International Relations 101: Institutions

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How do institutions promote cooperation? (Or do they?)

Institutions: Great or GREATEST EVAH?

1. Coordination
2. Repeating Interactions
3. Tweaking Incentives
4. Providing Information

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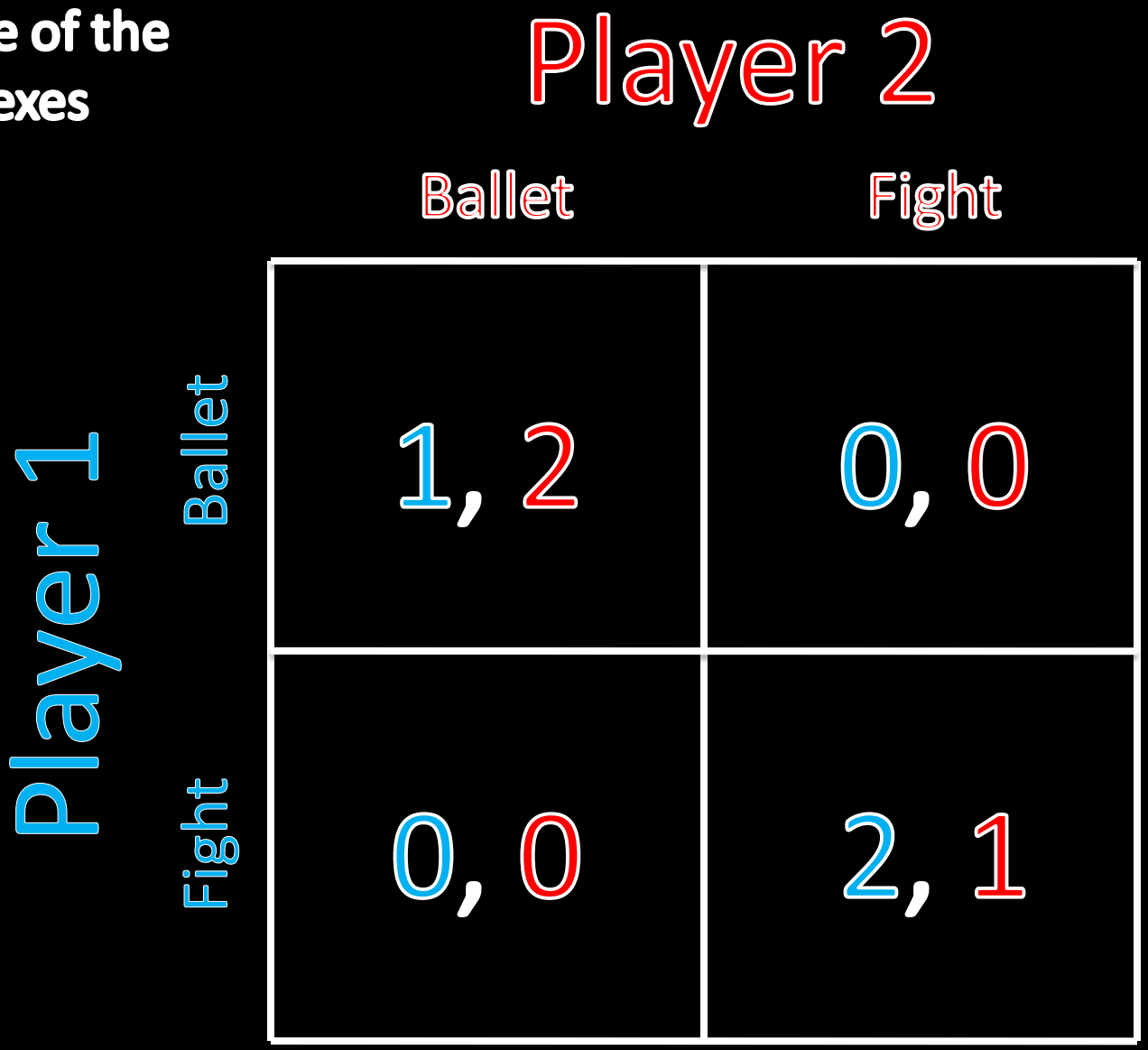
Battle of the Sexes

- A man and a woman want to get together for an evening of entertainment, but they have no means of communication.
- They can either go to the ballet or the fight.
  - The man prefers going to the fight.
  - The woman prefers going to the ballet.
  - But if they prefer being together than being alone.

Battle of the Sexes



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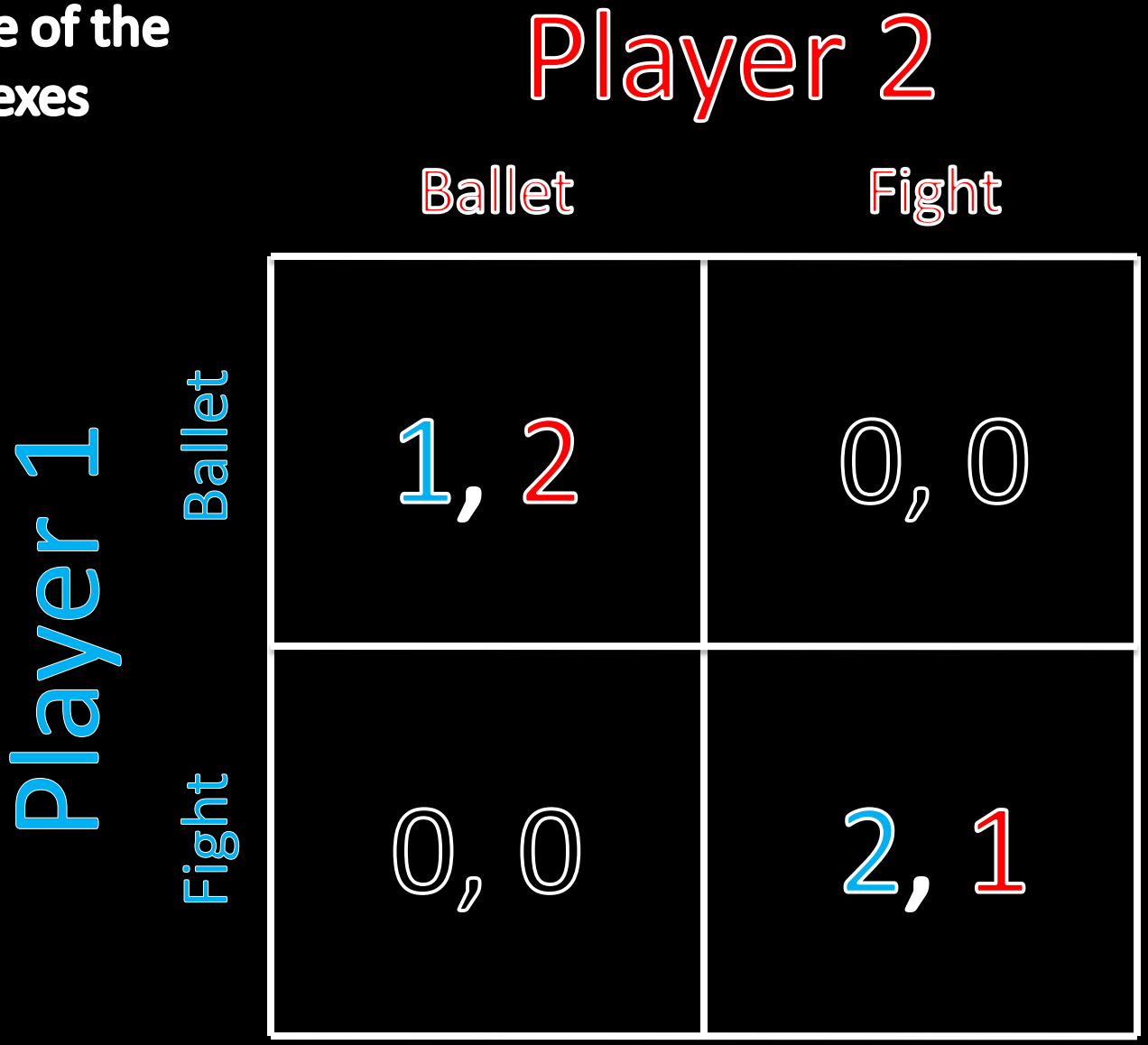
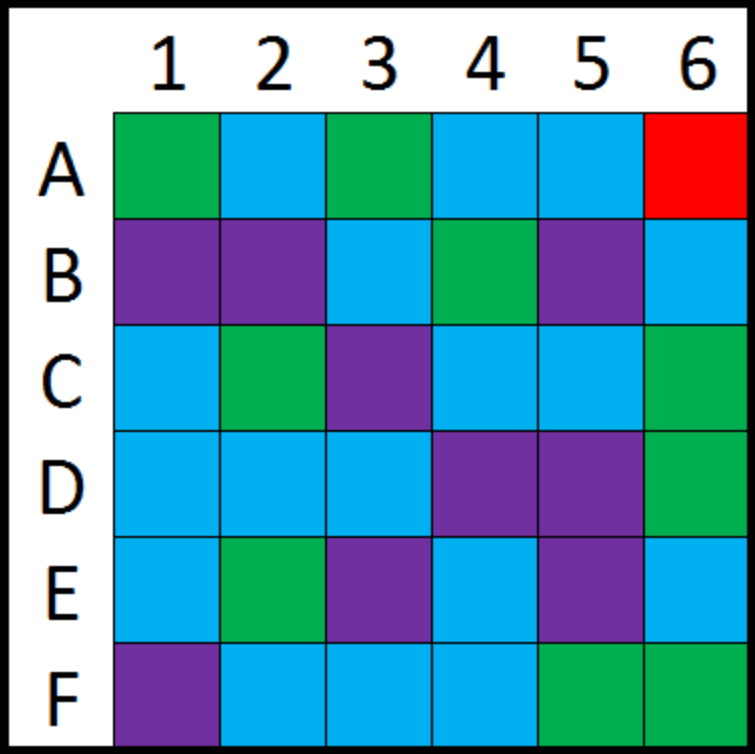


Critical Question

- In coordination games, how do players select a PSNE and avoid the bad outcomes?
- Possible solution: *focal points*.
  - Definition: a particular set of equilibrium strategies that players select due to the salience of that choice.

