



Instructor Guide to Matrix Games

Laboratory implementation, theoretical foundations,
experimental evidence, and variants

Behavioral and Experimental Economics Research Lab
Department of Economics



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<https://beer-lab.org/>

How to use this guide

This guide supports a complete class session with six canonical matrix games and their extensions. Common procedures appear once. Each game section then explains the payoff matrix, benchmark equilibrium, evidence to inspect, and questions for feedback.

The basic edition compares one round, repeated play with a fixed partner, and repeated play with reassigned partners. The extended edition adds communication, aggregate history, losses, focal labels, and catalog-defined matrices.

Author

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For the instructor

A class session produces evidence about strategic behavior in one group. Frequencies are not population estimates, and a deviation from equilibrium does not identify a psychological mechanism by itself. Use the matrix, the information available, and the round-by-round path to organize discussion.

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Quick reference

1.1 Access through the updated laboratory website

Start at <https://beer-lab.org/en/>. Select **CLASSROOM** in the top navigation menu; it opens <https://teaching.beer-lab.org/en/>. In the **Classroom experiments** catalog, use the search box to locate the activity by name. You can also filter by **Topic** or **JEL code**. Clear any filters left from an earlier search before looking for another game.

Each family's card distinguishes **Español** and **English** access links. The **Show extended version** checkbox selects that edition before following a link. Catalog language and session language are separate choices: verify both. Students use the room specified by the instructor; the instructor prepares and monitors the session through this family's own administrative pages.



Figure 1.1: Current institutional website. Select **CLASSROOM** in the top navigation menu to open the teaching experiments. Captured on October 7, 2026.



Figure 1.2: Current catalog: search by title, topic, or JEL code. Then locate this family's card and select language and edition. Captured on October 7, 2026.

Checking resources, comprehension, and participant requirements

Before opening the room, check the selected configuration and the number of students present. The session-creation form states the group size and minimum required by that configuration. An individual activity accepts any positive participant count; an interactive activity must satisfy its stated requirement: complete groups when size is fixed, or a minimum participant count when size is flexible. Requirements may change across treatments, for example when adding a third party or changing an institution's size. If you edit a grouping parameter, check the requirement for the edited configuration, rather than relying only on the demo's suggested count.

In the instructions, ensure that students can identify what each role receives, what they can decide, and how the outcome is calculated. An initial account, a distributable budget, and final earnings need not be the same amount. Refer to the resources panel and the example for the selected treatment. Do not carry the basic edition's endowment into a treatment that changes accounts or introduces additional positions.

When a comprehension check is included, an incorrect response receives an explanation beside that question, identifying the submitted answer and the correct answer. Other answers remain in the form. Ask the student to return to the example, locate the relevant rule, and redo the calculation before correcting the response. Avoid revealing answers to the entire class for an individual error, and do not interpret a comprehension mistake as an economic choice in the game.

iciales — Bach o Stravinsky, una ronda	Juegos matriciales / Matrix Games — BEER Lab Seleccione una variante de este juego. Select a version of this game.
es — Bach or Stravinsky, one round	
iciales — Bach o Stravinsky, 10 rondas, pareja fija	
es — Bach or Stravinsky, 10 rounds, fixed partner	
iciales — Bach o Stravinsky, 10 rondas, parejas reasignadas	
es — Bach or Stravinsky, 10 rounds, reassigned partners	
iciales — Monedas coincidentes, una ronda	
es — Matching Pennies, one round	
iciales — Monedas coincidentes, 10 rondas, pareja fija	
es — Matching Pennies, 10 rounds, fixed partner	
iciales — Monedas coincidentes, 10 rondas, parejas reasignadas	
es — Matching Pennies, 10 rounds, reassigned partners	
iciales — Caza del ciervo, una ronda	
es — Stag Hunt, one round	
iciales — Caza del ciervo, 10 rondas, pareja fija	
es — Stag Hunt, 10 rounds, fixed partner	
iciales — Caza del ciervo, 10 rondas, parejas reasignadas	
es — Stag Hunt, 10 rounds, reassigned partners	
iciales — Piedra, papel o tijera, una ronda	
es — Rock, Paper, Scissors, one round	
iciales — Piedra, papel o tijera, 10 rondas, pareja fija	
es — Rock, Paper, Scissors, 10 rounds, fixed partner	
iciales — Piedra, papel o tijera, 10 rondas, parejas reasignadas	
es — Rock, Paper, Scissors, 10 rounds, reassigned partners	
iciales — MinMax, una ronda	
es — MinMax, one round	
iciales — MinMax, 10 rondas, pareja fija	
es — MinMax, 10 rounds, fixed partner	
iciales — MinMax, 10 rondas, parejas reasignadas	

