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CHEAP TALK WITH TWO AUDIENCES: A TAXONOMY

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Abstract

When an informed party can engage in cheap talk with more than one audience, we show how the presence of one audience may either discipline or subvert the speaker's relationship with the other audience. We ask how welfare is affected by (exogenously) public or private disclosure.

JEL Classification: 026

Cheap Talk with Two Audiences: A Taxonomy

Joseph Farrell and Robert Gibbons

1. Introduction

Why are some claims made in public and others in private? Are public announcements always more credible than private ones? Should a politician meet with conservative and liberal constituents separately or together? How does it matter that a firm's claims about its profitability affect both its bond rating and its labor negotiations? When there are two candidates for a promotion, could the boss improve the credibility of his claims about their prospects by talking to both candidates together rather than separately? Why are engagements and weddings public? Why are letters of recommendation, and treaty negotiations, private?

These problems have in common a simple structure: an informed party says something to two interested but uninformed parties, who then take actions based on their beliefs; these actions affect the "sender" as well as the "receivers". In this paper we study how costless, nonverifiable claims *(cheap talk)* can affect these beliefs (and hence the actions), and how the incentives for truthful revelation to one receiver are affected by the presence of the other. We then ask how welfare is affected by conventions or institutions that mandate public or private claims. In future work, we will build on this to consider what one might infer from an informed party's choice of private or public forum.

As some of the above examples suggest, the presence of one audience can discipline the sender's relationship with the other; thus, public messages can be more credible than private messages addressed to either audience. We call this possibility *one-sided discipline.* An analogous idea (although with costly signals rather than with cheap talk) has been discussed in the finance literature by Bhattacharya and Ritter (1983) and Gertner, Gibbons

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and Scharfstein (1988). We show below that one-sided discipline is not the only interesting possibility, even in a very simple model. For instance, the presence of one audience may instead *subvert* the speaker's relationship with the other: credible communication may be impossible in public, though possible with one audience in private. Or, the informed party may be unable credibly to communicate with *either* audience in private, but be able to communicate with both in public: we call this *mutual discipline.*

Our paper is organized as follows. In Section 2 we develop the simplest possible model of cheap talk with two audiences. In Section 3 we characterize all the possible equilibria of our model, including those discussed above, and we give examples of some of the more interesting kinds of equilibria. Finally, in Section 4, we consider the welfare implications of public or private disclosure: Crawford and Sobel (1982) show in their model that both speaker and audience are better-off *ex-ante* in a more informative equilibrium. But with two audiences this need not be true. This opens the way to analysis of the welfare implications of institutions that mandate public or private disclosure, and potentially to an analysis of inferences from an informed sender's choice of forum. Unfortunately, a more general model will be needed for the latter analysis.

2. A Model

We develop the simplest possible model of cheap talk with two audiences. A *sender*, S, observes the state of the world $s \in \{s_1, s_2\}$; the (common-knowledge) prior probability of s_1 is π. There are two audiences or *receivers*, Q and R. (For pronominal clarity, we take S to be a man and Q and R to be women.) Each receiver can take an action: Q chooses q_1 or q_2, and R chooses r_1 or r_2. Each receiver's payoff depends on her own action and on the state of the world, s: for simplicity we suppose that it does not depend on the other's action. Without loss of interesting generality, we suppose that the receivers' payoffs are such that if the state were known to be s_i then Q would choose q_i and R would choose r_i.[1] The sender's payoff, u^S, is the sum of two components: one, u^S_Q, depending on Q's action,

[1] If one audience had an action that was always optimal for her irrespective of her beliefs about s then the problem would reduce to a one-audience problem. The simplest possible model with two active audiences, therefore, has two admissible actions for each audience.

q, and the state, s; the other, u_R^S, on r and s. We write $u_Q^S(s_i, q_i) = v_i$ and $u_R^S(s_i, r_i) = w_i$ for $i = 1, 2$, and we normalize so that $u_Q^S(s_i, q_j) = u_R^S(s_i, r_j) = 0$ for $j \neq i$. Thus, for example, if $s = s_1$, Q chooses q_2, and R chooses r_1, then S's payoff is $0 + w_1$.

