Disclosure and Incentives in Teams

Paula Onuchic
University of Oxford

João Ramos
USC Marshall

April 2024

Introduction

Productive activities are increasingly conducted in **teams**.

Introduction

Productive activities are increasingly conducted in **teams**.

After production occurs, teams **communicate** their product to third-parties:

- Entrepreneurial partners decide whether/when to pitch startups to investors.
- Within-firm teams report projects' progress in regular meetings with managers
- Firms bring new products to a market.

Introduction

Productive activities are increasingly conducted in **teams**.

After production occurs, teams **communicate** their product to third-parties:

- Entrepreneurial partners decide whether/when to pitch startups to investors.
- Within-firm teams report projects' progress in regular meetings with managers
- Firms bring new products to a market.

Individual interests are aggregated into collective communication decisions via a team's organizational hierarchy and governance structure.

Introduction

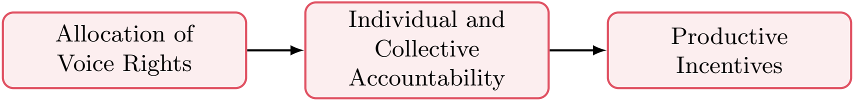
Voice Rights: "who can speak on behalf of an organization."

Zuckerman (2010), Freeland and Zuckerman (2018)

Introduction

Voice Rights: "who can speak on behalf of an organization."

Zuckerman (2010), Freeland and Zuckerman (2018)



In This Paper

This paper studies a **team production** and **team communication** environment.

We propose a new communication model — of team communication — and combine it with a simple productive environment in order to study how equilibrium communication of team outcomes affects team members' productive incentives.

Three Contributions

1. New model of team communication.
    - Communication protocol:
      Disclosure of team's productive outcome (verifiable information).
    - Team disclosure decisions aggregate individual recommendations through some deliberation procedure, which determines individuals' voice rights.
    - We establish a relationship between voice rights and the degree to which individuals are held accountable for "team failures."

Three Contributions

1. New model of team communication.

2. How to allocate voice rights to promote individual effort incentives?

- Low team externalities environment:
  - → Give team members unilateral rights to <u>disclose</u> team outcomes.
- High team externalities environment:
  - → Give team members unilateral rights to <u>veto disclosure</u> of team outcomes.

Three Contributions

1. New model of team communication.

2. How to allocate individual voice rights to promote productive incentives?

3. Interpretation of communication equilibrium as corporate culture.

    - Formalize one aspect of corporate culture: individual vs. group accountability.
    - Connect our design results to recommended business practices.

Relation to Previous Literature

1. Multi-sender Communication.

Milgrom and Roberts (1986), Battaglini (2002), Gentzkow and Kamenica (2016).

+ Disclosure of Verifiable Information.

Grossman (1981), Milgrom (1981), Dye (1985).

Our paper: model of communication by a group of senders.

2. Career Concerns and Moral Hazard in Teams.

Holmstrom (1982, 1999), Jeon (1996), Auriol, Friebel, and Pechlivanos (2002), Bar-Isaac (2007), Arya and Mittendorf (2011), Chaliotti (2016).

+ Reputation in Committees.

Levy (2007), Visser and Swank (2007), Name-Correa and Yildirim (2019).

Our paper: we show that voice rights can be used as an incentive tool.

3. Holdups and Incomplete Contracting.

Grossman and Hart (1986), Hart and Moore (1990), Che and Hausch (1999).

Our paper: parallel between design of property rights and of voice rights.

Relation to Previous Literature

1. Multi-sender Communication.

Milgrom and Roberts (1986), Battaglini (2002), Gentzkow and Kamenica (2016).

+ Disclosure of Verifiable Information.

Grossman (1981), Milgrom (1981), Dye (1985).

Our paper: model of communication by a group of senders.

2. Career Concerns and Moral Hazard in Teams.

Holmstrom (1982, 1999), Jeon (1996), Auriol, Friebel, and Pechlivanos (2002), Bar-Isaac (2007), Arya and Mittendorf (2011), Chaliotti (2016).

+ Reputation in Committees.

Levy (2007), Visser and Swank (2007), Name-Correa and Yildirim (2019).

Our paper: we show that voice rights can be used as an incentive tool.

3. Holdups and Incomplete Contracting.

Grossman and Hart (1986), Hart and Moore (1990), Che and Hausch (1999).

Our paper: parallel between design of property rights and of voice rights.

Relation to Previous Literature

1. Multi-sender Communication.

Milgrom and Roberts (1986), Battaglini (2002), Gentzkow and Kamenica (2016).

+ Disclosure of Verifiable Information.

Grossman (1981), Milgrom (1981), Dye (1985).

Our paper: model of communication by a group of senders.

2. Career Concerns and Moral Hazard in Teams.

Holmstrom (1982, 1999), Jeon (1996), Auriol, Friebel, and Pechlivanos (2002), Bar-Isaac (2007), Arya and Mittendorf (2011), Chaliotti (2016).

+ Reputation in Committees.

Levy (2007), Visser and Swank (2007), Name-Correa and Yildirim (2019).

Our paper: we show that voice rights can be used as an incentive tool.

3. Holdups and Incomplete Contracting.

Grossman and Hart (1986), Hart and Moore (1990), Che and Hausch (1999).

Our paper: parallel between design of property rights and of voice rights.

Disclosure Environment

Equilibrium Team Disclosure

Deliberation and Incentives

Further Results

Conclusion

Model - Disclosure in Teams

A team is made up of $n \geqslant 2$ team-members. ($N = \{1, ..., n\}$).

Team produces outcome $\omega = (\omega_1, ..., \omega_n)$, drawn from distribution μ.

