

Coordination in Policymaking*

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Abstract

Many public policies rely on multiple agencies, which raises the question of how agencies with overlapping policy responsibilities coordinate their decisions. We consider a model of coordination in which a political executive can provide subsidize coordination between two agencies and consider how this possibility affects both the agencies' incentives and, ultimately, social welfare. Our model of subsidizing coordination is very simple: an executive can invest his or her own resources in a *coordination protocol* that the agencies can (but need not) use to align their decisions. We consider the impact of scarce attention at the agency level and demonstrate that, while coordination between the agencies is maximized by the agencies having aligned policy preferences, the fact that the executive can invest in the communication protocol undermines these incentives.

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1 Coordination in Bureaucratic Policymaking

In terms of how the state affects the daily lives of its citizens, most policy-making is bureaucratic policy-making. Bureaucratic policy-making both reflects, and is often justified by, *expertise* (e.g., Gailmard and Patty (2012)). One important potential downside of relying on experts is that few, if any, people are “general experts”: instead, both people and bureaucratic agencies are typically specialized. Both individual expertise and most agencies’ statutory authorities are domain-specific.

Policy questions do not always fit neatly into one agency’s jurisdiction. Examples of such questions range from the relatively mundane (which agency is responsible for regulating the safety of garbage trucks?) to the quite serious (e.g., Hurricane Katrina in 2005, the 2010 Deepwater Horizon disaster, the 2014 Flint, Michigan water crisis, and the 2023 Norfolk Southern derailment in East Palestine, Ohio). The emergence of such issues to the national level has even prompted both overhauls of existing agencies (e.g., the dismantling of the Mineral Management Service (MMS) following the Deepwater Horizon disaster), creation of new ones (e.g., the Consumer Financial Protection Bureau (CFPB) after the financial crisis of 2007-08), and combinations of the two (e.g., the Department of Homeland Security (DHS) following the September 11th, 2001 terrorist attacks).

Such major realignments of the administrative state are relatively rare. But the general issue at play in them — the need for coordination between agencies — is omnipresent. This has been recognized for many years, of course. In the United States, this is seen as early as the early New Deal (1933-1935). For example, prior to passage of the Federal Register Act in 1935,¹ the US Federal Government did not even have a central repository for its agencies’ regulations. As the federal administrative state grew in size and complexity (largely mirroring the dynamics of society and the economy as a whole), legal and policy scholars observed that agencies had little incentive to coordinate their more quotidian policy choices, in spite of growing evidence that coordination failures could eventually produce *policy failures*.

This fact arguably led to the creation of agencies explicitly charged with coordinating other agencies’ activities. Examples include the Environmental Protection Agency (EPA), the Federal Emergency Management Agency (FEMA), and the Department of Homeland Security (DHS). At the same time, some coordination problems are arguably “baked into” the structure of the executive branch of the Federal Government. For example, the National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have split, but overlapping, authority for air travel safety in the United States, the EPA and the Army Corps of Engineers have similarly complicated overlapping authority with respect to water pollution, and the list of agencies with overlapping authority in law enforcement is very long: to name only three, consider the Federal Bureau of Investigation (FBI), the Drug Enforcement Agency (DEA), and the Bureau of Alcohol, Tobacco,

¹49 Stat. 500, enacted July 26, 1935.

and Firearms (ATF). The fact that Congress and presidents have both recognized coordination problems and *created* them in the administrative policy-making process is a little puzzling. We return to this question in more detail in Section 4.

2 A Simple Model of Policy Coordination

Our baseline model of bureaucratic coordination is based on the **the battle of the sexes game**, pictured in Figure 1. The parameter $\alpha \in (0, 1]$, which we refer to as the **alignment** of the agencies'

	A	B
A	$(\alpha, 2-\alpha)$	$(0, 0)$
B	$(0, 0)$	$(2-\alpha, \alpha)$

Figure 1: A Family of Asymmetric Coordination Games ($\alpha \in (0, 1]$)

preferences, is the heart of our focus in this article.² As α increases, we say that agencies' preferences are **more closely aligned** and, if $\alpha = 1$, then we say that their preferences are **completely aligned**.

Equilibrium Bureaucratic Coordination. If Agencies 1 and 2 each choose policy without knowing what policy the other agency chooses,³ there are three Nash equilibria of the game in Figure 1. Two of these are in pure strategies (both agencies choosing $a_i^* = A$ and both agencies choosing $a_i^* = B$). The third equilibrium involves both agencies randomizing between $a_i = A$ and $a_i = B$. Letting $\sigma_i \equiv \Pr[a_i = A]$ denote the probability that agency i chooses policy A , this mixed strategy equilibrium is a function of α :

$$\begin{aligned}\sigma_1^*(\alpha) &= \frac{\alpha}{2}, & \text{and} \\ \sigma_2^*(\alpha) &= \frac{2-\alpha}{2}.\end{aligned}$$

We refer to this equilibrium profile as the α -**MSNE**. The following proposition simple, but key to our analysis. It states that coordination is more likely to be successful between agencies with more closely aligned preferences and maximized by agencies with completely aligned preferences.

Proposition 1 *The probability of coordination in the α -MSNE is strictly increasing in $\alpha \in [0, 1]$.*

²The case of $\alpha = 0$ is omitted, because there a continuum of Nash equilibria and, substantively, the game is no longer a coordination game in that case.

³In game theoretic terminology, the agencies are *choosing policies simultaneously*.

The implications of Proposition 1 will appear multiple times in our subsequent analysis. In particular, because greater alignment promotes higher success rates in the coordination game between the agencies, it will also reduce the incentive to exert costly effort to augment this probability of success. With that in mind, the following remark clarifies that our analysis is not predicated on the supposition that agencies must always be playing the α -MSNE.

2.1 Subsidized Coordination

We now suppose that there is a **principal** who wants the agencies to successfully coordinate and who can **subsidize** the agencies' efforts to coordinate. We model the effects of this subsidy in a "black box" fashion by assuming that the principal can invest in a **communication protocol**, which is characterized by a probability, $\pi \in [0, 1]$.⁴ The probability π represents the probability that the communication protocol will recommend that the agencies coordinate on A , and $1 - \pi$ represents the probability that it will recommend coordination on B . After observing α and π , the principal P chooses how much to **invest** in the protocol, $c \in [0, 1]$. The direct cost to P of investing c is c^2 . Given any investment $c \in [0, 1]$, the probability of communication *failure* is $1 - c$. When the communication protocol fails, the agencies will play the α -MSNE.

Timing of the Game. The timing of information and decision-making is as follows.

1. The alignment value, α , and the communication protocol, π , are made common knowledge.
2. The principal chooses a level of investment in communication, $c \in [0, 1]$.
3. Policy-making by the agencies proceeds as follows:
 - (a) With probability $1 - c$, the device fails, and the agencies play the α -MSNE.
 - (b) With probability $c \cdot \pi$, the device coordinates the agencies on A ($a = (A, A)$).
 - (c) With probability $c \cdot (1 - \pi)$, the device coordinates the agencies on B ($a = (B, B)$).
4. The choices (a_1, a_2) are revealed, the game concludes, and players receive their payoffs.

The Principal's Subsidy c as "Bailing Out" the Agencies. For simplicity of discussion, we refer to P investing a positive amount, $c > 0$, into the communication protocol as "bailing out" the agencies from their coordination problem. This language might seem strange at first, but it will become more clear why we use this term when we consider the agencies' induced preferences over alignment, α . Put simply, the two agencies unambiguously gain from higher investment by P

⁴For now, we assume that π is exogenous and common knowledge.

in the communication protocol. With that in hand, we now turn to consider P 's incentives when choosing how much to invest, c , in the communication protocol's **reliability**.

Equilibrium Reliability, $c^*(\alpha, \pi)$. For any given protocol, π , the principal's equilibrium expected payoff depends on α and c :

$$EU_P^*(c | \alpha) = \underbrace{c}_{\text{Prob. successful communication}} + \underbrace{(1-c)}_{\text{Prob. failed communication}} \cdot \underbrace{\frac{\alpha(2-\alpha)}{2}}_{\text{Prob. coordination in MSNE}} - \underbrace{c^2}_{\text{Direct Cost}}. \quad (1)$$

Notice that π is not included in the principal's payoff function. This is because we assume that the principal strictly gains from successful coordination but is otherwise indifferent on which outcome (A or B) the agencies coordinate. This simplifying assumption will allow us to identify conditions under which an *unbiased* principal will nonetheless benefit from using a biased communication protocol (*i.e.*, one with $\pi \neq 1/2$).

