When to Stack the Deck in Public Hearings:

Strategic Decisions over Hearings and Witness Selection

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Abstract

In principle, committees hold hearings in order to gather and provide information to their principals, but some hearings are characterized as political showcases. However, previous theoretical research suggests that committees only hold costly hearings in order to gain information. By presenting a game-theoretic model of public hearings and witness selection and a lab experiment, this paper investigates a committee's decisions to call experts depending on the preference differences within the committee, the power of the chair, and the neutrality of a principal. I find that sometimes committees hold hearings that help the principal make an informed decision, but in other times they grandstand in pursuit of political gains.

Keyword: Information, Committee decision-making, Public hearing, Experiment

"Committees gather and organize information for their own members, for other members of Congress, and, quite often, for the executive branch as well. A particularly important source of information is committee hearings… A key objection is that hearings do not provide much information. Some say they are stagemanaged spectacles—theater, really—in which witnesses are chosen for political reasons, and what they will say is known in advance."

- Burstein & Hirsh (2007)

In many situations, fact-finding committees must give advice to a principal after gathering information via hearings. For example, the committees in legislatures give recommendations to the floor based on information collected from public hearings. Similar public hearing procedures are also found in committees of the United Nations or the European Union (e.g. the European Economic and Social Committee holds public hearings to hear voices from different stakeholders in the region and be consulted with by the EU on economic issues).

However, previous empirical studies suggest that such hearings are sometimes uninformative because the members choose to grandstand by promoting their own views rather than gathering information.[1] A classic case study by Huitt (1954) finds that committee members only reinforced their predetermined views via hearings on federal price control at the U.S. Senate Committee on Banking and Currency in 1946. A recent example includes hearings at multiple congressional committees on Benghazi terrorists' attacks in 2012. Especially when the then Secretary of State, Hillary Clinton, was subpoenaed, committee members spent more time asking questions in a way that their opinions are emphasized while

[1] See Burstein & Hirsh (2007), DeGregorio (1992), Del Sesto (1980), Farnsworth (1961), Huitt (1954), Jones, Baumgartner, and Talbert (1993), Lutzker (1969), Morrow (1969), Redman (1973), Sachs (2004), and Truman (1951) for empirical evidences.

leaving almost no time for her to provide an answer or even not requiring one (Hersh 2013).

This paper provides a theoretical explanation of conditions which incentivize committee members to hold costly but uninformative hearings and also explores institutional features that enhance committees' information gathering but have not been studied in previous models. I specifically investigate committee chairs' decisions to hold hearings, committee members' selection of witnesses, and principals' policy choices after hearings. In the model, I assume that committee members are driven by two incentives: information-seeking and political posturing. The model predicts that only informative hearings help principals make correct inferences concerning the state of the world; they ignore messages when there is grandstanding. However, committee members still hold hearings as long as they gain politically by doing so. Interestingly, I find that when a principal is moderately biased in favor of the majority in the committee, the chances of grandstanding decrease as the minority attempts to use unbiased information to appeal to the principal.

I test these predictions by running a lab experiment which provides important advantages for testing the theory. First, since the data is generated under a highly controlled environment, the experiment allows clear identification of the treatment effects of the key variables in the model while other variables are held constant. Second, by using human subjects, I can test if the theoretical predictions are still supported when the perfect rationality assumption is relaxed. Third, in a similar vein, the experimental results suggest behavioral and psychological trends that are not specifically predicted in the model.

Related Literature

Most of the informational theories of committees focus on finding conditions under which an agent gathers and transmits information to its principal. Seminal work by Crawford and Sobel (1982) studies strategic communication between a sender and a receiver and finds that communication is more likely as their goals become similar. Gilligan and Krehbiel (1987, 1989) apply Crawford and Sobel's model to the relationship between a committee and a legislative floor under different institutional rules (See also Austen-Smith 1990, 1993; Austen-Smith and Riker 1987; Gilligan and Krehbiel 1987, 1989). Diermeier & Feddersen (2000) further develops the model in Gilligan and Krehbiel (1987) by focusing on the role of hearings as devices for information transmission and find that if a hearing is informative but not costly, the committee does not specialize but still provides information to the floor; however, if it is costly but not informative, the committee neither specializes nor holds a hearing.

The current paper contributes to the literature by making several changes. First, most of the previous models focus on the relationship between a committee and a principal and consider the committee as a unitary actor rather than a composition of members with different interests.[2] So, internal decision-making processes within committees have been understudied and extremely simplified. To address this gap, my model assumes a committee of two members with heterogeneous preferences and explicitly models political competition within the committee over the selection of witnesses for a hearing.

[2] Gilligan and Krehbiel (1989) consider a committee with two heterogeous members. However, in their model internal decision-making processes are not addressed and information qualities available to committee members are exogenously determined whereas in my model committee members can choose the quality of information they acquire.

Second, existing models do not produce an equilibrium where a costly and uninformative hearing is held while such a hearing is observed empirically. That is, these models assume that the function of a hearing is limited to information gathering. I take a distinct approach by assuming that committee members earn utility from a hearing not only by collecting information but also by using a hearing to promote their own views.[3]

Third, while the quality of information transmitted from a hearing is exogenously given in most of the previous works, my model endogenizes its level by allowing committee members to choose a set of witnesses endowed with information of varying qualities. So, the model highlights the discretion that committee members have as information mediators. All these changes allow further investigation of the internal political competition between different stake holders within the committee.

The rest of the paper is organized as follows. The next section provides a simple theoretical model of public hearings used as a basis for the experiments. Then, I provide my experimental design and results. The final section concludes.

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[3] A strand of literature considers committees members with career concerns. These models assume that committee members' payoffs are not related to making a right decision on policies but to showing principals that they are high types as opposed to low types in regards to the quality of signals they receive (Fehrler & Hughes 2014; Levy 2007; Prat 2005; Stasavage 2007). The members' incentive in models in this literature is different from the political incentive in my model. Moreover, these models assume information qualities available to committee members are exogenously determined whereas in my model committee members can choose the quality of information they acquire.

Model

The basic model setup and assumptions follow Gilligan & Krehbiel (1987). The procedure of selecting witnesses is a novel addition to the existing literature. There are two possible states of nature $s = \{0, 1\}$. The true state of nature is unknown, but there is a common prior belief $\pi = P(s = 0)$. There are two policy alternatives $x \in \{0, 1\}$.

There are three strategic actors in the game: the principal (F) and two members of a standing committee, R and B. R serves as a chair of the committee. All players are assumed to maximize von Neumann Morgenstern expected utility.

Model with a Neutral Principal

The principal prefers implementing a policy that matches the state of the world such that she receives utility of 1 in such a case and 0 otherwise.

$$u_F(x, s) = \begin{cases} 1, & if\ x = s \\ 0, & otherwise \end{cases}$$

Each committee member earns utility in two ways: policy-based utility and political utility. The policy-based utility, $u_i(x, s)$ for $i \in \{R, B\}$, depends on the state of nature, the policy implemented, and their identity as follows:

$$u_R(x, s) \begin{cases} 1, & if\ x = s = 0 \\ 1 - d, & if\ x = s = 1 \\ 0, & otherwise \end{cases} \qquad u_B(x, s) \begin{cases} 1, & if\ x = s = 1 \\ 1 - d, & if\ x = s = 0 \\ 0, & otherwise \end{cases}$$

$$(0 \leq d \leq 1).$$

Let d represent the level of disagreement. If $d = 0$, both committee members are ex ante indifferent between policy alternatives. However, if $d > 0$, they suffer symmetrically from implementing a policy that does not match the state of the world but are rewarded asymmetrically such that R receives higher utility than his counterpart if $x = s = 0$, and B is rewarded more if $x = s = 1$. In this sense, they have conflicting interests, and I refer to the policy 0 as R's favorite or preferred policy and the policy 1 as B's favorite or preferred policy. The expected policy-based utility is as follows:

$$E(u_i(x,s)) = \sum_{\substack{x\in X \\ s\in S}} \{u_i(x,s) * P(x|s)\}, \quad \text{for } i \in \{R,B\}.$$

The political utility, $u_i(a_i)$, is simply the number of advocates (a_i) that each individual member invites weighted by a non-negative value of q, the marginal benefit of inviting an advocate.[4] I assume that q is exogenously determined.

$$u_i(a_i) = a_i * q, \quad \text{for } i \in \{R,B\}$$

$$(0 \leq q)$$

Given that each committee member has to pay a cost ($c > 0$) if a hearing is held,[5] the expected utility function for a committee member when a hearing is held is as follows:[6]

$$EU_i = \sum_{\substack{x\in X \\ s\in S}} \{u_i(x,s) * P(x|s)\} + u_i(a_i) - c, \quad for\ \ i\ \in \{R,B\}.$$

The two components of committee members' expected utility provide them with two different motivations when designing a public hearing. Policy utility potentially gives

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4 An advocate may also refer to an opponent whom a committee member wishes to publicly criticize. However, I will call both types of witnesses *advocates*. Basically, the action of inviting an advocate captures the member's political incentive to participate in a hearing, that is, to grandstand.

5 If a hearing is held the committee members have to invest their time and resources to search for witnesses, issuing invitations, and paying witnesses' travel costs. Also, there are opportunity costs because, given their time and budget constraints, the committee members could have spent their resources for other activities.

6 If a hearing is not held, the expected utility is simply the expected utility of policy-based utility such that $EU_i = E(u_i(x,s)), for\ i\ \in \{R,B\}$.

members an information-seeking incentive which depends on the nature of the policy. Some policy issues are resolved through cooperative deliberation (where $d = 0$ or is small), while others are resolved through more competitive negotiations (where d is large). If both committee members are ex ante indifferent between policy alternatives, they potentially have a stronger incentive to learn about the state of nature. Otherwise, they may be less interested in doing so.[7]

Political utility gives members a grandstanding motivation to hold a hearing. In public hearings, committee members often appear interested in expressing their own views rather than finding facts. Given that many hearings are open to the public and some receive substantial attention from the media, a member may do so by inviting advocates whose testimony will give support to his policy proposal or by inviting his political incentive opponent as a witness in order to publicly criticize her (as Republicans did to then-Secretary of State Hillary Clinton on terrorist attacks in Benghazi, Libya, at House Foreign Affairs Committee in 2013). In either case, the committee member can enhance his political status by posturing at hearings.

The game starts with an exogenous and nonstrategic nature choosing the state of the world with known probability, π. Then, the chair decides whether to hold a hearing at cost c. If the chair is indifferent, I assume that he randomizes his decision by holding a hearing with .5 probability.

[7] In legislative committees, for example, a committee member may promote his reelection prospects by posturing at hearings which may help signal and advertise his political stances to his constituents and facilitating credit claiming for working on the issue.

If the chair decides to hold a hearing, the chair and the other committee member simultaneously select ω witnesses in total.[8] Define μ as the proportion of witnesses the majority party can invite such that $.5 < \mu < 1$.[9] Every time there is a hearing, R invites $\mu\omega$ witnesses and B invites $(1-\mu)\omega$ witnesses.[10] Thus, R represents the majority and B the minority.

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[8] The number of witnesses to be invited can be considered a budget constraint, since committees have constraints on time and money to spend on a hearing. It is always binding because there is no cost of inviting additional witnesses and the utility of the committee members is increasing in witnesses.

[9] I assume $\mu < 1$ because it is typical that the minority party's right to select witnesses is protected by the rules of a chamber. For example, in the U.S., both chambers of the Congress have a rule that the minority members of the committee can call witnesses during at least one day of hearing when a majority of them sends a written request to the chairman (RULE XI, 2.(j)(1) for the House; Rule XXVI, paragraph 4(d) for the Senate). In European parliamentary systems where proportional representation is more prevalent than majority rule, the rights of minority parties in selection of witnesses tend to be better protected on a proportional basis. For example, the German Bundestag has a rule that allows minority members to call witnesses when they request a hearing. However, if the committee limits the number of witnesses, they can call a proportion of persons to be heard corresponding to their relative strength in the committee.

[10] I assume that the values of $\mu\omega$ and $(1-\mu)\omega$ are restricted to non-negative integers because the number of witnesses cannot be fractional.

There are three interest groups from which the committee members can invite witnesses. The groups are Red, Blue, and Green. The first two are biased, but the Green group is neutral. When a witness is called, she sends a message, m_x with $x \in \{0, 1\}$, supporting either of the two policy alternatives. The witnesses from the Red group always send a message m_0 supporting the policy 0. Those from the Blue group always send a message m_1 supporting the policy 1. However, those from the Green group send a message $m_{x=s}$ that matches the state with probability θ and $.5 < \theta \leq 1$. Thus, θ is the level of accuracy of the Green witnesses. The information qualities of the different types of witnesses are common knowledge to all players. Witnesses in this game are non-strategic actors.

Substantively, Red witnesses are advocates for R's preferred policy and Blue witnesses are advocates for B's favorite policy. Thus, let the number of Red advocates invited by R be $a_R \equiv r$, and the number of Blue advocates invited by B be $a_B \equiv b$. Similarly, let the number of witnesses invited from the Green group be g. Also, let g_i, for $i \in \{R, B\}$, be the number of Greens invited by R or B such that $g = g_R + g_B$. Then, R's choice of witnesses will be $\mu\omega = (g_R + r)$, and B's will be $1 - \mu\omega = (g_b + b)$. Thus, the number of witnesses invited from each group equals $\omega = r + b + g = r + b + (g_R + g_B)$.[11]

At the end of the game, the principal makes a policy decision. If the committee chair decides not to hold a hearing, the principal is uninformed and chooses one of the two policy alternatives based on her prior belief about the state of nature (π). If a hearing is held, she

[11] In equilibrium, R does not call Blue witnesses and vice versa. The reason is that R's strategy to call a Blue, who always sends m_1 regardless of the true state, is strongly dominated since the message does not help the principal learn about the state and only contributes to benefiting B as long as $q > 0$.

