

Optimality of Public Persuasion for Single-Good Allocation

Chen Chen

Xuyuanda Qi

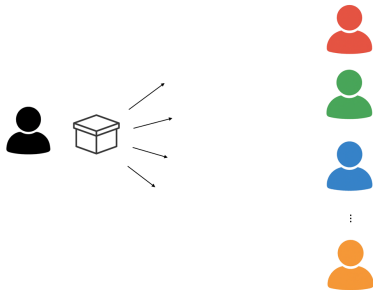


上海纽约大学
NYU SHANGHAI

2025 INFORMS RMP Conference
Columbia Business School
July 15, 2025

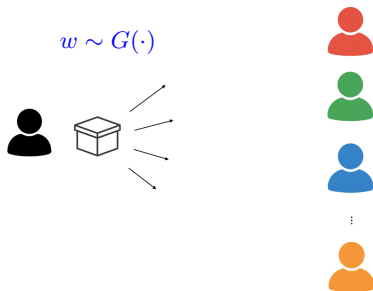
Model

- A sender allocates **an indivisible good** among n receivers
 - ▶ Sender can allocate to at most one receiver
 - ▶ Each receiver decides whether to accept based on self-interest



Model

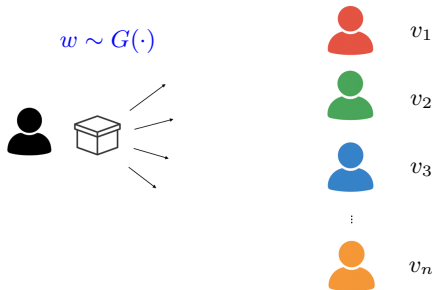
- A sender allocates **an indivisible good** among n receivers
 - ▶ Sender can allocate to at most one receiver
 - ▶ Each receiver decides whether to accept based on self-interest



- Sender strategically discloses good's characteristics $w \in \Omega$, with prior dist $G(\cdot)$

Model

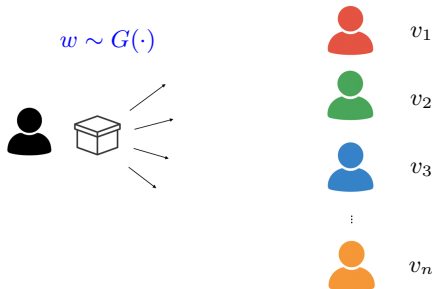
- A sender allocates **an indivisible good** among n receivers
 - ▶ Sender can allocate to at most one receiver
 - ▶ Each receiver decides whether to accept based on self-interest



- **Sender's utility:** v_i from allocating to receiver i ; zero if unallocated

Model

- A sender allocates **an indivisible good** among n receivers
 - ▶ Sender can allocate to at most one receiver
 - ▶ Each receiver decides whether to accept based on self-interest

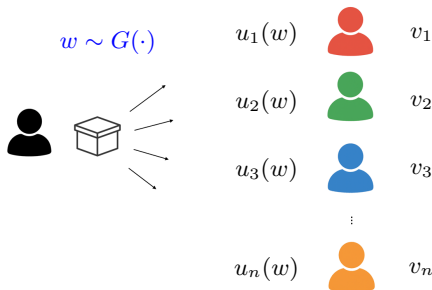


- **Sender's utility:** v_i from allocating to receiver i ; zero if unallocated

Assumption: sender's utility satisfies $0 < v_n < \dots < v_2 < v_1$

Model

- A sender allocates **an indivisible good** among n receivers
 - ▶ Sender can allocate to at most one receiver
 - ▶ Each receiver decides whether to accept based on self-interest



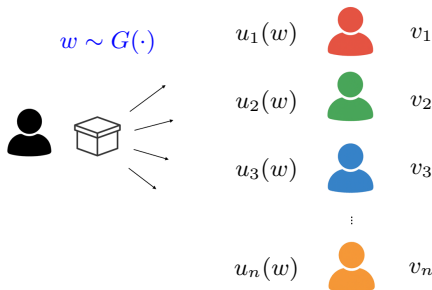
- **Sender's utility:** v_i from allocating to receiver i ; zero if unallocated

Assumption: sender's utility satisfies $0 < v_n < \dots < v_2 < v_1$

- **Receiver i 's utility:** $u_i(w)$ from receiving good of chars w ; zero otherwise