Model - Disclosure in Teams

A team is made up of $n \geqslant 2$ team-members. $(N = \{1, ..., n\})$.

Team produces outcome $\omega = (\omega_1, ..., \omega_n)$, drawn from distribution μ.

Interpretation. Career Concerns in Teams

- θ is an observable random outcome of team production.
- ω_i is the reputational value of θ to team member i: $\omega_i = \mathbb{E}\left[i\text{'s type}|\theta\right]$.
- μ is the joint distribution of such values implied by team's productive process.

Model - Disclosure in Teams

A team is made up of $n \geqslant 2$ team-members. ($N = \{1, ..., n\}$).

Team produces outcome $\omega = (\omega_1, ..., \omega_n)$, drawn from distribution μ.

Interpretation. Career Concerns in Teams

- θ is an observable random outcome of team production.
- ω_i is the reputational value of θ to team member i: $\omega_i = \mathbb{E}\left[i\text{'s type}|\theta\right]$.
- μ is the joint distribution of such values implied by team's productive process.

Assumptions.

- $\omega_i \in \Omega_i$, a finite subset of $\mathbb{R}$, with $|\Omega_i| > 1$.
- μ has full support over $\Omega = \Omega_1 \times ... \times \Omega_n$.

Model - Disclosure in Teams

A team is made up of $n \geqslant 2$ team-members. ($N = \{1, ..., n\}$).

Team produces outcome $\omega = (\omega_1, ..., \omega_n)$, drawn from distribution μ.

After outcome ω realizes, team decides whether to disclose it to an observer.

Model - Disclosure in Teams

A team is made up of $n \geqslant 2$ team-members. ($N = \{1, ..., n\}$).

Team produces outcome $\omega = (\omega_1, ..., \omega_n)$, drawn from distribution μ.

After outcome ω realizes, team decides whether to disclose it to an observer.

Team Member's Payoffs

- If ω is disclosed, then team member i's payoff is ω_i.
- If ω is not disclosed, observer "sees" the absence of disclosure and infers ω_i. Team member i's payoff is then

$$\omega_i^{ND} = \mathbb{E}\left[\omega_i | \text{no disclosure}\right].$$

Deliberation Procedure

Each team member sees outcome ω and makes
an individual disclosure recommendation $x_i(\omega) \in \{0, 1\}$ (or mixes).

Recommendations are summarized by $X(\omega) \subseteq N$,
the set of team members who favor disclosure of outcome ω.

Deliberation Procedure

Each team member sees outcome ω and makes
an individual disclosure recommendation $x_i(\omega) \in \{0,1\}$ (or mixes).

Recommendations are summarized by $X(\omega) \subseteq N$,
the set of team members who favor disclosure of outcome ω.

Deliberation procedure $D : \mathcal{P}(N) \to [0,1]$ aggregates indiv. recommendations.
Team discloses outcome ω with probability

$$d(\omega) = D\big(X(\omega)\big).$$

Deliberation Procedure

Each team member sees outcome ω and makes
an individual disclosure recommendation $x_i(\omega) \in \{0,1\}$ (or mixes).

Recommendations are summarized by $X(\omega) \subseteq N$,
the set of team members who favor disclosure of outcome ω.

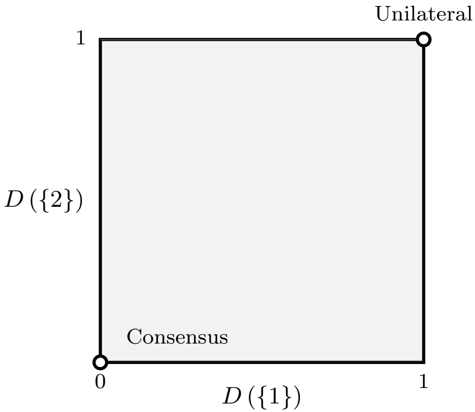
Deliberation procedure $D : \mathcal{P}(N) \to [0,1]$ aggregates indiv. recommendations.
Team discloses outcome ω with probability

$$d(\omega) = D\big(X(\omega)\big).$$

Assumptions. The deliberation procedure D

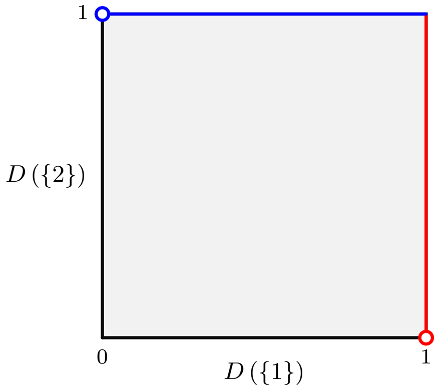
1. Respects unanimity: $D(\varnothing) = 0$ and $D(N) = 1$.
2. Is monotone: $X' \subseteq X$ implies $D(X) \geqslant D(X')$.

Deliberation in Two-Person Team



- Protocol can be fully described by $D(\{1\})$ and $D(\{2\})$, because $D(\varnothing) = 0$ and $D(\{1,2\}) = 1$.

Deliberation in Two-Person Team



- Protocol can be fully described by $D(\{1\})$ and $D(\{2\})$, because $D(\varnothing) = 0$ and $D(\{1, 2\}) = 1$.
- In **red** are protocols where team-member 1 can unilaterally choose disclosure.
- In **blue** are protocols where team-member 2 can unilaterally choose disclosure.