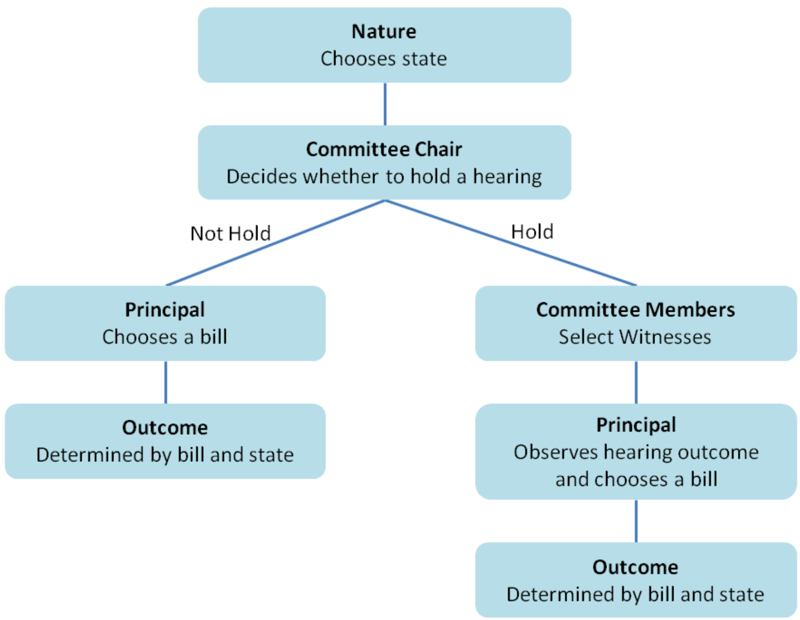
receives messages from the hearing and updates her belief about the state of nature. I assume that the principal is sophisticated enough to know the bias of each information group and the number of witnesses invited from each. Since the principal wants to choose a policy that matches the state, she considers the messages only from the Green group meaningful.

In sum, the timing of the game is as follows:

1. Nature chooses the state of the world with known probability π.
2. The chair of the committee decides whether to hold a hearing or not.
3. If a hearing is held, both members of the committee simultaneously select witnesses from three information groups.
4. Each of the selected witnesses sends a public message to the committee members and the principal.
5. With or without a hearing, the principal selects a policy based on the information she has, and payoffs are realized.

Figure 1 visually presents the sequence of moves in the game.

Figure 1. Timing of the Game



In the experiment, nature chooses the state with equal probability ($\pi = .5$), committee members can select three witnesses in total ($\omega = 3$), R selects two witnesses and B invites one witness ($\mu = \frac{2}{3}$).[12] Perfect Bayesian Equilibrium is used as a solution concept and will be simply referred to as equilibrium from now on. Below, I present propositions that describe equilibrium strategies and comparative statics using backward induction. The solutions and proofs are in supporting material.

1. *Policy decision by the principal*

(Proposition PD) Given $m \in \{0,1\}$*, suppose that* g_m *is the number of Greens sending a message m, such that* $g = g_0 + g_1$*. If a hearing is held, the principal implements policy 0 if* $g_0 > g_1$*; policy 1 if* $g_0 < g_1$*; and policy 0 with probability of π=.5 if* $g_0 = g_1$*. If a hearing is not held, the principal selects policy 0 with probability of π=.5.*

2. *Witness selection by committee members*

If a hearing is held, R chooses two witnesses in any combination of Greens and Reds, while B invites only one witness either from the Green or the Blue group. Let the marginal probability of implementing a policy that matches the state of nature by inviting the n^{th} number of one additional Green witness be

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[12] I choose $\omega = 3$ because it is the smallest possible number with which one of the committee members can select more witnesses than the other. The smallest value of ω allows the equilibrium solution to be as simple as possible and gives only the minimum number of choices to subjects to choose from. Thus, it provides the most control to the experimenter, which is desirable for an experimental design. If $\omega = 3$, μ has to be $\frac{2}{3}$ to allow each committee member a right to invite at least one witness.

$$\Delta P(n) \equiv P(x = s|\ g = n) - P(x = s|\ g = n - 1).$$

It is interesting to note that when n is an even number, the marginal probability is always 0 suggesting that inviting one Green and inviting two Greens produce the same informational effect.[13] The intuition is as follows. Suppose that they have invited two Greens. If they agree, the second Green is not necessary. If they disagree, adding the third Green will break the tie. Thus, inviting two Greens is a dominated strategy. Therefore, in equilibrium, the total number of Greens invited is either one or three, not two. The marginal probabilities can be formally expressed as the following:

$$\Delta P(1) = \theta - .5$$

$$\Delta P(3) = -2\theta^3 + 3\theta^2 - \theta.$$

There are three types of pure-strategy equilibria for witness selection which suggest three different types of hearings, respectively.

Grandstanding (No Greens: NG)

(Proposition NG) Both R and B do not invite Greens if $\Delta P(1) * (1 - \frac{1}{2}d) \leq q$.

The comparative statics suggest that as committee members disagree (d) more on policy alternatives and as the political utility of inviting an advocate (q) increases, grandstanding becomes more likely.

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[13] When g is an odd number, the marginal probability of implementing a policy matching the state of nature is positive but decreases as more Greens are invited. However, when g is an even number, it is always 0. Thus, $\mathrm{P}(\mathrm{x} = \mathrm{s}|\mathrm{g} = 1) = \mathrm{P}(\mathrm{x} = \mathrm{s}|\mathrm{g} = 2) = \theta$, $\mathrm{P}(\mathrm{x} = \mathrm{s}|\mathrm{g} = 3) = \mathrm{P}(\mathrm{x} = \mathrm{s}|\mathrm{g} = 4) = -2\theta^3 + 3\theta^2$, and so on. This is a surprising feature of the discrete choice combined with majoritarian rule.

Fully informative hearing (All Greens: AG)

(Proposition AG) Both R and B invite only Green witnesses if $\frac{\Delta P(3)}{2} * (1 - \frac{1}{2}d) \geq q.$

A fully informative hearing equilibrium is more likely as committee members share similar policy preferences (*d*) and as the political utility of inviting an advocate (*q*) decreases. Also, it becomes less likely as the level of accuracy of Greens (θ) is either too high or too low because, if $\theta = 1$, only one Green is enough to make a right guess about the state of nature; if $\theta \approx .5$, the informational benefit of a Green becomes trivial because it is little better than making a random choice.

Partially informative hearing (Some Greens: SG1 & SG2)

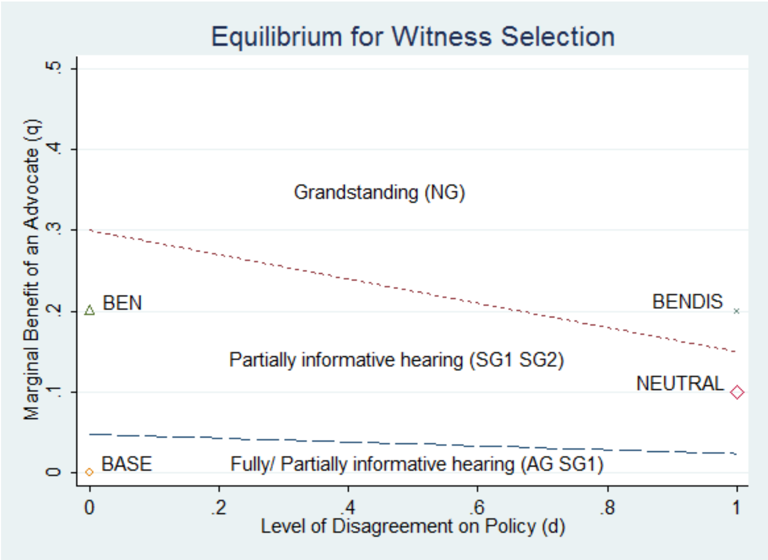
(Proposition SG1) R invites one Green witness, while B does not invite any Green if $\Delta P(1) * (1 - \frac{1}{2}d) \geq q.$

(Proposition SG2) B invites one Green witness, while R does not invite any Greens if $\frac{\Delta P(3)}{2} * (1 - \frac{1}{2}d) \leq q \leq \Delta P(1) * (1 - \frac{1}{2}d).$

The equilibrium SG1 is mutually exclusive with the equilibrium NG. Also, if $\frac{\Delta P(3)}{2} \geq q$, it may coexist with AG. In this case, AG is the Pareto-optimal strategy. Also, the equilibrium SG2 always coexists only with SG1. Neither of them is Pareto-optimal.

Figure 2 displays the possible equilibria for different values of *q* and *d*. Committee members are more likely to grandstand as the marginal benefit of inviting an advocate (*q*) and the level of disagreement (*d*) increase. However, it is interesting to note that, even at the high levels of disagreement (*d*), as long as the political utility (*q*) is small enough, fully or partially informative hearings are possible. Also, the graph marks four treatment combinations used in the experiment which will be explained further in the next section.

Figure 2. Equilibrium for Witness Selection with a Neutral Principal



*Two dashed lines divide the equilibrium space. Markers denote experimental treatments. The graph assumes $\theta = .8$.[14]

3. Hearing decision by the committee chair

(Proposition HD) The committee chair holds a hearing if $(p - .5)\left(1 - \frac{1}{2}d\right) + a_R * q > c$ *and randomizes by holding a hearing with .5 probability if* $(p - .5)\left(1 - \frac{1}{2}d\right) + a_R * q = c$.

(Proposition CH) The chair is more likely to hold a hearing as μ increases.[15]

Since the chair is more likely to hold a hearing as his expected gain from a hearing is greater, his incentive to hold one increases as his power in selecting witnesses increases.[16]

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[14] I chose this value because it is most interesting for the purpose of research to formulate a condition where a Green is highly informative and thus more Greens improves the precision of information transmitted in a hearing sufficiently. Therefore, all three different types of hearings are possible.

[15] Since the chair's expected utility increases in $a_R = \mu\omega - g_R$, it also increases in μ.

[16] This result provides an interesting implication that granting disproportionally more

Model with a Biased Principal

In the previous version of the model, we assumed that the principal was unbiased. In this subsection, I consider the equilibria in which the principal is biased in favor of the policy preferred by the majority power in the committee. Especially when there are multiple principals as in a legislative floor, this change addresses two possible conditions. One is when simple majority rule is used and the median voter is biased instead of neutral. It is more likely in a legislature where parties are polarized as in the current U.S. Congress. The other is when a supermajority is required to pass a bill so that the pivotal principal takes a more extreme stance. In the model, I assume that a biased principal shares the same policy preference as R:

$$u_F\,(x,s)\begin{cases}1, & if\ x=s=0\\ 1-d, & if\ x=s=1\\ 0, & otherwise.\end{cases}$$

$$(0<d\leq 1)$$

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discretion to a chair is optimal in terms of information transmission in a hearing. The only possible value of a greater μ given $\omega=3$ is 1. If μ increases to 1, R selects all three witnesses by himself. Thus, possible equilibrium strategies are threefold: inviting three Greens, one Green and two Reds, or three Reds. Compared to the case with $\mu=\frac{2}{3}$, his expected gains increase only when he invites one more Red using his increased power given the same number of Greens in the equilibrium. Therefore, if $\mu=1$, the chair is more likely to hold a hearing than he would under $\mu=\frac{2}{3}$ when he invites three Reds or when he calls one Green and two Reds believing that SG1 (but not SG2) would have been played. Since the probability of having a partially informative hearing that might have not been held otherwise increases, in terms of the absolute amount of information transmitted in hearings, it is desirable to grant more power to the chair. The solutions are available upon request.

In order to make sure that each committee member is biased toward a certain policy alternative, the level of disagreement (d) is now assumed to be a non-zero positive value. All other assumptions remain the same.

Equilibrium solutions and propositions are found in supporting material. Here, I highlight several interesting equilibrium strategies and comparative statics.[17] First, the principal is more likely to choose policy 0 as she is more biased in favor of the policy. Second, Figure 3 summarizes the equilibrium strategies for witness selection.[18] The most notable change is that, unlike the case with a neutral principal, there are combinations of d and q such that the only equilibrium is the partially informative SG2. Up to a critical value of d, increasing d increases the likelihood of SG2. That is, the fact-seeking incentive of the minority member grows as the principal becomes more biased but limited at a moderate level ($d \leq \frac{3}{4}$). However, if the principal is extremely biased ($d \geq \frac{3}{4}$), the grandstanding equilibrium (NG) dominates. When the principal prefers policy 0 strongly enough ($d \geq \frac{3}{4}$), she ignores

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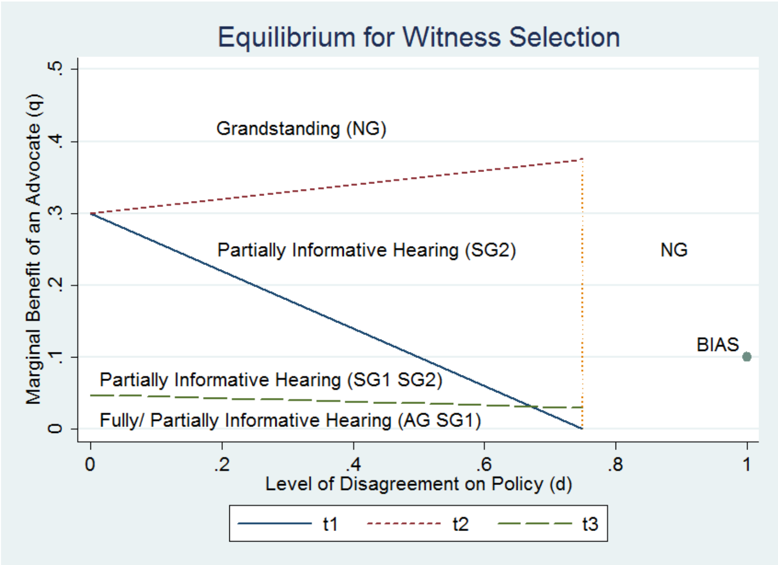
[17] For the model with a biased principal, I solve the equilibrium further for the case of $\theta = .8$ in order to draw more precise predictions to be directly applied to the experiment. Note: φ is the probability that the principal will choose policy 0 even if $g_0 < g_1$ such that $\varphi \equiv P(d > 1 - (\frac{\theta}{1-\theta})^{(g_0 - g_1)} | g_0 < g_1)$. Let φ_g denote the value of φ for the given number of Greens invited (g). There are three cut-points used to define equilibria for witness selection: $t_1 \equiv (1-\varphi_1)\left(\theta\lambda - \frac{1}{2}\right)$, $t_2 \equiv (1-\varphi_1)\left(\theta\lambda - \frac{1-d}{2}\right)$, and $t_3 \equiv \frac{\Delta P(3) * \lambda(1-\varphi)}{2}$.

[18] Note that the intercepts remain the same as in Figure 2 for a neutral principal. Also, although it is not shown in Figure 3, each equilibrium exists for certain range of d when $q = 0$: AG exists if $\frac{63}{64} \leq d \leq 1$; SG1 if $\frac{15}{16} \leq d \leq 1$; and SG2 if $\frac{22}{25} \leq d \leq 1$.

