a risk of unnecessary and costly conflict with compatible types. For similar specifications and justification, see Debs and Monteiro (2014) and Yoder (2019b).

FIGURE 2 Equilibria of the Dual-Uncertainty Game
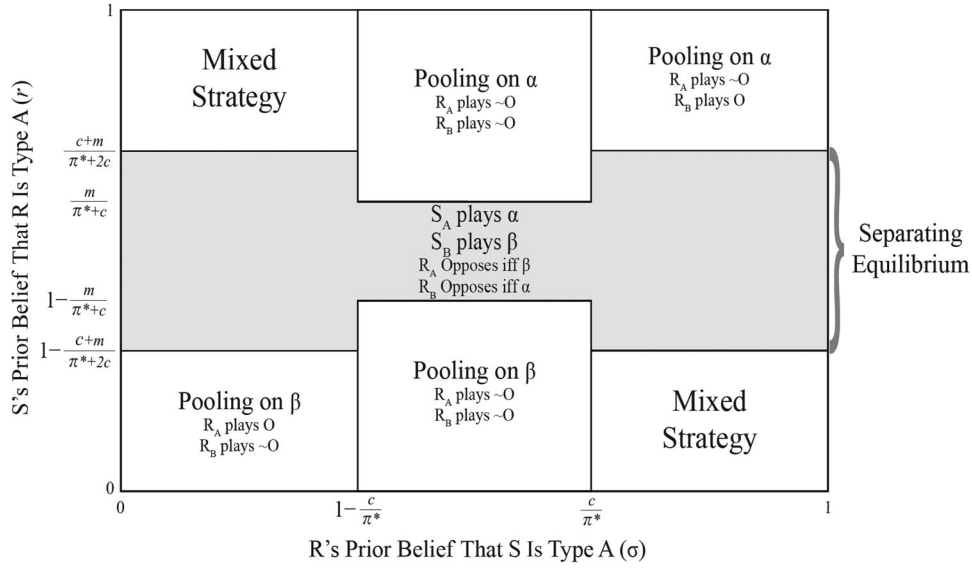
Sender faces immediate costs from misrepresentation, as it forgoes the benefits of immediately pursuing its true aims and risks incurring conflict with a compatible Receiver. The balance of these trade-offs determines Sender's incentive to signal honestly, and thus the credibility of its signals.

Results

Equilibria

Figure 2 depicts the equilibria across seven distinct parameter spaces, defined by the players' prior beliefs, r and σ.[11] Our analysis focuses on a separating equilibrium that occurs under intermediate values of r, when S is most uncertain of R's type. It is in this equilibrium where Sender's signals are fully credible. The remaining parameter spaces depicted in Figure 2 are composed of three sets of "mirror image" equilibria, in which Sender's signals are either entirely uninformative (in the pooling equilibria) or only partially informative (in the mixed-strategy equilibria). The mirror images, which emerge because the game is symmetrical across types, are identical in structure but with strategies and beliefs reversed. These equilibria are

both formally characterized and described intuitively in the supporting information.

At intermediate values of r, a separating equilibrium (the shaded range in Figure 2) occurs in which both S_A and S_B signal honestly (S_A plays α; S_B plays β). Receiver then fully updates its posterior beliefs such that $\sigma'|\beta = 0$ and $\sigma'|\alpha = 1$. R_A plays $\sim O$ in response to α and O in response to β, whereas R_B plays $\sim O$ in response to β and O in response to α. In short, when Sender is sufficiently uncertain, both types signal honestly in equilibrium, and Receiver's uncertainty is completely eliminated.

There are two distinct ranges of r that support this separating equilibrium.[12] At intermediate values of σ, when Receiver is highly uncertain, both types of Sender signal honestly *iff*

$$\frac{m}{\pi^* + c} > r > 1 - \frac{m}{\pi^* + c}. \tag{1}$$

At high values of σ, when Receiver is relatively confident that Sender is type A, both types of Sender signal honestly *iff*

$$\frac{c + m}{\pi^* + 2c} > r > 1 - \frac{c + m}{\pi^* + 2c}. \tag{2}$$

These parameter spaces both center on $r = \frac{1}{2}$, the point at which Sender is most uncertain about Receiver's type, and exist when $m \geq \frac{\pi^*}{2}$.[13] Equations (1) and (2) imply that a larger prospective power gain for Sender

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[11] Figure 2 depicts the equilibria under intuitive off-equilibrium-path beliefs: R_A acquiesces and R_B opposes in response to signal α, and R_A opposes and R_B acquiesces in response to β when these strategies occur off-path. This excludes several additional pooling equilibria, the existence of which does not affect the range of the separating equilibrium and thus has no relevance to our substantive argument.