Before the receivers choose their actions, the sender may make claims about the state s. These claims do not directly affect payoffs: they are "cheap talk." Accordingly, we need no notation for the claims themselves; only their information content matters. Since the meanings conveyed in pure-strategy equilibrium are "$s = s_1$", "$s = s_2$", and "no information", it is convenient to assume that those are the only three possible messages. Any message-space with at least two messages would give the same set of pure-strategy equilibrium outcomes.

3. Equilibria With Two Receivers

We now describe the (perfect Bayesian) equilibria in our model. The results depend only on the sender's payoff parameters (v_1, v_2, w_1, w_2).

As we suggested above, the presence of one audience may discipline communication with another. Formally, in our model, S has a separating equilibrium in private with Q if and only if $v_1, v_2 \geq 0$; and a separating equilibrium in private with R if and only if $w_1, w_2 \geq 0$. In public, he has a separating equilibrium if and only if $v_1 + w_1 \geq 0$ and $v_2 + w_2 \geq 0$. This proves

Proposition 1. *While incentives for honesty in each relationship in private imply incentives for honesty in public, the reverse is not true.*

So one audience may discipline S's relationship with the other (*one-sided discipline*), for instance if v_1 and v_2 are large and positive while w_1 and w_2 are small and negative. For examples of such one-sided discipline, see the finance papers cited above, in which an informed firm signals to two uninformed audiences: a rival firm and the capital market. Credible cheap talk is impossible between the informed firm and its uninformed rival alone, but is possible between the informed firm and the capital market. When communication is public, however, the uninformed firm can learn something from the informed firm, because the presence of the capital market disciplines the communication.

But there are other possibilities, even in our simple model. Proposition 1 also suggests *mutual discipline*: when v_1 and w_2 are large and positive while v_2 and w_1 are small and negative, *each* audience disciplines S's relationship with the other. Examples of mutual discipline include the firm dealing with bond-raters and a union, and a politician dealing with liberal and conservative constituents. In a single-audience problem in either of these examples, the sender's preferences over the receiver's actions (and thus over her beliefs) are independent of the sender's true type, and so cheap talk cannot be informative. For example, the firm always wants the highest possible bond rating and the lowest possible wage demands, so no claim made to either audience alone is credible. But since these considerations would tempt the firm to lie in opposite directions, its claims may perhaps strictly depend on its type when it speaks to both audiences in public. Similarly, the politician who always wants votes cannot credibly claim to side with either audience in private, but may be able to do so in public, where his preferred image might no longer be independent of the truth.

More systematically, we can distinguish five cases, as follows:

1) *No communication.* There is no separating equilibrium, in public or in private. Nothing can make cheap talk credible.

2) *Full communication.* There is a separating equilibrium with each receiver in private, and hence also (by Proposition 1) with both in public. There are no credibility problems.

3) *One-sided discipline.* There is a separating equilibrium in private with one receiver but not with the other, and there is a separating equilibrium in public.

4) *Mutual Discipline.* There is no separating equilibrium in private, but there is in public.

5) *Subversion.* There is a separating equilibrium with one receiver in private, but not with the other, and there is none in public. (Notice that, by Proposition 1, there cannot be *mutual subversion.*)

For an example of subversion, consider letters of recommendation. The sender, a professor, knows whether a student is good or bad. The two audiences are a colleague and

the student. The colleague must choose whether to hire the student, and the professor wants the colleague to make the right decision. The student will spread malicious rumors about the professor if she hears a "bad" reference, but not if she hears a "good" reference nor if the reference is secret.[2] If the professor cares enough about the malicious rumors, and not enough about the colleague's decision, then there is no public separating equilibrium, and so the professor prefers private disclosure.[3]

Another example occurs in the negotiation of treaties between heads of state. It is sometimes claimed that if all negotiating statements were public, this would merely lead to posturing in negotiation. That is, it is claimed that private negotiations allow for honesty, but the presence of the public swamps or subverts the incentives for honesty.