Our main conclusion in this baseline model is that the principal's equilibrium payoff is increasing, and his or her equilibrium investment level is decreasing, in alignment, α . These are stated in the following proposition.

Proposition 2 *In equilibrium, P 's investment in reliability, $c^*(\alpha)$, is strictly decreasing in the agencies' common alignment, α , and P 's expected equilibrium payoff is increasing in α .*

Figure 8 illustrates $c^*(\alpha)$ and P 's equilibrium expected payoff, $EU_P^*(\alpha)$, for $\alpha \in [0, 1]$. Intuitively, P 's equilibrium payoff is increasing in the agencies' alignment, α . Also intuitive is that P 's optimal investment, $c^*(\alpha)$, is decreasing in α . While this effect on the principal's investment is fairly straight-forward, we will see below that this induces the agencies to not share the principal's preferences for alignment (Proposition 3), in spite of the fact that they do share a common preference for successful coordination.

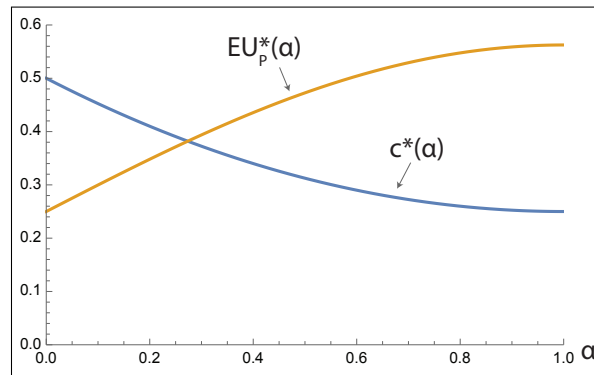


Figure 2: Optimal Fair Communication Reliability As a Function of Alignment

2.2 Agencies' Induced Preferences Over Alignment

Before extending the model to allow the agencies to have heterogeneous alignments, α_1 and α_2 , we first take a short detour to consider what the agencies would prefer for their (common) alignment, α , to be, given the supposition that P will invest $c^*(\alpha)$. Agency 1 and 2's equilibrium payoffs (*i.e.*, based on $c = c^*(\alpha)$), as a function of π , are contained in Appendix A. The following proposition illustrates that, while P is indifferent about π , *per se*,⁵ the agencies are most assuredly not indifferent to π . Indeed, an unfair communication protocol ($\pi \neq 1/2$) induces one agency (the one “favored” by the protocol) to prefer some misalignment ($\alpha < 1$) and, in many cases, to most prefer *complete misalignment* ($\alpha = 0$).

Proposition 3 *For any given $\pi \in [0, 1]$, Agency 1's equilibrium expected payoff with endogenous reliability is maximized by α^* defined by the following:*

$$\alpha^* = \begin{cases} 1 & \text{if } \pi \leq 1/2, \\ \tilde{\alpha}(\pi) \in (0.8, 1) & \text{if } \pi \in (1/2, 0.629382), \\ 0 & \text{if } \pi > 0.629382, \end{cases}$$

where $\tilde{\alpha}(\pi)$ is a strictly decreasing function of π for all $\pi \in (1/2, 0.629382)$.⁶

Proposition 3 has several implications. We discuss three of them now.

When Do Both Agencies Want Alignment? Note that the agencies mutually prefer perfect alignment ($\alpha = 1$) if and only if the communication protocol is fair (*i.e.*, $\pi = 1/2$). The sufficiency of a fair protocol for inter-agency agreement on alignment is not surprising. The necessity, however, is a little surprising: regardless of π , the agencies have a common interest in coordination for any alignment, α .

Disagreement Over Alignment. Because the game is symmetric (the agencies share a common alignment, α , a supposition that we relax below), whenever Agency 1 prefers lower levels of alignment, Agency 2 strictly prefers perfect alignment ($\alpha = 1$), and vice-versa. Proposition 3 implies that, when the principal can bail out the agencies in their coordination problem by investing c into the protocol, the agency who is *disadvantaged* by the communication protocol prefers that

⁵Again, this is because we have assumed that, in terms of outcomes, P is purely interested in the agencies coordinating but is indifferent about which outcome they coordinate upon.

⁶For completeness, the function $\tilde{\alpha}(\pi)$ is the second root of $4 - 8p + (-2 + 12p)\alpha + (-3 - 6p)\alpha^2 + 2\alpha^3 = 0$.

the agencies have aligned preferences. Thus, Proposition 3 indicates a conflict of interests between the agencies whenever the communication protocol is biased: the agency that is advantaged by a biased protocol would prefer to raise the stakes of successful coordination. *As π becomes more biased in favor of an agency's preferred outcome, that agency would prefer to have a larger payoff from its preferred outcome.*

Agency Preferences with Noisy Recommendations. For moderately unfair communication protocols,⁷ the two agencies agree that a degenerate communication protocol ($\alpha \in \{0, 1\}$) is *not* optimal. In fact, the preferences of the favored agency (in this case, Agency 1) over alignment, α , are non-monotonic. As an example, Figure 4 displays the agencies equilibrium expected payoffs as a function of α for an unfair communication protocol with $\pi = 0.65$.

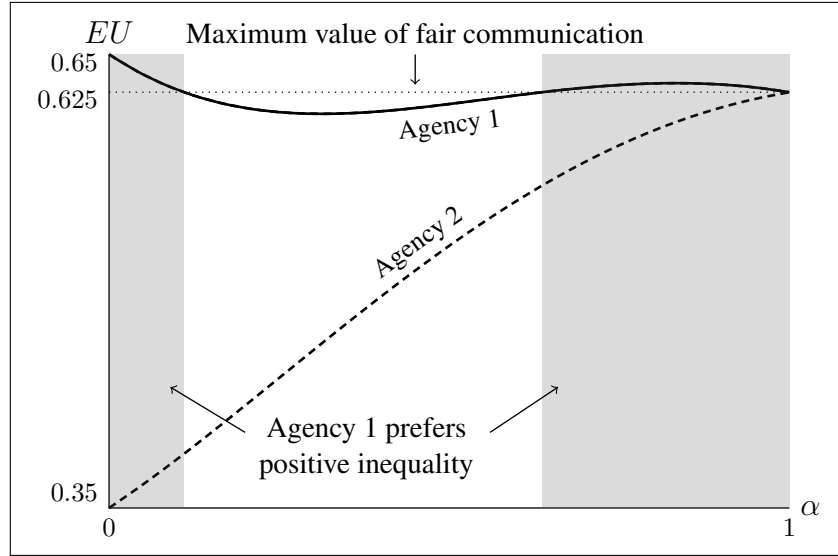


Figure 3: Preferences with Unfair Communication
 $\pi = 0.65$

***P*'s Preferences Over Fairness?** Proposition 3 provides one reason for *P* to prefer to use a fair communication protocol rather than an unfair one: if agencies expect that *P* will use an unfair communication protocol, then the agencies' induced preferences over α are no longer aligned, unlike when the communication protocol is fair. If the agencies can shape their own preferences (Section A.1), then *P* has at least one reason to use a fair protocol ($\pi = 1/2$). However, if alignment is exogenous, then *P* can benefit from an unfair communication protocol when the agencies have different alignments, α_1 and α_2 .⁸ We now turn to this extension, which also allows us to examine

⁷In this particular specification, moderately unfair communication describes any $\pi \in (0.370618, 0.629382)$.