[12] Derivations of these ranges are detailed in Proposition 1 and Lemma 3 in the supporting information.

[13] Relaxing the simplification of symmetrical payoffs across types, the separating range would no longer center precisely on $r = \frac{1}{2}$,

from avoiding opposition (π^*) shrinks the range of beliefs that support the separating equilibrium. This is intuitive. Sender has a greater incentive to misrepresent to the extent that inducing an incompatible Receiver to cooperate increases Sender's power, and thus helps Sender get what it wants in the future. Conversely, higher costs of misrepresentation (m) expand the separating equilibrium by increasing Sender's incentive to signal honestly. Thus, the range of the separating equilibrium depends on the importance of the immediate costs of foregoing Sender's preferences in the present, relative to the future benefits of duping a potentially incompatible Receiver into cooperating.[14]

Effect of Sender's Uncertainty

This section presents the model's comparative statics regarding the effect of Sender's prior beliefs—that is, its initial degree of uncertainty—on the credibility of its signals. Figure 2 shows that the separating equilibrium is most likely to obtain when Sender's uncertainty about Receiver's type is highest, under intermediate values of r. The credibility of Sender's signals then diminishes as it becomes more confident about Receiver's type, that is, at high or low values of r.

At these more extreme values of r, Senders who are confident that Receiver is compatible obviously have strong incentives to signal honestly. But the opposite incentives obtain for Senders who confidently believe Receiver is *in*compatible. Although misrepresentation incurs a cost m, it can also allow an incompatible Sender to dupe Receiver into cooperating. Consequently, Sender gains power (π^*) that it can use to achieve its goals at Receiver's expense in the future. Thus, when Senders are confident about Receiver's type, those that believe they are incompatible either fully misrepresent (in the pooling equilibria) or partially misrepresent (in the mixed-strategy equilibria), yielding less credible signals.

Consider S_A's incentives as r increases from 0 to $\frac{1}{2}$. As S_A becomes less confident that Receiver is type B,

Sender's point of maximum uncertainty. However, the separating equilibrium would still span $r = \frac{1}{2}$ as long as $m \geq \frac{\pi^*}{2}$, which is the condition under which the separating equilibrium exists. Our core comparative static result, that higher levels of Sender uncertainty move the outcome toward the separating range from the mixed and pooling equilibria, is therefore robust to asymmetric payoffs.

[14]Note that the reported effects of Sender uncertainty on credibility obtain only when the pooling and mixed-strategy equilibria exist, that is, when $\frac{\pi^*}{m}$ is sufficiently large. Otherwise, the separating equilibrium obtains under all conditions, and Sender's signals are fully credible regardless of its degree of uncertainty.

the probability that misrepresentation will provoke unintended conflict with a compatible R_A approaches the probability that it will dupe an incompatible R_B into cooperating. As these probabilities converge, S_A's expected benefits of misrepresentation decrease, and the likely strategic costs increase. This increases S_A's incentives to signal honestly and avoid the inherent costs of misrepresentation (m). Identical incentives obtain for S_B as r decreases from 1 to $\frac{1}{2}$. In sum, as r approaches $\frac{1}{2}$ from either direction, strong incentives to signal honestly increasingly obtain across *both* types of Sender. Conversely, as r moves from $\frac{1}{2}$ toward either 0 or 1, it generates stronger incentives for S_A or S_B, respectively, to misrepresent. Thus, the separating equilibrium that allows R to fully update its posterior beliefs is most likely to occur at intermediate values of r. In effect, Sender's uncertainty alleviates Receiver's uncertainty.

Discussion

These findings have important implications for the literatures on credible signaling and shifting power. As discussed above, the prevailing intuition has been that the obstacles to credible signaling that operate under one-sided uncertainty are compounded under mutual uncertainty, insofar as they would simply operate in both directions. Our results suggest that this logic is restricted to a particular type of information asymmetry in which actors are fully aware of which behaviors constitute cooperative signals in the eyes of the receiver. The compounding effect of mutual uncertainty does not obtain when the cooperativeness of any particular action is endogenous to the receiver's substantive preferences. Rather, when actors are uncertain about what constitutes a cooperative signal, mutual uncertainty has a self-negating effect in which actors with compatible preferences can more easily identify each other and avoid conflict.