Equilibrium

Given a deliberation procedure D, disclosure recommendations x_i for $i \in N$, and no-disclosure posteriors ω_i^{ND} for $i \in N$ constitute an **equilibrium** if

1. Individual disclosure strategies are as if pivotal:

$$\omega_i > \omega_i^{ND} \Rightarrow x_i(\omega) = 1 \text{ and } \omega_i < \omega_i^{ND} \Rightarrow x_i(\omega) = 0.$$

2. Individual disclosure recommendations are determined by own outcome values:

$$\omega, \hat{\omega} \in \Omega \text{ with } \omega_i = \hat{\omega}_i \Rightarrow x_i(\omega) = x_i(\hat{\omega}).$$

3. No-disclosure posteriors are Bayes-consistent:

$$\omega_i^{ND} = \mathbb{E}\left[\omega_i | \text{no disclosure}\right].$$

Disclosure Environment

Equilibrium Team Disclosure

Deliberation and Incentives

Further Results

Conclusion

Equilibrium Team Disclosure

Theorem 1.

1. A full-disclosure equilibrium exists, with

$$\omega_i^{ND} = \min(\Omega_i) \text{ for every } i \in N.$$

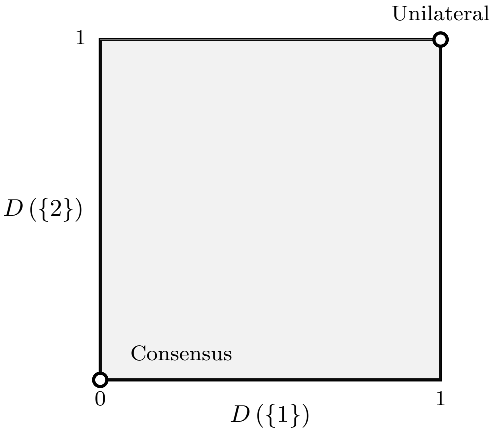
2. If i is a team-member who can unilaterally choose disclosure, then

$$\omega_i^{ND} = \min(\Omega_i) \text{ in every equilibrium } \underline{\text{without full disclosure}}.$$

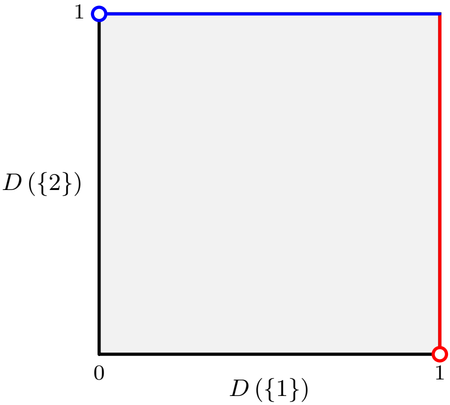
3. Conversely, if $I \subseteq N$ is the set of team-members who cannot unilaterally choose disclosure, there exists an equilibrium without full disclosure where

$$\omega_i^{ND} > \min(\Omega_i) \text{ for every } i \in I.$$

Equilibrium Team Disclosure



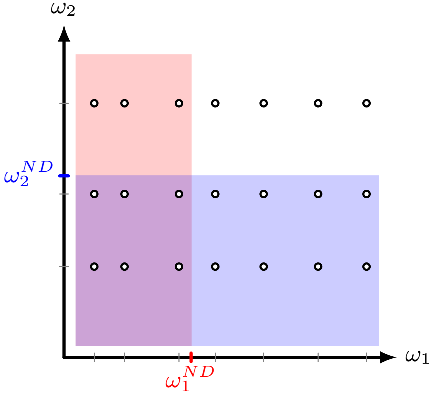
Equilibrium Team Disclosure



Proof Intuition with $n = 2$

Suppose there are two team-members, $n = 2$.

Conjecture an equilibrium with $\omega_1^{ND} > \min(\Omega_1)$ and $\omega_2^{ND} > \min(\Omega_2)$.



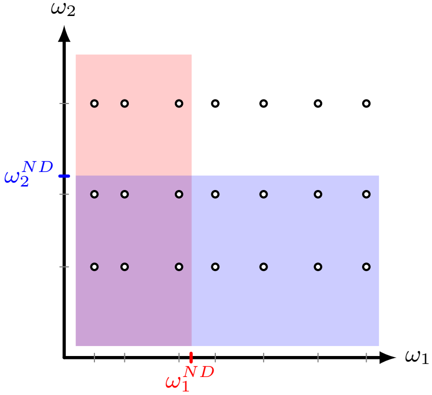
red region → 1 recommends ND.

blue region → 2 recommends ND.

Proof Intuition with $n = 2$

Suppose there are two team-members, $n = 2$.

Conjecture an equilibrium with $\omega_1^{ND} > \min(\Omega_1)$ and $\omega_2^{ND} > \min(\Omega_2)$.



red region $\rightarrow$ 1 recommends ND.

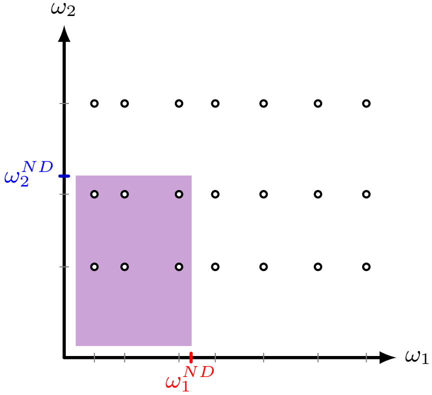
blue region $\rightarrow$ 2 recommends ND.

Suppose both individuals can unilaterally disclose, so that $D(\{1\}) = D(\{2\}) = 1$.

Proof Intuition with $n = 2$

Suppose there are two team-members, $n = 2$.

Conjecture an equilibrium with $\omega_1^{ND} > \min(\Omega_1)$ and $\omega_2^{ND} > \min(\Omega_2)$.



red region → 1 recommends ND.

blue region → 2 recommends ND.