Figure 1.3: Demo contains only the configurations of this game family, in both languages and editions. Continuation 1/3.

	iciales — Monedas coincidentes, una ronda
	es — Matching Pennies, one round
BE	iciales — Monedas coincidentes, 10 rondas, pareja fija
	es — Matching Pennies, 10 rounds, fixed partner
	iciales — Monedas coincidentes, 10 rondas, parejas reasignadas
	es — Matching Pennies, 10 rounds, reassigned partners
	iciales — Caza del ciervo, una ronda
	es — Stag Hunt, one round
	iciales — Caza del ciervo, 10 rondas, pareja fija
	es — Stag Hunt, 10 rounds, fixed partner
	iciales — Caza del ciervo, 10 rondas, parejas reasignadas
	es — Stag Hunt, 10 rounds, reassigned partners
	iciales — Piedra, papel o tijera, una ronda
	es — Rock, Paper, Scissors, one round
	iciales — Piedra, papel o tijera, 10 rondas, pareja fija
	es — Rock, Paper, Scissors, 10 rounds, fixed partner
	iciales — Piedra, papel o tijera, 10 rondas, parejas reasignadas
	es — Rock, Paper, Scissors, 10 rounds, reassigned partners
	iciales — MinMax, una ronda
	es — MinMax, one round
	iciales — MinMax, 10 rondas, pareja fija
	es — MinMax, 10 rounds, fixed partner
	iciales — MinMax, 10 rondas, parejas reasignadas
	es — MinMax, 10 rounds, reassigned partners
	iciales — Esconder y buscar, una ronda
	es — Hide and Seek, one round
	iciales — Esconder y buscar, 10 rondas, pareja fija
	es — Hide and Seek, 10 rounds, fixed partner
	iciales — Esconder y buscar, 10 rondas, parejas reasignadas
	es — Hide and Seek, 10 rounds, reassigned partners

Figure 1.4: Demo contains only the configurations of this game family, in both languages and editions. Continuation 2/3.

	iciales extendidos — Bach–Stravinsky con comunicación
	iciales extendidos — Caza del ciervo con comunicación
	iciales extendidos — Caza del ciervo con pérdidas
	iciales extendidos — Monedas coincidentes con historial agregado
	iciales extendidos — Piedra, papel o tijera con historial agregado
	iciales extendidos — Esconder y buscar con etiquetas focales
	iciales extendidos — matriz docente 2×2
	iciales extendidos — matriz docente 3×3
	atrix Games — Bach–Stravinsky with communication
	atrix Games — Stag Hunt with communication

es	— MinMax, 10 rounds, reassigned partners	
iciales	— Esconder y buscar, una ronda	
BE	es	— Hide and Seek, one round
iciales	— Esconder y buscar, 10 rondas, pareja fija	
es	— Hide and Seek, 10 rounds, fixed partner	
iciales	— Esconder y buscar, 10 rondas, parejas reasignadas	
es	— Hide and Seek, 10 rounds, reassigned partners	
iciales extendidos	— Bach–Stravinsky con comunicación	
iciales extendidos	— Caza del ciervo con comunicación	
iciales extendidos	— Caza del ciervo con pérdidas	
iciales extendidos	— Monedas coincidentes con historial agregado	
iciales extendidos	— Piedra, papel o tijera con historial agregado	
iciales extendidos	— Esconder y buscar con etiquetas focales	
iciales extendidos	— matriz docente 2×2	
iciales extendidos	— matriz docente 3×3	
atrix Games	— Bach–Stravinsky with communication	
atrix Games	— Stag Hunt with communication	
atrix Games	— Stag Hunt with losses	
atrix Games	— Matching Pennies with aggregate history	
atrix Games	— Rock, Paper, Scissors with aggregate history	
atrix Games	— Hide and Seek with focal labels	
atrix Games	— instructor matrix 2×2	
atrix Games	— instructor matrix 3×3	

Figure 1.5: Demo contains only the configurations of this game family, in both languages and editions. Continuation 3/3.

Rooms

Current rooms:

[ES] Juegos matriciales
[EN] Matrix Games
[ES] Juegos matriciales: extendido
[EN] Matrix Games: extended

Figure 1.6: Rooms contains the four rooms for this family: basic and extended editions in Spanish and English.