To illustrate the intuition underlying these results, consider the special case of one-sided uncertainty in which the sender is completely informed of the receiver's preferences, and thus knows which actions the receiver views as cooperative. Here, incompatible senders can use their information about the receiver's preferences to effectively misrepresent their own preferences. By taking actions they know will be interpreted as cooperative signals, incompatible senders can preclude the receiver from distinguishing them from compatible types. An incompatible sender does so in order to dupe the receiver into reciprocating cooperation, either fully (in the pooling equilibria) or partially (in the mixed-strategy equilibria),

which allows the incompatible sender to gain power to exploit the receiver in the future. Thus, under one-sided uncertainty and a sufficiently large power shift, it is difficult for the receiver to acquire information about the sender's preferences because both types of sender send the same behavioral signals.

This presents the uncertain receiver with an onerous choice between allowing a potentially incompatible sender to gain power unimpeded (as occurs in the pooling equilibria), and risking some degree of costly competition even with compatible types (as occurs in the mixed-strategy equilibria). Under one-sided uncertainty, our model therefore supports the widespread assertion in the literature on power shifts that tragic conflict can occur between rising and declining states with compatible preferences, due to a combination of intractable uncertainty and commitment problems (Copeland 2000; Levy 1987).[15]

This sort of preventive conflict among compatible states does not obtain under a high degree of *mutual* uncertainty over policy preferences, however. When the sender is uncertain about the receiver's preferences, it cannot be confident that misrepresentation will induce accommodation from an incompatible receiver. Instead, misrepresentation could inadvertently send a noncooperative signal to a truly compatible receiver and trigger unnecessary conflict. For a highly uncertain sender, the risk of the latter outcome, plus the inherent cost of misrepresentation, outweigh the potential benefits of duping an incompatible receiver into cooperation. As such, highly uncertain senders signal honestly, revealing their types and allowing the receiver to confidently update its beliefs. The fully informed receiver can then oppose truly incompatible senders, and avoid unwanted conflict with compatible ones.

In sum, when cooperation is subjective and conditional on the receiver's preferences, mutual uncertainty has an offsetting effect: Actors send honest, credible signals, thereby alleviating their initial uncertainty. This finding is a critical addition to the security dilemma literature, which has focused on a type of uncertainty in which actors are completely informed about which behaviors constitute cooperative signals. Under this assumption, two-sided uncertainty exacerbates barriers to credible signaling, making it more difficult for compatible states ("security seekers") to build trust and avoid conflict. In contrast, our results show that when coop-

eration is subjective, mutual uncertainty is far from intractable: Honest behavior and credible communication are strongly incentivized. Indeed, with dynamic power, a declining state's uncertainty about a rising state's substantive policy preferences is most intractable and dangerous when the riser is completely informed of the declining state's type. Our argument therefore delineates important conditions under which credible signaling can mitigate the security dilemma.

Mutual Uncertainty and the Sino–Soviet Split

Formal theories, especially those in which actors' beliefs play a central role, are particularly well suited to qualitative empirical examination, due to the common methodological emphasis on causal mechanisms (Goemans and Spaniel 2016). As such, this section illustrates the main hypothesis of the dual-uncertainty game—that a sender's uncertainty induces it to send honest signals of its preferences—in the context of the Sino–Soviet split from 1953 to 1960. We analyze the case with Soviet Premiere Nikita Khrushchev in the role of Sender and Chinese Communist Party (CCP) Chairman Mao Zedong in the role of Receiver.[16] From 1953 to 1956, Sino–Soviet relations were characterized by the type of uncertainty captured in our model. Khrushchev was highly uncertain about Mao's ideological preferences, and thus about which behaviors Mao would see as cooperative. This is represented in the model as a value of r around $\frac{1}{2}$. As described above, this parameter value strongly incentivizes senders to honestly signal their preferences, yielding the separating equilibrium.