⁸We show that the qualitative features of the analysis above extend to such settings in Appendix A.1

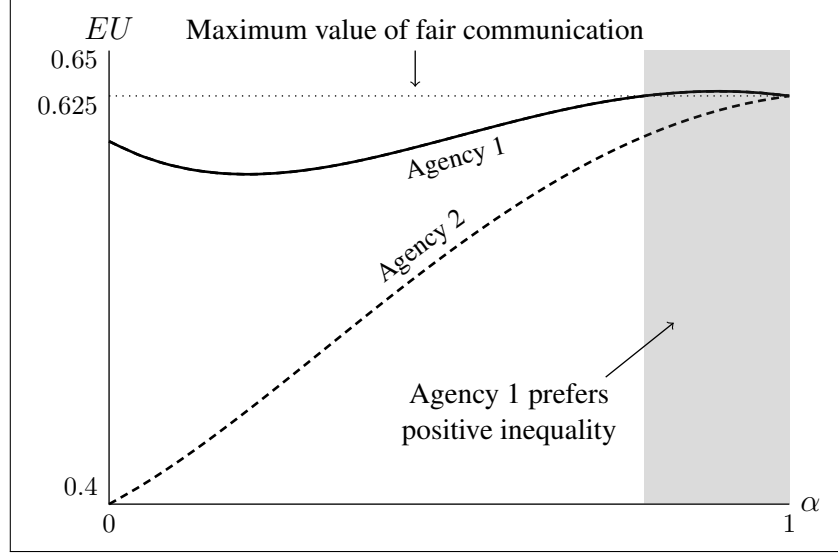


Figure 4: Preferences with Unfair Communication
 $\pi = 0.6$

the agencies' incentives to align their own preferences.

3 Alignment, Fairness, & Coordination

We now extend the model to allow each agency $i \in \{1, 2\}$ to value coordination on A at $\alpha_i \in [0, 2]$. This allows for our model to consider **Pareto-ranked coordination games**. If $\alpha_1 > 1$ and $\alpha_2 > 1$, then both agencies strictly prefer coordinating on A . These payoffs are displayed in Figure 5.

	A	B
A	(α_1, α_2)	$(0, 0)$
B	$(0, 0)$	$(2-\alpha_1, 2-\alpha_2)$

Figure 5: A Bigger Family of Asymmetric Coordination Games: $(\alpha_1, \alpha_2) \in (0, 1]^2$

When $\min[\alpha_1, \alpha_2] > 1$ or $\max[\alpha_1, \alpha_2] < 1$, we refer to the agencies as **ordinally aligned**: they share a common ranking of the two coordination outcomes, A or B .⁹ When the agencies are ordinally aligned, the equilibrium selection problem is arguably easier (*e.g.*, Pareto efficiency picks a unique outcome), and we will see shortly (Section 3.1) that the executive essentially recognizes this if he or she can choose the communication protocol, π .

⁹We omit the special case of $\alpha = (1, 1)$ for reasons that will become clear in Section 3.1.

3.1 Equilibrium Communication Fairness, π

If the executive can choose the communication protocol, π , P 's optimal choice depends on $\alpha = (\alpha_1, \alpha_2)$. When the agencies' preferences are ordinally aligned, the principal prefers to use a degenerate communication protocol that always recommends that the agencies choose their (mutually) most preferred coordination outcome.¹⁰ This preference for a degenerate communication protocol is retained for agency preferences that are not “to far from” ordinal alignment. This is illustrated in Figure 12, below, which identifies three qualitative regions. The upper right of the figure (dark gray) represents the alignments that the executive prefers that the protocol recommend the coordination outcome A , and the lower left of the figure (light gray) represents the alignments that the executive prefers that the protocol recommend the coordination outcome B . The remaining region (white) represents the alignments that prompt the executive to use a non-degenerate communication protocol. This third region includes only situations in which neither of the coordination outcomes is uniquely Pareto efficient.

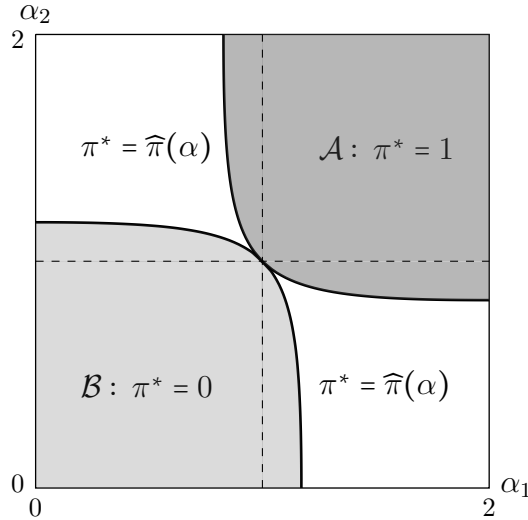


Figure 6: Endogenous Fairness: Regions of π^*

In the third region, the executive's optimal protocol, $\hat{\pi}(\alpha)$, is locally sensitive to changes in the agencies' alignments, α . Specifically, in the white region of Figure 12, the optimal protocol from P 's perspective is:¹¹

$$\pi^*(\alpha) = \hat{\pi}(\alpha) \equiv \begin{cases} 1/2 & \text{if } \alpha_1 = \alpha_2 = 1, \\ \frac{1}{8} \left(\alpha_2 - \alpha_1 + \frac{1}{1-\alpha_1} - \frac{1}{1-\alpha_2} + 4 \right) & \text{otherwise.} \end{cases} \quad (2)$$

¹⁰Formally, P prefers $\pi^* = 0$ if $\max[\alpha_1, \alpha_2] < 1$ and P prefers $\pi^* = 1$ if $\min[\alpha_1, \alpha_2] > 1$.

¹¹Note that \mathcal{B} & \mathcal{A} are not adjacent in $[0, 2]^2$: one can verify that $\alpha = (1, 1) \in \mathcal{M}$.

Equation (2) & Figure 12 jointly demonstrate that P 's optimal protocol is fair ($\pi = 1/2$) if *and only if* $\alpha_1 = \alpha_2 = 1$. Similarly, Equation (2) implies that $\pi^*(\alpha)$ is decreasing in α_1 and increasing in α_2 . This is in line with the logic described above regarding the flat regions, \mathcal{B} and \mathcal{A} . *more aligned* of the two agencies (*i.e.*, the agency i with the largest value α_i).

When the protocol π is not fair, the agency's induced preferences over their alignments, α , will not be the same. In spite of this being a coordination problem (and therefore, somewhat common value in nature), the agencies have distinct preferences not only because they actually have differing preferences, but also because they have different marginal values from the executive's investment in the protocol, c^* , and these marginal values are themselves sensitive to the exact values of the alignments, $\alpha = (\alpha_1, \alpha_2)$. Two examples of this are illustrated in Figure 7.

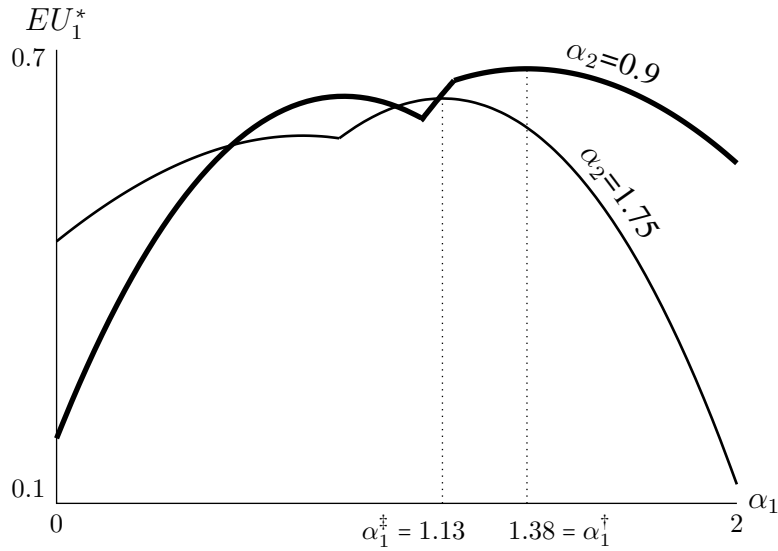


Figure 7: Agency 1's Induced Preferences over α_1

In Figure 7, the thick-lined curve portrays Agency 1's induced preference over its own alignment, α_1 , when Agency 2 prefers coordination on outcome B ($\alpha_2 = 0.9$). In this scenario, Agency 1's expected payoff, conditional on its own alignment, α_1 , given Agency 2's alignment is $\alpha_2 = 0.9$, is maximized by $\alpha_1 \approx 1.38$. Under such an alignment by Agency 1, given $\alpha_2 = 0.9$, the two agencies have ordinally-opposed alignments. However, if Agency 2's relative preference for its preferred coordination outcome is stronger ($\alpha_2 = 1.75$), then Agency 1's expected payoff, given Agency 2's alignment, $\alpha_2 = 1.75$, is maximized by $\alpha_1 \approx 1.13$, so that in this case, Agency 1 is made best off if its preferences are ordinally-aligned with Agency 2's.