Model

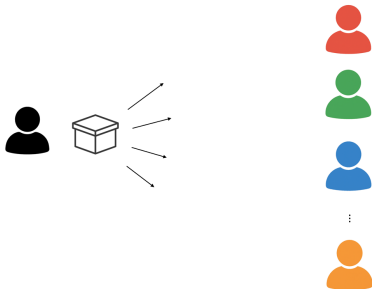
- A sender allocates **an indivisible good** among n receivers
 - ▶ Sender can allocate to at most one receiver
 - ▶ Each receiver decides whether to accept based on self-interest



- **Sender's utility:** v_i from allocating to receiver i ; zero if unallocated
Assumption: sender's utility satisfies $0 < v_n < \dots < v_2 < v_1$
- **Receiver i 's utility:** $u_i(w)$ from receiving good of chars w ; zero otherwise
- **Applications:** (i) school advisor promotes student for job positions, (ii) incubator pitches startup to VC investors

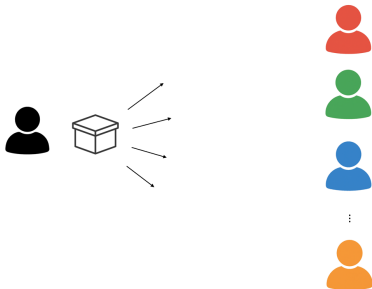
Public versus private persuasion

Sender commits to persuasion mechanism $f(s|w)$: joint dist of sending signals $\mathbf{s} = (s_1, s_2, \dots, s_n)$ conditional on w



Public versus private persuasion

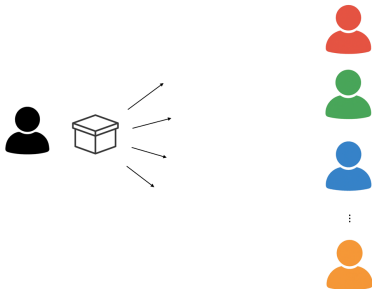
Sender commits to persuasion mechanism $f(s|w)$: joint dist of sending signals $s = (s_1, s_2, \dots, s_n)$ conditional on w



- **Public persuasion:** $f(s|w) = 0$ if $s_i \neq s_j$ for some $i, j \in [n]$; that is receivers always receive the same signal
- **Private persuasion:** otherwise

Public versus private persuasion

Sender commits to persuasion mechanism $f(s|w)$: joint dist of sending signals $s = (s_1, s_2, \dots, s_n)$ conditional on w



- **Public persuasion:** $f(s|w) = 0$ if $s_i \neq s_j$ for some $i, j \in [n]$; that is receivers always receive the same signal
- **Private persuasion:** otherwise
- Model permits receivers to **communicate** after receiving signals
 - Receivers can communicate in an arbitrary way (including in self-interest)

Model (cont.)

The game proceeds as follows:

1. Sender commits to a persuasion mechanism $f(\cdot|w)$ and a signal space $\mathbf{S} = \bigotimes_{i=1}^n S_i$.
2. Sender observes the good's characteristics $w \sim G(w)$. A signal $\mathbf{s} = (s_i)_{i \in [n]} \sim f(\cdot|w)$ is generated and sent to the receivers.
3. Receivers communicate with one another in a certain way.
4. Each receiver i decides whether to accept the good based on the signal and communication.
5. Sender accepts the best offer (if she receives any).

Model (cont.)

The game proceeds as follows:


1. Sender commits to a persuasion mechanism $f(\cdot|w)$ and a signal space $\mathbf{S} = \bigotimes_{i=1}^n S_i$.
2. Sender observes the good's characteristics $w \sim G(w)$. A signal $\mathbf{s} = (s_i)_{i \in [n]} \sim f(\cdot|w)$ is generated and sent to the receivers.
3. Receivers communicate with one another in a certain way.
4. Each receiver i decides whether to accept the good based on the signal and communication.
5. Sender accepts the best offer (if she receives any).