We show below that Mao and Khrushchev had starkly opposing ideological preferences. To a revolutionary Marxist—as Mao turned out to be—radical, populist mobilization campaigns and confrontation with the capitalist world were seen as cooperative actions, whereas moderate, liberalizing policies were anathema and threatening. The reverse was true for a pragmatic, ideologically flexible Marxist like Khrushchev. But importantly, neither one knew what the other's preferences were.

This uncertainty, we argue, was critical in inducing Khrushchev to honestly signal his ideological type. Khrushchev fully understood that he had overwhelming incentives to send cooperative signals to Mao in order

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[15]The commitment problem alone is only sufficient to explain conflict between completely informed rising and declining states whose preferences are known to conflict. "Tragic" conflict between states with truly compatible preferences also requires uncertainty on the part of the declining state (Yoder 2019a).

[16]Since uncertainty is two-sided, the model should also be able to account for Mao's behavior as sender and Khrushchev's beliefs as receiver if these roles were reversed. These implications are considered below (notes 18 and 20).

to maintain Mao's support in the domestic struggle to assume leadership of the Communist Party of the Soviet Union (CPSU). Yet in 1956, Khrushchev delivered his famous Secret Speech, which revealed his liberalizing policies of domestic de-Stalinization and peaceful coexistence with the West. Mao saw these policies as clear noncooperative signals, and he set in motion a radical break with the Soviet Union that was overtly manifested by 1958 and complete by 1960. The consequences of the split were dire for Khrushchev, who never recovered politically and was removed from power in 1964.

We argue that uncertainty about Mao's ideological preferences was necessary for Khrushchev to so clearly and ostentatiously reveal his own preferences for liberalization. There is strong evidence that, had he known Mao's radical preferences, Khrushchev would have obfuscated his ideological position and moderated both the framing and substance of his policy reforms in order to avoid alienating Mao. Thus, in keeping with our theoretical findings, an uncertain Khrushchev pursued his true preferences because he simply did not know which signals Mao would view as cooperative.

Overview: The Secret Speech and Its Consequences

Khrushchev delivered the Secret Speech in February 1956 at the 20th Congress of the CPSU. The speech articulated a set of liberalizing reforms at home, while denouncing the murderous purges and "cult of personality" of Khrushchev's predecessor, Josef Stalin. Equally important was Khrushchev's reorientation of Soviet foreign policy in pursuit of more amicable relations with the West. Khrushchev "renounced Stalin's doctrine of the inevitability of world war and laid out the principles of 'peaceful coexistence' between capitalism and socialism" (Zubok 2007, 129).

These reforms were unacceptable to Mao, whose ideology turned out to be even *more* radical than Stalin's. Since his early revolutionary years, Mao adhered tightly to a philosophy of "continuous revolution," wherein popular mobilization and radical economic and social "leaps" were necessary to achieve true communism (Luthi 2008, 24–27; Meisner 1999, chap. 4, 192–99). This ideology carried into foreign policy, where it mandated "sharpening the conflict with the west" in order to maintain revolutionary momentum (Zagoria 1962, 185).

The 20th Congress revealed to Mao that Khrushchev's ideological preferences differed radically from his own.[17]

[17]Previously, Mao had likely believed that Khrushchev would largely maintain Stalin's policies. Until late 1955, Khrushchev had

Khrushchev's Secret Speech was an "ideological bomb" that "shocked Mao," who rapidly and negatively updated his beliefs about Khrushchev's ideological compatibility (Chen 2001, 64; Shen and Xia 2015, 141). Mao privately called the Speech a "surprise attack" (Luthi 2008, 50) that "created serious cracks" in Sino–Soviet relations (Shen and Xia 2015, 242). Internally, Mao denounced Khrushchev as having abandoned not only the "sword of Stalin," but also, "to a large extent, the sword of Lenin" (Chen and Yang 1998, 266), and branded Khrushchev's "de-Stalinization . . . simply de-Marxification, it is revisionism" (Luthi 2008, 63).