Figure 7 illustrates Agency 1's induced preferences over α_1 given values of α_2 . Importantly, we observe that agencies sometimes prefer *misalignment* - when $\alpha_2 = 0.9$ (Agency 2 prefers to coordinate on B), for example, Agency 1 is best off with $\alpha_1^\dagger = 1.38$ (and prefers to coordinate on A). This is because they are acting in anticipation of the principal's actions; sufficient misalignment

between agencies induces the principal to invest more in c and π . In other cases, agencies prefer alignment in outcomes (see the case when $\alpha_2 = 1.75$), yet they still optimally want some degree of misalignment in their preferences.

Remark 1 *This analysis is unorthodox because it assumes that Agency 1's payoff from coordination on A is actually equal to α_1 : thus, changing Agency 1's alignment actually has both a direct effect on Agency 1's payoffs as well as an indirect effect through the principal's choice of π . Accordingly, the analysis involves interpersonal comparisons of utility, because it is comparing Agency 1's equilibrium payoff under one set of preferences over outcomes (as opposed to "stated preferences over outcomes," as in Gibbard (1973), Satterthwaite (1975)) with its equilibrium payoff under a different preferences over outcomes.*

3.2 Equilibrium Reliability, $c^*(\alpha)$

With the optimal communication protocol, $\pi^*(\alpha)$, in hand, we can now derive the equilibrium level of investment. We start our presentation in the baseline case of equally aligned agencies ($\alpha_1 = \alpha_2 \equiv \alpha \in [0, 1]$) and $k = 0$ (guaranteeing that the agencies will both pay attention to the protocol if c is close enough to 1).

Equal Alignments ($\alpha_1 = \alpha_2 \equiv \alpha \in [0, 1]$) and Certain Observation. Suppose that $\alpha_1 = \alpha_2 \equiv \alpha \in [0, 1]$, so that Equation (2) yields $\pi^*(\alpha) = 1/2$, and $k < k^*(\alpha, 1/2)$. Then Equation 1 easily yields the following as P 's optimal reliability, $c^*(\alpha, 1/2)$:

$$c^*(\alpha, 1/2) = \frac{2 - 2\alpha + \alpha^2}{4},$$

which is decreasing in $\alpha \in [0, 1]$, and P 's corresponding equilibrium payoff is

$$u_P^*(c^*(\alpha, 1/2) \mid \alpha_1 = \alpha_2 = \alpha) = \frac{1}{16} (\alpha^2 - 2\alpha - 2)^2,$$

which is increasing in $\alpha \in [0, 1]$. Figure 8 illustrates $c^*(\alpha)$ and P 's equilibrium expected payoff, $EU_P^*(\alpha)$ for $\alpha \in [0, 1]$. Intuitively, P 's optimal level of reliability is decreasing in α .

We now relax the assumption that $k = 0$, implying that there may be the possibility that k is sufficiently large to render the communication protocol ineffective due to the agencies ignoring it.

Equal Alignments ($\alpha_1 = \alpha_2 \equiv \alpha \in [0, 1]$) and Uncertain Observation. We now relax the presumption that P knows that the agencies will observe the recommendation with certainty. Instead, we suppose that the upper bound of the distribution of ϵ_1 and ϵ_2 , $k > 0$, is unobserved by the prin-

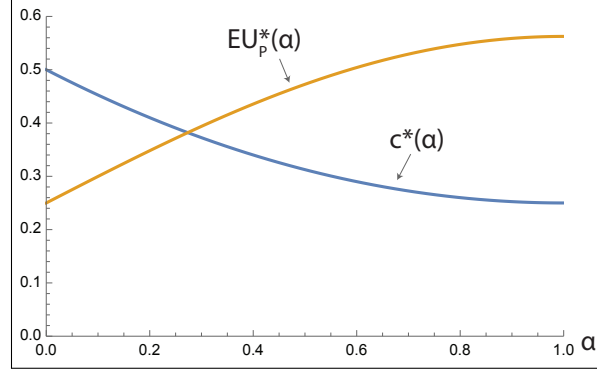


Figure 8: Optimal Communication Reliability As a Function of Alignment, $\alpha_1 = \alpha_2 = \alpha$

principal and distributed according to a CDF, $G : \mathbf{R}_+ \rightarrow [0, 1]$ that assigns positive probability to k being sufficiently large to rule out observation in equilibrium: $G(k^*(\alpha, \pi)) < 1$.¹² In this case, the principal's expected payoff depends on α , π , c , and k :

$$u_P(c | k) = \begin{cases} c + (1 - c) \frac{\alpha(2-\alpha)}{2} - c^2 & \text{if } k < k^*(\alpha, \pi), \\ \frac{\alpha(2-\alpha)}{2} - c^2 & \text{if } k \geq k^*(\alpha, \pi). \end{cases}$$

Note that the investment cost, c , is lost regardless of whether communication actually occurs, implying that P has a non-trivial trade-off when choosing c as long as P knows that there is a positive probability the agencies will pay attention to the protocol in equilibrium. Accordingly, the optimal investment in this setting will be some number in the interval $(0, c^*(\alpha))$, where $c^*(\alpha)$ is defined in Equation (6), above (after inserting the presumption that $\alpha_1 = \alpha_2 = \alpha$). Because investment is always costly but useful only if $k < k^*(\alpha, \pi^*(\alpha))$, the exact value of the optimal investment in this setting will (intuitively) depend on the distribution of k : the optimal investment will be an increasing function of $G(k^*(\alpha, \pi^*(\alpha))) \in (0, 1)$.

Figure 13 illustrates the maximum cost of attention that the agencies are willing to incur given their alignments ($k^*(\alpha, \pi)$). Note that P 's objective is to choose a value of π that maximizes $k^*(\alpha, \pi)$, as this would maximize the chances that agencies observe the recommendation. When agencies are aligned, P always recommends the outcome that both agencies prefer; P 's optimal choice of π is therefore either 0 or 1. Only when agencies are misaligned in outcomes (and no one agency strongly prefers one outcome over another, in which case P recommends that outcome with certainty) will P optimally choose some interior value of π . Further note that agencies are less willing to pay attention as they become more indifferent to the two outcomes.

¹²Note that we presume that, if $k < k^*(\alpha, \pi)$, the agencies play the “complete attention equilibrium” with $\epsilon_i^* = k$ for both agencies $i \in \{1, 2\}$. There is a continuum of subgame perfect Nash equilibria in this setting: we are focusing on the unique Pareto efficient equilibrium.

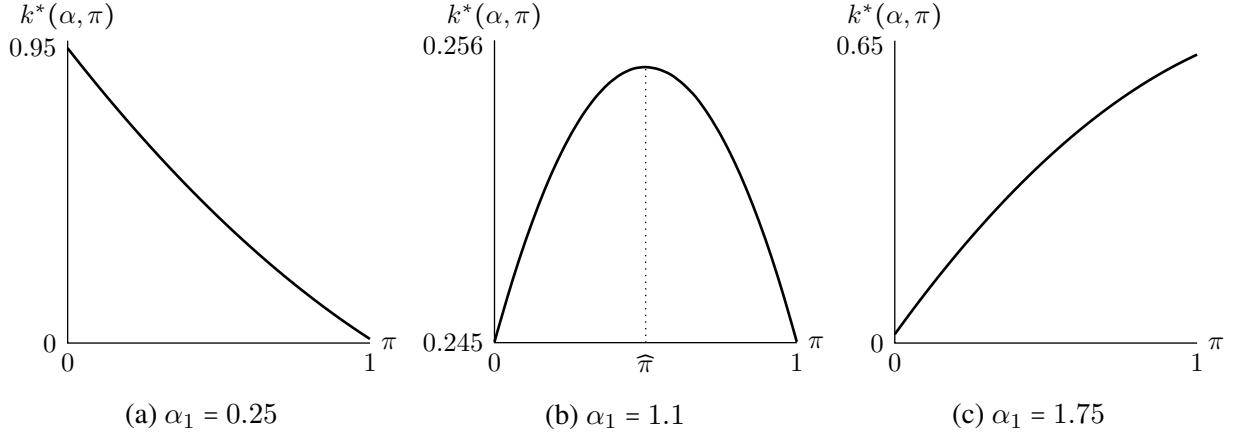


Figure 9: Maximum Cost of Attention that Agencies are Willing to Incur, $\alpha_2 = 0.9$

The General Case: Heterogeneous Alignments and Uncertain Attention. The derivation of optimal investment with heterogeneous alignments in Equation (5), above, can be used in the same way as $c^*(\alpha)$ (as defined in Equation (6)) was used in the common alignment with uncertain attention case examined above. Note that Equation (5) can be rewritten as follows:

$$c^*(\alpha_1, \alpha_2) = \frac{1}{4} + \frac{(\alpha_1 - 1)(\alpha_2 - 1)}{4},$$

which makes clear that each agency's misalignment is complementary in terms of supporting the agencies both paying attention to the protocol's recommendation in equilibrium. We now turn to the question of P 's incentives when choosing which pair of agencies to task with coordination.