Main result: Public persuasion is **optimal** regardless of how receivers communicate

\implies Sender eliminates any communication for her own interest

The first-best relaxation


Proposition. The optimal value \bar{V} of:


$$\begin{aligned} \max_{q(i|w) \geq 0} \quad & \sum_{i=1}^n v_i \int_{w \in \Omega} q(i|w) dG(w) \\ \text{s.t.} \quad & \int_{w \in \Omega} u_i(w) q(i|w) dG(w) \geq 0, \forall i \in [n], \quad (\text{participation constr.}) \\ & \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in \Omega. \end{aligned}$$

$q(i|w)$: prob of allocating to receiver i conditional on w

The first-best relaxation

Proposition. The optimal value \bar{V} of:



$$\begin{aligned} \max_{q(i|w) \geq 0} \quad & \sum_{i=1}^n v_i \int_{w \in \Omega} q(i|w) dG(w) \\ \text{s.t.} \quad & \int_{w \in \Omega} u_i(w) q(i|w) dG(w) \geq 0, \forall i \in [n], \quad (\text{participation constr.}) \\ & \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in \Omega. \end{aligned}$$

$q(i|w)$: prob of allocating to receiver i conditional on w

is an **upper bound** on sender's expected payoff, regardless of how receivers communicate.

The first-best relaxation

Proposition. The optimal value \bar{V} of:


$$\begin{aligned} \max_{q(i|w) \geq 0} \quad & \sum_{i=1}^n v_i \int_{w \in \Omega} q(i|w) dG(w) \\ \text{s.t.} \quad & \int_{w \in \Omega} u_i(w) q(i|w) dG(w) \geq 0, \forall i \in [n], \quad (\text{participation constr.}) \\ & \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in \Omega. \end{aligned}$$

$q(i|w)$: prob of allocating to receiver i conditional on w

is an **upper bound** on sender's expected payoff, regardless of how receivers communicate.

Proof sketch: let $q(i|w)$ be the allocation probabilities under equilibrium.

Optimality of public persuasion

Proposition. The optimal value \bar{V} of:

$$\begin{aligned} & \max_{q(i|w) \geq 0} \quad \sum_{i=1}^n v_i \int_{w \in \Omega} q(i|w) dG(w) \\ & \text{s.t.} \quad \int_{w \in \Omega} u_i(w) q(i|w) dG(w) \geq 0, \forall i \in [n], \quad (\text{participation constr.}) \\ & \quad \quad \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in \Omega. \end{aligned}$$

$q(i|w)$: prob of allocating to receiver i conditional on w

optimal solution of relaxation

Public persuasion: Sender broadcasts $s = i$ with prob $q^*(i|w)$

Optimality of public persuasion

Proposition. The optimal value \bar{V} of:

$$\begin{aligned} & \max_{q(i|w) \geq 0} && \sum_{i=1}^n v_i \int_{w \in \Omega} q(i|w) dG(w) \\ & \text{s.t.} && \int_{w \in \Omega} u_i(w) q(i|w) dG(w) \geq 0, \forall i \in [n], \quad (\text{participation constr.}) \\ & && \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in \Omega. \end{aligned}$$

$q(i|w)$: prob of allocating to receiver i conditional on w

optimal solution of relaxation

Public persuasion: Sender broadcasts $s = i$ with prob $q^*(i|w)$

Theorem. Under the public persuasion: (i) it is an equilibrium for each receiver $i \in [n]$ to extend an offer only upon receiving signal $s = i$; (ii) the expected payoff of the mechanism equals \bar{V} .

Optimality of public persuasion

Proposition. The optimal value \bar{V} of:

$$\begin{aligned} & \max_{q(i|w) \geq 0} && \sum_{i=1}^n v_i \int_{w \in \Omega} q(i|w) dG(w) \\ & \text{s.t.} && \int_{w \in \Omega} u_i(w) q(i|w) dG(w) \geq 0, \forall i \in [n], \quad (\text{participation constr.}) \\ & && \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in \Omega. \end{aligned}$$

$q(i|w)$: prob of allocating to receiver i conditional on w

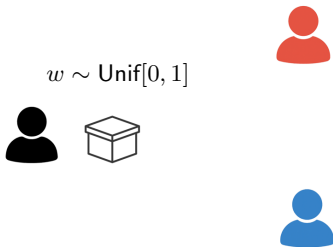
Public persuasion: Sender broadcasts $s = i$ with prob $q^*(i|w)$

Theorem. Under the public persuasion: (i) it is an equilibrium for each receiver $i \in [n]$ to extend an offer only upon receiving signal $s = i$; (ii) the expected payoff of the mechanism equals \bar{V} .

\implies Public persuasion is optimal

Suboptimality of vanilla private persuasion

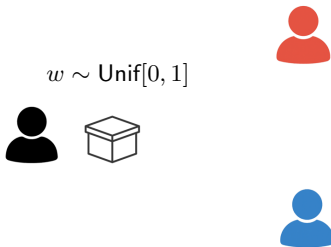
Suppose the receivers cannot communicate.