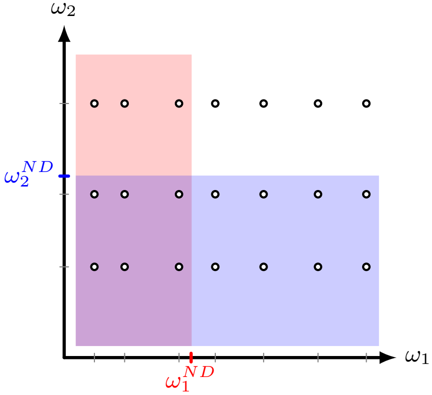
Suppose both individuals can unilaterally disclose, so that $D(\{1\}) = D(\{2\}) = 1$.

The conjectured equilibrium unravels.

Proof Intuition with $n = 2$

Suppose there are two team-members, $n = 2$.

Conjecture an equilibrium with $\omega_1^{ND} > \min(\Omega_1)$ and $\omega_2^{ND} > \min(\Omega_2)$.



red region → 1 recommends ND.

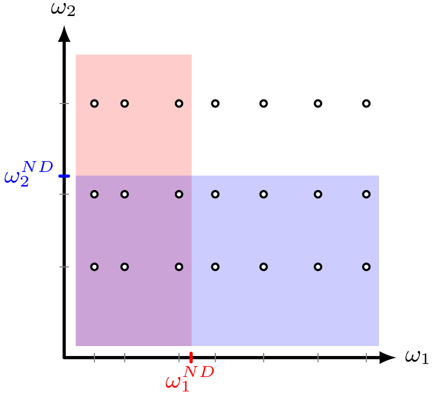
blue region → 2 recommends ND.

If instead neither team-member can unilaterally disclose, so that $D(\{1\}) = D(\{2\}) = 0$.

Proof Intuition with $n = 2$

Suppose there are two team-members, $n = 2$.

Conjecture an equilibrium with $\omega_1^{ND} > \min(\Omega_1)$ and $\omega_2^{ND} > \min(\Omega_2)$.



red region → 1 recommends ND.

blue region → 2 recommends ND.

If instead neither team-member can unilaterally disclose, so that $D(\{1\}) = D(\{2\}) = 0$.

Unraveling logic breaks, and one such equilibrium exists.

Skepticism in Team Disclosure

Two Lessons from Theorem 1

1. The existence of disclosure equilibria in which “team failures” are concealed.

(In contrast with result in a parallel model of individual disclosure.)

Skepticism in Team Disclosure

Two Lessons from Theorem 1

1. The existence of disclosure equilibria in which "team failures" are concealed.

2. A relationship b/w an individual's power to disclose the team outcome and the observer's skepticism about that individual's value upon seeing no-disclosure.

(New mechanism introduced in a model of team disclosure.)

Skepticism in Team Disclosure

Two Lessons from Theorem 1

1. The existence of disclosure equilibria in which "team failures" are concealed.

2. A relationship b/w an individual's power to disclose the team outcome and the observer's skepticism about that individual's value upon seeing no-disclosure.

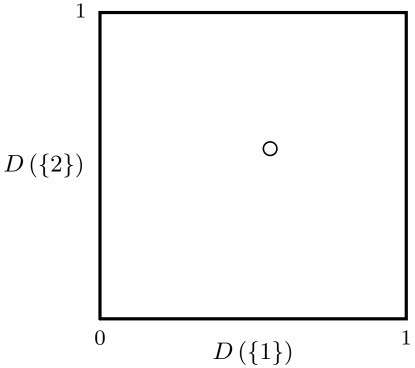
Next Result establishes a more refined relation between

- An individual's power to disclose team's outcome (determined by D).
- No-disclosure skepticism targeted at that individual (measured by ω_i^{ND}).

Voice Rights and Targeted Skepticism

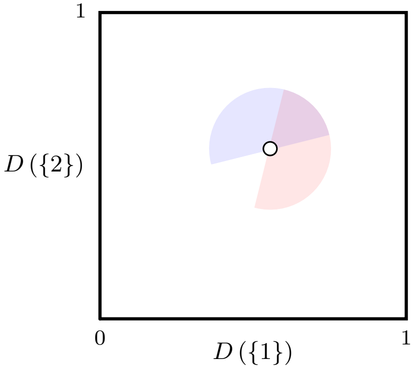
Fix an initial protocol D and an initial strict equilibrium.

We can determine how marginal changes to the protocol D affect ω^{ND}.



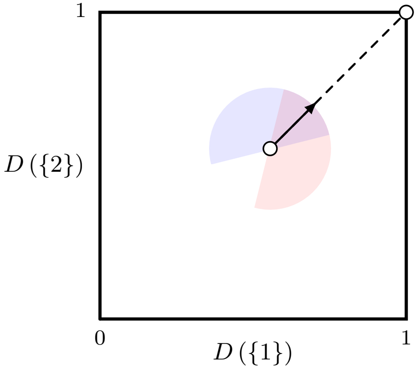
Fix an initial protocol D and an initial strict equilibrium.

We can determine how marginal changes to the protocol D affect ω^{ND}.



red area represents directions of change to deliberation procedure that increase skepticism about team member 1.

blue area represents directions of change to deliberation procedure that increase skepticism about team member 2.

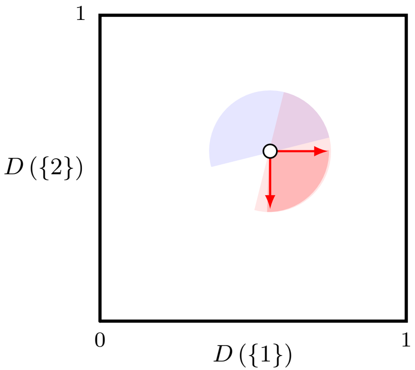


Proposition 1. If the deliberation protocol becomes more unilateral, then

$$\omega_i^{ND} \text{ decreases for every } i \in N,$$

or equivalently, observer's skepticism about each team member increases.