Greens' messages and selects policy 0. As a result, the marginal utility of inviting a Green decreases, and the committee members just choose to grandstand. Third, as in the model with a neutral principal, the chair is more likely to hold a hearing as μ increases.

Figure 3. Equilibrium for Witness Selection with a Biased Principal



The following summarizes the most important predictions of the model. First, there are three types of equilibria for witness selection that characterize each of the different types of hearings: *grandstanding* (NG), *partially informative hearing* (SG), and *fully informative hearing* (AG). Second, in equilibrium, committees invite only an odd number of Greens. Third, with a neutral principal, committee members are more likely to grandstand as they disagree on policy alternatives (d) and as the marginal political benefit of inviting an advocate (q) is high. Fourth, when the principal is moderately biased, the chances of holding a partially informative hearing increase, surprisingly, due to the minority's effort to truthfully appeal to the principal; however, when the principal is extremely biased, such an effort disappears and hearings are only for grandstanding. Lastly, the chair is more likely to hold a hearing as he commands more power in witness selection (μ).

Experiment

The experiment is designed as a three-person game with two committee members, R and B, and the principal. Some key parameters are fixed such that $\omega = 3$, $\mu = \frac{2}{3}$, $\theta = .8$, and $c = .2$.

There are five treatments. The treatments are designed to test the effects of the political benefit of inviting an advocate (q), the level of disagreement between two members of a committee (d), and the neutrality of the principal. Thus, these three conditions vary across the treatments. Table 1 presents the treatments and the equilibrium predictions for the chair's hearing decision and committee members' choice of witnesses.[19]

Table 1. Summary of Treatments and Predictions

Treatment	Political Benefit (q)	Disagree-ment (d)	Principal	Equilibrium Strategy	
				Hearing	Witness Selection
BASE	0	0	Neutral	Yes	All Green (GG, G) Some Green1 (GR, B)
BEN	.2	0	Neutral	Yes	Some Green1 (GR, B) Some Green2 (RR, G)
BENDIS	.2	1	Neutral	Yes	No Green (RR, B)
NEUTRAL	.1	1	Neutral	Yes	Some Green1 (GR, B) Some Green2 (RR, G)
BIAS	.1	1	Biased	Yes or No	No Green (RR, B)

*q: the marginal benefit of inviting an advocate; d: the level of disagreement between R and B members

The treatments are designed as follows. In the baseline treatment, BASE, committee members neither gain the political benefit from inviting an advocate ($q = 0$) nor have disagreement on an issue ($d = 0$). In the second treatment, BEN, they gain political benefit of

[19] The principal's policy choice is not addressed in the table because it depends on the randomly selected state of nature and messages from witnesses.

inviting an advocate ($q = .2$). Thus, any differences between the two treatments can be attributed to the effect of the political benefit (q). The third treatment, BENDIS, has the same condition as BEN except that committee members completely disagree over policy alternatives ($d = 1$). Hence, any differences between BEN and BENDIS can be considered as the effect of the increased level of disagreement (d). The last two treatments allow testing the influence of the principal's policy preference since it is the only difference between the treatments NEUTRAL and BIAS.[20] The treatments are marked on Figure 2 and 3.

Procedures

The experiment was conducted at a major American university using 135 student subjects and programmed in z-Tree (Fischbacher, 2007). At the beginning of the experiment, subjects were randomly assigned to play one of the three roles: R, B and the principal.[21] The roles, once assigned, did not change throughout the experiment. Nine subjects participated in one session with each role played by three subjects. Subjects experienced only one treatment per session. Each treatment was assigned to three sessions. After an experimenter read instructions to subjects, they were asked to answer a set of questions to check their understanding. The instructions are available online as a part of supporting information.

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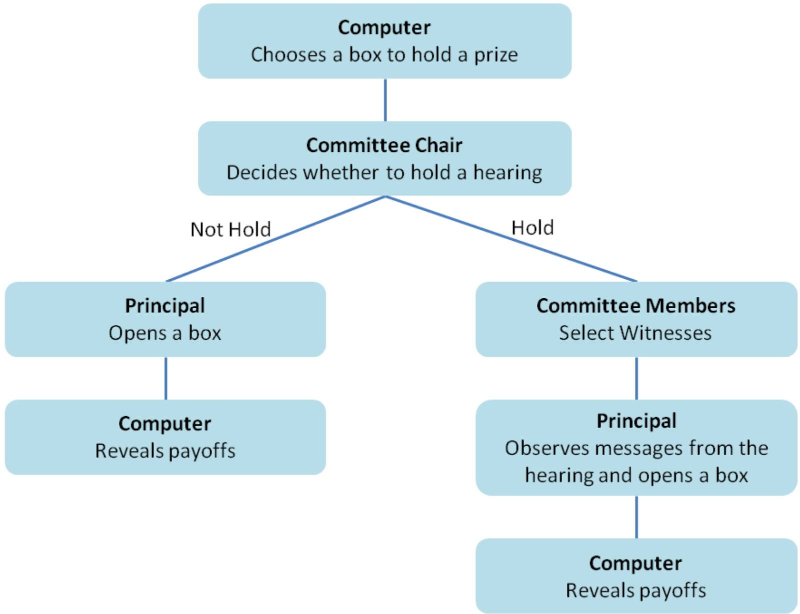
[20] These two treatments are designed to highlight the most important change by having a biased principal. That is, the committee members grandstand beyond a certain level of disagreement (d) regardless of the benefit of calling an advocate (q). To account for this difference, I set the political benefit (q) at .1, instead of .2, because if $q = .2$ there is no difference in the equilibrium strategy for witness selection between the model with a neutral principal and that with a biased one. See Figure 2 and 3 for comparison.

[21] In the experiment, the role of the principal was introduced as C player to subjects.

A period is composed of the following stages. First, each subject was randomly matched with two others such that they form a group of three, R, B and a principal. This matching process is repeated every period. Within a group, R and B comprise a committee. However, interactions among subjects occurred in an anonymous environment. Second, subjects saw two boxes on their computer screen: Box X and Box Y. The computer randomly selected one of the boxes to hold a prize. Subjects were told that a prize was placed in one of the two boxes with equal chances, but they were not told which box. Third, the chair decided whether to hold a hearing or not. If s/he decided to hold a hearing, R invited two witnesses and B invited one witness from three information groups, Red, Blue and Green. Subjects were fully informed as to the witnesses' messages as follows: the witnesses from the Red group always said that the prize is in Box X, regardless where the prize is actually located; likewise, those from the Blue group always said that the prize is in Box Y; however, the witnesses from the Green group said the box that truly holds the prize with 80% probability. After selecting witnesses, all three members of a group were revealed the R and B's choices of witnesses and the summary of messages from the witnesses. At the last stage, the principal decided which box to open. Everyone in the group could see the result of this decision and his or her payoff on the screen. Subjects played this game for 40 periods. Figure 4 presents the sequence of decisions made in one period.

Figure 4. Experimental Procedures Played in One Period



Subjects earned experimental points in each period but were paid only for the points they earned in five randomly selected periods. Subjects earned about $15 on average including $5 as a show-up fee.[22]

[22] Payoffs are designed in a way that the parameters in the model running from 0 to 1 are scaled up to run from 0 to 100. For example, in BASE and BEN where all types share the same policy preference over alternatives ($d = 0$), all the subjects received 100 experimental points if they found a prize in any box. In BENDIS and NEUTRAL where committee members disagree with each other ($d = 1$), only those playing the principal received 100 points from finding a prize in either of the boxes, and R and B received 100 or 0 points depending on which box they found a prize from. Likewise, R and B earned 20 points per advocate each of them invited in BEN and BENDIS where $q = .2$; they earned 10 points in NEUTRAL and BIAS where $q = .1$. The cost of holding a hearing was 20 points. In order to prevent earning negative payoffs, R and B were given 100 extra points in addition to their earnings in the five randomly selected periods.

Results

The analysis of the results mainly focuses on the chair's hearing decision and committee members' selection of witnesses.[23] In order to analyze the chair's decision to hold a hearing, I measure the average rate of holding a hearing for each treatment. If the equilibrium strategy is to hold a hearing, the hearing rate is expected to be 1; if it is to randomize the hearing decision, the expected hearing rate is .5. For the committee members' witness selection strategies, I calculate the average number of Greens invited to a hearing for each treatment. For example, it is expected to be 3 when the equilibrium strategy is to invite only the Greens (AG); 1 for some Green strategies (SG1 or SG2); and 0 for no Greens (NG). Table 2 presents the expected outcomes and experimental results for each treatment. Overall, findings closely follow the theoretical predictions.

I test the treatment effects of the three key variables respectively by comparing the outcomes in each of the three pairs of treatments. First, in order to test the effect of the political benefit of calling an advocate (q), I compare BASE and BEN. The theory predicts that chairs will hold a hearing in both treatments such that the observed hearing rates should not be statistically different from each other. The rates are .94 in BASE and .97 in BEN. To compare the hearing rates, a two-sample test of proportions is conducted. The test shows that the hearing rates are not statistically different from each other ($p = .11$) as predicted.[24]

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[23] The experimental results for the principal's decision are presented in supporting information online.

[24] Two more tests were conducted for robustness checks. First, I included bootstrapped clustered standard errors by subject with repetition of sampling for 1000 times. Also, I ran a probit model for each pair of treatments separately on chair's hearing decisions - coded as 1 for holding a hearing and 0 otherwise- with robust standard errors clustered by subject and

Table 2. Expected and Observed Hearing Rates and the Average Number of Greens

Treatment	BASE	BEN	BENDIS	NEUTRAL	BIAS
q	0	.2	.2	.1	.1
d	0	0	1	1	1
Principal	Neutral	Neutral	Neutral	Neutral	Biased
			Hearing		
EQ strategy	Yes	Yes	Yes	Yes	Randomize
Expected rate	1	1	1	1	.5
Observed rate	.94 (.01)	.97 (.01)	.98 (.01)	.73 (.02)	.25 (.02)
Obs.	360	360	360	360	360
			Witness selection		
EQ strategy	AG SG1	SG1 SG2	NG	SG1 SG2	NG
Expected # of G	1 or 3	1	0	1	0
Observed # of G	2.99 (.01)	1.15 (.04)	.39 (.03)	.70 (.04)	.24 (.05)
Obs.	339	348	353	263	91
			Proportional breakdown of the invited witnesses (%)		
NG (RR,B)	0	18.68	**63.17**	34.22	**75.82**
SG1 (GR,B)	**0**	**41.95**	19.55	**43.73**	0
SG2 (RR,G)	0	**9.20**	11.33	**2.66**	24.18
GR,G	0	18.1	4.25	7.22	0
GG,B	0	8.33	0	1.52	0
AG (GG,G)	**99.71**	3.74	0	0	0
Other	.29	0	1.7	10.65	0
EQ Total (%)	99.71	51.15	63.17	46.39	75.82

* The unit of observation is one committee in one period. Standard errors are in parentheses.
* Entries of equilibrium strategies are in bold. For the equilibrium strategies of witness selection, AG refers to All Greens; SG means Some Greens; and NG is No Greens. GR,G means that R player invited one Green and one Red while B player invited one Green. The similar notation is applied to GG,B. *Other* refers to the observations in which the R player invited a witness from the Blue group or B player invited a witness from the Red group.

Also, committee members are expected to invite one or three Greens (SG1 or AG) in BASE and one Green (SG1 or SG2) in BEN. Therefore, finding more Greens invited to a hearing in BASE than in BEN will empirically support empirically support the theoretical prediction that the increase in the political benefit of inviting an advocate (q) leads to inviting

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treatment dummy variable. The results in both trials are consistent with the findings from the two-sample test of proportions for all pairs of treatments compared.

more advocates than Greens.[25] The observed average number of Greens in BASE is 2.99 suggesting that subjects played the Pareto-optimal strategy (AG) predominantly in BASE. In BEN, they invited 1.15 Greens on average which is close to the theoretical expectation, 1. In order to test the difference in the average number of Greens, I run an ordered-probit model with clustered standard errors by session.[26] The dependent variable is the number of Greens invited to each committee, and the binary variable distinguishing the two treatments is the only predictor. The result is highly significant ($p < .0005$) yielding a support for the prediction.

Second, the treatment effect of disagreement (*d*) between committee members on a policy issue can be tested by comparing BENDIS to BEN. The theory predicts that chairs in both treatments will hold a hearing; and committee members invite no Greens in BENDIS but one Green in BEN. The hearing rates are .94 in BEN and .98 in BENDIS, and they are not statistically different from each other ($p = .25$). Also, the average number of Greens in BEN

[25] In BASE, AG is Pareto-optimal to SG1, and the experimental result shows that AG was played predominantly. Therefore, testing if more Greens were invited in BASE than in BEN on average is appropriate.

[26] In this experiment, subjects are re-matched into a group every period so that those in a session interact with one another. Thus, inclusion of clustered standard errors by session is advised. Indeed, the intra-class correlation coefficient (ICC) for each treatment is not trivial especially for some treatments: .005 in BASE, .167 in BEN, .35 in BENDIS, .166 in NEUTRAL, and .022 in BIAS. Thus, the session effect does exist especially in BENDIS. I also conducted two-sample t-test with bootstrapped standard errors clustered by session. The results are the same as those from the ordered-probit model for this pair and the other pairs to be compared.

is 1.15 and it is significantly greater than that in BENDIS, .39, (p = .004). The results indicate that when committee members have diverging policy preferences as opposed to sharing the same set of policy preferences, they tend to invite advocates instead of seeking for unbiased advice from Greens.

Third, the effect of the principal's policy preference can be tested by comparing NEUTRAL and BIAS. The theory predicts that, in NEUTRAL the chair holds a hearing and committee members invite one Green in total (SG1 or SG2); in BIAS, the chair randomizes the hearing decision with .5 probability and committee members invite none of the Greens (NG). The result shows that the average hearing rate in NEUTRAL is higher than that in BIAS as predicted and the difference is significant at the .01 level.[27] Also, the average number of Greens in NEUTRAL is greater than that in BIAS at the .01 level of significance suggesting that, when the principal is completely biased in favor of the majority preference

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[27] The hearing rate in NEUTRAL is lower than those in other treatments with the same expected rate, 1. The comparison with BENDIS could provide an explanation since the two treatments vary only in q. The chair's decision to hold a hearing is essentially based on the cost-benefit efficiency in a given situation. Therefore, as the level of q was halved to .1 in NEUTRAL, the expected benefit of hearings decrease, which made hearings relatively less attractive for chairs at a given cost. Even though the point estimate prediction does not reflect such a change in comparative statics, subjects seem to reflect the change in their hearing decisions. The similar amount of drop in BIAS can be partially due to the low level of q. Another possibility for the drop in BIAS could be that R might have been altruistic such that, by not holding a hearing, they tried to prevent the B member in their committee from earning negative payoffs. It is especially more plausible because R is indifferent between holding and not holding a hearing in this treatment.

within the committee, a hearing is less likely in the first place and information transmission is largely discouraged.