Problem 1: Pick a square.



If we both select the same square, we win $20.

Problem 2: Pick any whole number greater than 0.

If we both select the same number, we win $X, where X is the number we picked.

Problem 3: Pick any day of the year.

If we both select the same day, we win $20.

Problem 4: Pick heads or tails.

If we both select the same choice, we win $20.

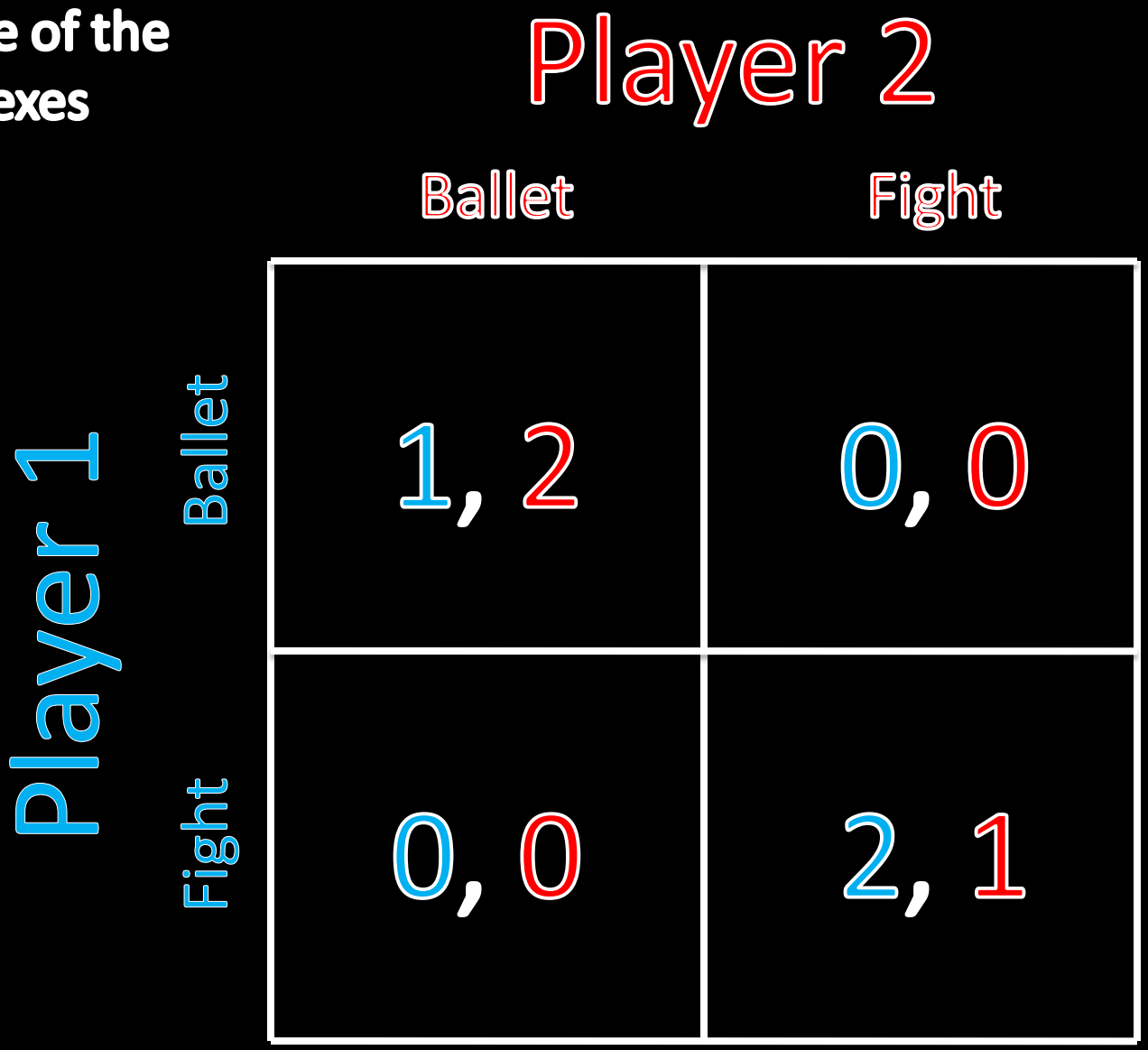
Problem 5: Pick a time and a place to meet me on campus tomorrow.

If we meet up, we win $20.

Problem 6: Pick fight or ballet.

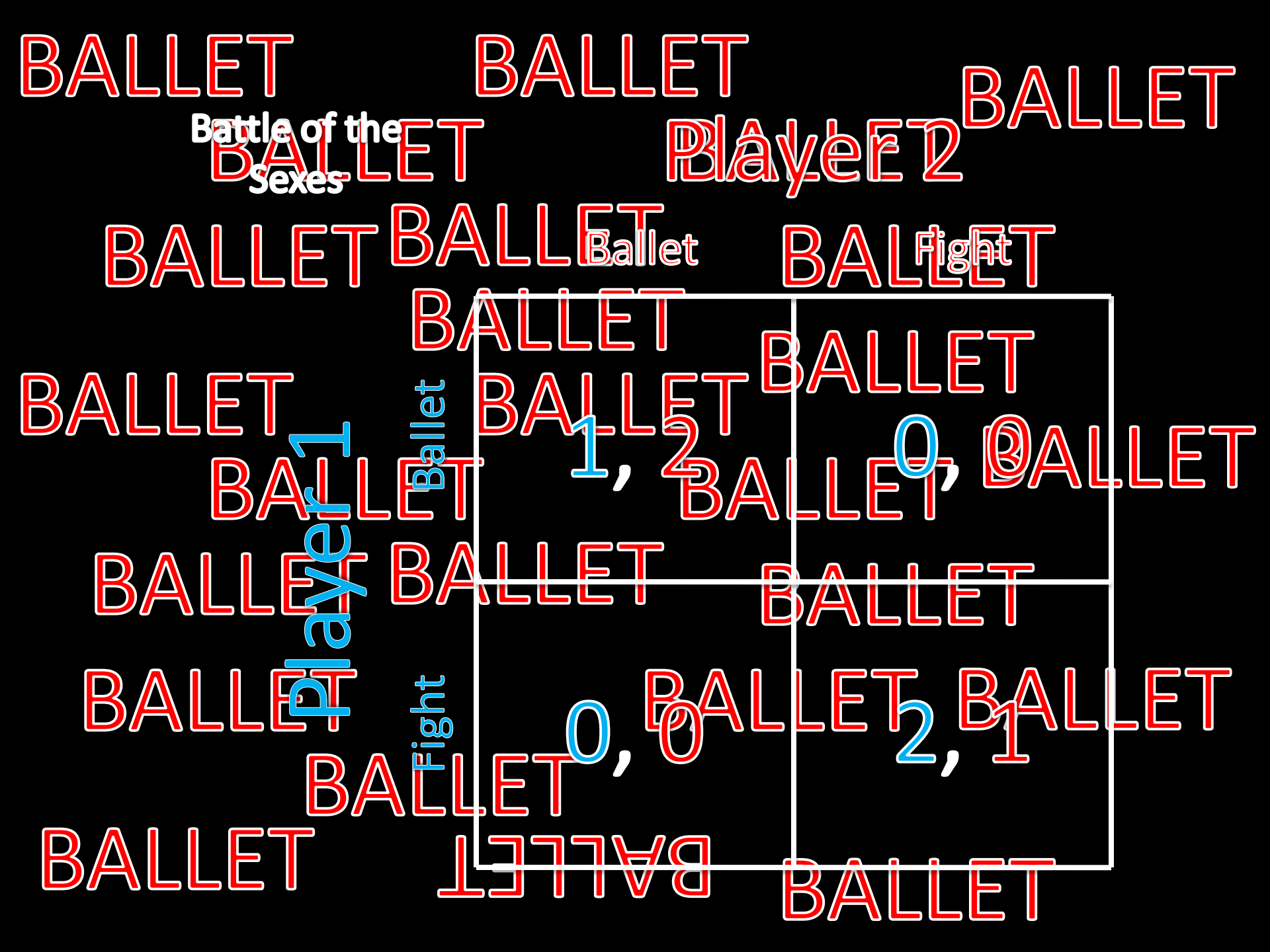
Your rewards are the payoffs from earlier.

Battle of the Sexes



Problem 7: Pick fight or ballet.

Your rewards are the payoffs from earlier.


Battle of the Sexes
Player 2
Ballet
Fight
Player 1
Ballet
Fight
1, 2
0, 0
0, 0
2, 1

Result

- Unless you all were trolling, we coordinated much better when someone told us what to do.

Coordination Problem

- The man and woman have incentive to cooperate but have opposing preferences on how to cooperate.
  - *Mixed motives*.
- They need some means of resolving the coordination problem.

Coordination Problem

- States want to trade (there are gains), but each side wants more of the trading surplus.
  - *Mixed motives*.
- They need some means of resolving the coordination problem.
  - Courts coordinate expectations.