Suboptimality of vanilla private persuasion

Suppose the receivers cannot communicate.

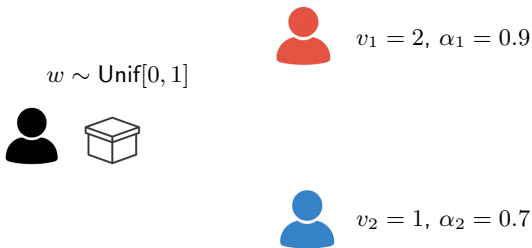
- Linear utilities: receiver $i \in \{1, 2\}$ accepts if posterior mean exceeds threshold α_i



Suboptimality of vanilla private persuasion

Suppose the receivers cannot communicate.

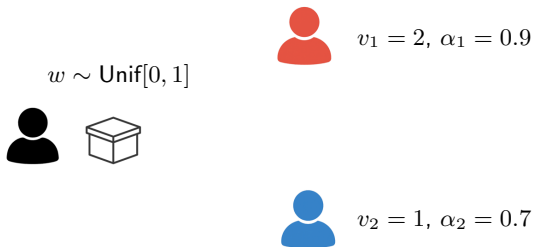
- Linear utilities: receiver $i \in \{1, 2\}$ accepts if posterior mean exceeds threshold α_i



Suboptimality of vanilla private persuasion

Suppose the receivers cannot communicate.

- Linear utilities: receiver $i \in \{1, 2\}$ accepts if posterior mean exceeds threshold α_i

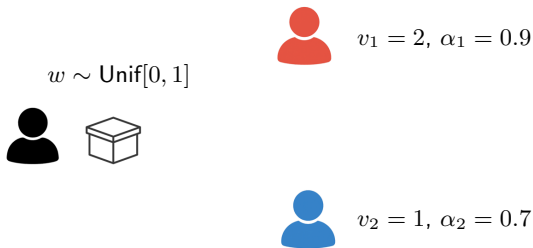


- **Vanilla private persuasion:** recommend receiver 1 to accept the good when $w \geq 0.8$, and recommend receiver 2 to accept the good when $w \geq 0.4$.

Suboptimality of vanilla private persuasion

Suppose the receivers cannot communicate.

- Linear utilities: receiver $i \in \{1, 2\}$ accepts if posterior mean exceeds threshold α_i

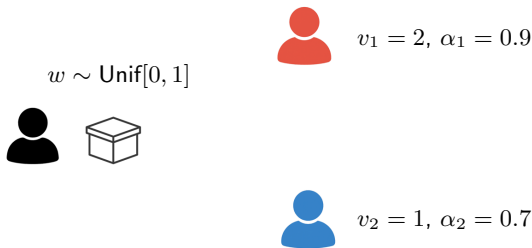


- **Vanilla private persuasion:** recommend receiver 1 to accept the good when $w \geq 0.8$, and recommend receiver 2 to accept the good when $w \geq 0.4$.
- Receiver 2, aware of presence of receiver 1, will **never** extend an offer

Suboptimality of vanilla private persuasion

Suppose the receivers cannot communicate.

- Linear utilities: receiver $i \in \{1, 2\}$ accepts if posterior mean exceeds threshold α_i

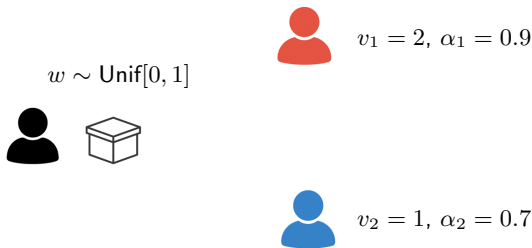


- **Vanilla private persuasion:** recommend receiver 1 to accept the good when $w \geq 0.8$, and recommend receiver 2 to accept the good when $w \geq 0.4$.
- Receiver 2, aware of presence of receiver 1, will **never** extend an offer
 - if extending an offer: only goods with $w \in [0.4, 0.8]$ will accept

Suboptimality of vanilla private persuasion

Suppose the receivers cannot communicate.