Room: [EN] Matrix Games

Create a new session

Session Config

[EN] Matrix Games — Bach or Stravinsky, one round

Number of participants

Complete groups of 2 participants. Use a multiple of 2; minimum 2.

Create

[Configure session](#) 

App sequence

matrix_games_game (10 rounds)

Juegos matriciales bilingües / Bilingual Matrix Games.

Figure 1.7: Session-creation form for the basic English room. Check the selected configuration and participant requirement before creating the session.

Downloading a session with several rounds

For the instructor

Open **Data** within the relevant session and use that session's CSV or CSV-for-Excel download link. The general export has one row per participant and columns for the different rounds. Ten rounds do not necessarily mean ten rows per person. When the family provides its own long-format export, observations may instead be organized by participant and round or another unit defined by the design.

Save the original file together with the configuration name, session code, and active-round count. Check that columns for the last active round are present and that the data belong to the selected session. Empty cells can represent inactive rounds, a pending decision, or a field that does not apply to a role; do not automatically recode them as zeros. To compare learning, preserve round and group identifiers alongside participant identifiers. Share only anonymous aggregates in class, and record session incidents before constructing derived tables.

Purpose	Teach normal form, best responses, pure and mixed equilibrium, coordination, minimax, learning, and focality.
Experimental unit	Pair: one participant controls rows and another controls columns.
Participants	An even number; four or more make pair comparisons possible.
Roles	Fixed within a session; partners may remain fixed or be reassigned.
Payoff	ECUs. This teaching implementation does not define a cash conversion.

Basic edition	Six games, each offered as one round, 10 fixed-partner rounds, and 10 reassigned-partner rounds.
Extended edition	Eight treatments per language.
Students	https://matrixgames.beer-lab.org/room/matrix_games_en
Instructor	https://matrixgames.beer-lab.org/demo
Local test	http://localhost:8020/demo with <code>GAME_FAMILY=matrixgames</code> .
Decision	Choose an action in the matrix; payoff depends on both players' actions.
Topics	normal form; Nash equilibrium; mixed strategies; coordination; game theory.
JEL	C72; C92.

Attention

The `matrixgames.beer-lab.org` domain is the proposed production route. It requires DNS, a dedicated oTree process, and its own PostgreSQL database. The local instance was verified on port 8020.

1.2 Learning objectives

By the end of a session, students should be able to:

- read a payoff matrix from the row and column roles;
- identify best responses, dominated strategies, and pure-strategy Nash equilibria;
- interpret a mixed strategy as a probability distribution rather than mechanical alternation;
- distinguish coordination, distributional conflict, and opposing interests;
- compare one-shot predictions with adaptation under repetition and aggregate history;
- assess how communication, payoff levels, and focal labels affect observed behavior.

1.3 Concepts before entering the laboratory

1.4 Normal form and simultaneity

Each pair chooses without observing the partner's current action. Rows belong to Participant A and columns to Participant B. In every cell, the first number is the row player's payoff and the second is the column player's payoff. A best response maximizes a role's payoff given the other role's action.

A Nash equilibrium is a profile in which neither participant gains from a unilateral deviation (Nash, 1951). In a mixed equilibrium, each action receives a probability that makes the other role indifferent among actions used with positive probability. A small class need not reproduce those probabilities exactly.

1.5 Three strategic problems

Coordination. Bach–Stravinsky and Stag Hunt have multiple pure equilibria. The empirical question is which equilibrium is selected and how often coordination fails.

Opposing interests. Matching Pennies, MinMax, Rock–Paper–Scissors, and Hide and Seek require unpredictability. Aggregate equilibrium frequencies can coexist with predictable individual sequences.

Focality. A prominent label can change expectations without changing payoffs. The focal Hide and Seek treatment separates the payoff matrix from framing.

Theoretical foundation

Solve the matrix first. State the prediction second. Inspect the data third. The report compares observed frequencies with equilibrium benchmarks but does not label a difference as statistically significant.

Accessing the platform

Begin at <https://beer-lab.org/>, open <https://teaching.beer-lab.org/>, and select *Matrix Games*.

Basic ES: https://matrixgames.beer-lab.org/room/juegos_matriciales_es

Basic EN: https://matrixgames.beer-lab.org/room/matrix_games_en

Extended ES: https://matrixgames.beer-lab.org/room/juegos_matriciales_extendido

Extended EN: https://matrixgames.beer-lab.org/room/matrix_games_extended

Instructors: <https://matrixgames.beer-lab.org/demo>

Rooms: <https://matrixgames.beer-lab.org/rooms>

The isolated instance contains 52 configurations: 36 basic and 16 extended across both languages. *Demo* and *Rooms* must not display another game family.