3.3 Picking Agencies to Coordinate

Suppose that the principal has one agency (Agency 1, with fixed and known alignment, $\alpha_1 \in [0, 1]$) that must be involved in policy-making, and is faced with a choice of which agency to choose as “Agency 2” to work with Agency 1. In all of the settings we have considered, the “most highly aligned” other agency (*i.e.*, the agency j other than Agency 1 with the largest alignment value, α_j) is P 's optimal choice of partner for Agency 1, *regardless of* α_1 .

However, if P can choose an agency that has the same ordinal preferences over the two coordination outcomes as Agency 1, as pictured in Figure 10, then P 's optimal choice is the agency

	A	B
A	(α_1, α_2)	$(0, 0)$
B	$(0, 0)$	$(2-\alpha_1, 2-\alpha_2)$

Figure 10: A Family of Pareto-Ranked Coordination Games ($\alpha_1, \alpha_2 \in (0, 1]$)

The unique α -MSNE in this case is For any pair of alignments, $\alpha \equiv (\alpha_1, \alpha_2)$, the unique α -MSNE is given by the following:

$$\begin{aligned}\sigma_1^*(\alpha) \equiv \Pr[a_1 = A] &= \frac{2 - \alpha_2}{2}, & \text{and} \\ \sigma_2^*(\alpha) \equiv \Pr[a_2 = A] &= \frac{2 - \alpha_1}{2},\end{aligned}$$

and the equilibrium probability of coordination in the α -MSNE is

$$\phi(\alpha) = \frac{(2 - \alpha_1)(2 - \alpha_2) + \alpha_1\alpha_2}{4}.$$

4 Discussion and Empirical Implications

As mentioned in the introduction, the problem of policy coordination is well-recognized by policy-makers and scholars alike. This recognition in the United States is demonstrated by the regularity with which the federal government is reorganized. At least a casual reflection on periods of reorganization (*e.g.*, the advent of regulatory agencies in the late 19th/early 20th century, New Deal, demobilization after WWII, the Great Society, the creation of the EPA and OSHA in the 1970s, creation of DHS after 9/11, the reorganization of MMS following the Deepwater Horizon disaster) indicates the potency of policy failures to spur such efforts. These efforts are costly and complicated, so that is not too surprising. However, as also alluded to in the introduction, formal divisions of authority remain quite common in the executive branch. For example, OSHA, the Department of Labor, and the National Labor Relations Board (NLRB) have mutually overlapping policy responsibilities. Yet, the NLRB is an independent agency: in theory at least, it is insulated from direct presidential control.

There are many reasons that such organizational divisions might emerge in equilibrium, of course (Aghion and Tirole (1997), Boehmke, Gailmard and Patty (2006)). In some contexts, “successful coordination” might be worrisome: for example, our theory omits concerns about *adverse selection* (Carpenter (2001, 2002), Gailmard and Patty (2019), Gailmard (2022)). Such concerns might induce the principal to create two “pools of experts” with separate career incentives to help “audit” the recommendations of each agency (Battaglini (2002), Turner (2017), but see also Patty and Turner (2021)).

More important, perhaps, is the fact that our theory is presuming that the principal is a unitary actor. In the United States (and elsewhere), partisan and ideological competition over policy outcomes can induce one or more political parties to have an incentive to “design agencies to fail” (*e.g.*, Moe (1989), but see also Patty and Turner (2024)). Such incentives were arguably at the heart of the fights between President Nixon and the Democratically controlled Congress in the late

1960s and early 1970s with respect to the EPA and, even more starkly, OSHA.

5 Conclusion

To be written.

A Technical Appendix

In this section, we provide derivations and proofs for the claims made in the body of the article.

Proposition 2 *In equilibrium, P 's investment in reliability, $c^*(\alpha)$, is strictly decreasing in the agencies' common alignment, α , and P 's expected equilibrium payoff is increasing in α .*

Proof: With Equation (1) in hand, it is simple to derive P 's optimal reliability, $c^*(\alpha)$:

$$c^*(\alpha) = \frac{2 - 2\alpha + \alpha^2}{4}, \quad (3)$$

which is decreasing in $\alpha \in [0, 1]$, and P 's corresponding equilibrium payoff is

$$EU_P^*(\alpha) = \frac{1}{16} (\alpha^2 - 2\alpha + 2)^2, \quad (4)$$

which is increasing in $\alpha \in [0, 1]$. ■

A.1 Heterogeneous Alignments

We now allow the agencies to have different alignments: the payoff that Agency 1 receives from its least-preferred coordination outcome (A) is $\alpha_1 \in [0, 2]$ and the payoff that Agency 2 receives from its least-preferred coordination outcome (B) is $\alpha_2 \in [0, 2]$, as illustrated in Figure 11.

	A	B
A	$(\alpha_1, 2 - \alpha_2)$	$(0, 0)$
B	$(0, 0)$	$(2 - \alpha_1, \alpha_2)$

Figure 11: A Family of Asymmetric Coordination Games: $(\alpha_1, \alpha_2) \in (0, 1]^2$

The (α_1, α_2) -MSNE. For any pair of alignments, $\alpha \equiv (\alpha_1, \alpha_2)$, the unique α -MSNE is given by the following:

$$\begin{aligned} \sigma_1^*(\alpha) &= \frac{\alpha_2}{2}, & \text{and} \\ \sigma_2^*(\alpha) &= \frac{2 - \alpha_1}{2}, \end{aligned}$$

and the equilibrium probability of coordination in the α -MSNE is

$$\phi(\alpha) = \frac{\alpha_2 \cdot (2 - \alpha_1) + \alpha_1 \cdot (2 - \alpha_2)}{4}.$$

The following lemma demonstrates that the fundamental effect of alignment on coordination in equilibrium remains true in this extension of the model.

Lemma 1 *The probability of coordination is increasing in α_1 (and α_2).*

Proof: The first partial derivative of $\phi(\alpha)$ with respect to α_i for either $i \in \{1, 2\}$ is

$$\frac{\partial \phi(\alpha)}{\partial \alpha_i} = 2(1 - \alpha_{3-i}) > 0,$$

establishing the claim. ■

Given (α_1, α_2) , P 's optimal investment in reliability is

$$c^*(\alpha_1, \alpha_2) \equiv \frac{1}{2} + \frac{\alpha_1 \alpha_2 - \alpha_1 - \alpha_2}{4} \quad (5)$$

Our main result in this extension is essentially a robustness check. The following proposition mirrors Propositions 1 and 2 and establishes that P 's preference for more highly aligned agencies is still true if the agencies have different levels of alignment.

Proposition 4 *P 's equilibrium investment is strictly decreasing in each agency i 's alignment, α_i .*

Proposition 4 does have substantive implications. For example, it indicates why some agencies might try to be unbiased, *if the principal, P , gets to choose which agencies to assign the task.* Simply put, the principal does not need to invest as much in the communication protocol when the agencies are more aligned. We discuss this angle more, with empirical referents, in Section 4.