I now examine the witness selection strategies played most frequently in each treatment. The lower part of Table 2 presents a breakdown of all possible combinations of witnesses invited. Each cell in this part of the table presents the percentage of observations when hearings were held in which the distribution of witnesses selected fit the associated equilibrium of that row. There are several interesting points. First, in all treatments, the equilibrium strategy or strategies have been played more frequently than any other single strategy that is off-the-equilibrium-path.

Second, there is some evidence of coordination failure in BEN and NEUTRAL where there are two equilibria without a Pareto-optimal strategy. However, note that SG1 was much more frequently chosen than SG2. Given that the informational utility that Green witnesses provide to all members of a group is non-excludable and non-rivalrous, inviting a Green can be considered providing a public good to the group. As in these two treatments, when inviting only one Green is expected, the committee member with more power, R, tends to invite the Green witness rather than the one with less, B. So, the finding illustrates that when there is a coordination problem in providing informational public goods to a group and the principal is unbiased, it is the majority who delivers them.[28]

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[28] It is also important to note that, in BEN and NEUTRAL, the evidence of coordination failure is observed especially in a way of selecting no Greens (NG) or two Greens. One possible explanation is that, even if each individual committee member has played one of his equilibrium strategies in a given treatment, the committee's decision as a whole may end up with an off-equilibrium strategy. For example, if R invited one Green and one Red and B invited one Green so that two Greens were invited, then it can be considered a simple

Third, while no Green is expected in BIAS, SG2 is observed 24% of the time and SG1 is not observed. It appears that B sometimes behaved as if the line t_2 in Figure 3 has been extended beyond the cut-point at $d = .75$. It can possibly be explained by the bounded rationality of B members who might have hoped that the principal, by chance, could consider following the Green's message if a Green says Box Y holds a prize. Inviting one or two Greens while none is expected was found in other treatments. However, the most notable difference in BIAS is that those who invited Greens are no longer R members but B's in the minority role. Thus, we find support for the theoretical claim that the minority will be the ones who invite neutral witnesses when the principal is biased. Also, this result is empirically true beyond the theoretically expected level of bias of the principal. Therefore, hearing outcomes could be empirically more informative than what is theoretically predicted.

Since the choice of witnesses was essentially an individual decision, I conduct an individual level analysis on witness selection. Table 3 presents which strategy has been played by R or B member in each treatment for how many periods in percentages. Also, the percentage of the equilibrium strategies played is provided for each member. Compared to the committee level analysis, the proportion of equilibrium strategies have significantly increased to over 80% in most of the treatments, which suggests that off-the-equilibrium strategies at the committee level are largely attributed to coordination failures between R and B.

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coordination failure. However, if two Greens were invited such that R invited two Greens which is not an equilibrium strategy and B invited a Blue, the blame goes to R's non-equilibrium move rather than a coordination failure. Individual level analysis shows that R invited two Greens for 12% of the time in BEN and 1.9% in NEUTRAL. Thus, in the rest of the cases, both R and B members played equilibrium strategies.

Table 3. Choice of witnesses by individual committee members (%)

Treatment	BASE	BEN	BENDIS	NEUTRAL	BIAS
q	0	.2	.2	.1	.1
d	0	0	1	1	1
Principal	Neutral	Neutral	Neutral	Neutral	Biased
EQ strategy	AG SG1	SG1 SG2	NG	SG1 SG2	NG
R member					
R's EQ strategy	GG, GR or RR	GR or RR	RR	GR or RR	RR
RR	**0**	**27.87**	**74.79**	**41.83**	**100**
GR	**0**	**60.06**	23.8	**56.27**	0
GG	**99.7**	12.07	0	1.9	0
EQ total (%)	99.7	87.93	74.79	98.1	100
B member					
B's EQ strategy	B or G	B or G	B	B or G	B
B	**0**	**68.97**	**84.14**	**79.47**	**75.82**
G	**100**	**31.03**	15.58	**9.89**	24.18
EQ total (%)	100	100	84.14	89.36	75.82

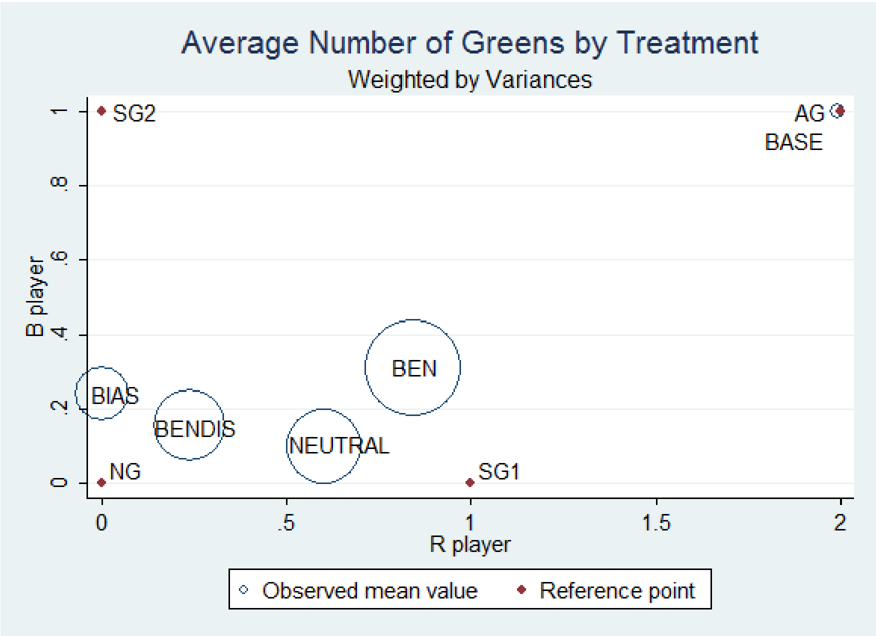
* The unit of observation is the strategy played by an individual committee member (R or B) in one period. Standard errors are in parentheses.
* Entries for equilibrium strategies are in bold. For R member's strategies, RR means that R member invited two Reds; GR means one Green and one Red; and GG means two Greens. For B member's strategy, B means that B member chose one Blue and G represents one Green. The rest of the cases omitted from the table include the observations in which R member invited a witness from the Blue group or B member invited a witness from the Red group.

I run an ordered-probit regression for R's choice of Greens with clustered standard errors by subject for each pair of treatments. The coefficients in all four of the comparisons were statistically significant with correct signs. R members invited more Greens in BASE than in BEN ($p<.000$); more in BEN than in BENDIS ($p=.008$); more in NEUTRAL than in BENDIS ($p=.091$); and more in NEUTRAL than in BIAS ($p=.000$).

For B's choice, I use a probit model since the choice is binary. The treatment variable of the first pair comparing BASE and BEN is dropped because there is no variation in BASE. The coefficients on the treatment variables for the other three pairs (BEN and BENDIS; BENDIS and NEUTRAL; and NEUTRAL and BIAS) turned out to be insignificant, suggesting that B's strategy does not vary much across treatments except BASE. The reason is straightforward. Although one of the committee members was expected to invite a Green in BEN and NEUTRAL, it tended to be R rather than B. Thus, the average number of Greens that B invited in these treatments is not statistically different from BENDIS and BIAS where no Green was expected.

Figure 5 summarizes R and B members' choice of witnesses with circular markers for each treatment weighted by the sum of variances of each member's choices. The circles correspond well to the equilibrium number of Greens at the committee level. BASE almost overlaps the reference point for AG with little variance. BEN and NEUTRAL are between SG1 and SG2, but closer to SG1 implying that R instead of B tended to invite a Green. Since subjects in both treatments experienced a coordination problem, the marker reflects larger variance than any other treatments. BENDIS and BIAS are located near NG.

Figure 5. Individual Level Strategy of Witness Selection Weighted by Variances



*Circular markers report the average number of Greens invited in each treatment. Red dots are reference points for the equilibrium strategies in one or multiple treatments.

In sum, the results from the data analysis suggest that witness selection strategies chosen by each of the R and B members are generally consistent with the theoretical predictions.

Conclusion

In this paper, I examined the conditions under which committee chairs hold hearings and which types of hearings are held by considering committee members' choices of witnesses. I specifically find that (1) when the principal is neutral, the political benefit of inviting an advocate and high level of policy disagreement between committee members contribute to increasing the chances of grandstanding; (2) when the principal is moderately biased, however, the minority member's effort to truthfully appeal to the principal helps a hearing become more informative, and such behavior is empirically observed even when not theoretically predicted; (3) as the chair commands more power in selecting witnesses, he is more likely to hold a hearing; (4) in a partially informative hearing where there is a coordination problem over who will invite a neutral witness carrying information at the cost of inviting an advocate instead, it was often the majority member who served the role under a neutral principal; in contrast, it was the minority member under a biased principal when they held one.

Another important implication of this study is that information gathering and transmission can be hindered even when the policy preferences between the agent and the principal perfectly coincide. Previous literature has shown that information transmission is more likely as they share similar preferences.[29] In the model with a neutral principal, I find that a hearing is more likely to be informative as policy preferences of the two committee

[29] See Crawford and Sobel (1982), for example.

members become more aligned and closer to the principal. However, when the principal shares the majority member's policy preference, if both strongly prefer one alternative over the other, the committee does not gather information but grandstand. It is intuitive because the majority member has less incentive to seek information, as does the principal. Thus, this finding adds a new insight about how a biased principal may hinder information transmission.

A lab experiment testing a formal theory provides technical advantages but also may raise questions about external validity. Thus, I consider the experimental findings as an initial empirical test on the validity of my theory and suggest further tests to be conducted using observational data. However, the studies using observational data might confront methodological limits, for example, in establishing causal effects of different institutions while keeping other factors constant, which can be best solved by an experimental study. Therefore, the experimental results presented in this paper will complement future research using observational data.

The findings of this study highlight interesting dynamics in the political competition within a committee and suggest that more attention should be paid to the internal decision-making processes in a committee and its effects on interactions with actors outside the committee. It will also be interesting to study political bargaining over rules and procedures of holding a hearing and witness selection when an ad hoc committee is formed, while such rules were exogenously given in my model. A better understanding of how information is collected and policy decisions are made in specialized committees through a political competition may help us better institutionalize decision-making bodies in many contexts.

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Supporting Information

A. Equilibrium Solutions

Equilibrium Solution for the Model with a Neutral Principal

The equilibrium solution of the model is presented here using backwards induction. The equilibrium strategies for each stage of the game are defined as follows. First, for $i \in \{R, B\}$, let $h^*(\cdot)$ be the chair's equilibrium strategy for the hearing decision and it maximizes EU_i. I denote $h^* = 1$ for holding a hearing and 0 otherwise. Second, $l_i^*(\cdot\,|l_{\sim i}, h^*(\cdot))$ is a committee member *i*'s equilibrium strategy for witness selection that maximizes EU_i, if a hearing is held. Third, let *G* represent a set of messages from the Green group. Then, $f^*(\cdot \mid G, h^*(\cdot))$ is the principal's equilibrium strategy on a policy decision and maximizes EU_f, given the chair's hearing decision and the messages from the Green witnesses, if any.

1. *Policy decision by the principal*

If a hearing is not held, the principal randomizes the policy decision based on her prior belief about the state (π =.5) between two alternatives. If a hearing is held, the principal will choose a policy in the following manner:

$$f^*(\cdot\,|h^*=1) = \begin{cases} x=0, & if \quad EU_F(x=0|G,h^*=1) > EU_F(x=1|G,h^*=1) \\ x=1, & if \quad EU_F(x=0|G,h^*=1) < EU_F(x=1|G,h^*=1) \\ randomize, & if \quad EU_F(x=0|G,h^*=1) = EU_F(x=1|G,h^*=1). \end{cases}$$

Below is the principal's expected utility for each policy decision:

$$EU_F(x=0|G,h^*=1) = P(s=0|G)*1 + P(s=1|G)*0$$

$$EU_F(x=1|G,h^*=1) = P(s=0|G)*0 + P(s=1|G)*1.$$

Now, I present posterior beliefs about the state of the world (s) after receiving the messages from the Green groups (*G*). Given $m \in \{0,1\}$, suppose that g_m is the number of

Green witnesses sending a message, *m*, such that $g = g_0 + g_1$. First of all, suppose that the probability of receiving certain combination of Greens' messages given each state is

$$P(G|s=0) = \binom{g}{g_0} \theta^{g_0} (1-\theta)^{g_1} \equiv \alpha$$

$$P(G|s=1) = \binom{g}{g_1} \theta^{g_1} (1-\theta)^{g_0} \equiv \beta.$$

Then, the posterior beliefs are

$$P(s=0|G) = \frac{P(G|s=0) * P(s=0)}{P(G|s=0) * P(s=0) + P(G|s=1) * P(s=1)} = \frac{\alpha\pi}{\alpha\pi + \beta(1-\pi)}$$

$$P(s=1|G) = \frac{P(G|s=1) * P(s=1)}{P(G|s=0) * P(s=0) + P(G|s=1) * P(s=1)} = \frac{\beta(1-\pi)}{\alpha\pi + \beta(1-\pi)}.$$

Given that, the principal always selects policy 0 if the following is satisfied:

$$EU_F(x=0|G, h^*=1) > EU_F(x=1|G, h^*=1)$$

$$\alpha\pi > \beta(1-\pi)$$

$$\alpha > \beta$$

$$\binom{g}{g_0} \theta^{g_0} (1-\theta)^{g_1} > \binom{g}{g_1} \theta^{g_1} (1-\theta)^{g_0}$$

$$(\frac{\theta}{1-\theta})^{(g_0-g_1)} > 1. \tag{1}$$

Since $.5 < \theta < 1$, $\left(\frac{\theta}{1-\theta}\right) > 1$. Therefore, if a hearing is held, the equilibrium strategy for the principal is to implement policy 0 when $g_0 > g_1$ and policy 1 when $g_0 < g_1$. However, even when a hearing is held, if $g_0 = g_1$, the principal will randomize her policy choice with probability of π.

$$f^*(\cdot\,|h^*=1) = \begin{cases} x^* = 0, & if\ g_0 > g_1 \\ x^* = 1, & if\ g_0 < g_1 \\ randomize, & if\ g_0 = g_1 \end{cases}$$

2. Witness selection by committee members

Let p be the probability of implementing a policy that matches the state of nature. Then, the policy-based utility is

$$\sum_{\substack{x\in X\\ s\in S}} \{u_i(x,s) * P(x|s)\}$$

$$= \pi\{u_i(0,0) * p + u_i(1,0) * (1-p)\} + (1-\pi)\{u_i(0,1) * (1-p) + u_i(1,1) * p\}.$$

Given π=.5 and $u_i(1,0) = u_i(0,1) = 0$, the policy-based utility for each committee member reduces to

$$\sum_{\substack{x\in X\\ s\in S}} \{u_i(x,s) * P(x|s)\} = p\left(1-\frac{1}{2}d\right). \qquad (2)$$

If a hearing is held, the expected utility of a committee member is composed of the policy-based utility, the political utility from inviting advocates, and the cost of holding a hearing as follows:

$$EU_i = p\left(1-\frac{1}{2}d\right) + a_i * q - c, \quad for \;\; i \in \{R, B\}. \qquad (3)$$

If a hearing is held, R chooses two witnesses in any combination of Greens and Reds, while B invites only one witness either from the Green or the Blue group. Since there is a tradeoff between inviting Greens for informational gains and inviting advocates, Reds or Blues, for political gains, the relative size of the marginal utility of one additional Green and that of one additional advocate will determine the equilibrium strategy for witness selection. Thus, I solve for the equilibrium by finding the number of Greens each committee member will invite in the equilibrium.