Voice Rights and Targeted Skepticism



Proposition 1. If the deliberation protocol becomes more unilateral, then

$$\omega_i^{ND} \text{ decreases for every } i \in N,$$

or equivalently, observer's skepticism about each team member increases.

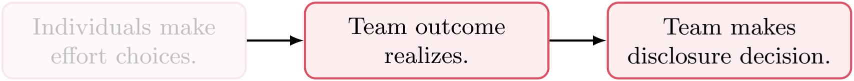
Proposition 2. If team member i becomes more pivotal, so that for every $I \subseteq N$

$$i \in I \Rightarrow dD(I) \geqslant 0,$$

$$\text{and } i \notin J \Rightarrow dD(J) \leqslant 0,$$

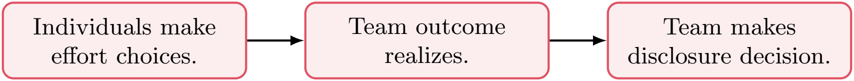
then ω_i^{ND} decreases, meaning that the observer's skepticism about i increases.

Disclosure and Incentives



So far: team disclosure, distribution of outcome values as an exogenous primitive.

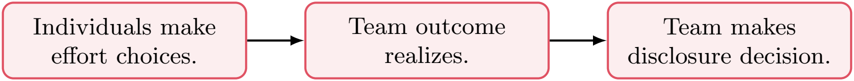
Disclosure and Incentives



So far: team disclosure, distribution of outcome values as an exogenous primitive.

We now study the complete environment of team **production** + team **disclosure**.

Disclosure and Incentives

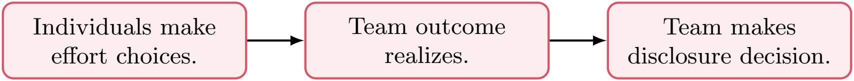


So far: team disclosure, distribution of outcome values as an exogenous primitive.

We now study the complete environment of team **production** + team **disclosure**.

Question. How can the team design the procedure used to make communication decisions — voice rights — so as to incentivize individual effort provision?

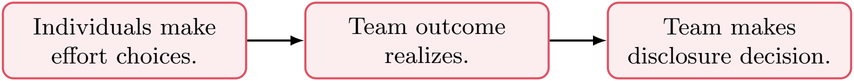
Disclosure and Incentives



Productive Environment:

- Each $i \in N$ covertly chooses effort $e_i \in \{0, 1\}$, incurring in cost $c_i > 0$ if $e_i = 1$.
- Given an effort vector e, the outcome distribution is $\mu(\cdot; e)$.
- Once outcome ω realizes, team chooses to disclose/not disclose it, as before.

Disclosure and Incentives



Productive Environment:

- Each $i \in N$ covertly chooses effort $e_i \in \{0, 1\}$, incurring in cost $c_i > 0$ if $e_i = 1$.
- Given an effort vector e, the outcome distribution is $\mu(\cdot; e)$.
- Once outcome ω realizes, team chooses to disclose/not disclose it, as before.

Assumption. Effort is productive: $e \geqslant e' \Rightarrow \mu(\cdot; e) \succsim_{FOS} \mu(\cdot; e')$.

Notation. e_I indicates $e_i = 1$ if and only if $i \in I$.

Full Effort Implementation

We want to compare deliberation procedures in terms of effort-incentive provision.

Definition. Deliberation procedure D dominates procedure D' if for every cost vector $c \in \mathbb{R}^n_{++}$ such that full effort is implementable in equilibrium under D', full effort is also implementable in equilibrium under D.

Full Effort Implementation

We want to compare deliberation procedures in terms of effort-incentive provision.

Definition. Deliberation procedure D dominates procedure D' if for every cost vector $c \in \mathbb{R}^n_{++}$ such that full effort is implementable in equilibrium under D', full effort is also implementable in equilibrium under D.

Lemma. Deliberation protocol D implements full effort given cost vector $c \in \mathbb{R}^N_{++}$ if and only if for some equilibrium team-disclosure strategy $d : \Omega \to [0, 1]$, for every $i \in N$,

Full Effort Implementation

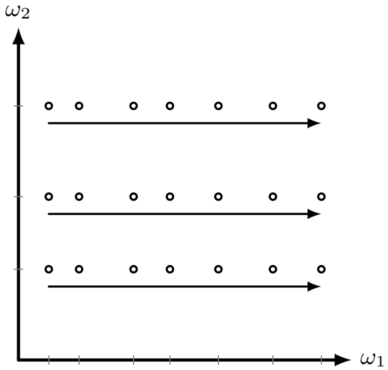
We want to compare deliberation procedures in terms of effort-incentive provision.

Definition. Deliberation procedure D dominates procedure D' if for every cost vector $c \in \mathbb{R}^n_{++}$ such that full effort is implementable in equilibrium under D', full effort is also implementable in equilibrium under D.