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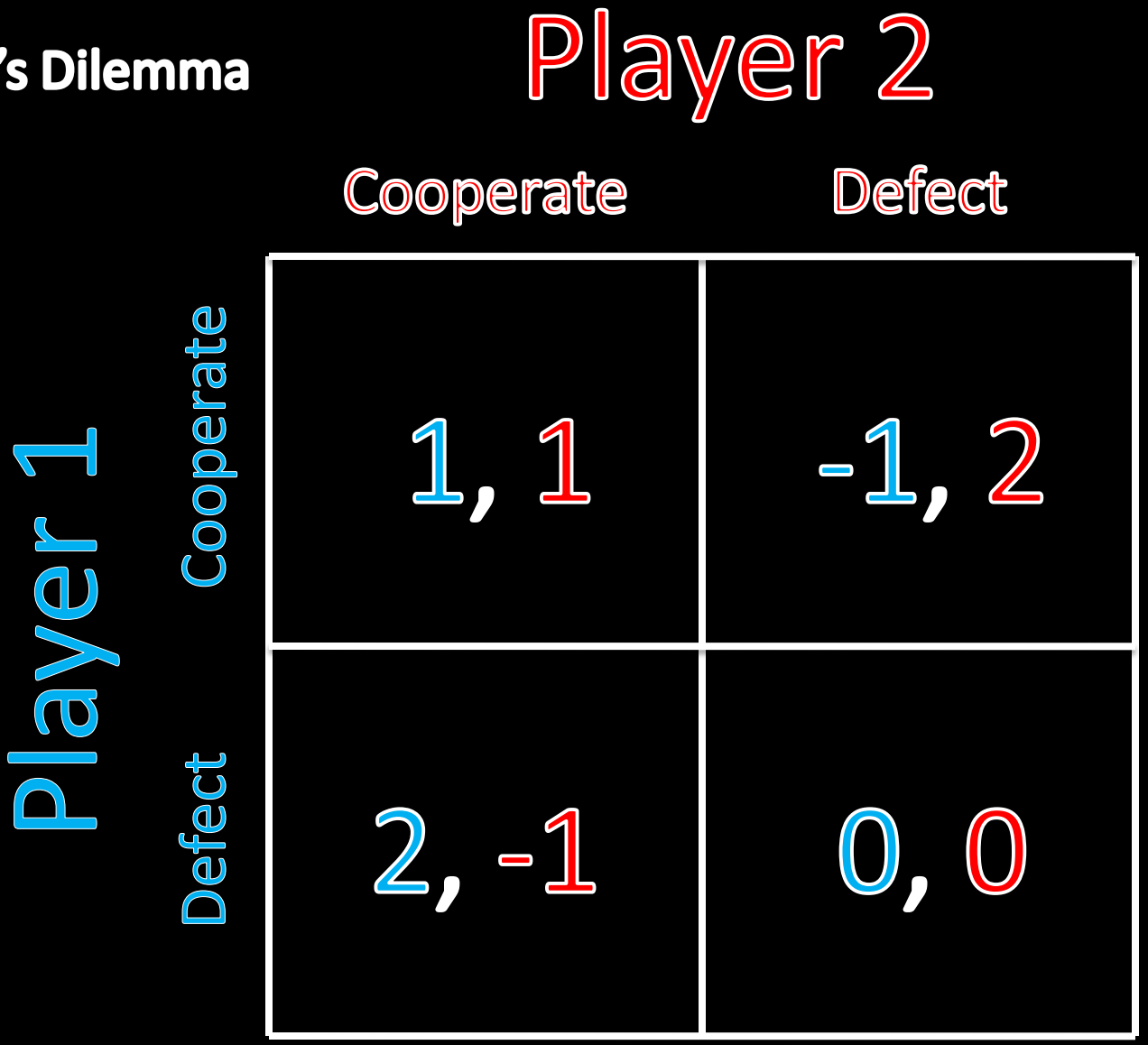
Prisoner's Dilemma



The Prisoner's Dilemma

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  - Some interactions are truly one-shot (preemptive war).
  - Others are repetitive (trade, arms races).

The Prisoner's Dilemma

- In a one-shot interaction, the players cannot cooperate because they individually have incentive to defect.
  - Some interactions are truly one-shot (preemptive war).
  - Others are repetitive (trade, arms races).
- Can states cooperate with each other by threatening punishment in the future?

Repeated Play

- The simplest model:
  - States play the prisoner's dilemma twice.
  - Moves from the first round are publicly known in the second round.

Repeated Play

- Can the players cooperate in the first round under threat of punishment in the second round?
  - Is “I will cooperate today and, if you cooperate today as well, I will cooperate tomorrow” a viable strategy?

Optimal Strategies

- Stage 1:

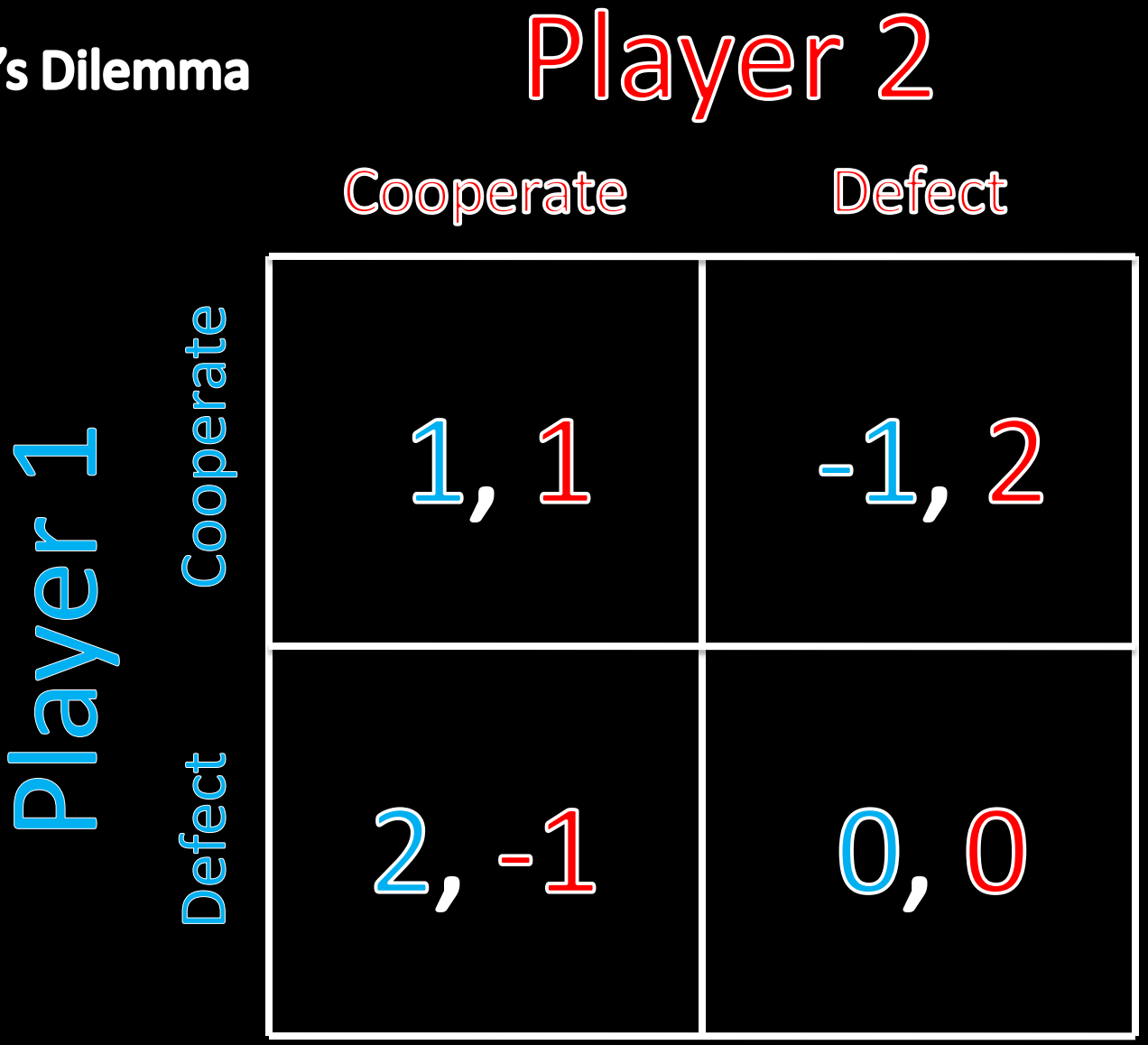
- Stage 2:

Optimal Strategies

- Stage 1: Something happens.

- Stage 2: Something already happened, but the states cannot alter their previous payoffs. Therefore, they must optimize their second stage payoffs.