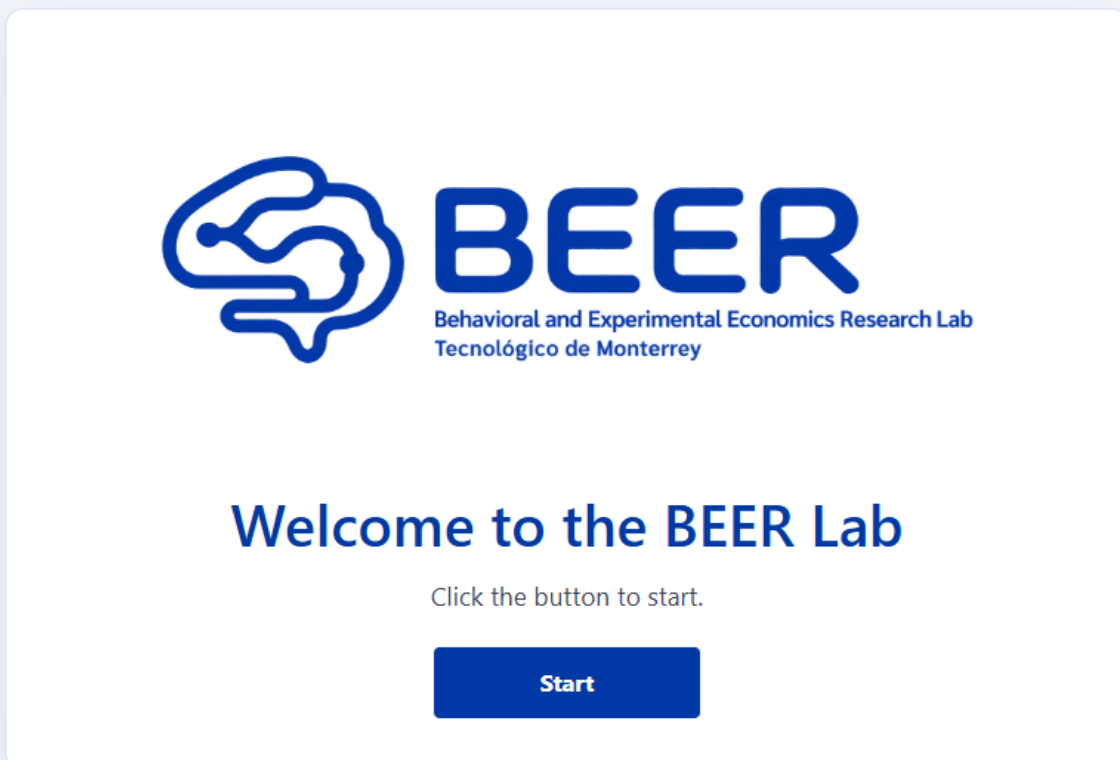


Figure 2.1: Public landing page for the basic English room.

oTree Demo Sessions Rooms Data Server Check

[EN] Matrix Games — Bach or Stravinsky, one round: session 'u09489nh' (demo)

New Links Monitor Data Payments Report Description

Below are temporary links for testing and demonstration. To launch a real study, either create persistent links by setting up a [room](#), or create a session through the [sessions page](#).

Choose one of the following options to play the session:

Combined views

Split-screen view [Launch](#) Grid view [Launch](#)

Session-wide testing link

Open the below link in up to 4 browser tabs.

<http://127.0.0.1:8020/join/zedeteme>

Single-use links

Open each link in its own browser tab.

P1	http://127.0.0.1:8020/initializeParticipant/dxj9hi1c
P2	http://127.0.0.1:8020/initializeParticipant/nkbj0b05
P3	http://127.0.0.1:8020/initializeParticipant/h1kbqper
P4	http://127.0.0.1:8020/initializeParticipant/fs710f5j

Figure 2.2: Individual links in a demo session. Each participant must use a different link.

2.1 Preparing a session

1. Define one teaching question: equilibrium selection, mixing, learning, communication, losses, or focality.
2. Choose language, edition, and configuration. Use one round for initial intuition and 10 rounds for adaptation.
3. Recruit an even number of participants. If you want spontaneous choices, do not announce the equilibrium strategy before play.
4. Create the session, keep *Monitor* and the instructor report open, and test one link before distribution.
5. Explain that ECUs are classroom points. Negative values in the losses treatment are not debts and do not require students to pay money.
6. Wait until the session is complete before revealing the report.