Lemma. Deliberation protocol D implements full effort given cost vector $c \in \mathbb{R}^N_{++}$ if and only if for some equilibrium team-disclosure strategy $d : \Omega \to [0, 1]$, for every $i \in N$,

$$\underbrace{\mathbb{E}\left[\omega_i | e_N\right] - \mathbb{E}\left[\omega_i | e_{N \setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND | e_{N \setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N \setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$

Externalities in Productive Environment



Def. Effort is purely self-improving if, for every $i \in N$ and every $I \subset N$,

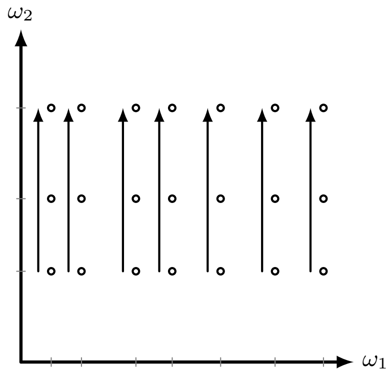
$$\mu_{N\setminus i}(\cdot; e_I) = \mu_{N\setminus i}(\cdot; e_{I\setminus i})$$

and $\mu_i(\cdot|\omega_{N\setminus i}; e_I) \succ_{FOS} \mu_i(\cdot|\omega_{N\setminus i}; e_{I\setminus i})$.

Def. Effort is purely team-improving if, for every $i \in N$ and every $I \subset N$,

$$\mu_{N\setminus i}(\cdot|\omega_i; e_I) \succ_{FOS} \mu_{N\setminus i}(\cdot|\omega_i; e_{I\setminus i})$$

and $\mu_i(\cdot; e_I) = \mu_i(\cdot; e_{I\setminus i})$.



Def. Effort is <u>purely self-improving</u> if, for every $i \in N$ and every $I \subset N$,

$$\mu_{N\setminus i}(\cdot; e_I) = \mu_{N\setminus i}(\cdot; e_{I\setminus i})$$

and $\mu_i(\cdot|\omega_{N\setminus i}; e_I) \succ_{FOS} \mu_i(\cdot|\omega_{N\setminus i}; e_{I\setminus i})$.

Def. Effort is <u>purely team-improving</u> if, for every $i \in N$ and every $I \subset N$,

$$\mu_{N\setminus i}(\cdot|\omega_i; e_I) \succ_{FOS} \mu_{N\setminus i}(\cdot|\omega_i; e_{I\setminus i})$$

and $\mu_i(\cdot; e_I) = \mu_i(\cdot; e_{I\setminus i})$.

Disclosure and Incentives

Theorem 2.

- If effort is purely self-improving, then unilateral deliberation dominates any other deliberation procedure.
- If effort is purely team-improving, then the consensus deliberation procedure strictly dominates any procedure in which some team member can unilaterally choose disclosure.

Disclosure and Incentives

Theorem 2.

- If effort is purely self-improving, then unilateral deliberation dominates any other deliberation procedure.
- If effort is purely team-improving, then the consensus deliberation procedure strictly dominates any procedure in which some team member can unilaterally choose disclosure.

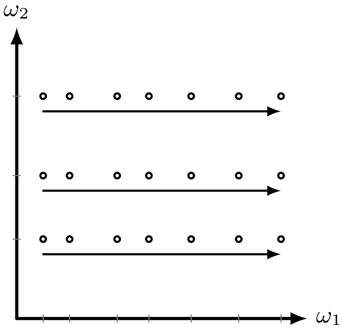
Additional Result. Monotonicity with respect to "more self-improving" and "more team-improving" changes to the productive environment.

Proof Sketch

$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$

Proof Sketch

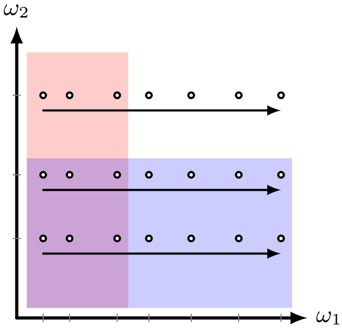
$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



Purely Self-Improving

Proof Sketch

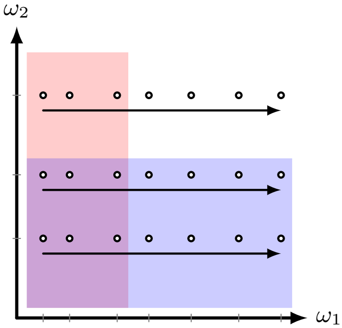
$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



Purely Self-Improving

Proof Sketch

$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



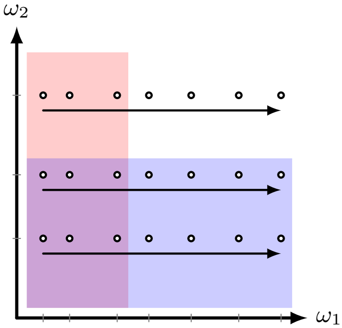
Purely Self-Improving

Given the eq. region of no disclosure,

$$\omega_1^{ND}(e_N) > \omega_1^{ND}(e_{N\setminus 1}).$$

Proof Sketch

$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



Purely Self-Improving

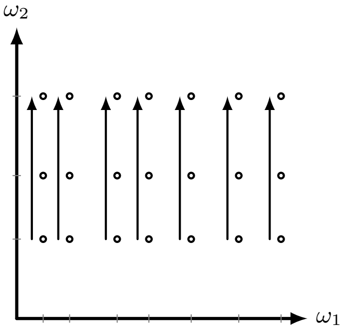
Given the eq. region of no disclosure,

$$\omega_1^{ND}(e_N) > \omega_1^{ND}(e_{N\setminus 1}).$$

$\Rightarrow$ Misattributed skepticism reduces effort incentives.