The first step is to define the marginal probability of implementing a policy matching the state of nature by inviting an additional Green to a hearing. Let g_s, $s \in \{0,1\}$, be the number of Greens recommending the policy that matches the true state of the world; and let $g - g_s$ be the number of Greens that fail to do so. Since the principal considers messages only from the Green group useful, the probability of implementing a policy that matches the state of nature can be expressed as the following.

If g is odd,

$$P(x = s|\ G) = \sum_{g_s > \lceil \frac{g}{2} \rceil}^{g} \binom{g}{g_s} \theta^{g_s} (1-\theta)^{(g-g_s)} \equiv p$$

If g is even or zero,

$$P(x = s|\ G\ ) = \sum_{g_s > \frac{g}{2}}^{g} \binom{g}{g_s} \theta^{g_s} (1-\theta)^{(g-g_s)} + \frac{1}{2} \binom{g}{\frac{g}{2}} \theta^{\frac{g}{2}} (1-\theta)^{\frac{g}{2}} \equiv p$$

$$P(x \neq s|\ h = 1) \equiv 1 - p$$

The marginal probability of implementing a correct policy by inviting the n[th] number of one additional Green witness can be expressed as $\Delta P(n)$ such that

$$\Delta P(n) \equiv P(x = s|\ g = n) - P(x = s|\ g = n - 1). \tag{4}$$

As aforementioned, in the equilibrium, the total number of Greens invited will be either one or three, not two. Thus, when only one Green witness is invited, the probability of implementing a policy that matches the true state is equal to θ; and the marginal effect compared to the case without any Greens is θ-.5 because the principal without Greens' messages still has 50% chances of choosing a policy matching the state. When three Green witnesses are invited, the probability increases to $-2\theta^3+3\theta^2$.[30] So, the marginal effect compared to having third additional Green is $-2\theta^3+3\theta^2 - \theta$. Formally,

$$P(x = s|g = 1) = \theta$$

$$\Delta P(1) = \theta - .5$$

[30] $\binom{3}{3}\theta^3 + \binom{3}{2}\theta^2(1-\theta) = -2\theta^3+3\theta^2$

$$P(x = s|g = 3) = -2\theta^3 + 3\theta^2$$

$$\Delta P(3) = -2\theta^3 + 3\theta^2 - \theta.$$

Using these values, Table 4 presents expected payoffs for committee members given their choice of witnesses. Note that the effect of inviting Greens equally rewards both committee members, but the utility of inviting an advocate, Red or Blue, is granted only to the corresponding member. For simpler notation, I use

$$\lambda \equiv \left(1 - \frac{1}{2}d\right). \quad (5)$$

Table 4. Payoffs for committee members from the selection of witnesses

R member | B member	Green	Blue
Green-Green	$(-2\theta^3 + 3\theta^2)\lambda$ $(-2\theta^3 + 3\theta^2)\lambda$	$\theta\lambda$ $\theta\lambda+q$
Green-Red	$\theta\lambda + q$ $\theta\lambda$	$\theta\lambda + q$ $\theta\lambda + q$
Red-Red	$\theta\lambda + 2q$ $\theta\lambda$	$.5\lambda + 2q$ $.5\lambda + q$

*Upper entry of each cell is payoffs for R member; lower entry is for B member.
*Note that the cost of hearing (c) has not been subtracted from each payoff because it is not necessary for solving the equilibrium strategies of witness selection once a hearing is held. However, it will be subtracted from the expected utility for solving the chair's choice of holding a hearing in the next section.

Grandstanding equilibrium (No Greens: NG)

First, there exists an equilibrium where $g=0$. Given that B invites a Blue, R will invite two Reds if $.5\lambda+2q \geq \theta\lambda+q$. Likewise, when R invites two Reds, B will invite a Blue if $.5\lambda+q \geq \theta\lambda$. Both conditions are the same. Therefore, both committee members will not invite any Green witnesses if the following condition is met.

$$EU_i(g_i = 1|\ g_{\sim i} = 0) \leq EU_i(g_i^* = 0|\ g_{\sim i} = 0)$$

$$(\theta - .5)\lambda \leq q$$

$$\Delta P(1) * \lambda \leq q$$

Fully informative equilibrium (All Greens: AG)

Second, there exists an equilibrium where g=ω. Given that B invites a Green witness, R will also invite two Greens if $(-2\theta^3 + 3\theta^2)\lambda \geq \theta\lambda + 2q$. Also, when R invites two Greens, B will invite a Green if $(-2\theta^3 + 3\theta^2)\lambda \geq \theta\lambda + q$. Therefore, the committee members will invite witnesses only from the Green group when both conditions are satisfied. However, since the former is a stronger condition unless $q = 0$, this equilibrium exists if

$$EU_R(g_R^* = 2|g_B = 1) \geq EU_R(g_R = 0|\, g_B = 1)$$

$$(-2\theta^3 + 3\theta^2 - \theta)\lambda \geq 2q$$

$$\frac{\Delta P(3) * \lambda}{2} \geq q.$$

The following proves that the condition above is possible for certain range of q.

Proof 1. *There exists q such that* $\frac{\Delta P(3)*\lambda}{2} \geq q$.

Given $q \geq 0$ and $.5 \leq \lambda \leq 1$ because $\lambda = (1 - \frac{1}{2}d)$ and $0 \leq d \leq 1$, showing $\Delta P(3) \geq 0$ proves the existence of such q.

$$\Delta P(3) = -2\theta^3 + 3\theta^2 - \theta$$

$$= -\theta(\theta - 1)(2\theta - 1)$$

Given $.5 < \theta \leq 1$, *if* $\theta = 1$, $\Delta P(3) = 0$*;* *if* $\theta \neq 1$, since $\theta > 0$, $(\theta - 1) < 0$ and $(2\theta - 1) > 0$, $\Delta P(3) > 0$. Therefore, $\Delta P(3) \geq 0$. So, there exists q such that $\frac{\Delta P(3)*\lambda}{2} \geq q$.

Partially informative equilibrium (Some Greens: SG)

Third, I show that there exist equilibria where $0 < g < \omega$. As aforementioned, the total number of Green witnesses to be invited in an equilibrium strategy is either one or three because there is no marginal benefit of inviting two Green witnesses instead of one. Hence, the number of Greens in this type of equilibrium is one.

a. Some Greens 1 (SG1)

There exists an equilibrium where R invites one Green and one Red while B invites one Blue ($\mathrm{g_R} = 1$ and $\mathrm{g_B} = 0$). Given that B invites a Blue, R will invite one Green and one Red, if $\theta\lambda + q \geq .5\lambda + 2q$. Also, when R invites one Green and one Red, B will invite a Blue if $\theta \leq \theta + q$, which is always true. Thus, the equilibrium SG1 exists if $(\theta - .5)\lambda \geq q$, which is same as $\Delta P(1) * \lambda \geq q$.

***b.* Some Greens 2 (SG2)**

There exists an equilibrium where R invites two Reds while B invites one Green ($\mathrm{g_R} = 0$ and $\mathrm{g_B} = 1$). When R invites two Reds, B will invite a Green if $\theta\lambda \geq .5\lambda + q$ that is equal to $\Delta P(1) * \lambda \geq q$. Also, when B invites a Green, R will select two Reds if $\theta\lambda + 2q \geq (-2\theta^3 + 3\theta^2)\lambda$, which is same as $q \geq \frac{\Delta P(3)}{2} * \lambda$. Thus, the equilibrium exists when both conditions are met such that $\frac{\Delta P(3)}{2} * \lambda \leq q \leq \Delta P(1) * \lambda$.

Proof 2. *There exists certain range of q such that* $\frac{\Delta P(3)}{2} * \lambda \leq q \leq \Delta P(1) * \lambda$.

Given $.5 \leq \lambda \leq 1$, showing $\frac{\Delta P(3)}{2} \leq \Delta P(1)$ proves the existence of such *q*.

$$\frac{1}{2}(-2\theta^3 + 3\theta^2 - \theta) \leq \theta - .5$$

$$0 \leq 2\theta^3 - 3\theta^2 + 3\theta - 1$$

$$0 \leq 2\left(\theta - \frac{1}{2}\right)(\theta^2 - \theta + 1)$$

Since $.5 < \theta \leq 1$, $\left(\theta - \frac{1}{2}\right) > 0$. Also, $\left(\theta^2 - \theta + 1\right) > 0$ because it is a convex function and its discriminant (D) is -3 which is negative. Thus, the right-hand side is positive. Therefore, $\frac{\Delta P(3)}{2} \leq \Delta P(1)$ is always true.

Also, note that the equilibrium AG exists if $\frac{\Delta P(3)*\lambda}{2} \geq q$ and the equilibrium SG1 exists if $\Delta P(1) * \lambda \geq q$. Given this proof showing $\frac{\Delta P(3)}{2} \leq \Delta P(1)$, we know that the equilibria AG and SG1 coexist if $\frac{\Delta P(3)*\lambda}{2} \geq q$. The following proves that SG1 is Pareto-suboptimal to AG when they coexist.

Proof 3. *If* $\frac{\Delta P(3)*\lambda}{2} \geq q$, *AG is Pareto-optimal and SG1 is a Pareto-suboptimal Nash Equilibrium.*

In AG,

$$EU_R(g_R = 2|g_B = 1) = EU_B(g_B = 1|g_R = 2) = (-2\theta^3 + 3\theta^2)\lambda.$$

In SG1,

$$EU_R(g_R = 1|g_B = 0) = EU_B(g_B = 0|g_R = 1) = \theta\lambda + q.$$

Given $\frac{\Delta P(3)}{2} * \lambda \geq q$ that is $\frac{1}{2}(-2\theta^3 + 3\theta^2 - \theta)\lambda \geq q$, it is always true that

$$\mathrm{EU_R}(\mathrm{g_R} = 2|\mathrm{g_B} = 1) > \mathrm{EU_R}(\mathrm{g_R} = 1|\mathrm{g_B} = 0)$$

$$(-2\theta^3 + 3\theta^2)\lambda > \theta\lambda + q$$

$$(-2\theta^3 + 3\theta^2 - \theta)\lambda > q.$$

3. *Hearing decision by the committee chair*

The chair holds a hearing if the following satisfies.

$$EU_i(g_i^*|g_{\sim i}, h^* = 1) \geq EU_i(h^* = 0)$$

$$p\lambda + q * a_i - c \geq .5\lambda$$

$$(p - .5)\lambda + q * a_i \geq c \tag{6}$$

Equilibrium Solution for the Model with a Biased Principal

1. *Policy decision by the Principal*

The principal maximizes her expected utility by selecting one of the two policy alternatives (*x*). Given π =.5, if a hearing is not held, the expected utility of the principal from choosing the policy 0 is .5 and that of choosing policy 1 is .5*(1-d)*. Thus, the principal will always select the policy 0. However, if a hearing is held, she will select a policy with higher expected utility given the messages from the Green witnesses (*G*) and randomizes her choice if indifferent between alternative policies by choosing $x = 0$ with .5 probability. The expected utility for each policy decision made after a hearing can be formally expressed as the following:

$$EU_f(x = 0|G, h^* = 1) = P(s = 0|G) * 1 + P(s = 1|G) * 0 \quad (7)$$

$$EU_f(x = 1|G, h^* = 1) = P(s = 0|G) * 0 + P(s = 1|G) * (1 - d). \quad (8)$$

Note that the principal's expected utility of selecting the policy 1 decreases as her level of policy bias (*d*) increases. Using the posterior belief functions as defined in the previous section, the principal selects the policy 0 if and only if the following is satisfied:

$$EU_f(x = 0|G, h^* = 1) > EU_f(x = 1|G, h^* = 1)$$

$$\binom{g}{g_0} \theta^{g_0} (1-\theta)^{g_1} > \binom{g}{g_1} \theta^{g_1} (1-\theta)^{g_0} (1-d)$$

$$(\frac{\theta}{1-\theta})^{(g_0-g_1)} > 1 - d$$

$$d > 1 - (\frac{\theta}{1-\theta})^{(g_0-g_1)}. \quad (9)$$

Since $(\frac{\theta}{1-\theta})$ >1 and $0 < d \leq 1$, the condition above is always true if $g_0 \geq g_1$ leading the principal to implement the policy 0, which is consistent with the previous prediction for a neutral principal. However, now with a biased principal, it is possible that the she chooses policy 0 even when $g_0 < g_1$ as long as *d* is large enough. For example, when *θ*=.8, $g_0 = 1$ and $g_1 = 2$, the principal will choose $x = 0$ if $d \geq \frac{3}{4}$. Thus, the comparative statics implies that, as *d* increases, the probability of the principal choosing policy 0 increases. In other words, the more biased the principal is in favor of policy 0, the more likely she will choose that policy. For notational convenience, I will use a new term, *φ*, for the probability that the principal will choose policy 0 even if $g_0 < g_1$.

$$P(d > 1 - (\frac{\theta}{1-\theta})^{(g_0-g_1)}|g_0 < g_1) \equiv \varphi \tag{10}$$

The size of *φ* is conditioned not only by the level of partisan disagreement (*d*) but also by how many Greens are invited in total (*g*) and the gap between the number of different messages from them, $(g_0 - g_1)$. Thus, let φ_g denote the value of *φ* for the given number of Greens invited (*g*).