These five cases are shown in the three figures below, which plot w_1 against w_2. Figure 1, for the case $v_1, v_2 > 0$, suggests viewing one-sided discipline (case 3) as intermediate between subversion (case 5) and full communication (case 2). Figure 2, for the case $v_1 < 0 < v_2$, shows subversion and mutual discipline as intermediate cases between one-sided discipline and no communication. And Figure 3, for the case $v_1, v_2 < 0$, shows subversion as intermediate between one-sided discipline and no communication.

4. Welfare

Receivers always prefer separation, since they get more information and that can only help them.[4] The interesting questions therefore concern the sender's preferences.

In our simple (two-action) model, S too would prefer a separating equilibrium, even *ex-post*, if there were just one audience, R: for R's pooling-equilibrium action is always "available" to S in a separating equilibrium (he can get it taken by saying the right thing) as is her other action.

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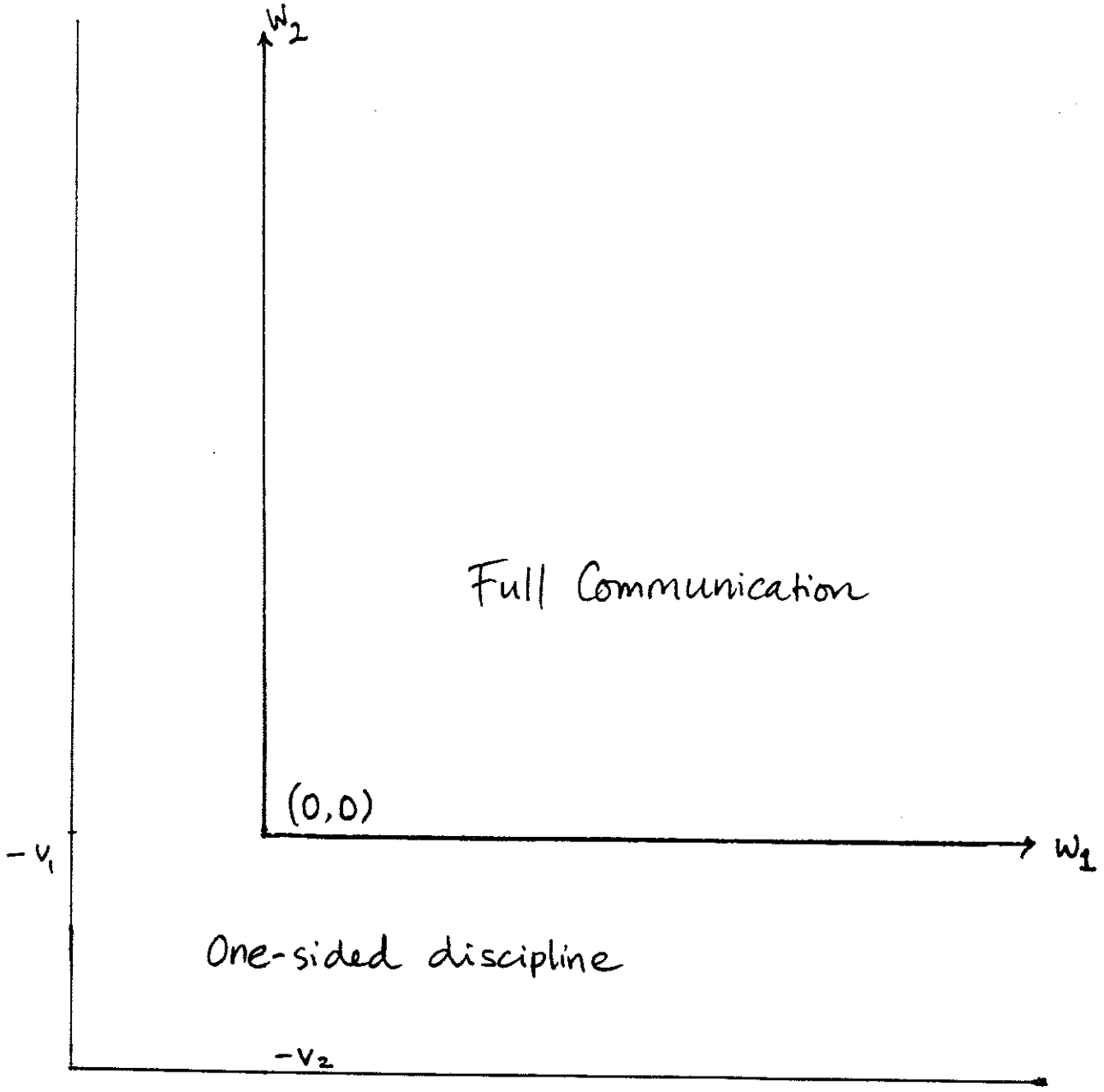
[2] The student also cares about the colleague's action, but we can ignore this provided the student's preferences are suitably separable.