Prisoner's Dilemma



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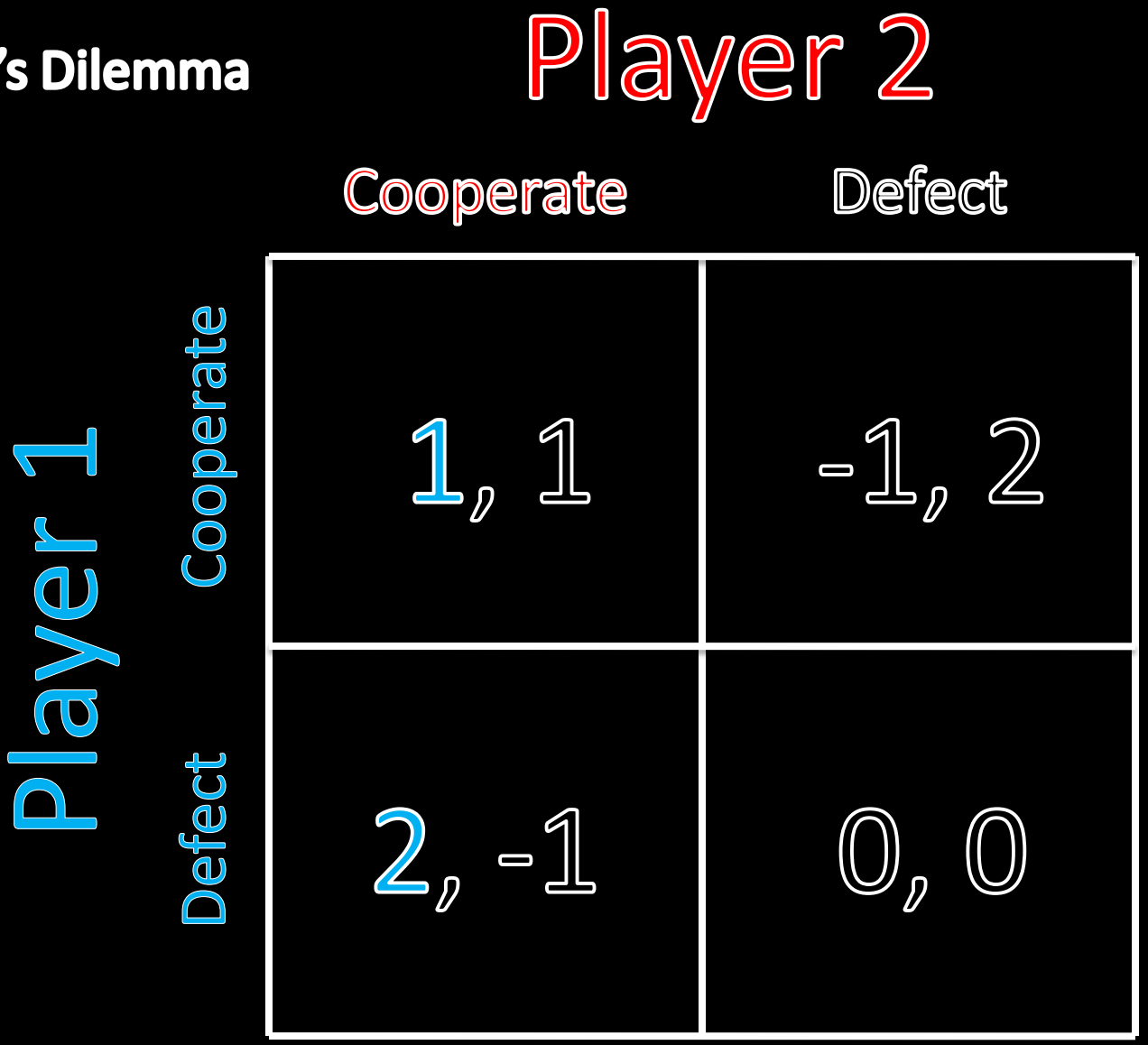

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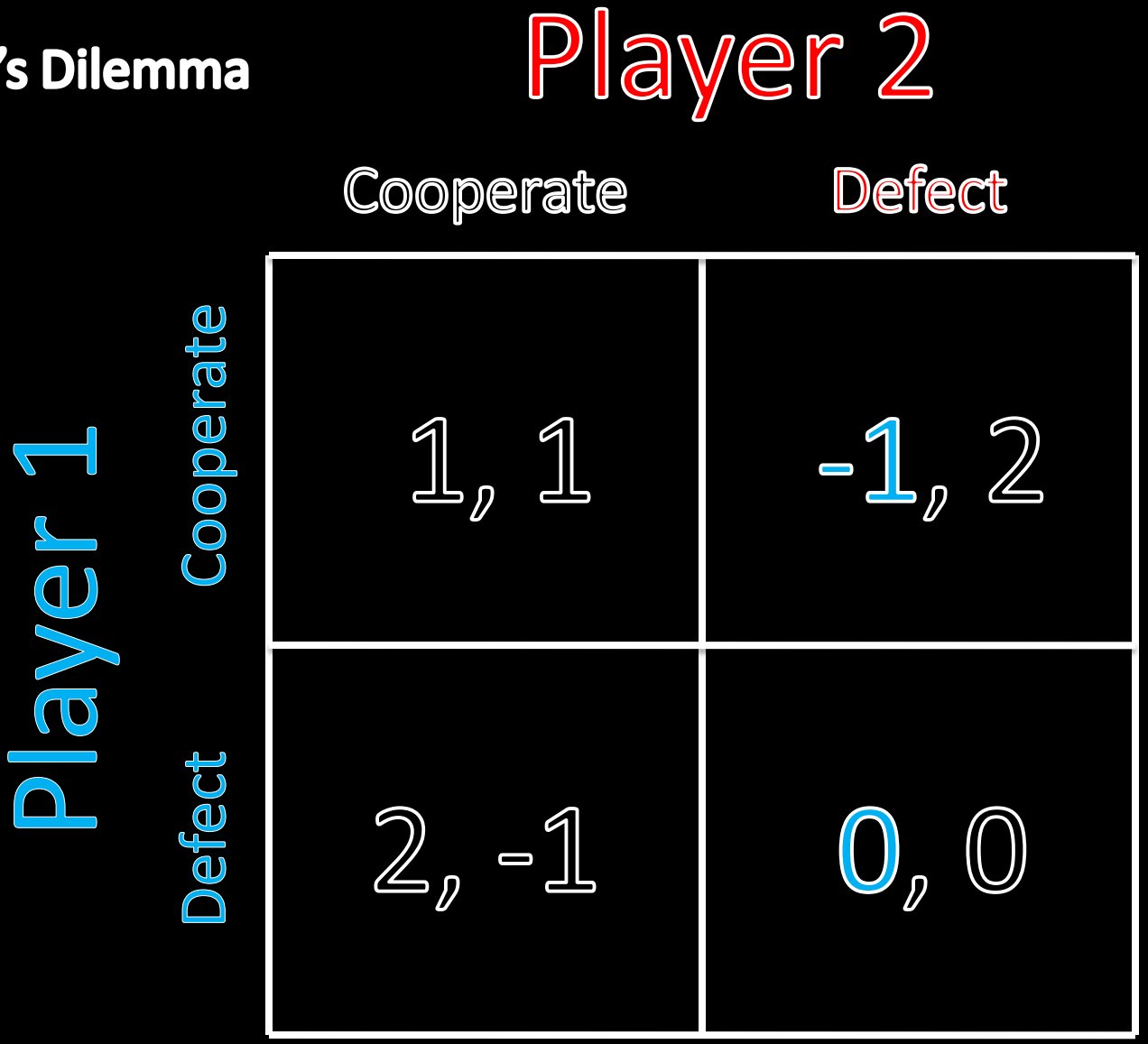


Optimal Strategies

- Stage 1: Something happens.

- Stage 2: Both players defect.

Repeated Play

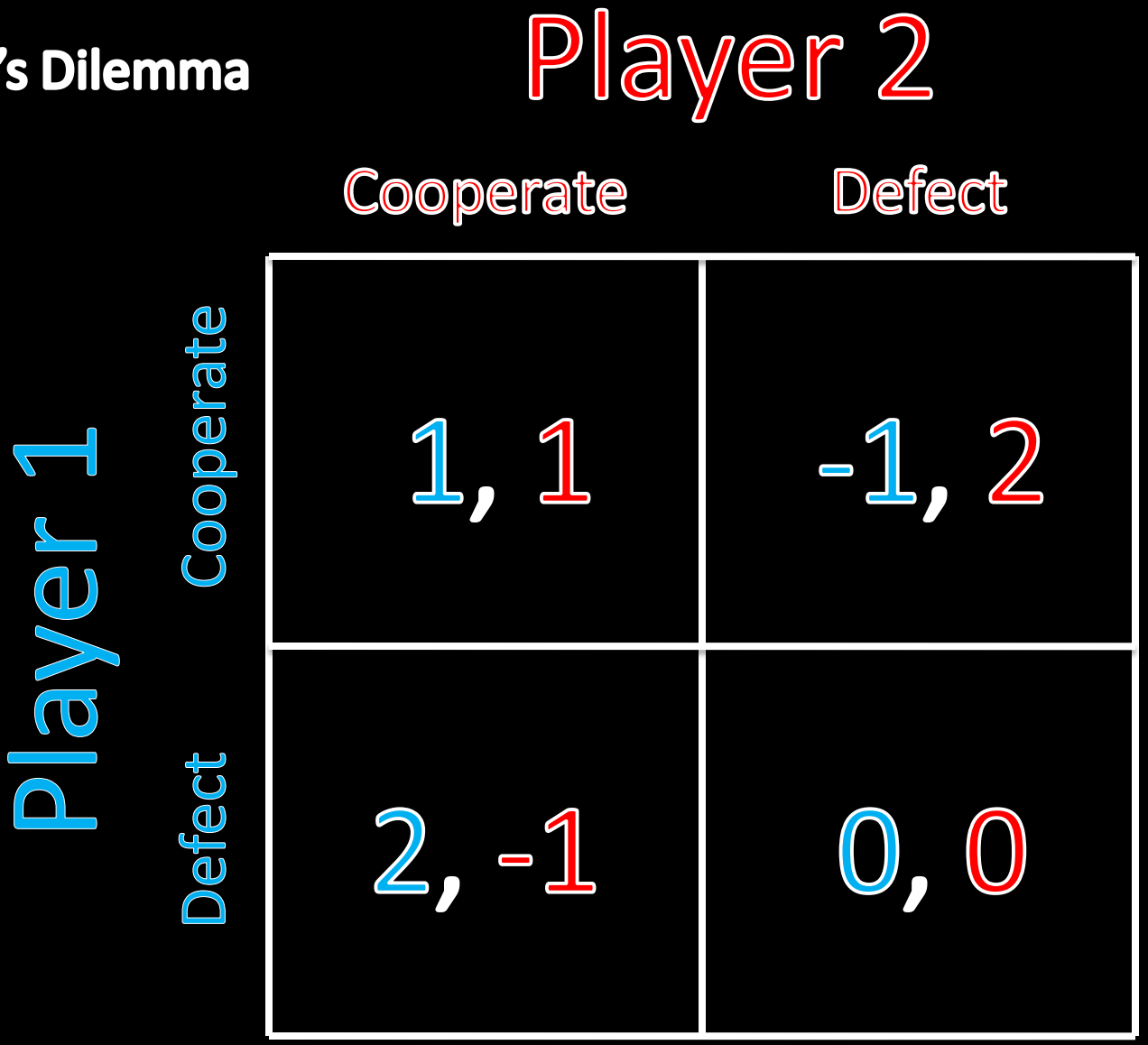
- “I will cooperate today and, if you cooperate today as well, I will cooperate tomorrow.”