Then, the equilibrium strategy of the principal if a hearing is held is as follows:

$$f^*(\cdot\,|h^* = 1) = \begin{cases} x^* = 0, & if\ g_0 \geq g_1\ or\ if\ d > 1 - (\dfrac{\theta}{1-\theta})^{(g_0-g_1)}\ given\ g_0 < g_1 \\ x^* = 1, & otherwise. \end{cases}$$

(Proposition PD-Bias) Given that the principal is biased in favor of policy 0 by d, if a hearing is not held, the principal always selects policy 0. If a hearing is held, she selects policy 0, if $g_0 \geq g_1$, *or if* $g_0 < g_1$ *and* $d > 1 - (\frac{\theta}{1-\theta})^{(g_0-g_1)}$*; and policy 1, otherwise. However, if she is indifferent about choosing either of the policies, she randomizes her choice. As the level of bias (d) increases, she is more likely to choose policy 0.*

As a result, as the principal is more biased, the probability of implementing a policy that matches the state (s) increases if the state is $s = 0$ but decreases if the state is $s = 1$. Given that *p* represents the probability for a *neutral* principal to implement a policy matching the state, such probabilities for a *biased* principal are modified as the following:

$$P(x = s|s = 0, G) = p + (1 - p)\varphi \tag{11}$$

$$P(x = s|s = 1, G) = p(1 - \varphi). \tag{12}$$

2. *Witness selection by committee members*

Since the probability of implementing a policy that matches the true state has changed, the expected utilities of the committee members have to be modified accordingly.

$$EU_i = E(u_i(x,s)) + q * a_i - c \quad \text{for } i \in \{R, B\}$$

$$E(u_R(x,s)) = \sum_{\substack{x \in X \\ s \in S}} \{u_R(x,s) * P(x|s)\} = \frac{1}{2}\{p + (1 - p)\varphi + p(1 - \varphi)(1 - d)\}$$

$$= p(1 - \varphi)(1 - \frac{d}{2}) + \frac{\varphi}{2} \tag{13}$$

$$E(u_B(x,s)) = \sum_{\substack{x \in X \\ s \in S}} \{u_B(x,s) * P(x|s)\} = \frac{1}{2}[\{p + (1 - p)\varphi\}(1 - d) + p(1 - \varphi)]$$

$$= p(1 - \varphi)(1 - \frac{d}{2}) + \frac{\varphi(1 - d)}{2}. \tag{14}$$

Thus, given $P(x = s|g = 1) = \theta$, $P(x = s|g = 3) = -2\theta^3 + 3\theta^2$, and $\lambda = (1 - \frac{1}{2}d)$,

$$E(u_R(x,s)|g = 1) = \theta\lambda(1 - \varphi_1) + \frac{\varphi_1}{2}$$

$$E(u_R(x,s)|g=3) = (-2\theta^3+3\theta^2)(1-\varphi_3)\lambda + \frac{\varphi_3}{2}$$

$$E(u_B(x,s)|g=1) = \theta\lambda(1-\varphi_1) + \frac{\varphi_1(1-d)}{2}$$

$$E(u_B(x,s)|g=3) = (-2\theta^3+3\theta^2)(1-\varphi_3)\lambda + \frac{\varphi_3(1-d)}{2}.$$

The arguments above can be solved further by fixing θ at a certain value because, then, the size of φ can be calculated depending on the level of disagreement on policy (d) and the combination of Greens' messages (g_m) as presented below.

Calculation of the probability φ

Assuming θ=.8 and ω=3, $\varphi = P(d \geq 1-(\frac{\theta}{1-\theta})^{(g_0-g_1)}|g_0 < g_1)$ takes conditional values as the following (Note: φ_g means the size of φ when committee members invited g number of Greens):

a) If g=1, it is always true that $g_1 - g_0 = 1$ given $g_1 > g_0$.

$$\varphi_1 = \begin{cases} 1, & if\ d \geq \frac{3}{4} \\ 0, & otherwise \end{cases}$$

b) If g =2, it is always true that $g_1 - g_0 = 2$ given $g_1 > g_0$.

$$\varphi_2 = \begin{cases} 1, & if\ d \geq \frac{15}{16} \\ 0, & otherwise \end{cases}$$

c) If g =3, then $g_1 - g_0 = 1\ or\ 3$ given $g_1 > g_0$. Since π=.5,

If $g_1 - g_0 = 1$,

$$\varphi_3 = \begin{cases} 1, & if\ d \geq \frac{3}{4} \\ 0, & otherwise \end{cases}$$

If $g_1 - g_0 = 3$,

$$\varphi_3 = \begin{cases} 1, & if\ d \geq \dfrac{63}{64} \\ 0, & otherwise \end{cases}$$

In summary, if $d < \frac{3}{4}$, $\varphi_1 = \varphi_2 = \varphi_3 = 0$ regardless of the number of Greens (g) and their messages (g_m). Likewise, if $d \geq \frac{63}{64}$, $\varphi_1 = \varphi_2 = \varphi_3 = 1$, always. If $\frac{3}{4} \leq d < \frac{15}{16}$, $\varphi_1 = 1$ and $\varphi_2 = 0$; and if $\frac{15}{16} \leq d < \frac{63}{64}$, $\varphi_1 = \varphi_2 = 1$. However, when $\frac{3}{4} \leq d < \frac{63}{64}$, the size of φ_3 varies depending on g_m such that $\varphi_3 = 1$ if $g_1 - g_0 = 1$; $\varphi_3 = 0$ if $g_1 - g_0 = 3$. Assuming that committee members are aware of this contingency and take it into account when making decisions, I further clarify the expected size of φ_3 as the following:

$$\mathrm{P}(g_1 - g_0 = 1\ |g = 3) = \frac{1}{2} * \{P(g_0 = 1, g_1 = 2|s = 0) + P(g_0 = 1, g_1 = 2|s = 1)\}$$

$$= \frac{1}{2} * \{\binom{g}{g_0} \theta^{g_0} (1-\theta)^{g_1} + \binom{g}{g_1} \theta^{g_1} (1-\theta)^{g_0}\}$$

$$= \frac{1}{2} * \{\binom{3}{1} .8\ (1 - .8)^2 + \binom{3}{2} .8^2\ (1 - .8)\} \equiv x$$

$$\mathrm{P}(g_1 - g_0 = 3\ |g = 3) = \frac{1}{2} * \{P(g_0 = 0, g_1 = 3|s = 0) + P(g_0 = 0, g_1 = 3|s = 1)\}$$

$$= \frac{1}{2} * \{\binom{3}{0}\ (1 - .8)^3 + \binom{3}{3} .8^3\} \equiv y$$

$$\mathrm{P}(g_1 - g_0 = 1\ |g = 3, g_1 > g_0) = \frac{x}{x+y} = .48$$

$$\mathrm{P}(g_1 - g_0 = 3\ |g = 3, g_1 > g_0) = \frac{y}{x+y} = .52.$$

Thus, if $g = 3, g_1 > g_0,\ and\ \frac{3}{4} \leq d < \frac{63}{64}$, φ_3 is 1 with .48 probability when $g_1 - g_0 = 1$; and 0 with .52 probability when $g_1 - g_0 = 3$. Then, the expected size of φ_3 under this condition will be .48 as shown below:

$$E\left(\varphi_3 \middle| g = 3, g_1 > g_0, \frac{3}{4} \leq d < \frac{63}{64}\right) = .48 * 1 + .52 * 0 = .48.$$

Therefore, the equilibrium of witness selection is a non-linear function of d such that there will be cut-points at $\frac{3}{4}$ if g=1; at $\frac{15}{16}$ if g=2; and at $\frac{3}{4}$ and $\frac{63}{64}$ if g=3. If θ=.8 and $d < \frac{3}{4}$ or $\frac{63}{64} \leq d$, then $\varphi_1 = \varphi_2 = \varphi_3$.

Table 5 presents expected payoffs for each of the committee members. Note that, when the members do not invite any Green witnesses, the principal always selects policy 0. Then, R's expected policy-based utility becomes .5; but B's expected policy-based utility is $\frac{(1-d)}{2}$ because she receives (1-d) if policy 0 is chosen and there is a 50% chance for the policy to match the state.

Table 5. Payoffs for committee members from the selection of witnesses

R member | B member	Green	Blue
Green-Green	$E(u_R(x,s)\|g=3)$ $E(u_B(x,s)\|g=3)$	$E(u_R(x,s)\|g=1)$ $E(u_B(x,s)\|g=1)+q$
Green-Red	$E(u_R(x,s)\|g=1)\ +q$ $E(u_B(x,s)\|g=1)$	$E(u_R(x,s)\|g=1)\ +q$ $E(u_B(x,s)\|g=1)\ +q$
Red-Red	$E(u_R(x,s)\|g=1)\ +2q$ $E(u_B(x,s)\|g=1)$	$.5+2q$ $\frac{(1-d)}{2}+q$

*Upper entry of each cell is the payoff for R; lower entry is for B.
*Note that the cost of hearing (c) has not been subtracted from each of the payoffs in this table because it is not necessary for solving the equilibrium strategies of witness selection once a hearing is held.

As in the model with a neutral principal, there are three types of pure-strategy Bayesian-Nash equilibrium.

Grandstanding equilibrium (No Greens: NGBias)

(Proposition NG-Bias) Both R and B members will not invite any Green witnesses if $q \geq t_2$.

For an equilibrium where nobody invites Greens to exist, the following two conditions have to be satisfied:

$$EU_R(g_R^* = 0 | \, g_B = 0) \geq EU_R(g_R = 1 | \, g_B = 0)$$

$$.5 + 2q \geq \theta\lambda(1 - \varphi_1) + \frac{\varphi_1}{2} + q$$

$$q \geq (1 - \varphi_1)\left(\theta\lambda - \frac{1}{2}\right) \equiv t_1, \qquad \text{and}$$

$$EU_B(g_B^* = 0 | \, g_R = 0) \geq EU_B(g_B = 1 | \, g_R = 0)$$

$$\frac{(1-d)}{2} + q \geq \theta\lambda(1 - \varphi_1) + \frac{\varphi_1(1-d)}{2}$$

$$q \geq (1 - \varphi_1)\left(\theta\lambda - \frac{1-d}{2}\right) \equiv t_2.$$

Since $d > 0$, $t_2 > t_1$. Thus, the second argument addressing B's strategy serves as a stronger condition for this equilibrium to exist. Therefore, both committee members will not invite any Green witnesses if $t_2 \leq q$.

Also, the comparative statics suggests several interesting points. First of all, for a given value of inviting an advocate, q, the equilibrium becomes more likely as θ decrease and as d increases.[31] The implication is that committee members tend to grandstand in a hearing as Greens' messages are less accurate; as the principal is more biased; and as the members have more divergent interests over a policy. Likewise, for a given value of θ and d, the

[31] Note $\lambda = 1 - \frac{d}{2}$. Thus, $t_2 = (1 - \varphi_1)\{\theta - \frac{1}{2} - d(\frac{\theta - 1}{2})\}$. Therefore, t_2 decreases in d.

equilibrium becomes more likely as q increases, which suggests that committee members tend to hold a stage-managed hearing as they have larger political interest by doing so.

Fully informative hearing (All Greens: AGBias)

(Proposition AG-Bias) The equilibrium where both R and B invite Green witnesses only exists if $q \leq t_3$ *when* $d < \frac{3}{4}$ or $\frac{63}{64} \leq d$*; especially when* $\frac{63}{64} \leq d$*, it exists if q=0; however, it does not exist when* $\frac{3}{4} \leq d < \frac{63}{64}$.

Second, there is an equilibrium where both committee members invite Green witnesses only if the following two conditions are satisfied:

$$EU_R(g_R^* = 2|g_B = 1) \geq EU_R(g_R = 0|\ g_B = 1)$$

$$\frac{1}{2}\left[\{(-2\theta^3 + 3\theta^2)(1-\varphi_3) - \theta(1-\varphi_1)\}\lambda + \frac{\varphi_3 - \varphi_1}{2}\right] \geq q, \qquad and$$

$$EU_B(g_B^* = 1|g_R = 2) \geq EU_B(g_B = 0|\ g_R = 2)$$

$$\frac{1}{2}\left[\{(-2\theta^3 + 3\theta^2)(1-\varphi_3) - \theta(1-\varphi_2)\}\lambda + \frac{(\varphi_3 - \varphi_2)(1-d)}{2}\right] \geq q.$$

Given $\varphi_1 = \varphi_2 = \varphi_3$ if $\theta = .8$ and $d < \frac{3}{4}$ or $\frac{63}{64} \leq d$, the arguments above are reduced as the following, respectively:

$$q \leq \frac{\Delta P(3) * \lambda(1-\varphi)}{2} \equiv t_3 \quad and$$

$$q \leq \Delta P(3) * \lambda(1-\varphi).$$

It shows that the former condition defining R's strategy is a stronger condition than the latter. Therefore, when θ=.8, there is an equilibrium All Greens (AG) if the former holds, and I label the upper bound for q as t_3. Also, especially when $\frac{63}{64} \leq d$, $\varphi_1 = \varphi_2 = \varphi_3 = 1$. Thus, the equilibrium exists only if q = 0. However, if $\frac{3}{4} \leq d < \frac{63}{64}$, the equilibrium AG does not exist.

Proof 4. *If* $\frac{3}{4} \leq d < \frac{63}{64}$*, the equilibrium AG does not exist.*

First, assume that the second condition that defines B's strategy is more binding, and it will be true if the following is satisfied:

$$\left(\theta\lambda - \frac{1}{2}\right)(\varphi_1 - \varphi_2) > \frac{(\varphi_2 - \varphi_3)d}{2}.$$

Again, for further solution, I assume $\theta = .8$. Then, $\varphi_1 = 1, \varphi_2 = 0, and\ E(\varphi_3) = .48$. The condition above reduces to $d < 1.875$ which is always true since $0 < d \leq 1$. Therefore, the second condition addressing B's strategy serves as a stronger condition and it becomes $-.047 - .036d \geq q$. However, since $0 \leq q$ by assumption, the condition does not hold in any case. Thus, the equilibrium AG does not exist if $\frac{3}{4} \leq d < \frac{15}{16}$.