[3] Of course, this is a *locus classicus* for inferences from choice of forum: it is common to wonder what to infer from a student's waiver of her right to see her letter, or from a professor's advice to waive it.

[4] If the receivers had to take into account others' responses to their information, they might of course prefer to be kept ignorant.



Subversion

Figure 1: $v_1 > 0$, $v_2 > 0$.

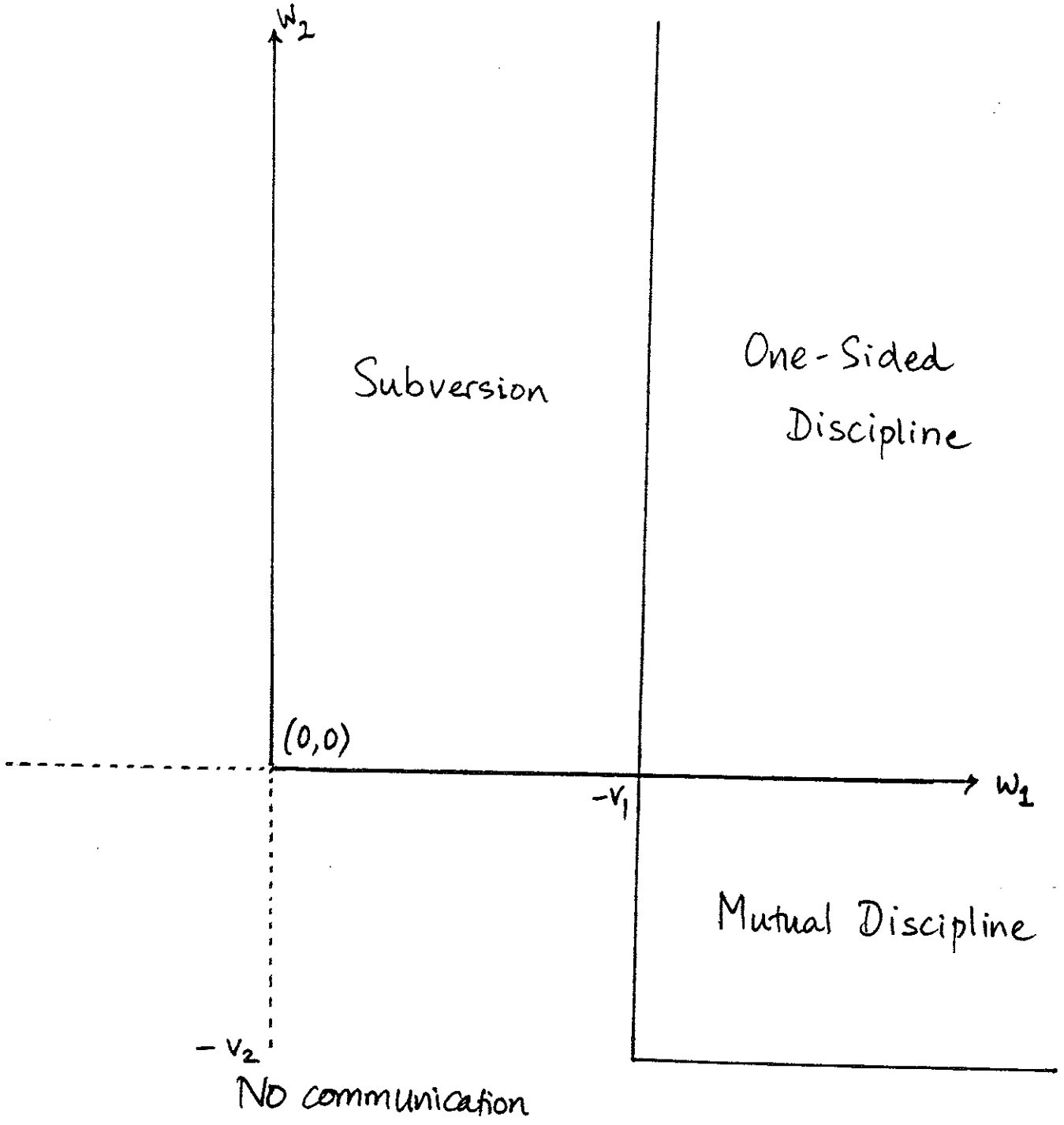


Figure 2 : $v_1 < 0, \quad v_2 > 0.$

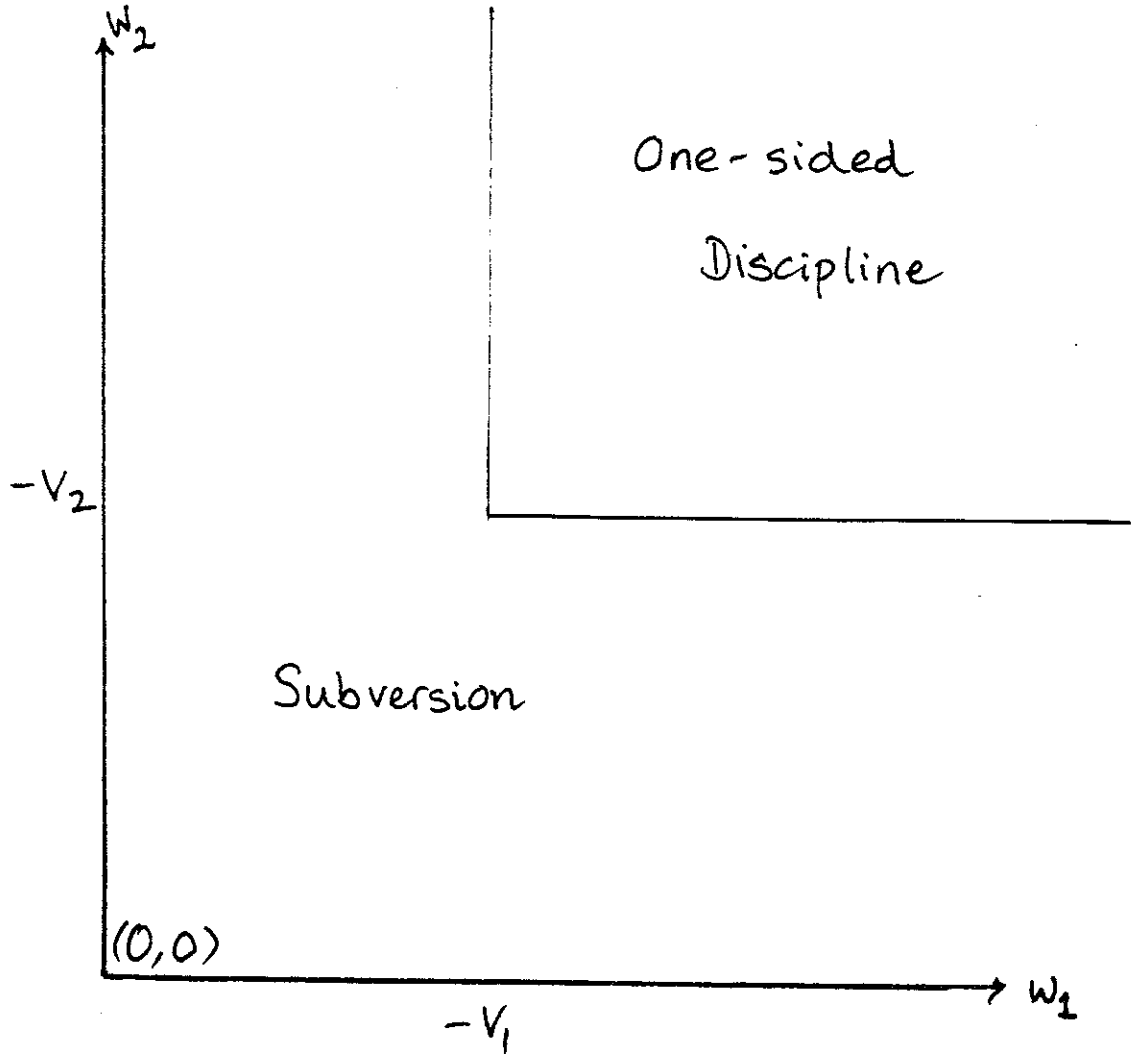


Figure 3: $v_1 < 0$, $v_2 < 0$.

This single-receiver result does not extend beyond our simple model, however. In Crawford and Sobel's model, S and R both prefer a more-informative equilibrium *ex-ante*, but no comparisons can be made *ex-post*. Moreover, even this *ex-ante* ranking is not general; for example, in a three-action, two-state model, R may choose r_1 (r_2) when she thinks the state is s_1 (s_2), but choose r_3 in pooling equilibrium. If S would always like her to choose r_3 then he will prefer pooling to separation, even *ex-post*.[5]

In reality, we see that much communication occurs in private. Our two-audience model suggests two reasons for this, apart from the possibility of subversion, where public communication worsens rather than improves the sender's credibility.