Proof Sketch

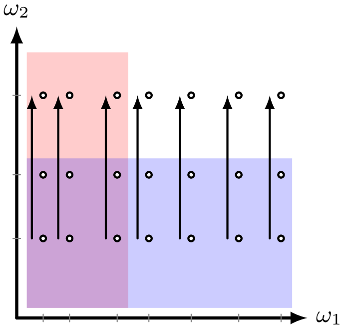
$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



Purely Team-Improving

Proof Sketch

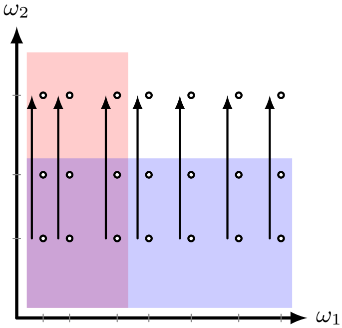
$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



Purely Team-Improving

Proof Sketch

$$\underbrace{\mathbb{E}\left[\omega_i|e_N\right] - \mathbb{E}\left[\omega_i|e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND|e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



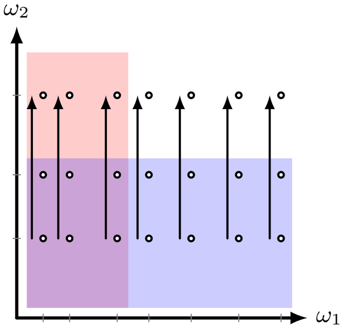
Purely Team-Improving

Given the eq. region of no disclosure,

$$\omega_1^{ND}(e_N) < \omega_1^{ND}(e_{N\setminus 1}).$$

Proof Sketch

$$\underbrace{\mathbb{E}\left[\omega_i | e_N\right] - \mathbb{E}\left[\omega_i | e_{N\setminus i}\right]}_{\text{Individual Effort Benefits}} + \mathbb{P}\left[ND | e_{N\setminus i}\right] \underbrace{\left[\omega_i^{ND}(e_{N\setminus i}) - \omega_i^{ND}(e_N)\right]}_{\text{Misattributed Skepticism}} \geqslant c_i.$$



Purely Team-Improving

Given the eq. region of no disclosure,

$$\omega_1^{ND}(e_N) < \omega_1^{ND}(e_{N\setminus 1}).$$

$\Rightarrow$ Misattributed skepticism improves effort incentives.

Two Lessons from Theorem 2

1. Full disclosure implied by unilateral procedure

$\rightarrow$ individual fully benefits from effect of effort on their own value.

2. Strategic non-disclosure implied by consensus procedure

$\rightarrow$ individual internalizes effect of effort on fellow team members' values.

Lessons and Interpretation

Two Lessons from Theorem 2

1. Full disclosure implied by unilateral procedure
   $\rightarrow$ individual fully benefits from effect of effort on their own value.
2. Strategic non-disclosure implied by consensus procedure
   $\rightarrow$ individual internalizes effect of effort on fellow team members' values.

Interpretation: Deliberation as Corporate Culture

1. Radically transparent corporate culture $\leftrightarrow$ Unilateral disclosure procedure
   $\rightarrow$ Individual accountability for contributions to teams' successes/failures.

Lessons and Interpretation

Two Lessons from Theorem 2

1. Full disclosure implied by unilateral procedure
   → individual fully benefits from effect of effort on their own value.
2. Strategic non-disclosure implied by consensus procedure
   → individual internalizes effect of effort on fellow team members' values.

Interpretation: Deliberation as Corporate Culture

1. Radically transparent corporate culture ↔ Unilateral disclosure procedure
   → Individual accountability for contributions to teams' successes/failures.
2. No blame game corporate culture ↔ Consensus disclosure procedure
   → Team collectively suffers the burden of bad team outcomes.

Advocacy for radically transparent culture:

"when used judiciously (...) blame can prod people to put forth their best efforts"

From: "How to Win the Blame Game," Harvard Business Review.

Advocacy for "no blame game" culture:

"too much transparency can create a blaming culture that may actually decrease constructive, reciprocal behavior between employees."

From: "When Transparency Backfires, and How to Prevent It," Harvard Business Review.

Lessons and Interpretation

Advocacy for radically transparent culture:

"when used judiciously (...) blame can prod people to put forth their best efforts"

From: "How to Win the Blame Game," Harvard Business Review.

Advocacy for "no blame game" culture:

"too much transparency can create a blaming culture that may actually decrease constructive, reciprocal behavior between employees."

From: "When Transparency Backfires, and How to Prevent It," Harvard Business Review.

Our contribution:

Degree of externalities determines the fitness of culture to productive environment.

Disclosure Environment

Equilibrium Team Disclosure

Deliberation and Incentives

Further Results

Conclusion

Further Results

1. Effort towards a highly-correlated outcome.

2. Effort-maximizing deliberation in a symmetric, binary-outcome, environment.

- In a simplified environment, we show that effort-maximizing deliberation

  a. Requires less consensus (more consensus) for disclosure when effort is "more self-improving" ("more team-improving").

  b. Requires more consensus (less consensus) for disclosure when effort is "more correlating" ("less correlating").

---

3. Refining the set of team-disclosure equilibria:

When is the full disclosure equilibrium "consistent with deliberation"?

Skip to Conclusion

Effort Towards Common Outcome

Proposition 5. For some $\epsilon \in (0, 1)$, let

$$\mu_\epsilon(\cdot; e_N) = (1 - \epsilon)\mu + \epsilon\nu,$$

where μ is a full-support distribution and ν has perfect correlation across team-members' outcomes. Further, suppose $\nu \succsim_{FOS} \mu \succsim \mu(\cdot; e_{N\setminus i})$ for every $i \in N$.

Let D be the unilateral protocol and D' be a deliberation procedure in which no team-member can unilaterally choose disclosure. There exists $\bar{\epsilon} \in (0, 1)$ such that if $\epsilon > \bar{\epsilon}$, D' strictly dominates D.