The revelation of this "ideological chasm" made long-term cooperation prohibitively costly for Mao, and it was the key driver of the Sino–Soviet split (Luthi 2008, 52).[18] First, given this ideological distance between Mao and Khrushchev, cooperation with a liberalized Soviet Union after 1956 would have required Mao to adopt foreign and domestic policies starkly at odds with his own radical preferences. Second, as Lorenz Luthi (2008, 46) notes, "de-Stalinization threatened to undercut Mao's domestic position" in favor of moderates within the CCP. Thus, in response to the Secret Speech, Mao "had to be critical of Moscow in order to reduce the influence of the Soviet model" in China, and adopt "a tough approach to the Soviet[s]" (Li 2012, 52). In April 1956, Mao presented his own "secret speech" to the CCP Politburo, which called for the "wholesale abandonment of the 'Soviet model' of development" and outlined "a radically different strategy" more in tune with his own revolutionary ideology (Meisner 1999, 156, 169) that would pursue socialism through decentralized, populist mobilization of the peasantry (Luthi 2008, 73; Meisner 1999, 161).

adopted a disingenuous hard-line position against de-Stalinization in order to discredit moderate rivals and win support from Stalinists within the CPSU (Crankshaw 1966, 192, 200–201), which "emboldened Mao in his revolutionary optimism" (Westad 1998, 18). Having recently (though still incompletely) consolidated power, Khrushchev's first opportunity to articulate his broader policy goals was the CPSU Congress in February 1956 (Crankshaw 1966, 189–201, 211–12; Shen and Xia 2015, 137–38).

[18]In terms of the model with Mao as the sender and Khrushchev the receiver, the Secret Speech shifted Mao's strategy from the pooling equilibrium to the separating equilibrium. Mao's costs of misrepresentation went from tolerably low, when he thought Khrushchev was likely a Stalinist (see previous note), to unacceptably high when he learned Khrushchev was a liberalizer. Until 1956, Mao had been willing to misrepresent himself as an orthodox Stalinist and delay pursuit of his radical "leaps." As we show below, given the massive amounts of Soviet aid China was receiving during this period, Mao would have faced strong incentives to conceal the more radical elements of his ideology that conflicted with Soviet doctrine. Indeed, in 1955, Mao's ostensible long-term intentions were to adhere to the Stalinist development model, at least through the early 1960s (Luthi 2008, 42–43; Shen and Xia 2015, 106).

Accordingly, in 1958 Mao launched a radical domestic and foreign policy strategy with the initiation of the Great Leap Forward and the Second Taiwan Strait Crisis.[19] These policies were "an explicit double challenge to Soviet leadership in the world and within the socialist camp" (Luthi 2008, 81; see also Zubok and Pleshakov 1997, 220–29). In an attempt to undermine Khrushchev's pursuit of peaceful coexistence with the West, Mao began openly accusing the Soviet leadership of abandoning socialist ideals. By 1959, "it was obvious to the Kremlin that the concrete difficulties in Sino-Soviet relations were . . . the manifestation of basic ideological disagreements," and Sino–Soviet relations continued to deteriorate through 1960 (Pleshakov 1998, 238).

The Sino–Soviet split was ultimately devastating to Khrushchev both internationally and domestically. The intra-bloc confrontation "seriously weakened the Soviet Union in its global military rivalry with the United States" (Pleshakov 1998, 230, 240) and undermined peaceful co-existence, as Khrushchev was compelled to increasingly challenge the United States in order to compete with Mao for leadership of the socialist bloc (Luthi 2008, 157, 164–67; Pleshakov 1998, 238; Zubok and Pleshakov 1997, 199, 202–5). The rekindling of hostilities with the West, in turn, siphoned resources from Khrushchev's domestic programs and seriously weakened the Soviet economic recovery (Zubok and Pleshakov 1997, 202; Zubok 2007, 131–32). These events, along with Mao's vicious and relentless ideological denunciations of Khrushchev, contributed greatly to Khrushchev's fall from power in 1964 (Crankshaw 1966, 283; Luthi 2008, 278–81).

Khrushchev's Uncertainty in 1956

Given the immense costs Khrushchev ultimately incurred from the Sino–Soviet split, why did he so overtly reveal his reformist preferences in the Secret Speech, rather than concealing or downplaying his ideological differences with Mao? We argue that Khrushchev did so in large part because he simply did not know Mao's preferences. Up to that point, Khrushchev and Mao faced intense mutual uncertainty about each other's underlying ideology. According to Khrushchev's memoirs, Mao "deceived us for a number of years before we saw through his tricks . . . Mao Tse-tung has always been a master at concealing his true

thoughts and intentions [including] after the 20th Party Congress" (Talbott 1971, 461–62). Yet Khrushchev was not completely duped by Mao: "I was always on my guard with him" (Talbott 1971, 462). Rather, Khrushchev remained highly uncertain, holding neither accurate beliefs that Mao was a radical, nor false confidence that Mao was a moderate. In Khrushchev's words, it was "always difficult to know what the Chinese [were] really thinking," for example, "whether China [was] really for or against peaceful coexistence" (Talbott 1971, 473). Henry Kissinger (2011, 168) concurs that Khrushchev, unaware of Mao's radicalism, simply "did not understand . . . that his policy of peaceful coexistence . . . was, in Mao's eyes, incompatible with the Sino-Soviet alliance."