Participant flow

Review the participant journey after selecting the matrix and before distributing entry links. The same architecture can represent coordination, conflict, or competition, so recognizing the screen's appearance is not sufficient. Check action names, the payoffs associated with each combination, and the role of the person choosing rows or columns. The displayed matrix must belong to the configuration announced to the class.

The opening screens present the welcome, rules, and a check of matrix reading. To locate a payoff, students combine their own action with the other person's action and identify which of the two amounts belongs to them. A comprehension error may arise from reversing roles, reading the wrong cell, or confusing one's own payoff with the partner's. Specific feedback allows that difficulty to be resolved before students make decisions that will be used in the discussion.

The decision is private and simultaneous. The subsequent waiting screen synchronizes the pair's choices; it should not be interpreted as a strategic announcement. When the outcome appears, participants can reconstruct actions and payoffs before proceeding to another round or the final screen. In repeated versions, explain whether partners remain together and what history is observable. Those conditions change opportunities to learn and coordinate even if the matrix itself remains unchanged.

Checkpoint

Before launching the session, read one cell from both roles and confirm that everyone identifies their own payoff. Avoid projecting individual choices while the activity is running. Compare observed decisions, best responses, and equilibrium using the aggregate report once the block ends.

The institutional cover explains the purpose and laboratory rules. Participants then see instructions, a comprehension check, any treatment-specific information, the simultaneous decision, pair outcome, and an explicit closing screen.



Welcome to the BEER Lab

The Behavioral and Experimental Economics Research Lab of the Department of Economics at Tecnológico de Monterrey is a space designed to learn about economic decision-making through controlled activities.

In this activity, you will make strategic decisions. Your outcome will depend on your choice and another person's choice.

General laboratory rules

- Remain silent and do not talk to other participants.
- Make your decisions individually and privately.
- Follow the instructions shown on screen.
- Do not refresh, close, or leave this page.
- If you have a problem, raise your hand and wait for laboratory staff.

☒ I have read the rules and agree to follow them.

Start

Con tecnología de [oTree](#)

Figure 3.1: BEER Lab welcome page and general session rules.



MATRIX GAMES

Bach or Stravinsky

 Your role
Participant A
Resources and unit of account

ECU stands for Experimental Currency Units. It is the unit of account for this activity.

This session does not convert ECU into real money.

Instructions

The matrix shows the possible outcomes. Your decision is combined simultaneously with the other person's decision.

Your actions appear in the rows. In each cell, the first number is your outcome and the second belongs to the other person.

Neither person will know the other's decision before choosing. **You will play one round.**

Outcome matrix in ECUs

Row ↓ · Column →	Bach	Stravinsky
Bach	80, 60	0, 0
Stravinsky	0, 0	60, 80

Each cell displays: Row outcome, Column outcome.

Core concept

Coordination with two efficient equilibria and conflict over which one to select.

Theoretical prediction

There are two coordinated pure equilibria and one mixed equilibrium. Theory alone does not select a coordinated outcome.

[Continue](#)

Con tecnología de [oTree](#)

Figure 3.2: Current instructions for the basic edition: initial resources, decision rules, and experimental units.



Review the marked questions. Each shows your answer and an explanation; your other answers are retained.

BACH OR STRAVINSKY

Comprehension check

Answer correctly before making decisions.

Your role
Participant B

Row ↓ Column →	Bach	Stravinsky
Bach	80, 60	0, 0
Stravinsky	0, 0	60, 80

Each cell displays: Row outcome, Column outcome.

Which part of the matrix contains your actions?

- ☒ The rows
☐ The columns
☐ Both at the same time

Your answer: The rows. The correct answer is The columns. Review your role and where your actions appear.

In the highlighted cell, how many ECUs do you receive?

60

In the highlighted cell, how many ECUs does the other person receive?

80

When will you learn the other person's decision?

- ☒ After both people have decided
☐ Before I make my decision
☐ It will never be recorded

How many rounds will you play?

- ☒ 1
☐ 10

Figure 3.3: Current comprehension check with an incorrect answer, its specific explanation, and retained responses. Continuation 1/2.

Which part of the matrix contains your actions?

☒ The rows
☐ The columns
☐ Both at the same time

Your answer: The rows. The correct answer is The columns. Review your role and where your actions appear.

In the highlighted cell, how many ECUs do you receive?

60

In the highlighted cell, how many ECUs does the other person receive?

80

When will you learn the other person's decision?

☒ After both people have decided
☐ Before I make my decision
☐ It will never be recorded

How many rounds will you play?