A.2 Agencies' Equilibrium Expected Payoffs with Common Alignment, α

Agency 1 and 2's equilibrium payoffs (*i.e.*, based on $c = c^*(\alpha)$), as a function of π , are as follows:

$$\begin{aligned} EU_1(\alpha, c, \pi) &= \frac{2 - 2\alpha + \alpha^2}{4} \cdot \left(\pi(2 - \alpha) + (1 - \pi)\alpha \right) + \left(1 - \frac{2 - 2\alpha + \alpha^2}{4} \right) \cdot \frac{\alpha(2 - \alpha)}{2} \\ EU_2(\alpha, c, \pi) &= \frac{2 - 2\alpha + \alpha^2}{4} \cdot \left(\pi\alpha + (1 - \pi)(2 - \alpha) \right) + \left(1 - \frac{2 - 2\alpha + \alpha^2}{4} \right) \cdot \frac{\alpha(2 - \alpha)}{2}. \end{aligned}$$

A.3 Endogenous Fairness of the Communication Protocol, π

We now allow the principal to choose both the communication protocol, $\pi \in [0, 1]$, and the amount to invest in it, $c \in [0, 1]$. As before, for any given c , the probability of communication failure is $1 - c$. We also assume that each agency i has a privately observed attention cost, $\epsilon_i \in \mathbf{R}$, which we assume to be drawn independently from a distribution with CDF, F_i .

1. The alignment values, α_1 and α_2 , are made common knowledge.
2. The principal chooses $\pi \in [0, 1]$ and a level of investment in communication, $c \in [0, 1]$.
3. The principal's choices, π and c , are made common knowledge.
4. Each agency i privately observes $\epsilon_i \in \mathbf{R}$.
5. The agencies simultaneously choose whether to observe the recommendation, $\omega_i \in \{0, 1\}$.
6. With probability $\omega_1 \cdot \omega_2 \cdot c \cdot \pi$, the device coordinates the agencies on A ($a = (A, A)$).
7. With probability $\omega_1 \cdot \omega_2 \cdot c \cdot (1 - \pi)$, the device coordinates the agencies on B ($a = (B, B)$).
8. With probability $1 - \omega_1 \cdot \omega_2 \cdot c$, the agencies play the α -MSNE.
9. The choices (a_1, a_2) are revealed and the players receive their payoffs:

$$\begin{aligned}
v_i(\omega_i, a) &= u_i(a) - \omega_i \cdot \epsilon_i \quad \text{for each agency } i \in \{1, 2\}, \text{ and} \\
v_P(a, c) &= \begin{cases} 1 - c^2 & \text{if } a_1 = a_2, \\ -c^2 & \text{otherwise.} \end{cases}
\end{aligned}$$

The Agencies' Incentives. Each agency makes two choices in the process, but we focus on the observation decision. The only restriction we are imposing on the agencies' choice of a_i is that the agencies play the α -MSNE unless both agencies pay attention to the recommendation. We now turn to this decision.

Uniformly Distributed Costs of Attention. Supposing that ϵ_1 and ϵ_2 are each independently distributed according to the Uniform $[0, k]$ distribution for some fixed and known $k > 0$, Agency 1 should observe the recommendation if

$$\epsilon_1 \leq p_1^*(\pi, c) \cdot c^2 \cdot \left(\pi \alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2} \right) (2 - \alpha_1) \right) \left(\left(\pi - \frac{\alpha_2}{2} \right) (2 - \alpha_2) + (1 - \pi) \alpha_2 \right),$$

and Agency 2 should observe the recommendation if

$$\epsilon_2 \leq p_2^*(\pi, c) \cdot c^2 \cdot \left(\pi \alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2} \right) (2 - \alpha_1) \right) \left(\left(\pi - \frac{\alpha_2}{2} \right) (2 - \alpha_2) + (1 - \pi) \alpha_2 \right).$$

$$\begin{aligned}\epsilon_1 &< p_2^*(\pi, c)c \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1) \right) \\ \epsilon_2 &< p_1^*(\pi, c)c \left(\pi\alpha_2 + \left(1 - \pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) \right)\end{aligned}$$

Thus, in any equilibrium, the agencies' cutoffs, ϵ_1^* & ϵ_2^* , must satisfy the following:

$$\begin{aligned}\epsilon_1^* &= \epsilon_1^* \cdot c^2 \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1) \right) \left(\left(\pi - \frac{\alpha_2}{2} \right)(2 - \alpha_2) + (1 - \pi)\alpha_2 \right), \\ \epsilon_2^* &= \epsilon_2^* \cdot c^2 \cdot \left(\pi\alpha_2 + \left(1 - \pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) \right) \left(\left(\pi - \frac{\alpha_2}{2} \right)(2 - \alpha_2) + (1 - \pi)\alpha_2 \right),\end{aligned}$$

There is always an equilibrium in which neither agency pays attention $(\epsilon_1^*, \epsilon_2^*) = (0, 0)$. When a positive attention equilibrium exists, there is an equilibrium in which both agencies observe the recommendation with probability 1 (*i.e.*, $\epsilon_i^* = k$ for both $i \in \{1, 2\}$). Such an equilibrium exists if and only if

$$k < k^*(\alpha, \pi) \equiv \frac{1}{4} \left((\alpha_1 - 2)^2 + 4(\alpha_1 - 1)\pi \right) (\alpha_2^2 - 4(\alpha_2 - 1)\pi).$$

The Principal's Incentives. Conditional on α , π , and k , P 's optimal investment is

$$c^*(\alpha) = \begin{cases} \frac{1}{4} (\alpha_1^2(\alpha_2 - 1)^2 - 2\alpha_1(\alpha_2 - 1)^2 + \alpha_2^2 - 2\alpha_2 + 2) & \text{if } k < k^*(\alpha, \pi), \\ 0 & \text{if } k \geq k^*(\alpha, \pi). \end{cases} \quad (6)$$

Note that Equation 6 implies that $c^*(\alpha)$ is independent of π . This is for two reasons:

1. P is assumed to be focused only on maximizing the probability of successful coordination, independent of which of the two outcomes is achieved (*i.e.*, P is indifferent between (A, A) and (B, B)).
2. P 's optimal choice of communication protocol, $\pi^*(\alpha)$, is chosen to equalize the marginal impact of c on the equilibrium probability that Agency 1 will pay attention and its marginal effect on the equilibrium probability that Agency 2 will pay attention, because the two values are complements from P 's perspective.

Second, mirroring Proposition 5 (which assumed that the agencies always observe the recommendation), as either agency's preferences become more aligned, P will in equilibrium invest less in communication when either or both of the agencies are more aligned:

$$\frac{\partial c^*(\alpha)}{\alpha_i} < 0, \quad \text{for each } i \in \{1, 2\}.$$

A.4 Endogenous Fairness

Agencies pay attention if

$$\begin{aligned}\epsilon_1 &< p_2^*(\pi, c)c \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1) \right) \\ \epsilon_2 &< p_1^*(\pi, c)c \left(\pi\alpha_2 + \left(1 - \pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) \right)\end{aligned}$$

Cutoff $\epsilon_1^*, \epsilon_2^*$ must satisfy the following:

$$\begin{aligned}\epsilon_1^* &= \epsilon_1^* c^2 \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1) \right) \left(\pi\alpha_2 + \left(1 - \pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) \right) \\ \epsilon_2^* &= \epsilon_2^* c^2 \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1) \right) \left(\pi\alpha_2 + \left(1 - \pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) \right)\end{aligned}$$

There always exists equilibrium where $(\epsilon_1^*, \epsilon_2^*) = (0, 0)$: i.e., no attention. There may exist equilibrium where $(\epsilon_1^*, \epsilon_2^*) = (k, k)$: i.e., perfect attention. This is so if and only if

$$k < k^*(\alpha, \pi) \equiv \frac{1}{4}((\alpha_1 - 2)^2 + 4(\alpha_1 - 1)\pi)((\alpha_2 - 2)^2 + 4(\alpha_2 - 1)\pi)$$

If attention probability is either 0 or 1, then P's choice of c is independent of π . Therefore, P's optimal investment is

$$c^*(\alpha) = \begin{cases} \frac{1}{4}(\alpha_1 + \alpha_2 - \alpha_1\alpha_2) & \text{if } k < k^*(\alpha, \pi) \\ 0 & \text{if } k > k^*(\alpha, \pi) \end{cases}$$