Indeed, Khrushchev's uncertainty remained in place until 1958, when Mao's radical leftist turn shocked Soviet leaders. "The Kremlin was amazed to note how great the ideological differences between Moscow and Beijing were" and was "completely unprepared" for Mao's ideological challenge (Pleshakov 1998, 238–39). Khrushchev was "at a loss to interpret China's aims" in provoking the Second Taiwan Strait Crisis, and "confused by what was occurring in China" during the Great Leap Forward (Chen 2001, 77–78). It was only following these events that "Moscow came to believe that Beijing was opting out of the [Soviet] development model" once and for all (Luthi 2008, 47).

What was the basis of Khrushchev's uncertainty in 1956? Prior to Stalin's death in March 1953, both Khrushchev and Mao had little choice but to defer to Stalinist orthodoxy. Khrushchev's incentives to do so were obvious, but in Beijing as well, "Mao and his comrades had to respect [Stalin's] authority and yield to his reputation" (Chen and Yang 1998, 259). Well aware of Mao's incentives to placate Stalin, Khrushchev was unable to infer whether Mao was a moderate reformer, like himself, or a radical whose revolutionary zeal matched or exceeded Stalin's.

Khrushchev's uncertainty was sustained following Stalin's death by China's foreign and domestic circumstances, which constrained Mao to adopt particular policies regardless of his true ideology.[20] Domestically, China's early stage of socialist development necessitated

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[19]The 2-year time lag between the Secret Speech and Mao's policy shift was due to an ongoing power struggle within the CCP. As Maurice Meisner observes, "Mao's unorthodox ideas on economic development were largely ignored [in 1956] because he no longer exercised supreme authority over the Party." Not until late 1957, when Mao reestablished personal control, could he implement his radical policies (Meisner 1999, 170–80, 187–88, at 170).

[20]In terms of the model with Mao in the sender role, Mao initially misrepresented himself as an orthodox Stalinist, rather than honestly revealing his even more radical preferences. He did this for two reasons. First, given Khrushchev's initial moderation (see note 17), Mao likely believed that Khrushchev was an orthodox Stalinist who would have seen Mao's Stalinist policies as cooperative. Second, hard-line Stalinism was sufficiently close to Mao's true preferences that the costs of misrepresenting himself as a Stalinist were ultimately tolerable (see note 18). These factors put Mao in the pooling equilibrium prior to the Secret Speech.

adherence to the Soviet model of agricultural collectivization and industrialization (Christensen 2011, 84; Shen and Xia 2015, chap. 4). This was a requisite first step for any socialist society, especially one as underdeveloped as China, and would have been undertaken by either a radical or a moderate Chinese Communist leader (Chen 2001, 63; Meisner 1999, 104–20). Consequently, Khrushchev could not form confident beliefs about Mao's ideological convictions. As Chen Jian (2001, 63) observes, "the specific needs of Mao's continuous revolution at this stage were well-served by the Sino-Soviet Alliance. A vague undercurrent of disagreement and distrust, however, lingered between Chinese and Soviet leaders."

China's moderate foreign policy through 1956 was similarly uninformative. According to Thomas Christensen (2011, 84, 91), following the Korean War, "China was clearly looking for a breathing spell in its efforts to spread revolution and challenge the Western powers in East Asia . . . .Chinese foreign policy would be relatively moderate in the middle 1950s and fully in tune with Soviet designs for a breathing spell in the Cold War."[21] Yet despite their outward cooperation on foreign policy, "early misgivings between Mao and Khrushchev were reciprocal" (Christensen 2011, 101). Thus, on both of Khrushchev's major ideological shifts—de-Stalinization domestically and peaceful coexistence internationally—Mao's preferences remained highly opaque at the time of the Secret Speech.