☒ 1
☐ 10

Continue

Con tecnología de [oTree](#)

Figure 3.4: Current comprehension check with an incorrect answer, its specific explanation, and retained responses. Continuation 2/2.



BACH OR STRAVINSKY · ROUND 1 OF 10

Message received

Your role
Participant B

Your partner sent the following message:

I propose that we choose: Bach

Before choosing, both participants will send a structured message about the action they consider appropriate. The message is not binding.

Continue

Con tecnología de [oTree](#)

Figure 3.5: Structured pre-decision communication in the extended coordination treatment.



BACH OR STRAVINSKY · ROUND 1 OF 10

Make your decision

Your role
Participant B

Select an action. Your partner decides at the same time and will not see your choice before deciding.

Row ↓ · Column →	Bach	Stravinsky
Bach	80 , 60	0 , 0
Stravinsky	0 , 0	60 , 80

Your action

☐ Bach

☐ Stravinsky

Continue

Con tecnología de [oTree](#)

Figure 3.6: Decision page: the matrix remains visible and color identifies the role.



BACH OR STRAVINSKY · ROUND 1 OF 10

Round result

Cumulative outcome
0 ECUs

Your action

Bach

0 ECUs

Other person's action

Stravinsky

0 ECUs

Continue to the next round

Con tecnología de [oTree](#)

Figure 3.7: Round result: both actions, realized cell, and role-specific payoffs.



BACH OR STRAVINSKY

Activity completed

Cumulative outcome

0 ECUs

You have completed all decisions. Keep this screen open and wait for the instructor's directions.

Decision history

Round	Your action	Other person's action	Your outcome
1	Bach	Stravinsky	0 ECUs
2	Stravinsky	Bach	0 ECUs
3	Bach	Stravinsky	0 ECUs
4	Stravinsky	Bach	0 ECUs
5	Bach	Stravinsky	0 ECUs
6	Stravinsky	Bach	0 ECUs
7	Bach	Stravinsky	0 ECUs
8	Stravinsky	Bach	0 ECUs
9	Bach	Stravinsky	0 ECUs
10	Stravinsky	Bach	0 ECUs

You have completed all decisions. Keep this screen open and wait for the instructor's directions.

Con tecnología de [oTree](#)

Figure 3.8: Explicit closing page with cumulative payoff and action summary.

Instructor report and feedback

The report remains hidden while pairs are pending and requires an explicit instructor action to show results. It never displays participant codes.

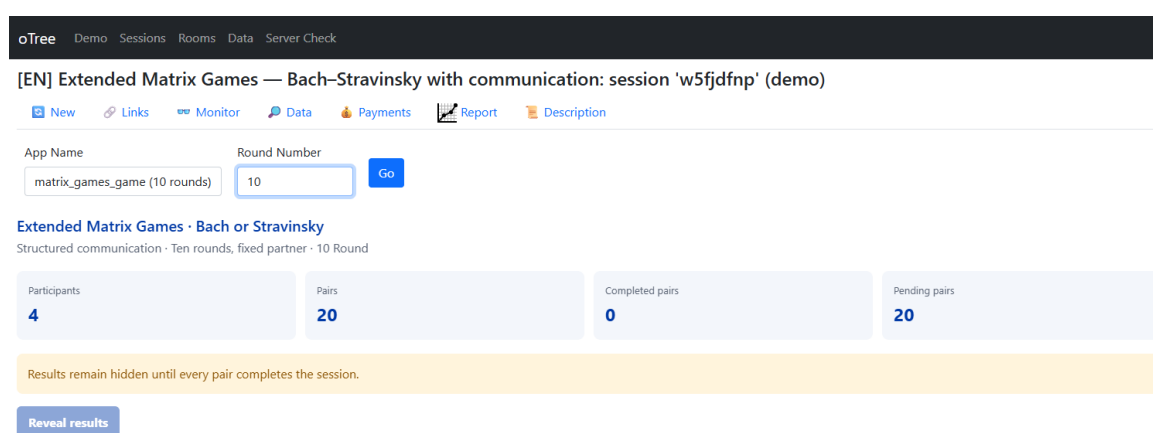


Figure 4.1: Progress indicators and the protected report before reveal.

Read the report in this order:

1. verify participants, complete pairs, rounds, and denominators;
2. compare row and column distributions because several games give the roles different incentives;
3. inspect realized cells and the relevant coordination, match, or tie rate;
4. compare observed mixing with the equilibrium reference;
5. in 10-round sessions, examine the path rather than a single endpoint;
6. in communication treatments, compare messages with choices without attributing individual motives.