- Linear utilities: receiver $i \in \{1, 2\}$ accepts if posterior mean exceeds threshold α_i



- **Vanilla private persuasion:** recommend receiver 1 to accept the good when $w \geq 0.8$, and recommend receiver 2 to accept the good when $w \geq 0.4$.
- Receiver 2, aware of presence of receiver 1, will **never** extend an offer
 - if extending an offer: only goods with $w \in [0.4, 0.8]$ will accept
- Suboptimal outcome: only goods with $w \in [0.8, 1]$ are allocated
($V^{\text{Vanilla}} = 0.4 \leq \bar{V} = 5/8 = 0.625$)

Extension

- **Weak preference:** sender's utility satisfies $0 \leq v_n \leq \dots \leq v_2 \leq v_1$

Public persuasion is optimal? ✓

- **Multiple actions:** each receiver selects from multiple actions regarding the good

Public persuasion is optimal? ✓

- **Uncertain Preference:** sender's offer values $\{v_i\}$ are uncertain and possibly correlated with the good's characteristics w

- ▶ Ordinal ranking over receivers remains fixed: ✓

- ▶ Arbitrary correlation: ✗

- **Multiple goods:** sender has multiple goods to allocate

Public persuasion is optimal? in general ✗

Counter-example: two identical goods to allocate to two receivers \rightarrow externalities between receivers vanish \rightarrow problem decouples over receivers

Extension

- **Weak preference:** sender's utility satisfies $0 \leq v_n \leq \dots \leq v_2 \leq v_1$

Public persuasion is optimal? ✓

- **Multiple actions:** each receiver selects from multiple actions regarding the good

Public persuasion is optimal? ✓

- **Uncertain Preference:** sender's offer values $\{v_i\}$ are uncertain and possibly correlated with the good's characteristics w

- ▶ Ordinal ranking over receivers remains fixed: ✓
- ▶ Arbitrary correlation: ✗

- **Multiple goods:** sender has multiple goods to allocate

Public persuasion is optimal? in general ✗

Counter-example: two identical goods to allocate to two receivers \rightarrow externalities between receivers vanish \rightarrow problem decouples over receivers

- **Key assumptions:** sender (i) allocates a **single good** and (ii) has a known **preference ranking** over receivers.

Special case: linear utilities

Utility function $u_i(w) = \kappa_i(w - \alpha_i)$ for each receiver i , where $w \in [0, 1]$

- Receivers care only about posterior mean: accept iff it exceeds α_i
- Sender equivalently optimizes dist of posterior means (we use an alternative approach)

Special case: linear utilities

Utility function $u_i(w) = \kappa_i(w - \alpha_i)$ for each receiver i , where $w \in [0, 1]$

- Receivers care only about posterior mean: accept iff it exceeds α_i
- Sender equivalently optimizes dist of posterior means (we use an alternative approach)

Related literature

- Extreme-point approach to characterize an optimal persuasion mechanism: [\[Candogan, 2022\]](#), [\[Kleiner et al., 2021\]](#), [\[Arieli et al., 2023\]](#)
- Dual approach for optimality conditions: [\[Dworczak and Martini, 2019\]](#)

Special case: linear utilities


Utility function $u_i(w) = \kappa_i(w - \alpha_i)$ for each receiver i , where $w \in [0, 1]$

- Receivers care only about posterior mean: accept iff it exceeds α_i
- Sender equivalently optimizes dist of posterior means (we use an alternative approach)

Related literature

- Extreme-point approach to characterize an optimal persuasion mechanism: [\[Candogan, 2022\]](#), [\[Kleiner et al., 2021\]](#), [\[Arieli et al., 2023\]](#)

- **Dual approach** for optimality conditions: [\[Dworczak and Martini, 2019\]](#)

- 
- our approach
- ▶ [\[Dworczak and Martini, 2019\]](#) study a more general problem, interpreting dual price as Walrasian equilibrium price in a persuasion economy
 - ▶ We consider a special case in which sender's utility is piecewise constant and increasing in posterior mean (as in [\[Candogan, 2022\]](#)), but we explicitly characterize set of optimal persuasion mechanisms by dualizing different constraints

Special case: linear utilities

Utility function $u_i(w) = \kappa_i(w - \alpha_i)$ for each receiver i , where $w \in [0, 1]$

- Receivers care only about posterior mean: accept iff it exceeds α_i
- Sender equivalently optimizes dist of posterior means (we use an alternative approach)

First-best relaxation with linear utilities:

$$\begin{aligned} \max_{q(i|w) \geq 0} \quad & \sum_{i=1}^n v_i \cdot \int_0^1 q(i|w) g(w) dw \\ \text{s.t.} \quad & \int_0^1 w \cdot q(i|w) g(w) dw \geq \alpha_i \int_0^1 q(i|w) g(w) dw, \forall i \in [n], \\ & \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in [0, 1]. \end{aligned}$$