First, with two audiences, the speaker may prefer the less informative equilibrium, both *ex-ante* and *ex-post*: by remaining silent (or uninformatively noisy), he may "get the best of both worlds", by inducing the two audiences to take actions that they would never take together in the informative equilibrium.

Second, with two audiences the choice need not be restricted to more and less informative public messages: by communicating in private, the speaker can reveal more to one audience than to the other; and he may prefer this to any public-message equilibrium.

Does the Sender Prefer Pooling or Separation?

We have assumed that the receivers' payoffs are such that if the state is known to be s_i then Q's optimal action is q_i and R's is r_i. In any interesting model (*i.e.*, one in which the receivers' optimal actions depend on the state), our assumption is merely a labeling convention. It leaves open, however, the question of which action is optimal when a receiver is uncertain about the state: in particular if a receiver (say R) holds a prior belief π, then either r_1 or r_2 could be optimal depending on R's payoffs. If r_1 (r_2) is optimal then we say that R's "presumption" is that the state is s_1 (s_2) ; we define Q's presumption analogously. We call the game *coherent* if the receivers' presumptions agree, and *incoherent* if they do not. In the coherent case, the actions chosen in a pooling equilibrium can be (q_1, r_1) or (q_2, r_2); in the incoherent case, they can be (q_1, r_2) or (q_2, r_1).

[5] In that case, S's refusal to reveal the state would be a "credible neologism," which arguably would destroy the credibility of the separating equilibrium. See Farrell (forthcoming).

In the coherent case, S always prefers a separating equilibrium (provided one exists) to a pooling equilibrium, even ex post, just as with one audience: in a public separating equilibrium, S can choose between inducing the action-pairs (q_1, r_1) and (q_2, r_2); the separating equilibrium therefore represents an expansion of choice for S. But consider now the incoherent case. Without loss of generality, suppose that the pooling action-pair is (q_1, r_2). Then the s_1 type of S prefers pooling to separating if and only if $v_1 > v_1 + w_1$, and the s_2 type prefers pooling if and only if $w_2 > v_2 + w_2$. Thus S prefers pooling *ex-post* if and only if $0 > w_1$ and $0 > v_2$, and prefers pooling *ex ante* if and only if $\pi w_1 + (1 - \pi)v_2 < 0$. We summarize these findings as:

Proposition 2. *If the game is coherent, separating is better than pooling, as it is with one audience. But if it is incoherent, the sender may prefer pooling, even if a public separating equilibrium exists. However, if separating equilibria exist in private with both receivers, then he prefers (public) separation to pooling.*

Suppose for example that a boss is communicating with two candidates for a promotion. Let the state of the world s_i be "candidate i will receive the promotion (if he stays with the firm)". Each candidate must choose now either to stay on in the hope of the promotion, or to leave and take a new job (which he would prefer if and only if he will not get the promotion). In any separating equilibrium the candidate with poor prospects leaves, but if (say) $\pi \approx 1/2$ and if each candidate prefers his chance of promotion to leaving, then then both would stay in a pooling equilibrium: the game is incoherent. If the boss prefers that both stay then he prefers pooling to a public separating equilibrium, even if the latter exists.

Private Disclosure

Even if he prefers public separation to public pooling, the sender may prefer private disclosure to any public-message equilibrium. While public communication may create the useful discipline effects described above, it also constrains the sender to treat both receivers alike. In our model, private disclosure gives him a new option: he can pool with one receiver while separating with the other. Of course, in such a *semi-informative*

equilibrium the sender cannot deceive either receiver; but he may gain from revealing to one receiver and concealing from the other.

By our expanded-choice argument, private disclosure dominates public pooling (*ex post*, and therefore also *ex-ante*) for the sender. Thus his preferences among equilibria reduce to a comparison of private disclosure and public separation.

In case (1) there is no choice. In case (2) it is immediate that S prefers separation in public or with each receiver in private. In case (5), public disclosure implies pooling, which is available in private but inferior to private disclosure. In case (4), private disclosure implies pooling, which is available in public, so there is a weak preference for a public forum; however, in the incoherent case the pooling equilibrium can be preferred to the public separating equilibrium, as described in Proposition 2.

Finally, in case (3), the sender may prefer either private disclosure or (public) separation. The payoffs from separation are $(v_1 + w_1, v_2 + w_2)$: that is, $v_1 + w_1$ when $s = s_1$ and $v_2 + w_2$ when $s = s_2$. The payoffs from private disclosure, supposing for definiteness that separation is possible with R but not with Q, are $(v_1 + w_1, w_2)$. *Ex-ante* and *ex-post*, S prefers public separation if and only if $v_2 > 0$.[6] We summarize the results from cases (3) and (5) as:

Proposition 3. *The sender prefers private to public disclosure when he prefers that one audience not learn the state.*

5. Conclusion and Directions for Future Work

We have analyzed S's preferences across equilibria, with a view towards *ex-ante* institutional design. Of course, Q's and R's preferences should matter too, but are not very interesting because receivers always prefer more information to less.

Often, however, there is no binding *ex-ante* institutional design; instead, an interested party, often the sender, chooses the forum *ex-post*. In that case, what can be inferred from his choice? For instance, what should you infer if someone tells you something in private

[6] Analogously, it is the comparison between S's payoff from R's pooling action, which could be either w_2 or w_1, and zero, that determines S's preferences if he can separate with Q but not with R.

that he could have told you in public? This seems likely to be the most interesting question that could be addressed in our basic framework. In this paper's two-state model, however, a separating equilibrium at the forum-choice stage would leave nothing to be said in the chosen forum. A more general model will be needed.

References

Bhattacharya, S. and J. Ritter (1983) "Innovation and Communication: Signalling with Partial Disclosure," *Review of Economic Studies*, **50**, 331–346.

Crawford, V. and J. Sobel (1982) "Strategic Information Transmission," *Econometrica*, **50**, 1431–1451.

Farrell, J. (forthcoming) "Meaning and Credibility in Cheap-Talk Games," Twenty-fifth Anniversary Volume of Oxford Mathematical Economics Seminar, M. Dempster, editor.

Gertner, R., R. Gibbons, and D. Scharfstein (1988) "Simultaneous Signalling to the Capital and Product Markets," *Rand Journal of Economics*, **19**, 173–190.

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