Feedback script

1. Before revealing results, ask the class to predict the distribution and most common cell.
2. Return to the matrix and elicit each role's best responses.
3. Reveal denominators and distributions before average payoffs.
4. Ask whether the pattern fits a pure equilibrium, mixed play, adaptation, or a focal rule.

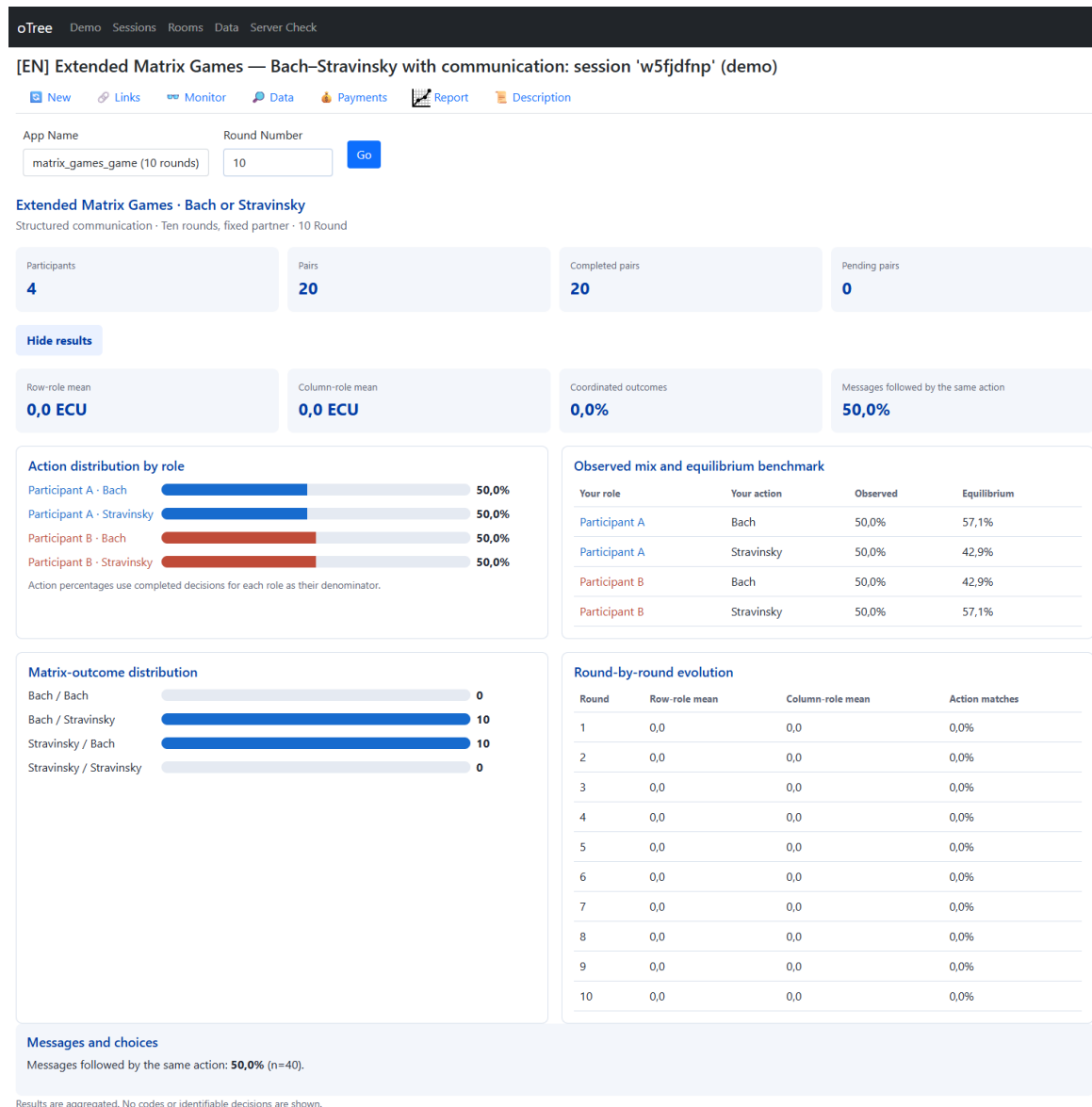


Figure 4.2: Revealed report with role-specific payoffs, action distributions, equilibrium references, outcomes, and message consistency.

5. Compare roles and matching modes. The same frequency can have different origins under fixed and reassigned partners.
6. End by separating observed facts, plausible mechanisms, and prior evidence.