Optimal Strategies

- Stage 1: Regardless of what happens in stage 1, the rival will defect in stage 2. Therefore, the states must optimize for today only.

- Stage 2: Both players defect.

Prisoner's Dilemma



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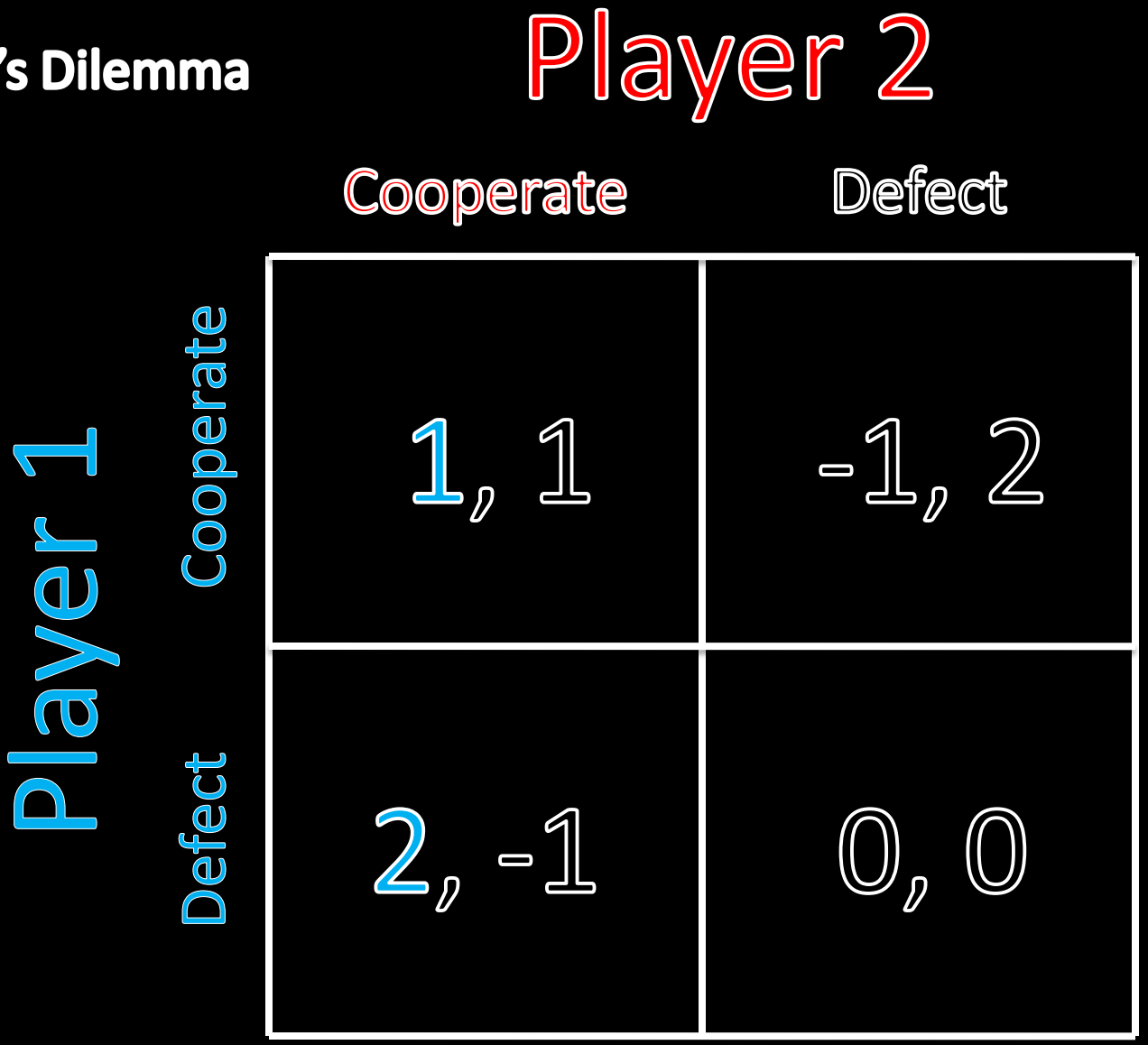

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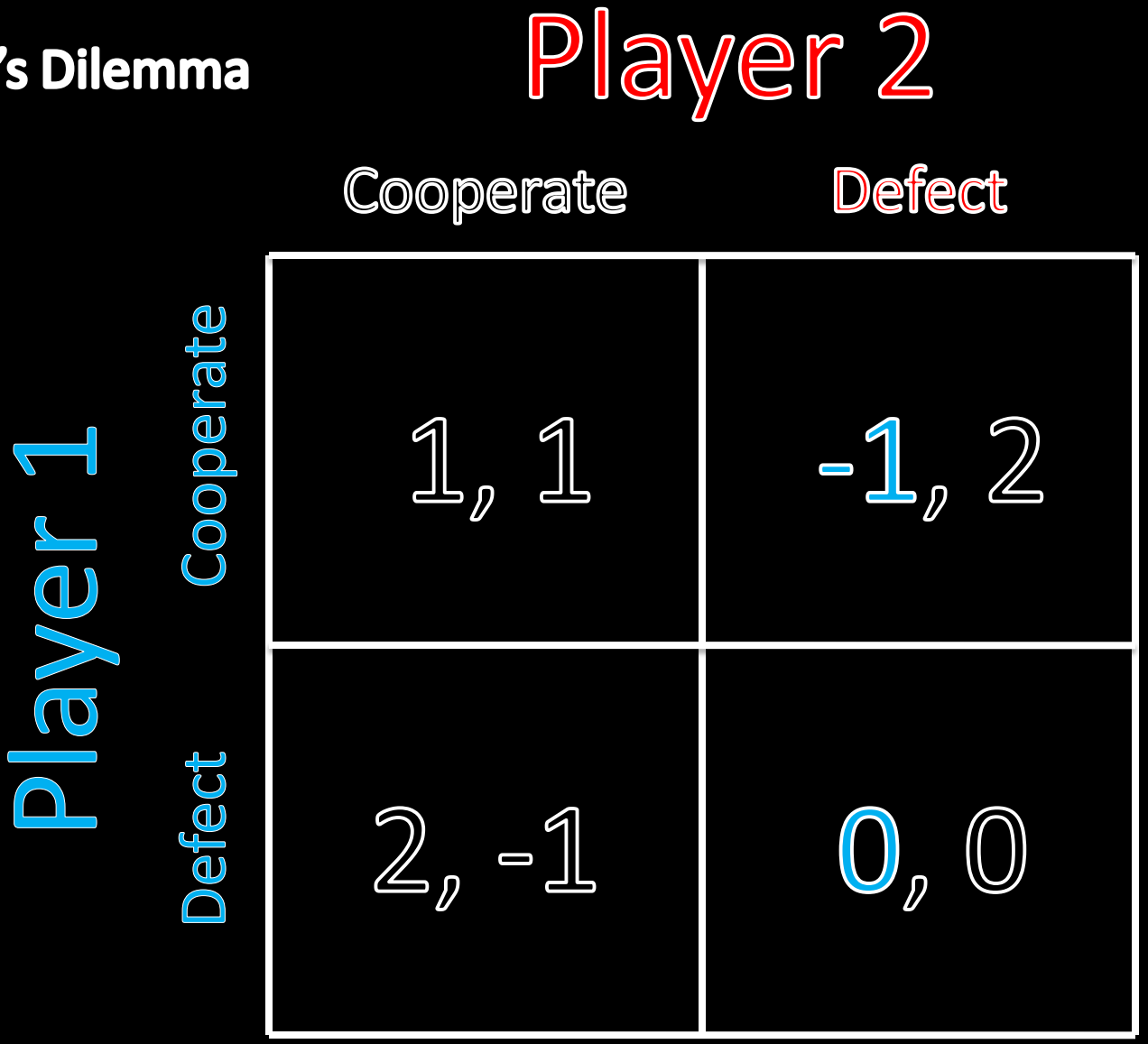

Optimal Strategies

- Stage 1: Both players defect.

- Stage 2: Both players defect.

Result

- Cooperation is not possible with just two interactions.
- Can more interactions help? What if there were n stages?

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
- Stage n – 1: ?
- Stage n: ?

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
- Stage n – 1: ?
- Stage n: Whatever's happened happened.

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
- Stage n – 1: ?
- Stage n: ?

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
- Stage n – 1: ?
- Stage n: Everyone defects.

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
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Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
- Stage n – 1: WHH/future defection certain.
- Stage n: Everyone defects.

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: ?
- Stage n – 1: Everyone defects.
- Stage n: Everyone defects.

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
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- …
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- Stage n – 1: Everyone defects.
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Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: WHH/FDC.
- Stage n – 1: Everyone defects.
- Stage n: Everyone defects.

Optimal Strategies

- Stage 1: ?
- Stage 2: ?
- Stage 3: ?
- …
- Stage n – 2: Everyone defects.
- Stage n – 1: Everyone defects.
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Optimal Strategies

- Stage 1: Everyone defects.
- Stage 2: Everyone defects.
- Stage 3: Everyone defects.
- …
- Stage n – 2: Everyone defects.
- Stage n – 1: Everyone defects.
- Stage n: Everyone defects.

Outcome

- Regardless of the length of the interaction, states never cooperate.
- The endgame sabotages cooperation in the earlier stages.

Repeated Interaction

- The shadow of the future fails to inspire cooperation if the game has a definite end.