P's optimal protocol design is to maximize k^* . Note that k^* is a convex function of π if agencies are aligned, and a concave function of π if misaligned. $k^*(\alpha, \pi) > 0$ for all π . It follows that P's optimal design when agencies are aligned is

$$\pi^*(\alpha) = \begin{cases} 1 & \text{if } \alpha_1 \geq 1, \alpha_2 \geq 1 \\ 0 & \text{if } \alpha_1 < 1, \alpha_2 < 1. \end{cases}$$

When the agencies are misaligned, P chooses

$$\pi^*(\alpha) = \begin{cases} 0 & \text{if } \hat{\pi}(\alpha) < 0 \\ \hat{\pi}(\alpha) & \text{if } \hat{\pi}(\alpha) \in [0, 1] \\ 1 & \text{if } \hat{\pi}(\alpha) > 1 \end{cases}$$

where

$$\widehat{\pi}(\alpha) = \frac{1}{8} \left(6 + \frac{1}{1-\alpha_1} - \alpha_1 + \frac{1}{1-\alpha_2} - \alpha_2 \right).$$

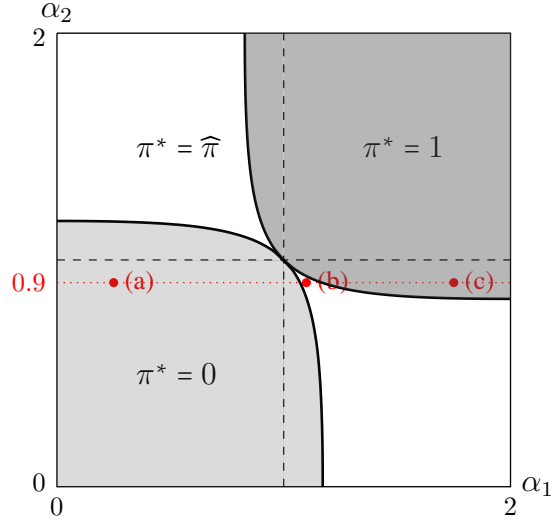


Figure 12: Regions of π^*

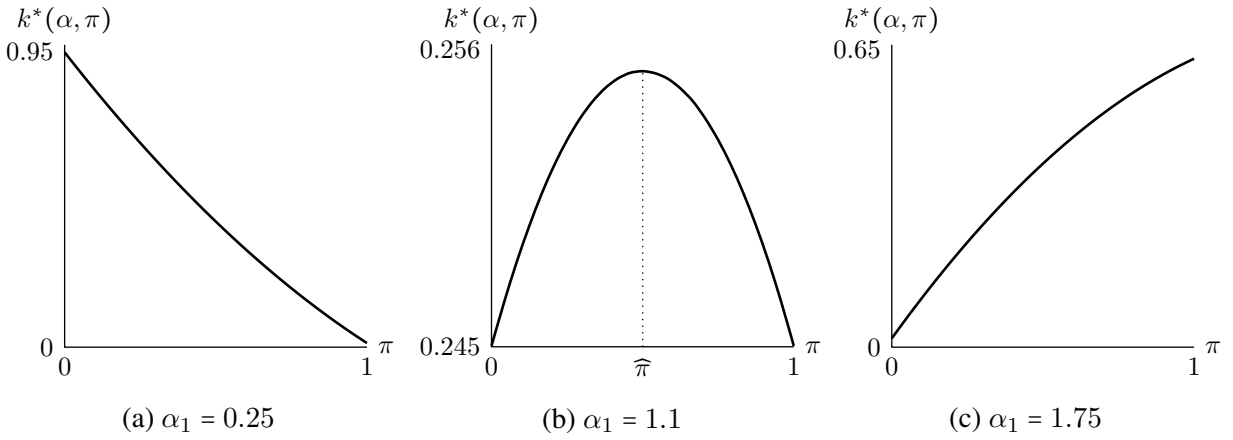


Figure 13: Maximum Cost of Attention that Agencies are Willing to Incur, $\alpha_2 = 0.9$

A.5 Defining \mathcal{M} , \mathcal{B} , and \mathcal{A}

Here we define the region of alignments, $\mathcal{M} \subset [0, 1]^2$, in which P 's optimal communication protocol is locally sensitive to $\alpha \equiv (\alpha_1, \alpha_2)$. To do this, define the following intermediary regions:

$$\begin{aligned} X(\alpha) &\equiv \left\{ \alpha \in [0, 1]^2 : 2\alpha_1(\alpha_2 - 1) > (\alpha_2 - 2) \left(\alpha_2 + \sqrt{(\alpha_2 - 8)\alpha_2 + 8} - 2 \right) \right\}, \\ Y(\alpha) &\equiv \left\{ \alpha \in [0, 1]^2 : 2\alpha_1\alpha_2 + \alpha_2\sqrt{\alpha_2(\alpha_2 + 4) - 4} + 4 < 2\alpha_1 + \alpha_2(\alpha_2 + 4) \right\}, \text{ and} \\ Z(\alpha) &\equiv \left\{ \alpha \in [0, 1]^2 : \alpha_2 + 2 \leq 2\sqrt{2} \right\}. \end{aligned}$$

Then, \mathcal{M} is defined by the following:

$$\mathcal{M} \equiv X(\alpha) \cap \left(Y(\alpha) \cup Z(\alpha) \right),$$

and the regions \mathcal{B} and \mathcal{A} are a partition of the complement of \mathcal{M} in $[0, 1]^2$:

$$\begin{aligned} \mathcal{B} &\equiv 2\alpha_1(\alpha_2 - 1) + \alpha_2 \left(\sqrt{\alpha_2(\alpha_2 + 4) - 4} - 4 \right) + 4 > \alpha_2^2, \text{ and} \\ \mathcal{A} &\equiv 2\alpha_1(\alpha_2 - 1) \leq (\alpha_2 - 2) \left(\alpha_2 + \sqrt{(\alpha_2 - 8)\alpha_2 + 8} - 2 \right). \end{aligned}$$

A.6 Incentive Compatibility in Costly Communication

Each agency's expected payoffs from its observation choice are as follows:

$$\begin{aligned} EU_1(\omega_1 = 1) &= p_2^*(\pi, c) \cdot c \cdot (\pi\alpha_1 + (1 - \pi)(2 - \alpha_1)) + (1 - p_2^*(\pi, c) \cdot c) \frac{\alpha_1(2 - \alpha_1)}{2} - \epsilon_1, \\ EU_1(\omega_1 = 0) &= \frac{\alpha_1(2 - \alpha_1)}{2}, \text{ and} \\ EU_2(\omega_2 = 1) &= p_1^*(\pi, c) \cdot c \cdot (\pi(2 - \alpha_2) + (1 - \pi)\alpha_2) + (1 - p_1^*(\pi, c) \cdot c) \frac{\alpha_2(2 - \alpha_2)}{2} - \epsilon_2, \\ EU_2(\omega_2 = 0) &= \frac{\alpha_2(2 - \alpha_2)}{2}, \text{ and} \end{aligned}$$

Thus, Agency 1 should observe the recommendation if

$$\begin{aligned} \epsilon_1 &\leq p_2^*(\pi, c) \cdot c \cdot \left(\pi\alpha_1 + (1 - \pi)(2 - \alpha_1) - \frac{\alpha_1(2 - \alpha_1)}{2} \right), \\ &\leq p_2^*(\pi, c) \cdot c \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2} \right) (2 - \alpha_1) \right), \end{aligned}$$