Causal Salience of Khrushchev's Uncertainty

We claim that Khrushchev's uncertainty was a necessary condition for him to reveal his preferences in the Secret Speech. An alternative hypothesis is that his costs of misrepresentation were simply prohibitive—that is, that Khrushchev's short-term policy goals were so valuable that he was unwilling to temper or defer them, even had he known Mao's preferences. This hypothesis is manifested in our model as a value of m sufficiently high that the separating equilibrium would obtain even when Sender is completely informed of Receiver's incompatibility. To validate the operation of our mechanism in this case, we must therefore marshal evidence that counterfactually, had he known Mao's true ideological convictions, Khrushchev would at the very least have tempered his reformist language and delayed or moderated his liberalizing policies, in order to remain on good terms with Mao and maintain Sino–Soviet cooperation.[22]

There is strong evidence in support of this counterfactual. Even after achieving a tenuous hold on the CPSU leadership in 1955, Khrushchev remained heavily dependent on Mao's continued support to maintain his position domestically and throughout the communist world. Moreover, he fully recognized his incentives to retain Mao's support, and he incurred tremendous costs in order to do so. Khrushchev was initially a dark horse in the domestic leadership struggle after Stalin's death, and he did not fully consolidate his power in the face of intraparty challenges until mid-1957 (Crankshaw 1966, 201, 244–51; Luthi 2008, 74; Shen and Xia 2015, 188–92; Zubok and Pleshakov 1997, 169). Khrushchev's tenuous domestic position meant that he stood to benefit enormously from ideological and political support from Mao, who, given his intellectual contributions to Marxism, revolutionary credentials, and spectacular recent military successes, was uniquely equipped to legitimize Khrushchev's leadership at home and abroad (Zubok 2007, 111). The historical literature on the Sino–Soviet split is clear on this point. Vladislav Zubok (2007, 118) argues that, at the time of the Secret Speech, "Khrushchev, from his position of weakness, needed Mao's friendship," and Chen Jian (2001, 63) concurs that Khrushchev "certainly understood that support from China was indispensable to him."

It is hard to overstate the value Khrushchev placed on securing Mao's support, and the lengths to which he went in order to do so. This is most clearly reflected in the massive increase in Soviet aid to China, which took the "highest priority" among its allies (Westad 1998, 16). At Khrushchev's behest, Soviet economic assistance to China in the mid-1950s grew a hundredfold (Zubok and Pleshakov 1997, 217), eventually absorbing an astounding 7% of total Soviet GDP (Shen and Xia 2015, 105; Zubok 2007, 111). This aid, which diverted desperately needed resources from the Soviet Union's own postwar recovery, persisted through the end of the 1950s, including the dispatch of thousands of Soviet experts to help execute developmental projects and provide vital training for their Chinese counterparts (Shen and Xia 2015, chap. 4). Khrushchev also made widespread territorial concessions to China along the Sino–Soviet border, as well as extensive transfers of military technology and material.

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[21]Christensen (2011, 102) also notes, however, that "Mao clearly saw such peaceful gestures to the West as temporary and tactical measures," and was not, like Khrushchev, "wedded to these ideas in principle."

[22]It was clearly possible for Khrushchev to temper his policy reforms in both rhetoric and practice. Indeed, as discussed above (note 17), Khrushchev misrepresented his ideological position in precisely this way from 1953 to 1955 in response to his main domestic challenge from the liberal Georgi Malenkov (Crankshaw 1966, 192, 200–1).

There is even evidence that "Khrushchev personally made the decision to assist China in building a nuclear industry to repay Mao for his political support" (Shen and Xia 2015, 217).

Indeed, Khrushchev's overwhelming economic, military, and territorial concessions to China were clearly driven by his desire to procure Mao's patronage. In trade and border negotiations at the end of 1954, Khrushchev "not only agreed to Chinese demands, but also surpassed them in 'fraternal' generosity . . . .This gift was worth many billions of dollars" (Zubok and Pleshakov 1997, 170–71). In doing so, Khrushchev overruled vehement protests within the Soviet Presidium and from his own economic advisors, betting that securing Mao's support would outweigh any domestic opposition the move generated (Zubok 2007, 111). Furthermore, Khrushchev remained vulnerable to domestic challenges through June 1957; thus, he was clearly still dependent on Mao's continued support at the time of the Secret Speech.