Repeated Interaction

- The shadow of the future fails to inspire cooperation if the game has a definite end.
- But interactions in the real world seem to be unlikely to end.
  - Can the states maintain cooperation like this?

The Model

- Two states play the prisoner's dilemma repeatedly.
  - Each period is worth $0 < \delta < 1$ percentage of the last period.
    - So a payoff of 2 tomorrow is only worth 2δ by today's standards.

Grim Trigger

- A “tough love” strategy.
  - Begin by cooperating.
  - If at any point in the game a player has defected, defect for the rest of time.

Grim Trigger

- A “tough love” strategy.
  - Begin by cooperating.
  - If at any point in the game a player has defected, defect for the rest of time.
- Would two grim trigger players ever have incentive to defect on one another?

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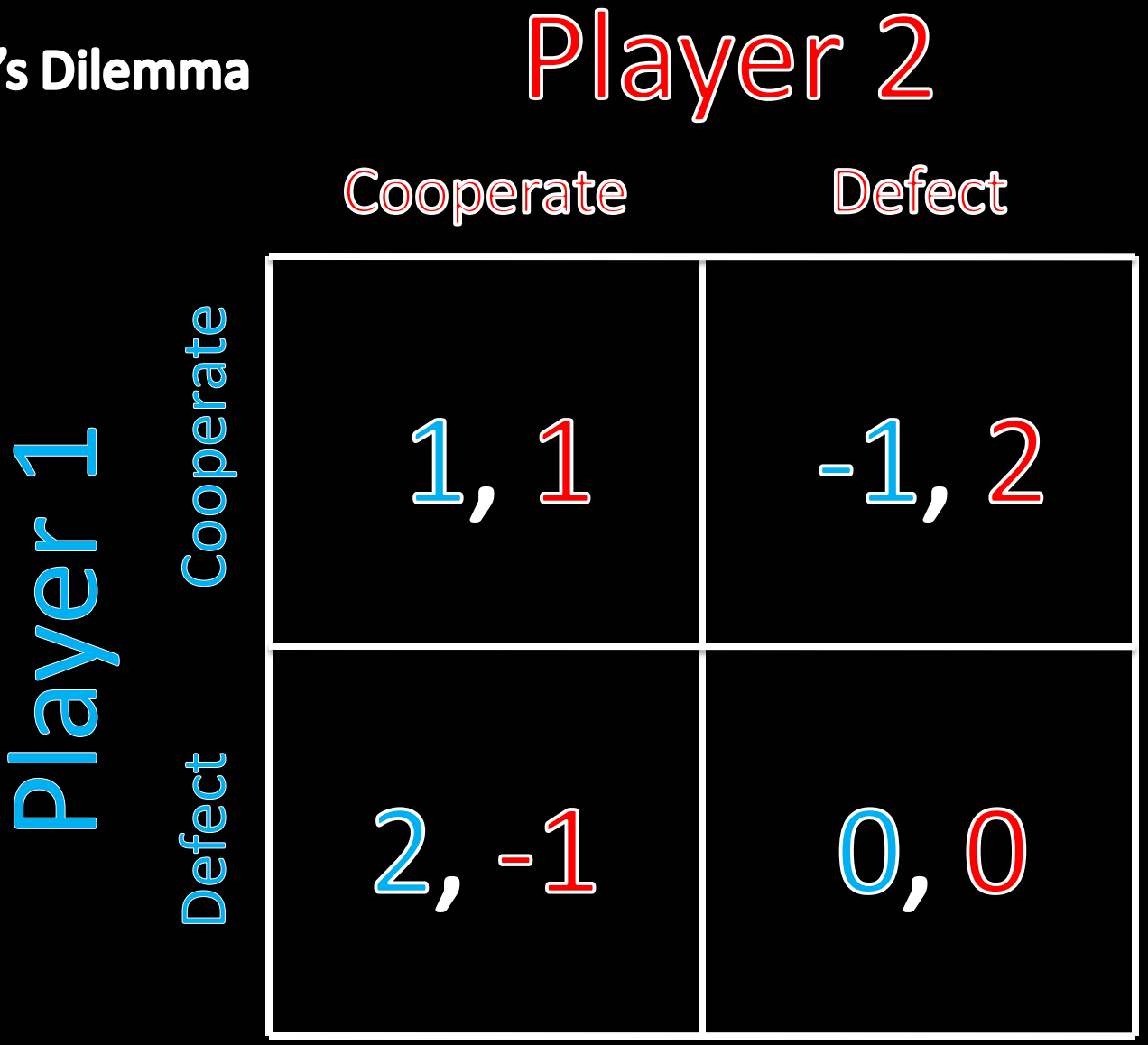

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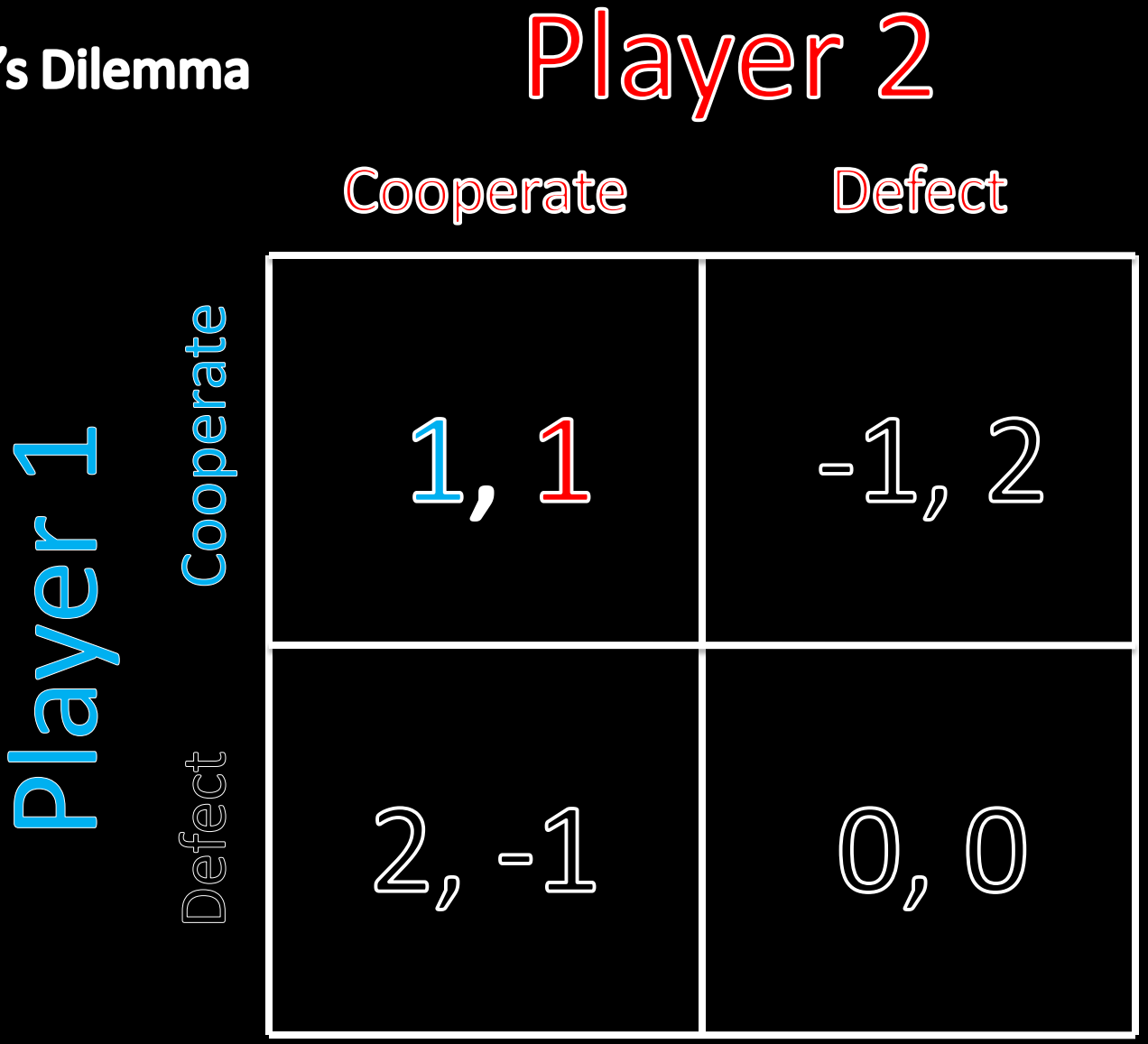


Payoffs for Cooperating Forever

- Today’s payoff: 1

Payoffs for Cooperating Forever

- Today's payoff: 1
- Tomorrow's payoff: (δ)(1)

Payoffs for Cooperating Forever

- Today's payoff: 1
- Tomorrow's payoff: $(\delta)(1)$
- Day after tomorrow's payoff: $(\delta^2)(1)$

Payoffs for Cooperating Forever

- Today's payoff: 1
- Tomorrow's payoff: $(\delta)(1)$
- Day after tomorrow's payoff: $(\delta^2)(1)$
- Fourth day's payoff: $(\delta^3)(1)$
- Fifth day's payoff: $(\delta^4)(1)$
- Sixth day's payoff: $(\delta^5)(1)$
- Seventh day's payoff: $(\delta^6)(1)$

Payoffs for Cooperating Forever

- $1 + (\delta)(1) + (\delta^2)(1) + (\delta^3)(1) + (\delta^4)(1) + (\delta^5)(1) + (\delta^6)(1) + (\delta^7)(1) + (\delta^8)(1) + (\delta^9)(1) + (\delta^{10})(1) + (\delta^{11})(1) + (\delta^{12})(1) + (\delta^{13})(1) + (\delta^{14})(1) + (\delta^{15})(1) + (\delta^{16})(1) + (\delta^{17})(1) + (\delta^{18})(1) + (\delta^{19})(1) + \ldots$
  - This goes on forever.