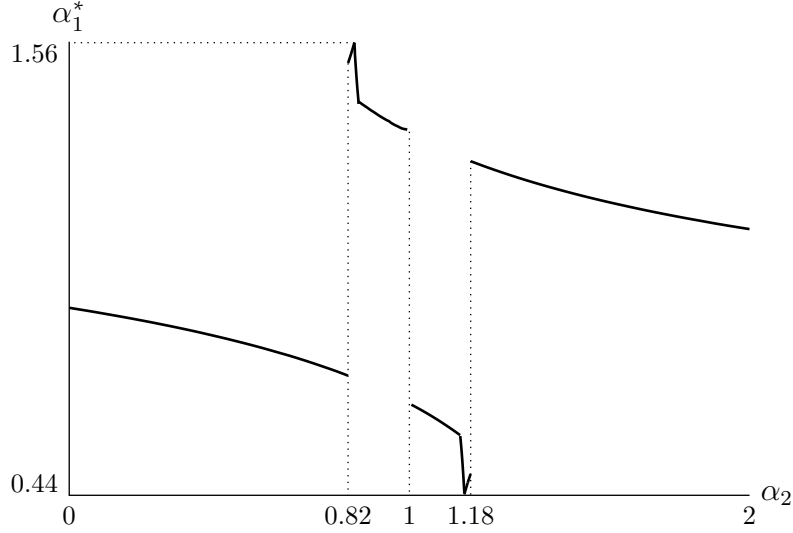


Figure 14: Agency 1's Optimal Choice of α_1

and, similarly, Agency 2 should observe the recommendation if

$$\begin{aligned} \epsilon_2 &\leq p_1^*(\pi, c) \cdot c \cdot \left(\pi(2 - \alpha_2) + (1 - \pi)\alpha_2 - \frac{\alpha_2(2 - \alpha_2)}{2} \right), \\ &\leq p_1^*(\pi, c) \cdot c \cdot \left(\left(\pi - \frac{\alpha_2}{2} \right) (2 - \alpha_2) + (1 - \pi) \alpha_2 \right). \end{aligned}$$

Thus, given p_2^* , Agency 1 will pay attention with probability

$$p_1^*(\pi_2^* | \pi, c) = F_1 \left(p_2^*(\pi, c) \cdot c \cdot \left(\pi \alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2} \right) (2 - \alpha_1) \right) \right),$$

and, given p_1^* , Agency 2 will pay attention with probability

$$p_2^*(\pi_1^* | \pi, c) = F_2 \left(p_1^*(\pi, c) \cdot c \cdot \left(\left(\pi - \frac{\alpha_2}{2} \right) (2 - \alpha_2) + (1 - \pi) \alpha_2 \right) \right).$$

B Some Figures

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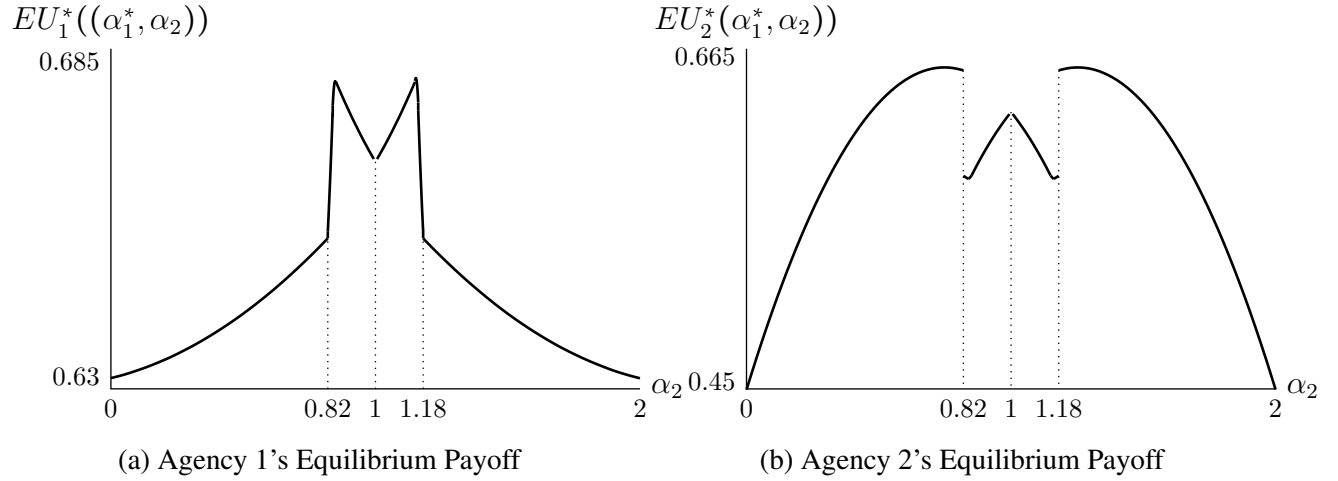


Figure 15: Equilibrium Payoffs of Agencies

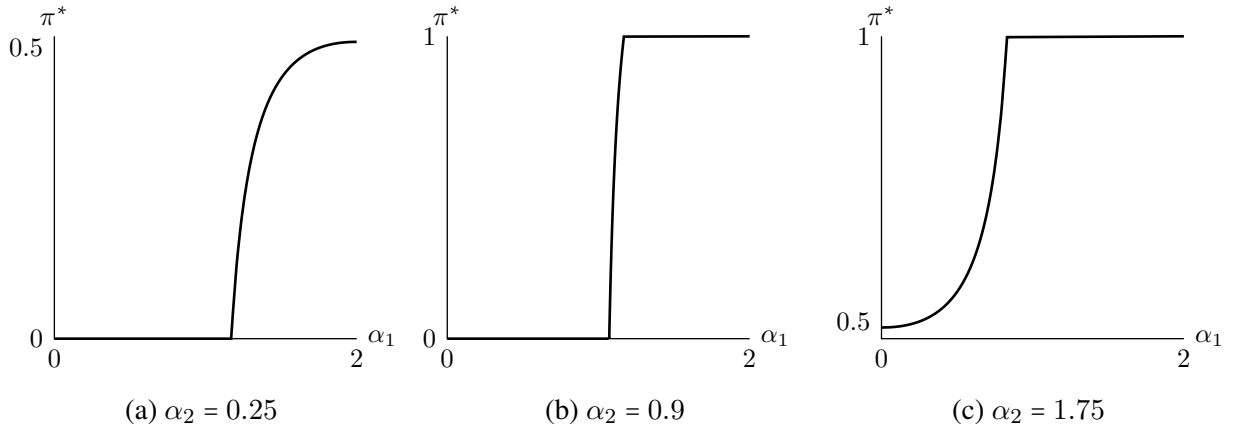


Figure 16: Principal's Optimal Choice of π

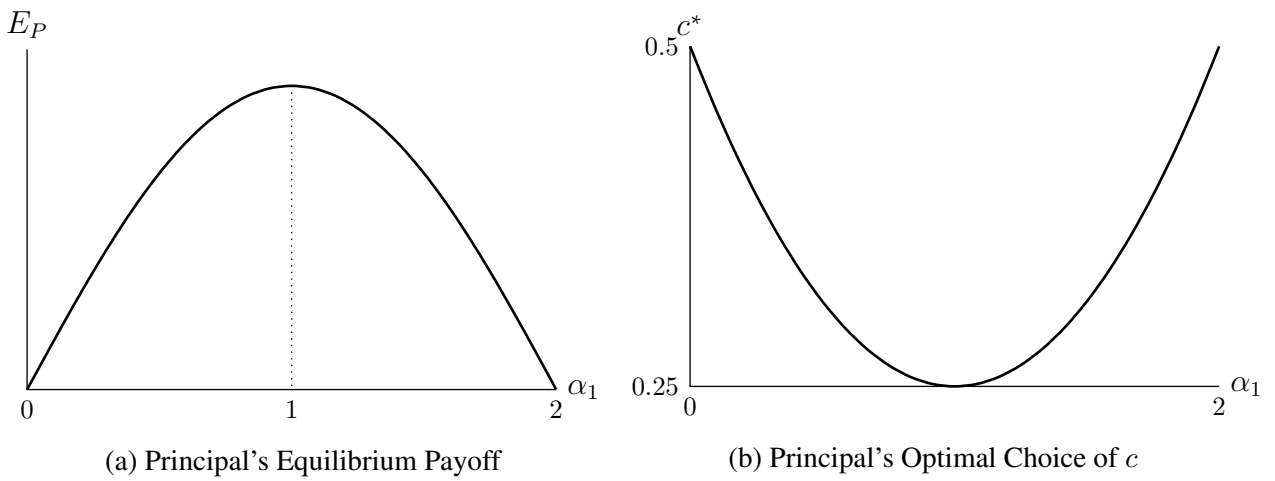


Figure 17: Symmetrically Misaligned Preferences ($\alpha_1 + \alpha_2 = 2$)

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