As with any counterfactual, it is impossible to establish with complete certainty that a fully informed Khrushchev would have moderated his liberal policies and rhetoric in order to maintain Mao's support. However, the alternative verges on the implausible: that Khrushchev would have *knowingly* given a speech so likely to alienate the radical Mao even as he concurrently bent over backwards to garner Mao's favor, making astonishing political and economic sacrifices in order to do so. We therefore have high confidence that Khrushchev's uncertainty regarding Mao's radical ideology was a necessary condition for him to honestly reveal the extent of his own moderate preferences in the Secret Speech.

The Sino–Soviet split nicely illustrates how a sender's uncertainty can induce it to send honest signals of its preferences. Khrushchev's uncertainty about Mao's degree of radicalism is exactly the type of uncertainty captured by the dual-uncertainty game. Whether Mao would interpret the reformist policies revealed in the Secret Speech as cooperative or hostile depended heavily on Mao's own ideological preferences. Whereas a moderate Mao would have seen Khrushchev's liberalizing policies of de-Stalinization and peaceful coexistence as cooperative signals, in reality Mao was a radical who saw Khrushchev's reforms as noncooperative and highly threatening. Yet because Khrushchev did not know Mao's preferences, he did not know which actions Mao would see as cooperative. Thus, although Khrushchev had enormous incentives to retain Mao's support, his uncertainty caused him to simply behave honestly, pursuing policies that advanced his true domestic and international goals. These

actions clearly revealed Khrushchev's preferences to Mao. In effect, Khrushchev's uncertainty caused him to take actions that eliminated Mao's uncertainty.

Conclusion

This article has argued that mutual uncertainty over policy preferences produces an "offsetting" effect, which increases the credibility of actors' reassurance signals and allows them to confidently infer each other's intentions. This finding contrasts with the conventional wisdom on interstate signaling, which holds that both tragic security dilemma spirals and bargaining failure are more likely when *both* states in an interaction are operating under uncertainty. Such conclusions are founded on a crucial assumption that pervades the signaling literature: that signals are objectively cooperative or noncooperative, regardless of the receiver's preferences. While this is sometimes the case, as in bilateral territorial disputes, there are many issue areas in which cooperation is subjective, and thus conditional on the receiver's preferences. Fiscal and monetary policies, ideological beliefs, policies toward third parties, and the shape of international norms and institutions are all examples of issues where cooperation is in the eye of the beholder. On such issues, which are common sources of interstate disputes, cooperation is subjective and uncertainty about the receiver's preferences also implies uncertainty about which actions constitute cooperative signals.

We showed above that when cooperation is subjective, mutual uncertainty facilitates credible reassurance. Because highly uncertain senders do not know whether misrepresentation will be seen as cooperative or not, they prefer to simply behave honestly, pursuing their true goals instead of concealing them in order to deceive the receiver. As such, receivers can view an uncertain sender's signals as highly credible and confidently update their beliefs in response.

The most immediate and obvious application of this logic is to contemporary U.S.–China relations. Until recently, Chinese leaders had almost certainly been well informed of American preferences, which have been manifested in the norms and institutions of the U.S.-led international order since the end of WWII. However, under the Trump administration, American foreign policy preferences have suddenly become far more uncertain. As Wang Jisi (2018, 183) observes,

> The way the Trump administration is wielding U.S. power and influence is bewildering to Chinese political analysts . . . . It has become harder

and harder for foreign-policy makers in China to discern what rules the Americans want themselves and others to abide by, what kind of world order they hope to maintain, and where Washington [stands] on major international issues.

Such incoherence is, on balance, likely to undermine American interests abroad. But ironically, it may also yield an unanticipated benefit. If Chinese leaders no longer know which actions will be seen as cooperative by the United States, their incentives to misrepresent are substantially reduced. As a result, Chinese policies that comport with prevailing international norms would be considerably more credible signals than they would have been given stable, well-defined U.S. preferences.[23] Thus, although an erratic U.S. foreign policy is likely to yield high strategic costs, our argument implies that it may also help elicit more credible signals of China's long opaque preferences.

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[23]This directional effect holds even if Chinese leaders view the Trump administration as likely a temporary departure from more traditional U.S. foreign policy, since Trump has undoubtedly increased Chinese uncertainty regarding U.S. preferences in both the short and long term.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix A: Equilibrium Proofs of the Dual-Uncertainty Game