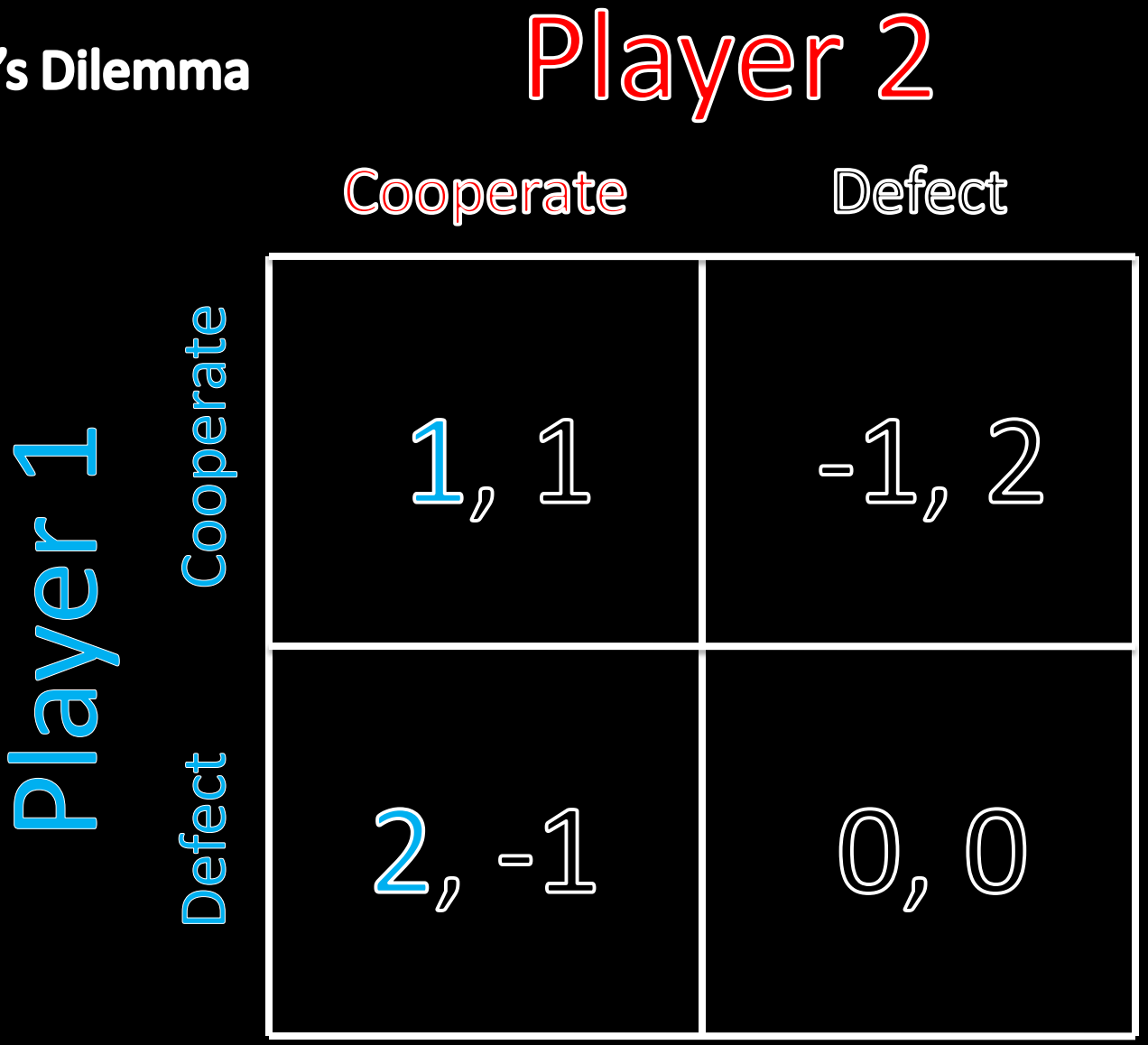
Payoffs for Cooperating Forever

- $1 + (\delta)(1) + (\delta^2)(1) + (\delta^3)(1) + (\delta^4)(1) + (\delta^5)(1) + (\delta^6)(1) + (\delta^7)(1) + (\delta^8)(1) + (\delta^9)(1) + (\delta^{10})(1) + (\delta^{11})(1) + (\delta^{12})(1) + (\delta^{13})(1) + (\delta^{14})(1) + (\delta^{15})(1) + (\delta^{16})(1) + (\delta^{17})(1) + (\delta^{18})(1) + (\delta^{19})(1) + \ldots$
  - This goes on forever.
- Neat math trick: this is finite!
- Equal to $1/(1 - \delta)$.

Payoffs for Betrayal

- If I defect against a grim trigger player, I do slightly better during the first period.

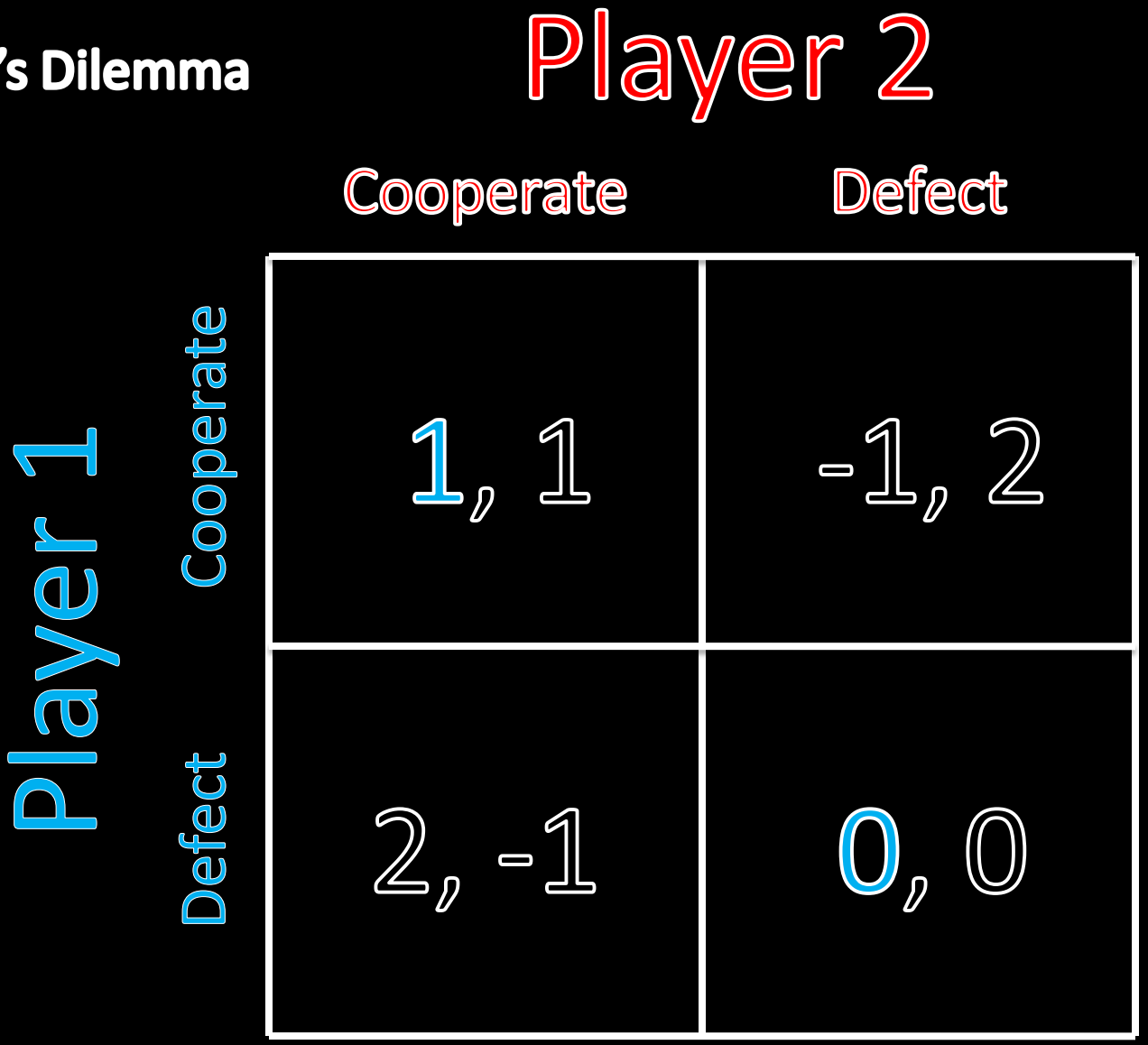
Prisoner's Dilemma



Payoffs for Betrayal

- If I defect against a grim trigger player, I do slightly better during the first period.
  - I get 2 instead of 1.
- However, I do worse for the rest of time.

Prisoner's Dilemma



Payoffs for Betrayal

- If I defect against a grim trigger player, I do slightly better during the first period.
  - I get 2 instead of 1.
- However, I do worse for the rest of time.
  - Instead of earning 1 every period, I earn 0 instead.
- Therefore, the most I can earn from betrayal is 2.

Comparing My Choices

- Payoff for sticking to grim trigger: $1/(1 - \delta)$
- Payoff for betrayal of my opponent: 2

Comparing My Choices

- Payoff for sticking to grim trigger: $1/(1 - \delta)$
- Payoff for betrayal of my opponent: 2
- Therefore, playing cooperatively is in my best interest if:
  - $1/(1 - \delta) \geq 2$
  - $1 \geq 2(1 - \delta)$
  - $1 \geq 2 - 2\delta$
  - $\delta \geq ½$

Important Result

- As long as we are likely to keep interacting in the future, cooperation is possible!

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  - Threat of future punishment keeps states in line even without a world police.

