

Game Theory at the Movies 2:

Games with N Players

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Outline

- *High Noon* (1952): the volunteer's dilemma.
- *Glengarry Glen Ross* (1992): competing for rank.
- *The Platform* (2019): the tragedy of the commons.

High Noon (1952)



Theatrical release poster.

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The Town That Would Not Help

- A killer Kane once sent to prison returns on the noon train, with three accomplices.
- Kane asks the townspeople to stand with him.
- Every citizen wants the gang stopped, yet one by one they find reasons not to help.
- Kane faces the four without the town's help.

The Volunteer's Dilemma

- N citizens choose *Volunteer* or *Wait*.
- If at least one volunteers, every citizen gets a benefit b .
- Each volunteer pays a cost c , where $0 < c < b$.
- If no one volunteers, everyone gets 0.

Pure-Strategy Nash Equilibria

- If no one else volunteers, my best response is to volunteer:
 $b - c > 0$.
- If someone else volunteers, my best response is to wait:
 $b > b - c$.
- Hence there are N pure-strategy NEs, each with exactly one volunteer.
- **Problem:** who should it be? Each citizen hopes it is someone else.

A Symmetric Mixed-Strategy Equilibrium

- Each citizen volunteers with probability p .
- Indifference between volunteering and waiting:
- $b - c = b [1 - (1 - p)^{N-1}]$, so $(1 - p)^{N-1} = \frac{c}{b}$.
- The probability that *no one* volunteers is $(1 - p)^N = \left(\frac{c}{b}\right)^{\frac{N}{N-1}}$.

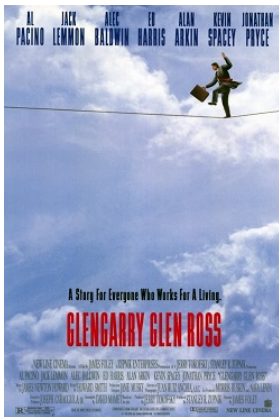
Larger Towns, Less Help

- **Example:** $b = 10$ and $c = 4$, so $c/b = 0.4$.

Citizens, N	Each volunteers, p	No one volunteers
2	0.60	0.16
5	0.20	0.32
10	0.10	0.36
100	0.01	0.40

- Intuitively, each citizen, seeing many others who might act, feels less pressure to be the one who does.
- Diekmann (1985) named this game; it fits the bystander who assumes someone else has called for help.

Glengarry Glen Ross (1992)



Theatrical release poster.

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The Sales Contest

- A real-estate office announces a contest among its salesmen.
- First prize: a Cadillac. Second prize: a set of steak knives.
- Everyone else is fired.
- Only your *rank* matters, not how much you sell.

A Rank-Order Tournament

- Your payoff depends on your sales relative to your colleagues' sales.
- Two ways to climb the ranking: sell more, or make a rival sell less.
- Both raise your rank by the same amount, so both earn the same prize.
- Intuitively, when the gap between prizes is wide, sabotage becomes a best response.

Tournaments in Real Life

- Lazear and Rosen (1981): paying by rank can motivate as much effort as paying for output.
- Firms use it for promotions; sports leagues use it for prizes.
- Grading on a curve is also a tournament: your grade depends on your classmates' scores.
- The office burglary in the play is the dark side of the same rule.

The Platform (2019)



Theatrical release poster.

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Food Falling Through the Floors

- A vertical prison with many levels and two inmates per level.
- Once a day a platform of food descends, stopping two minutes on each level.
- The top levels eat far more than they need; the lower levels starve.
- Every month inmates are moved, at random, to a new level.

The Tragedy of the Commons

- Each level chooses to *Ration* (eat its share) or *Grab*.
- Rationing passes food to strangers below, who cannot repay it.
- Grab is a **dominant strategy**: better regardless of what the other levels do.
- The unique NE: everyone grabs, and the lower levels starve.

Why the Monthly Reshuffle Does Not Help

- Rationing would serve everyone *ex ante*, since no one knows next month's level.
- But holding back this month buys nothing next month.
- With no communication, no monitoring, and no punishment, cooperation has nothing to rely on.
- Ostrom (1990): real communities escape with rules, monitoring, and graduated sanctions.

Summary

- *High Noon*: in the volunteer's dilemma, larger groups can be less likely to act.
- *Glengarry Glen Ross*: when only rank matters, sabotage pays like effort.
- *The Platform*: with a dominant strategy to grab, the commons is overused.
- In all three, individually rational choices hurt the group.