Back

Symmetric + Binary-Outcome Environment

Consider the following environment:

- The team has 2 team-members.
- For each team-member i, outcomes are binary: $\omega_i \in \{\omega_\ell, \omega_h\}$.
- Deliberation is symmetric: $D(\{1\}) = D(\{2\})$.
- The distribution of outcomes induced under full effort, $\mu(\cdot; e_N)$, is symmetric.

What is the level D^* of $D(\{1\}) = D(\{2\})$ that maximizes effort-incentives?

Back

Symmetric + Binary-Outcome Environment

Effort environment is described by two measures:

1. $\Delta_\rho = \bar{\rho} - \rho$ measures the degree to which effort improves outcome correlation.

$$\bar{\rho} = \frac{\mu\left[(\omega_\ell, \omega_\ell); e_N\right]}{\mu\left[(\omega_h, \omega_\ell); e_N\right] + \mu\left[(\omega_\ell, \omega_h); e_N\right]} \text{ and } \rho = \frac{\mu\left[(\omega_\ell, \omega_\ell); e_{N\setminus i}\right]}{\mu\left[(\omega_h, \omega_\ell); e_{N\setminus i}\right] + \mu\left[(\omega_\ell, \omega_h); e_{N\setminus i}\right]}$$

indicate the correlation between team-members' low outcomes.

2. $\Delta_\sigma = \bar{\sigma} - \sigma$ measures the degree to which effort is self-improving.

$$\bar{\sigma} = \frac{\mu\left[(\omega_i = \omega_h, \omega_{-i} = \omega_\ell); e_N\right]}{\mu\left[(\omega_h, \omega_\ell); e_N\right] + \mu\left[(\omega_\ell, \omega_h); e_N\right]} \text{ and } \sigma = \frac{\mu\left[(\omega_i = \omega_h, \omega_{-i} = \omega_\ell); e_{N\setminus i}\right]}{\mu\left[(\omega_h, \omega_\ell); e_{N\setminus i}\right] + \mu\left[(\omega_\ell, \omega_h); e_{N\setminus i}\right]}$$

indicate the degree to which the distribution is skewed towards team-member i.

Symmetric + Binary-Outcome Environment

Proposition.

The effort-maximizing level of $D(\{1\}) = D(\{2\})$ is fully determined by $(\rho, \bar{\rho}, \sigma, \bar{\sigma})$.

Moreover, keeping $\bar{\rho}$ and $\bar{\sigma}$ fixed,

- D^* is decreasing in Δ_ρ, that is, effort-maximizing deliberation requires more (less) consensus when effort is more (less) correlating.
- D^* is increasing in Δ_σ, that is, effort-maximizing deliberation requires more (less) consensus when effort is more self-improving (more team-improving).

Back

Refining the Team-Disclosure Equilibrium Set

Remember that full-disclosure equilibria always exist.

Refining the Team-Disclosure Equilibrium Set

Remember that full-disclosure equilibria always exist.

They must be supported by (potentially off-path) observer beliefs that are maximally skeptical about a set $I \subseteq N$ of team-members such that $D(I) = 1$. That is,

$$\omega_i^{ND} = \min(\Omega_i)$$

for every team-member i belonging to one such set I.

Refining the Team-Disclosure Equilibrium Set

Remember that full-disclosure equilibria always exist.

They must be supported by (potentially off-path) observer beliefs that are maximally skeptical about a set $I \subseteq N$ of team-members such that $D(I) = 1$. That is,

$$\omega_i^{ND} = \min(\Omega_i)$$

for every team-member i belonging to one such set I.

Are such (off-path) beliefs plausible given the team's deliberation procedure?

Definition.

No-disclosure beliefs ω^{ND} are consistent with deliberation for protocol D if there exists some team disclosure decision d with $d(\omega) < 1$ for some $\omega \in \Omega$, and a vector of individual disclosure recommendations x such that

1. For each $i, j \in N$ with $j \neq i$, $x_i(\omega)$ is constant with respect to ω_j.
2. The team's disclosure decision aggregates the individual disclosure strategies x:

$$d(\omega) = \sum_{X \subseteq N} \Pi_X(\omega) D(X) \text{ for every } \omega \in \Omega.$$

3. No-disclosure posteriors are Bayes-consistent.

Back

Definition.

A deliberation procedure D is such that disclosing requires more consensus than concealing if for every subgroup $I \subseteq N$, such that $D(I) = 1$ and $D(N \setminus I) < 1$, there exists a smaller subgroup $J \subset I$ such that $D(N \setminus J) < 1$ but $D(J) \neq 1$.

Refining the Team-Disclosure Equilibrium Set

Definition.

A deliberation procedure D is such that disclosing requires more consensus than concealing if for every subgroup $I \subseteq N$, such that $D(I) = 1$ and $D(N \setminus I) < 1$, there exists a smaller subgroup $J \subset I$ such that $D(N \setminus J) < 1$ but $D(J) \neq 1$.

Theorem 3.

A full-disclosure equilibrium that is consistent with deliberation procedure D exists if and only if disclosure does not require more consensus than concealing.

Back

Disclosure Environment

Equilibrium Team Disclosure

Deliberation and Incentives

Further Results

Conclusion

Conclusion

We studied a model of **team production** + **team disclosure**.

Theoretical Perspective:

1. We introduced and analyzed an evidence disclosure model, where a team makes disclosure decisions through a deliberation procedure.

2. We proposed a new problem of designing how a team makes communication decisions with the goal of providing effort incentives.

Applied Perspective:

1. We established a relationship between "voice rights" in an organization and individual/collective accountability.

2. We interpreted our design problem as one of "designing corporate culture" and connected our results to existing business practices.