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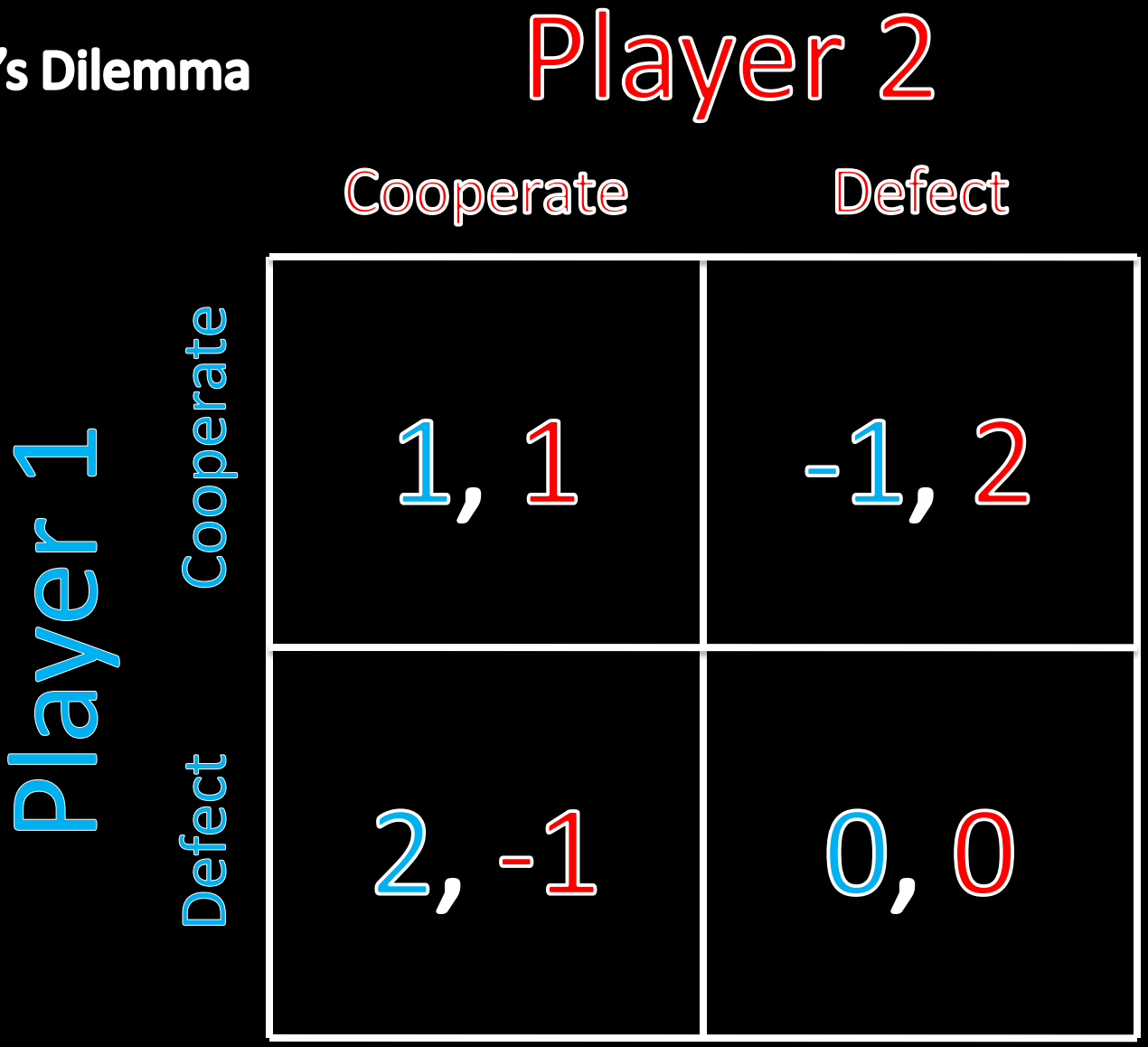
Important Result

- As long as we are likely to keep interacting in the future, cooperation is possible!
  - Threat of future punishment keeps states in line even without a world police.
- But this also means that if $\delta < ½$, cooperation fails.

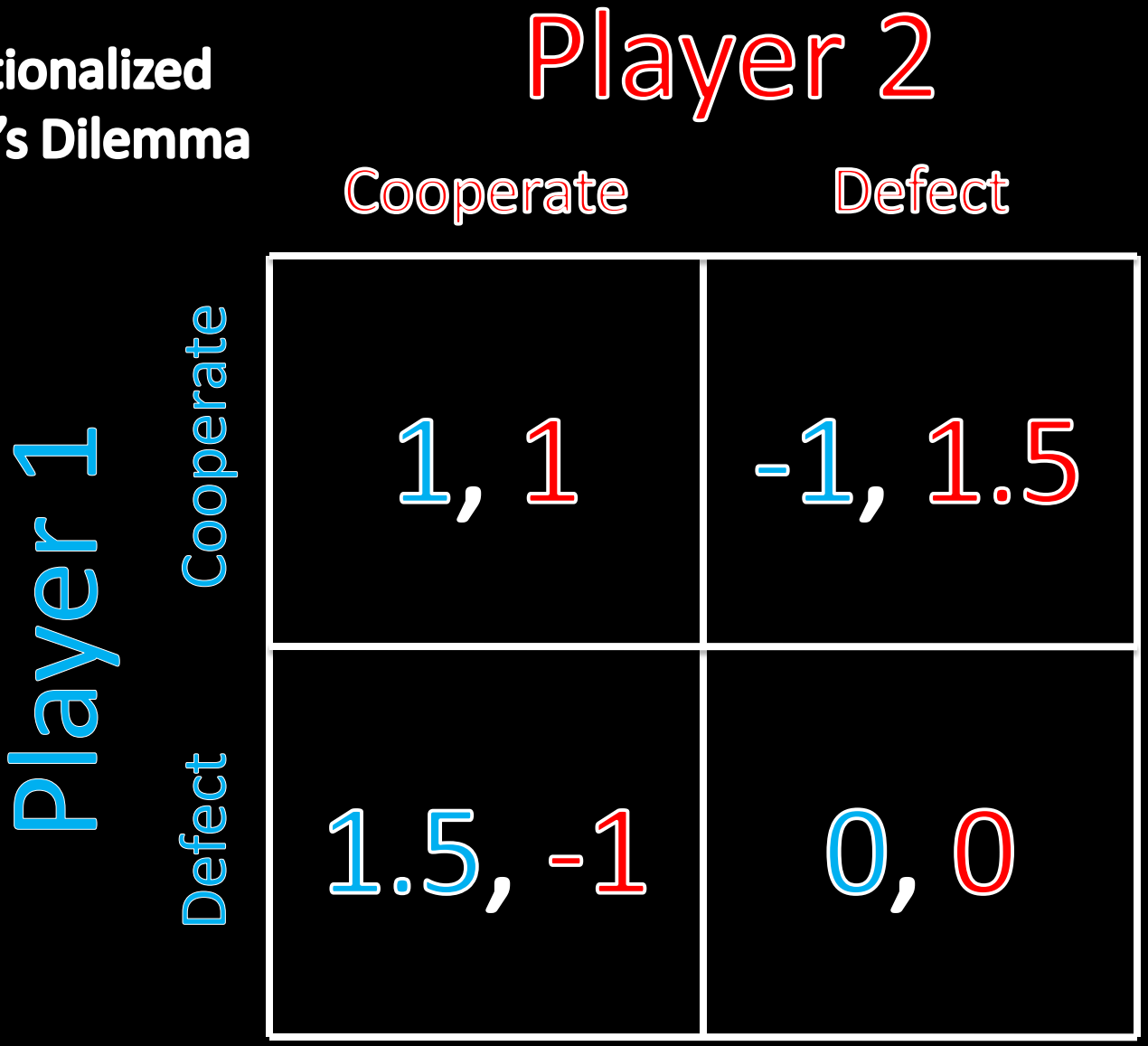
Important Result

- As long as we are likely to keep interacting in the future, cooperation is possible!
  - Threat of future punishment keeps states in line even without a world police.
- But this also means that if $\delta < ½$, cooperation fails.
  - Fortunately, institutions are the GREATEST EVAH.

Prisoner's Dilemma



Institutionalized Prisoner's Dilemma



Payoffs for Cooperating Forever

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  - This goes on forever.
  - Same as before.
  - Equal to $1/(1 - \delta)$.

Payoffs for Betrayal

- If I defect against a grim trigger player, I do slightly better during the first period.
  - I get 1.5 instead of 1.
- However, I do worse for the rest of time.
  - Instead of earning 1 every period, I earn 0 instead.
- Therefore, the most I can earn from betrayal is 1.5.

Comparing My Choices

- Payoff for sticking to grim trigger: $1/(1 - \delta)$
- Payoff for betrayal of my opponent: 2
- Therefore, playing cooperatively is in my best interest if:
  - $1/(1 - \delta) \geq 2$
  - $1 \geq 1.5(1 - \delta)$
  - $1 \geq 1.5 - (1.5)\delta$
  - $\delta \geq 1/3$

GREATEST EVAH, RLY

- Now states can cooperate if $\delta \geq 1/3$.
- Note: We barely changed the payoffs!
  - If institutions matter a little, they can matter a lot.

GREATEST EVAH, RLY

- Now states can cooperate if $\delta \geq 1/3$.
- Note: We barely changed the payoffs!
  - If institutions matter a little, they can matter a lot.
  - Moreover, as long as states are cooperating, the institution never actually does anything.

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Triggering Grim Trigger

- Grim trigger strategies require players to observe violations to be effective.
  - If I can't see whether the other guy defected in the last period, how can I appropriately punish him?
  - This leads to everyone defecting. Cooperation is not possible.

Solution: Bureaucracy!

- Creating monitoring institutions resolves the informational problem.
  - Yes, bureaucracy sucks and is costly to maintain.
  - But it can flag violations of the agreement and allow states to correctly sanction violators.
  - The alternative is no cooperation at all.

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