Second, consider $\frac{15}{16} \leq \mathrm{d} < \frac{63}{64}$. Then, since $\varphi_1 = \varphi_2 = 1$, the condition $\left(\theta\lambda - \frac{1}{2}\right)(\varphi_1 - \varphi_2) > \frac{(\varphi_2 - \varphi_3)d}{2}$ reduces to $d < 0$, which is false. Thus, it leads to a conclusion that R's equilibrium condition is stronger than B's. R's condition is $.103 - .117d \geq q$. However, even when $d = \frac{15}{16}$, the right hand side becomes negative, -.007. Since $0 \leq q$ by assumption, the condition does not hold. Therefore, the equilibrium AG does not exist if $\frac{15}{16} \leq \mathrm{d} < \frac{63}{64}$.

Partially informative equilibrium (Some Greens: SGBias)

(Proposition SG1-Bias) The equilibrium where R invites only one Green and B does not invite any Green exists if $q \leq t_1$*, when* $d < \frac{3}{4}$ or $\frac{15}{16} \leq d$*; especially when* $\frac{15}{16} \leq d$*, it exists if q=0; however, it does not exist when* $\frac{3}{4} \leq d < \frac{15}{16}$.

(Proposition SG2-Bias) The equilibrium where B invites one Green and R does not invite any

Greens exists if $t_3 \leq q \leq t_2$*, when* $d < \frac{3}{4}$ *or* $\frac{63}{64} \leq d$*; especially, when* $\frac{22}{25} \leq d$*, it exists if q=0; however, it does not exist when* $\frac{3}{4} \leq d < \frac{22}{25}$.

Third, there are equilibria in which the invited witnesses are a mixture of some Greens and some Reds or a Blue. In this case, as previously discussed, the total number of Green witnesses will be one, not two, because the second Green will not add any informational value to the message delivered by the first Green in a hearing.

First I consider the equilibrium SG1. Now, with a biased principal, the equilibrium exists if both of the following two conditions are satisfied:

$$EU_R(g_R^* = 1 | g_B = 0) \geq EU_R(g_R = 0 |\, g_B = 0)$$

$$(1 - \varphi_1)\left(\theta\lambda - \frac{1}{2}\right) \geq q, \quad and$$

$$EU_B(g_B^* = 0 | g_R = 1) \geq EU_B(g_B = 1 |\, g_R = 1)$$

$$\theta\lambda(1 - \varphi_1) + \frac{\varphi_1(1 - d)}{2} + q \geq \theta\lambda(1 - \varphi_2) + \frac{\varphi_2(1 - d)}{2}.$$

I further solve the equilibrium assuming θ=.8. Note that the first condition for R player is equivalent to $t_1 \geq q$. The latter condition for B depends on the values of φ_1 and φ_2. Since if $d < \frac{3}{4}$ or $d \geq \frac{15}{16}$, then $\varphi_1 = \varphi_2$, the argument reduces to $q \geq 0$ which is always true. Thus, the equilibrium SG1 exists when the first condition $t_1 \geq q$ is satisfied for the given the range of *d*. However, if $d \geq \frac{15}{16}$, $t_1 = 0$ because $\varphi_1 = 1$. Therefore, SG1 exists only when *q*=0 if $d \geq \frac{15}{16}$.

On the other hand, if $\frac{3}{4} \leq d < \frac{15}{16}$, then $\varphi_1 = 1$ and $\varphi_2 = 0$. Thus, $t_1 = 0$, and the first condition reduces to $0 \geq q$, which suggests that R selects one Green in this case only when *q*=0. However, the second condition reduces to $q \geq d\left(\frac{1-\theta}{2}\right) + (\theta - \frac{1}{2})$, and the right-hand side is a non-zero positive value because $d > 0$ and $.5 < \theta < 1$. Therefore, since there is no *q* that satisfies both conditions, the equilibrium, SG1, does not exist if $\frac{3}{4} \leq d < \frac{15}{16}$.

Next, the equilibrium SG2 exists if the following two conditions are satisfied:

$$EU_R(g_R^* = 0|g_B = 1) \geq EU_R(g_R = 2|\ g_B = 1)$$

$$\theta(1-\varphi_1)\lambda + \frac{\varphi_1}{2} + 2q \geq (-2\theta^3 + 3\theta^2)(1-\varphi_3)\lambda + \frac{\varphi_3}{2}, \qquad and$$

$$EU_B(g_B^* = 1|g_R = 0) \geq EU_B(g_B = 0|\ g_R = 0)$$

$$q \leq (1-\varphi_1)\left(\theta\lambda - \frac{1-d}{2}\right) = t_2.$$

If $d < \frac{3}{4}$ or $\frac{63}{64} \leq d$, $\varphi_1 = \varphi_3$. Then, the first condition reduces to $q \geq t_3$. The second condition is equivalent to $q \leq t_2$. Thus, for the given range of *d*, SG2 exists if $t_3 \leq q \leq t_2$. Especially, if $\frac{63}{64} \leq d$, then $\varphi_1 = \varphi_3 = 1$ so that $t_2 = t_3 = 0$. Therefore, the equilibrium exists only when *q*=0.

If $\frac{3}{4} \leq d < \frac{63}{64}$,then $\varphi_1 = 1$ and $E(\varphi_3) = .48$. Note that $\lambda = 1 - \frac{d}{2}$.

For R member to invite no Greens,

$$EU_R(g_R^* = 0|g_B = 1) \geq EU_R(g_R = 2|\ g_B = 1)$$

$$\theta(1-\varphi_1)\lambda + \frac{\varphi_1}{2} + 2q \geq (-2\theta^3 + 3\theta^2)(1-\varphi_3)\lambda + \frac{\varphi_3}{2}$$

$$q \geq .103 - .117d.$$

For B member to invite a Green,

$$EU_B(g_B^* = 1|g_R = 0) \geq EU_B(g_B = 0|\, g_R = 0)$$

$$q \leq (1-\varphi_1)(\theta\lambda - \frac{1-d}{2}) = t_2$$

$$q \leq 0.$$

Since $0 \leq q$ is assumed, for B to invite a Green, q has to be 0. For both conditions to be met, $d \geq \frac{22}{25}$. Therefore, if $\frac{3}{4} \leq d < \frac{22}{25}$, the equilibrium SG2 does not exist; if $\frac{22}{25} \leq d < \frac{63}{64}$, it exists for q=0.

3. Hearing decision by the committee chair

(Proposition HD-Bias) A chair will hold a hearing if $p\lambda(1-\varphi) + \frac{\varphi}{2} + q * r - .5 > c$ *and randomizes by holding a hearing with .5 probability if indifferent.*

(Proposition CH-Bias) A chair is more likely to hold a hearing as μ increases.

The chair holds a hearing if the following condition is satisfied:

$$EU_i(g_i^*|g_{\sim i}, h^* = 1) > EU_i(h^* = 0)$$

$$p\lambda(1-\varphi) + \frac{\varphi}{2} + q * r - .5 > c \quad for\ i = R \tag{15}$$

Since $r = \mu\omega - g_R$, the left-hand side of the argument above increases in μ.

B. Further Analysis on Experimental Results

A Neutral Principal's Decision to Open a Box

First of all, I analyze the decisions that the subjects playing a neutral principal made in treatments BASE, BEN, BENDIS, and NEUTRAL. Table 6 summarizes the neutral principal's choices given messages from Green witnesses. The observations of opening Box X and opening Box Y for a given number of Greens invited and the number of Greens saying Box X are shown in percentages.

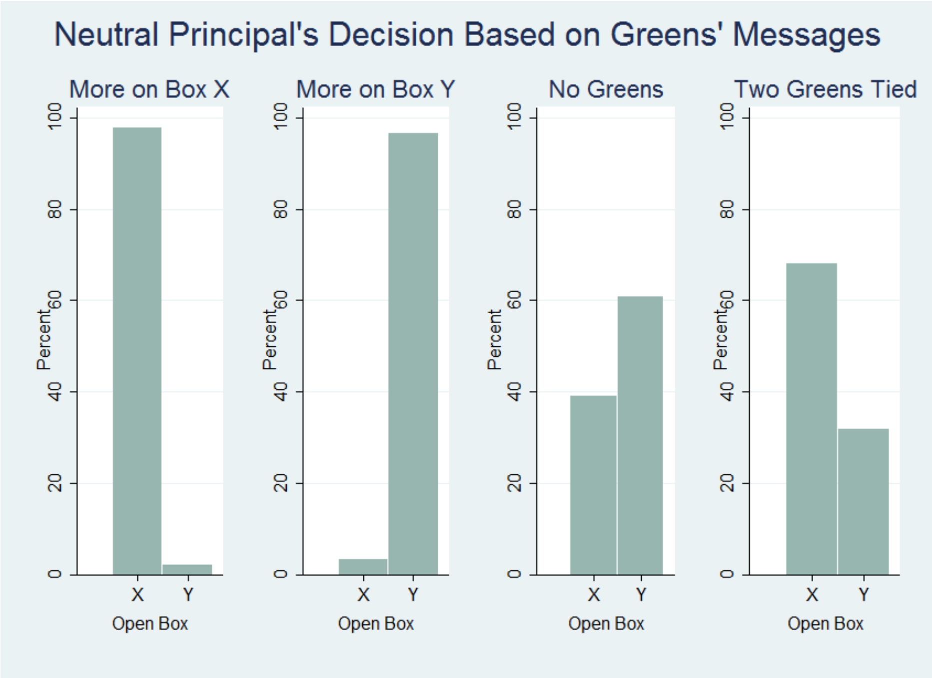
Table 6. Summary of Neutral Principals' Decision Based on Green's Messages in %

# of Greens invited	Open Box	# of Greens that say that Box X has the prize				
		0	1	2	3	Obs.
0	X	39%	-	-	-	155
	Y	61%	-	-	-	242
1	X	4%	97.4%	-	-	231
	Y	95.9%	2.6%	-	-	193
2	X	2.4%	68.1%	100%	-	78
	Y	98%	32%	0%	-	55
3	X	1%	4%	96%	100%	190
	Y	99%	96%	4%	0%	161

I test whether the number of Greens saying Box X is statistically related to which box the principal opens using Fisher's exact test. The tests are conducted individually for three cases: each with one Green, two Greens or three Greens invited to a hearing. The test results suggest that the principal chose to open Box X when Greens sent more messages saying that Box X has a prize, and the results are highly significant ($p<.0001$) in all three cases. The results suggest that they updated belief about which box holds a prize based on the messages from Green witnesses as predicted in the theory.

Figure 6 provides a closer look at which box the neutral principals opened depending on Greens' messages in percentages.[32] The first two graphs show that the principals followed Greens' messages in their choice of opening either of the boxes, which is consistent with the theory. However, while the theory predicts that they would choose either of the boxes with equal chances when there is no Green witness or when there are two Greens with conflicting messages, the third and the fourth graphs present that the principals had some bias in both cases, but interestingly in the opposite way. In the former, they were biased toward Box Y (61%), and one-sample two-tailed t-test statistically shows the bias does exist (p=.0000). However, in the latter, they were biased toward Box X (68%) with the test result highly significant (p=.0115).

Figure 6. Neutral Principals' Decision Based on Greens' Messages



I suggest some psychological explanations for these biases. First, here is one possible explanation for the bias toward opening Box Y when there is no Green. Note that Box Y can

[32] Figure 6 excludes decisions made without a hearing because they are irrelevant to the principal's belief-updates based on the messages from witnesses. However, when a hearing was not held, the principal randomized its choice of boxes by choosing Box X in 51% of the time.

be generally conceived as representing B's interest because it was colored in Blue on the screen in all treatments and because, especially in treatments BENDIS, B received rewards from finding a prize only in Box Y. Given that, when not provided with any messages from the Green group, the principal might have had more incentive to bet on Box Y in order to give B, the minority, a chance to offset his institutional disadvantage experienced throughout the hearing process. This incentive can be out of sympathy for those with less power or based on fairness concern. Whichever it is, if the principal's bias toward opening Box Y was to help the minority person, the bias is expected to be stronger when the committee members' interests are completely diverging than converging.

The expectations are supported by the data. The principal's bias toward Box Y is found to be stronger in BENDIS (Box Y for 64%) where the committee members have completely divergent preferences (d =1) than in BEN (55%) where they share the same preferences (d =0). (There was no observation without Greens in BASE.) Given that having no Greens (NG) has been the equilibrium strategy in BENDIS and the number of observations in this treatment is more than five times larger than that in BEN, the bias toward Box Y is largely driven by BENDIS where d =1, presumably motivated to help the minority compensate his institutional disadvantage in the power to select witnesses.

However, when there are two Greens with different messages, such an incentive of the principal to help the minority is totally missing. Rather, the principal was biased toward opening Box X for 68% of the time. In both cases where R invited all two Greens and where R and B equally contributed one Green each, the principal showed bias toward Box X. A possible explanation can be that since in both cases, the majority power, R, contributed to the group by inviting one or two Greens, the principal might have felt less obliged to help the minority power than in the previous case without Greens where R obviously exploited his institutional advantage by grandstanding. Furthermore, the principal's bias favoring Box X than being neutral can be considered as her incentive to reward R's effort to contribute information from the Greens to the group at the cost of inviting advocates that will only benefit the R himself. If this was the case, the principal's bias toward Box X will be stronger in cases where it is harder for R to have an incentive to invite any Greens, such as in BENDIS where R and B have completely diverging interests in finding a prize. Indeed, the data supports the explanation. The principal opened Box X in 68% (21 obs. out of 31) of the time in BEN; but in 100% (5 obs.) in BENDIS.

In summary, we can reasonably consider that the principal, when uninformed about the messages from Greens, tended to help the minority compensate his institutional disadvantage by opening Box Y more frequently than Box X; and reward the majority for inviting some Greens, that benefit the entire community of the group, by opening Box X.

Biased Principals' Decision to Open a Box

In BIAS, only one or no Green was invited in all cases where a hearing was held. The subjects playing the principal always opened Box X if there was no Green, and they chose Box X for 8 times out of 13 when one Green was invited although the principal is expected to choose Box X regardless of a Green's message. Thus, the subjects playing the principal sometimes gave up their probabilistically expected benefits from finding a prize in Box X for some unknown reason such as a collectively better outcome, for example. However, the test result does not support the relationship between Green's messages and the principal's choice at the .05 level of significance.