Assumption (WLOG): receivers' hiring thresholds satisfy $0 < \alpha_n < \dots < \alpha_2 < \alpha_1$

Special case: linear utilities

Utility function $u_i(w) = \kappa_i(w - \alpha_i)$ for each receiver i , where $w \in [0, 1]$

- Receivers care only about posterior mean: accept iff it exceeds α_i
- Sender equivalently optimizes dist of posterior means (we use an alternative approach)

First-best relaxation with linear utilities:

$$\begin{aligned} \max_{q(i|w) \geq 0} \quad & \sum_{i=1}^n v_i \cdot \int_0^1 q(i|w) g(w) dw \\ \text{s.t.} \quad & \int_0^1 w \cdot q(i|w) g(w) dw \geq \alpha_i \int_0^1 q(i|w) g(w) dw, \forall i \in [n], \\ & \sum_{i \in [n]} q(i|w) \leq 1, \forall w \in [0, 1]. \end{aligned}$$

dualize participation constr.
with dual variable $\mu_i \geq 0$

Assumption (WLOG): receivers' hiring thresholds satisfy $0 < \alpha_n < \dots < \alpha_2 < \alpha_1$

Optimality conditions

Lagrangian dual problem:

$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\{v_i + \mu_i(w - \alpha_i)\}} \cdot q(i|w) \right) \cdot g(w) dw.$$

Optimality conditions

Lagrangian dual problem:

$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\{v_i + \mu_i(w - \alpha_i)\}}_{\text{Receiver } i\text{'s line: passing through point } (\alpha_i, v_i) \text{ with slope } \mu_i \geq 0}} \cdot q(i|w) \right) \cdot g(w) dw.$$

Optimality conditions

Lagrangian dual problem:

$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\{v_i + \mu_i(w - \alpha_i)\}}_{\substack{\text{Receiver } i\text{'s line: passing through} \\ \text{point } (\alpha_i, v_i) \text{ with slope } \mu_i \geq 0}} \cdot q(i|w) \right) \cdot g(w) dw.$$

allocate to receiver with highest
positive value for a given w

Receiver i 's line: passing through
point (α_i, v_i) with slope $\mu_i \geq 0$

Optimality conditions

Lagrangian dual problem:

$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\left\{ v_i + \mu_i (w - \alpha_i) \right\}}_{\substack{\text{Receiver } i\text{'s line: passing through} \\ \text{point } (\alpha_i, v_i) \text{ with slope } \mu_i \geq 0}} \cdot q(i|w) \right) \cdot g(w) dw.$$

allocate to receiver with highest positive value for a given w

Receiver i 's line: passing through point (α_i, v_i) with slope $\mu_i \geq 0$

Upper envelope function: $h(w; \boldsymbol{\mu}^*) \triangleq \max_{i \in [n]} \left\{ v_i + \mu_i^* (w - \alpha_i) \right\} \vee 0$

$\boldsymbol{\mu}^* \triangleq \arg \min_{\boldsymbol{\mu} \in \mathbb{R}_+^n} V^{\text{LR}}(\boldsymbol{\mu})$: optimal dual variable

Optimality conditions

Lagrangian dual problem:

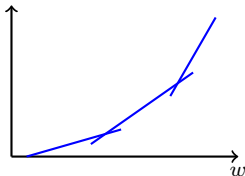
$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\{v_i + \mu_i(w - \alpha_i)\}}_{\substack{\text{Receiver } i\text{'s line: passing through} \\ \text{point } (\alpha_i, v_i) \text{ with slope } \mu_i \geq 0}} \cdot q(i|w) \right) \cdot g(w) dw.$$

allocate to receiver with highest positive value for a given w

Upper envelope function: $h(w; \boldsymbol{\mu}^*) \triangleq \max_{i \in [n]} \{v_i + \mu_i^*(w - \alpha_i)\} \vee 0$

$\boldsymbol{\mu}^* \triangleq \arg \min_{\boldsymbol{\mu} \in \mathbb{R}_+^n} V^{\text{LR}}(\boldsymbol{\mu})$: optimal dual variable

$\implies h(w; \boldsymbol{\mu}^*)$ is convex, increasing, and piecewise linear



Optimality conditions

Lagrangian dual problem:

$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\{v_i + \mu_i(w - \alpha_i)\}}_{\substack{\text{Receiver } i\text{'s line: passing through} \\ \text{point } (\alpha_i, v_i) \text{ with slope } \mu_i \geq 0}} \cdot q(i|w) \right) \cdot g(w) dw.$$

allocate to receiver with highest positive value for a given w

Receiver i 's line: passing through point (α_i, v_i) with slope $\mu_i \geq 0$

Upper envelope function: $h(w; \boldsymbol{\mu}^*) \triangleq \max_{i \in [n]} \left\{ v_i + \mu_i^*(w - \alpha_i) \right\} \vee 0$

$\boldsymbol{\mu}^* \triangleq \arg \min_{\boldsymbol{\mu} \in \mathbb{R}_+^n} V^{\text{LR}}(\boldsymbol{\mu})$: optimal dual variable

$\implies h(w; \boldsymbol{\mu}^*)$ is convex, increasing, and piecewise linear

Optimality conditions (informal). A (public) persuasion mechanism is **optimal** iff it satisfies:

1. For each linear segment of $h(w; \boldsymbol{\mu}^*)$: allocate w in this range exclusively to receivers whose point (α_i, v_i) lie on the segment
2. Receivers' participation constrs bind (for all segments with positive slopes)

Optimality conditions

Lagrangian dual problem:

$$V^{\text{LR}}(\boldsymbol{\mu}) = \int_0^1 \left(\max_{\substack{q(i|w) \geq 0, \\ \sum_{i \in [n]} q(i|w) \leq 1}} \sum_{i=1}^n \underbrace{\{v_i + \mu_i(w - \alpha_i)\}}_{\substack{\text{Receiver } i\text{'s line: passing through} \\ \text{point } (\alpha_i, v_i) \text{ with slope } \mu_i \geq 0}} \cdot q(i|w) \right) \cdot g(w) dw.$$

allocate to receiver with highest positive value for a given w

Upper envelope function: $h(w; \boldsymbol{\mu}^*) \triangleq \max_{i \in [n]} \{v_i + \mu_i^*(w - \alpha_i)\} \vee 0$

$\boldsymbol{\mu}^* \triangleq \arg \min_{\boldsymbol{\mu} \in \mathbb{R}_+^n} V^{\text{LR}}(\boldsymbol{\mu})$: optimal dual variable

$\implies h(w; \boldsymbol{\mu}^*)$ is convex, increasing, and piecewise linear

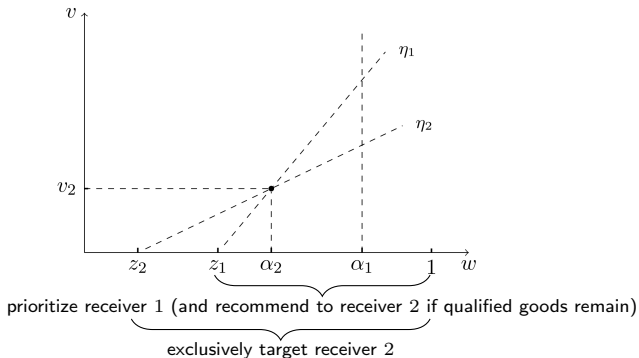
Optimality conditions (informal). A (public) persuasion mechanism is **optimal** iff it satisfies:

1. For each linear segment of $h(w; \boldsymbol{\mu}^*)$: allocate w in this range exclusively to receivers whose point (α_i, v_i) lie on the segment
2. Receivers' participation constrs bind (for all segments with positive slopes)