Hearing and witness decisions by period

Figure 7 demonstrates whether the chair's decision on holding a hearing converges to the equilibrium point as they play the game. The hearing decisions in BEN, BENDIS and BENDIS_N tend to converge to their equilibrium hearing rate that are 1, 1 and .5, respectively, while that in BASE slightly drops from the equilibrium point, 1, in the middle of the experiment but slightly jumps up again in the end. Also, Figure 8 shows the trends in the witness selection by committee members as the game proceeds. The general trend is that the decisions tend be stable throughout the experiment in all treatments.

Figure 7. Chair's Hearing Decision by period

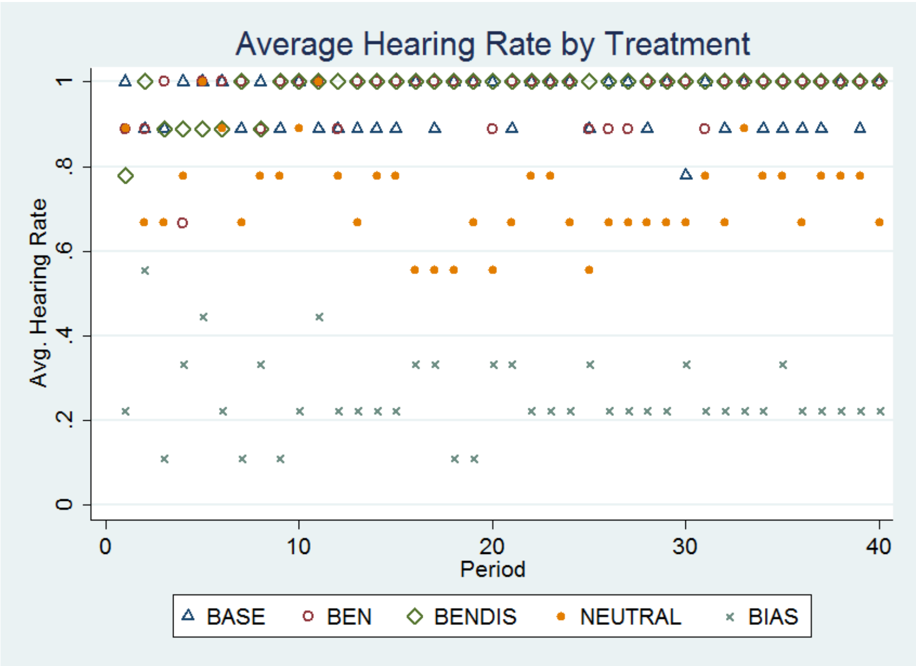
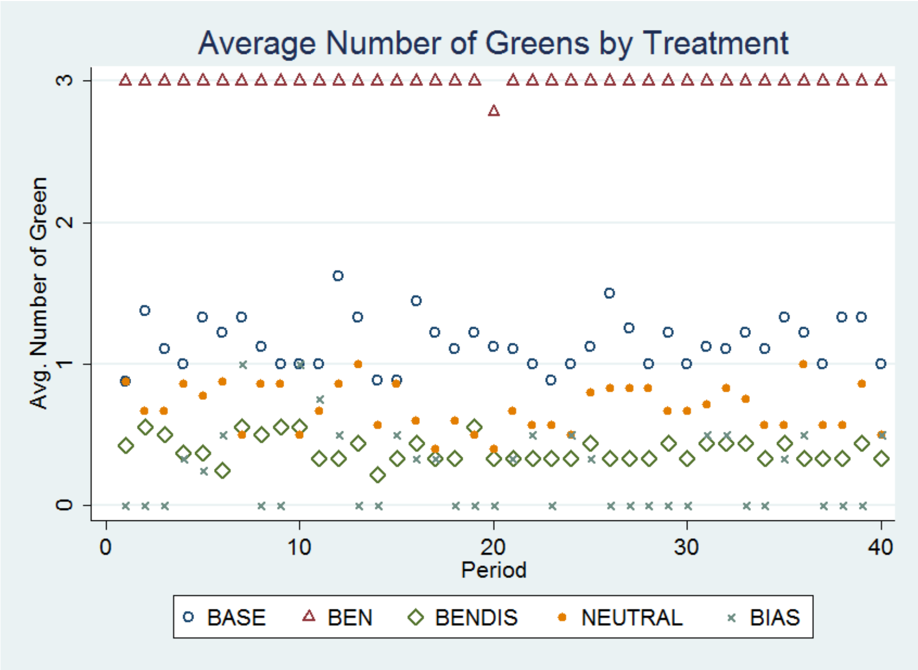


Figure 8. Committee's Choice of Green Witnesses by period



C. Instructions (BEN)

An Experiment on Decision-Making

Introduction

Thank you for agreeing to participate in today's experiment. You are about to participate in a decision-making experiment.

There are a few rules you must follow during the experiment. First, please remember to turn off your cell phones. Second, please do not talk or communicate with other subjects in the room in any way. Third, please do not write on these instructions; use the notepad provided. Fourth, if you have any questions during the experiment, please raise your hand and I will come to you privately and answer your questions. If the question is general in nature, I will share the answer with all subjects. Do not speak unless asked to.

Different participants may earn different amounts, depending upon their decisions and the decisions that other people make. Throughout the experiment, your earnings will be given in Experimental Points as described below. The experiment will take place over a number of periods. You will earn points in each period. However, only five of the periods will be counted for actual payment. That is, at the end of the experiment, the computer will randomly select five of the periods you have played for your payment. After the experiment, the points you earned in these five periods will be converted to dollars with the following exchange rate: 33 points = $1, and 1 point = 3 cents. Also, there will be $5 dollar show-up fee for your participation of the experiment. At the end of the experiment, you will be given a cash voucher for this money.

Experimental Procedures

1. "At the beginning of the experiment, one third of you will be randomly assigned as an R PLAYER, another third of you will be assigned as a B PLAYER and the other third will be assigned as C PLAYER. These are your identities. Your IDENTITY will last throughout the entire experiment and will not change. In each period, you will be matched with two other players with different identities of yours. You and the players you are matched with will form a GROUP. For example, if you are an R PLAYER, you will be matched to one B PLAYER and one C PLAYER each period. You may or may not be matched to the same people you played with in the previous period."

2. "In your GROUP, the R and B PLAYERS will comprise a COMMITTEE and R will always be the CHAIR of the COMMITTEE. The C PLAYER is not the COMMITTEE."

3. "Once you are matched with two other players, you will see on your computer screen two boxes, BOX X and BOX Y. The computer will randomly choose one of these boxes with equal chances to hold a prize, that is, BOX X with 50% probability will have the prize or BOX Y with 50% probability will have the prize. However, you will not be told which Box has the prize."

4. “Here is the role of C PLAYER in this game. After observing decisions of R and B PLAYERS, C PLAYER will choose which BOX to open at the last stage of the game each period. Now, I describe the first two stages that only apply to R and B PLAYERS.”

5. “The CHAIR of the COMMITTEE, the R PLAYER, will choose whether to hold a HEARING or not. If R chooses to hold a hearing, it will have a cost and reduce R and B PLAYERS’ payoffs, as I will explain below. However, holding a hearing will not reduce C PLAYER’s payoff. If a hearing is held, R PLAYER can invite 2 WITNESSES and B PLAYER can invite 1 WITNESS from three INFORMATION GROUPS. The groups are called RED, BLUE, and GREEN.”

6. “To invite WITNESSES, if you are an R or a B PLAYER, you will see on your computer screens blanks for each of the information groups. You will enter in each blank how many WITNESSES from each group you wish to invite. That is, suppose you are an R PLAYER and you wish to invite 1 RED and 1 GREEN WITNESSES. You would enter into the blanks 1, 0, and 1, respectively. Note that the numbers you enter must sum to the number of WITNESSES you can invite. You can invite any combination of WITNESSES you wish. For example, if you are an R PLAYER you can invite all 2 from one group, or divide just between two groups. If you are a B PLAYER you can invite only one witness from one group.”

7. “WITNESSES from each group vary in the information they can provide you. When you invite a witness from the RED group, she will always say that the prize is in BOX X, regardless of where the prize actually is located. The witness from the BLUE group will always say that the prize is in BOX Y, regardless of where the prize actually is located. However, the witnesses from the GREEN group will tell you information that is related to where the prize is actually located. That is, if the prize is in BOX X, a witness from the GREEN group will tell you the prize is located in BOX X in 8 times out of 10 and that it is located in BOX Y in 2 times out of 10. Similarly, if the prize is in BOX Y, a witness from the GREEN group will tell you the prize is located in BOX Y in 8 times out of 10 and that it is located in BOX X in 2 times out of 10. Therefore, a witness from the GREEN group will tell you the box that truly holds the prize 80% of the time and the wrong box 20% of the time. The table below summarizes this.”

Information Groups	**Messages**
RED	Always say that the prize is in BOX X
BLUE	Always say that the prize is in BOX Y
GREEN	Say the BOX that actually holds the prize with 80% probability

8. “Once R and B PLAYERS of your GROUP have chosen WITNESSES, everyone in your group including C PLAYER will be revealed R and B PLAYERS’ choice of WINTESSES and the summary of MESSAGES that the WITNESSES provide. That is, suppose that the prize is in BOX Y and that R and B PLAYERS call together 1 witness from each of the RED, BLUE, and GREEN group. The 1 witness from the RED group will always say BOX X. The 1 witness from the BLUE group will always say BOX Y. And the 1 witness from the GREEN group will tell you BOX Y with 80% probability and tell you BOX X with 20% probability. Suppose that the GREEN WINTESS said BOX Y. Then, everyone in your GROUP will be told that 1 witness said BOX X and 2 witnesses said BOX Y, and this is the summary of MESSAGES.”

9. “At the end of this process, C PLAYER makes a decision of which box to open. If the CHAIR of the COMMITTEE chooses NOT to have a HEARING, C PLAYER will randomly select one BOX. If the CHAIR chooses to have a HEARING, C PLAYER will select one BOX based on the MESSAGES from the witnesses.”

10. “Now, here is how you earn your experimental points. Players of different identity will earn experimental points in different ways. If you are a C PLAYER, your earnings in a given period depend on which box you open and whether the prize is in that box.

    If you are a C PLAYER, you earn

    100 points if you open a box and there is a prize in it.

    0 points if you open a box and there is NOT a prize in it.”

11. “If you are an R or a B PLAYER, there are two ways you can earn experimental points. First, your earnings in a given period will depend on which box C PLAYER opens, whether the prize is in that box, and whether a hearing is held or not. Suppose that NO HEARING is held.

    If you are an R or a B PLAYER, you earn

    100 points if the C PLAYER opens a box and there is a prize in it.

    0 points if the C PLAYER opens a box and there is NOT a prize in it.”

12. “Suppose that a HEARING is held. The HEARING COSTs 20 Experimental Points.

    If you are an R or a B PLAYER, you earn

    80 points if the C PLAYER opens a box and there is a prize in it.

    -20 points if the C PLAYER opens a box and there is NOT a prize in it.”

13. “In addition to that, your earnings in a given period depend on which witness you invite.

    If you are an R PLAYER, you earn additional

    20 points if you select only one witness from the RED group.

    40 points if you select two witnesses from the RED group.

    If you are a B PLAYER, you earn additional

    20 points if you select a witness from the BLUE group.”

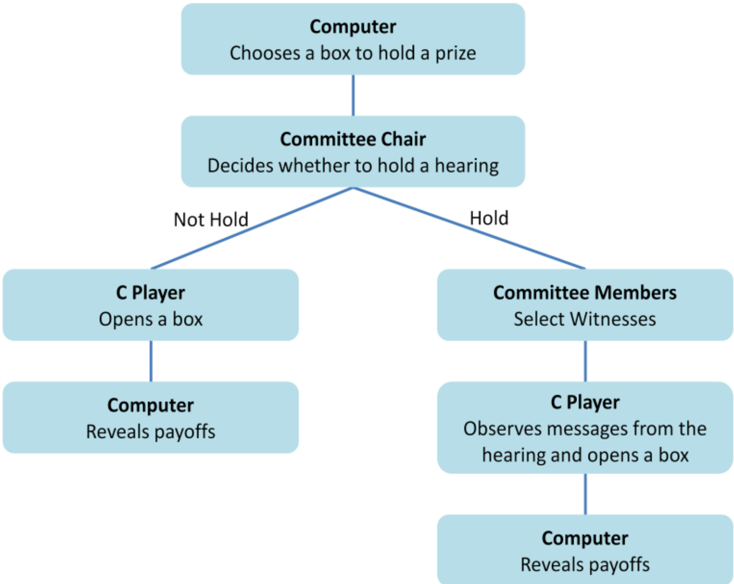
14. “At the end of the experiment, five periods will be randomly selected for payment. You will receive the sum of these five periods and the show-up fee for the experiment. If you are an R or a B player, you will receive additional 100 experimental points in order to prevent earning negative payoffs. For example, suppose that periods 3, 9, 22, 23, and 35 are chosen and in these five periods you earned -20, 80, 100, 100, and 80 respectively. The experimental points you earned today would be (-20 + 80 +100 +100 + 80) +100 =440. Therefore, the final payment will be $13.8 = $5 show-up + (340+100)*0.02. The maximum payment you can earn from this experiment is $19.”

How the game works

In summary, the game will be played in the following order.

- The computer decides in which BOX a prize is placed.
- The CHAIR, the R PLAYER, decides whether to hold a HEARING or not.
- If the chair decides NOT to hold a HEARING, the C PLAYER will randomly select either of the BOXES.
- If the CHAIR decides to hold a HEARING at the COST of 20, the chair and the B PLAYER simultaneously invite WITNESSES as many as they are allowed to in any combination of the three INFORMATION GROUPS.
- Then, everyone in your GROUP receives the summary of MESSAGES from the WITNESSES, and the C PLAYER selects one BOX based on the information.
- Depending on the decisions, the payoffs are revealed and distributed in experimental points.

The chart below will help you understand the procedure visually.



You have 2 minutes to review the instructions and think about how to play the game.

If you have any questions, please raise your hand.

(After 2 minutes)

Quiz

At the beginning of the experiment, you will be told about your identity. Then, in order to make sure that you have understood the instructions for the experiment, you will be asked to answer seven check-up questions on your computer screen. Your answers will not affect your earnings. When everyone is ready after solving the quiz, you will automatically proceed to start the game.

Last announcements

Now, you will start playing the game. Before doing so, there are some last announcements.

- You will play 40 periods of the game.
- Please remember to click the “Continue” or “OK” button to move to the next page.

(Note: Instructions for the other treatments are similar to the one presented here except for the numbers colored in red. Exchange rates were adjusted for each treatment so that average earnings of subjects who participated in different treatments do not vary much across treatments.)