\implies Problem **decouples** over segments of $h(w; \boldsymbol{\mu}^*)$

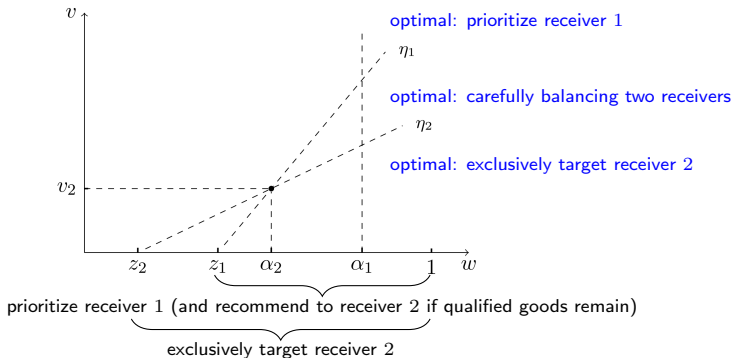
Optimal persuasion mechanisms

Two-receiver case: closed-form characterization



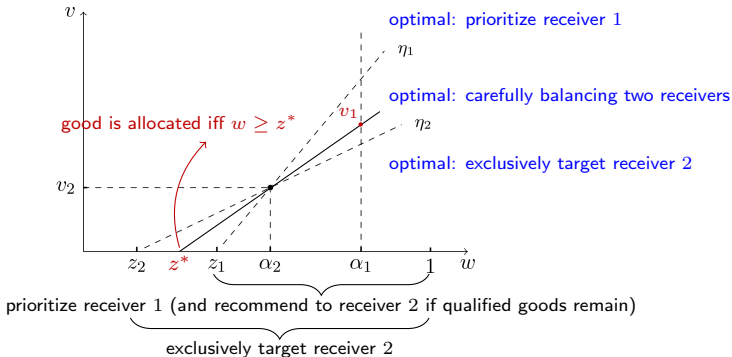
Optimal persuasion mechanisms

Two-receiver case: closed-form characterization



Optimal persuasion mechanisms

Two-receiver case: closed-form characterization

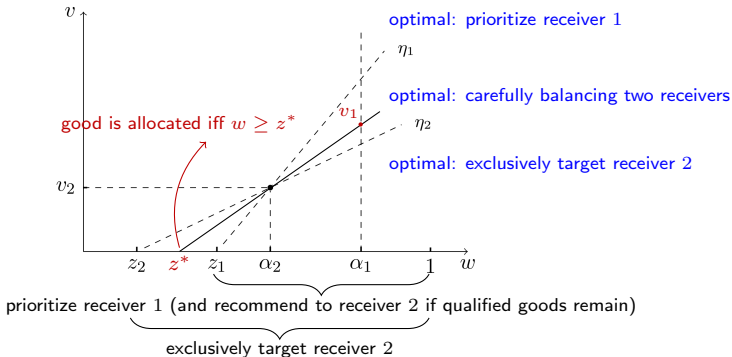


Any mechanism that satisfies the following is **optimal**:

1. Good is allocated if and only if $w \geq z^*$
2. Both receivers' participation constraints bind

Optimal persuasion mechanisms

Two-receiver case: closed-form characterization



General case:

- **Explicit** characterization of upper envelope function $h(w; \mu^*)$
- **Multiple ways** to construct optimal persuasion mechanisms

Summary

- We study **single-good resource allocation** in the **Bayesian persuasion** context, where the sender has known preferences over the receivers.
- Operational takeaway: **public persuasion** remains **optimal**, irrespective of how receivers communicate.
 - ▶ Analysis is based on **first-best relaxation**: public persuasion obtains first-best performance.

Summary

- We study **single-good resource allocation** in the **Bayesian persuasion** context, where the sender has known preferences over the receivers.
- Operational takeaway: **public persuasion** remains **optimal**, irrespective of how receivers communicate.
 - ▶ Analysis is based on **first-best relaxation**: public persuasion obtains first-best performance.
- Linear utility case: **dual-based approach** to explicitly characterize *all* optimal persuasion mechanisms.

Summary

- We study **single-good resource allocation** in the **Bayesian persuasion** context, where the sender has known preferences over the receivers.
- Operational takeaway: **public persuasion** remains **optimal**, irrespective of how receivers communicate.
 - ▶ Analysis is based on **first-best relaxation**: public persuasion obtains first-best performance.
- Linear utility case: **dual-based approach** to explicitly characterize *all* optimal persuasion mechanisms.
- **Future work.** Examine optimality of public persuasion in other applications, or quantify the suboptimality gap when it is not optimal.

Summary

- We study **single-good resource allocation** in the **Bayesian persuasion** context, where the sender has known preferences over the receivers.
- Operational takeaway: **public persuasion** remains **optimal**, irrespective of how receivers communicate.
 - ▶ Analysis is based on **first-best relaxation**: public persuasion obtains first-best performance.
- Linear utility case: **dual-based approach** to explicitly characterize *all* optimal persuasion mechanisms.
- **Future work.** Examine optimality of public persuasion in other applications, or quantify the suboptimality gap when it is not optimal.

Reference: C. Chen and X. Qi. 2024. Optimality of Public Persuasion for Single-Good Allocation. Major Revision at *OR*.

Appendix