The six canonical games

5.1 Bach or Stravinsky

	Bach	Stravinsky
Bach	(80, 60)	(0, 0)
Stravinsky	(0, 0)	(60, 80)

There are two coordinated pure equilibria and a conflict over which equilibrium favors each role. In the mixed equilibrium, Row chooses Bach with probability $4/7 \approx 57.1\%$ and Column with $3/7 \approx 42.9\%$. Inspect total coordination, the split between equilibria, and coordination failures. Pre-play communication can improve selection, although messages are nonbinding ([Cooper et al., 1992](#)).

5.2 Matching Pennies

	Heads	Tails
Heads	(100, 0)	(0, 100)
Tails	(0, 100)	(100, 0)

The matcher wins on the diagonal; the mismatcher wins off it. There is no pure equilibrium. The unique equilibrium mixes Heads and Tails at 50%. Compare frequencies with sequences: experiments document learning and sensitivity to historical information, so aggregate balance can hide exploitable patterns ([Mookherjee and Sopher, 1994](#); [Ochs, 1995](#)).

5.3 Stag Hunt

	Stag	Hare
Stag	(100, 100)	(0, 70)
Hare	(70, 0)	(70, 70)

Stag–Stag is efficient; Hare–Hare is safe under strategic uncertainty. Stag is optimal when a participant assigns more than 70% probability to the other’s Stag choice. Ask whether repetition moves the group toward efficiency or stabilizes the safe equilibrium. Coordination experiments document sensitivity to game structure, history, and communication ([Devetag and Ortmann, 2007](#); [Cooper et al., 1992](#)).

5.4 Rock, Paper, Scissors

	Rock	Paper	Scissors
Rock	(50, 50)	(0, 100)	(100, 0)
Paper	(100, 0)	(50, 50)	(0, 100)
Scissors	(0, 100)	(100, 0)	(50, 50)

Dominance is cyclical and the uniform equilibrium assigns one third to every action. Distinguish balanced frequencies, serial independence, and unpredictability. A round graph can suggest cycles, but 10 rounds in one class do not establish a stable dynamic.

5.5 MinMax

	Left	Right
Up	(80, 20)	(20, 80)
Down	(0, 100)	(60, 40)

This is a constant-sum game. Row mixes Up and Down at 50%; Column chooses Left with probability 1/3 and Right with 2/3. Row's expected value is 40 ECUs. The game illustrates why asymmetric mixing makes an opponent indifferent and how equilibrium relates to a security strategy.

5.6 Hide and Seek

There are four locations. The hider earns 100 ECUs when choices differ, and the seeker earns 100 ECUs when they match. With neutral locations, equilibrium assigns 25% to each location. Compare roles separately. The focal-label extension changes labels and prominence without changing payoffs, opening a discussion of level- k reasoning and framing ([Crawford and Iriberri, 2007](#)).

5.7 Basic modes

Every canonical game has three configurations per language.

Mode	What changes	Teaching use
One round	One simultaneous decision and no history.	Elicit initial intuition, best responses, and equilibrium selection.
10 rounds, fixed partner	The same opponent returns and roles remain fixed.	Study bilateral learning, conventions, and interpersonal predictability.
10 rounds, reassigned partners	Roles remain fixed while partners change.	Reduce bilateral history and study learning about the population.

Repetition does not turn the activity into an infinite-horizon model. Participants know that it lasts 10 rounds. Interpret changes as adaptation within the session rather than definitive evidence of reputation.

Extended treatments

6.1 Structured communication

Bach–Stravinsky and Stag Hunt add a predefined message before each decision. The treatment draws on evidence that nonbinding communication can change equilibrium selection ([Cooper et al., 1992](#)). It is a teaching adaptation rather than an exact replication and avoids open chat. Inspect message agreement, message-choice consistency, and coordination.

6.2 Aggregate history

Matching Pennies and Rock–Paper–Scissors display cumulative action frequencies by role before the next choice. The information is aggregate and does not identify the current opponent. Ask whether players correct imbalances, chase patterns, or become predictable. Matching Pennies experiments show that information about past choices affects play ([Mookherjee and Sopher, 1994](#)).

6.3 Stag Hunt with losses

The application subtracts 80 ECUs from every payoff: $(20, 20)$, $(-80, -10)$, $(-10, -80)$, and $(-10, -10)$. Best responses and equilibria are unchanged under payoff-translation invariance. A behavioral change indicates sensitivity to payoff level or sign. [Feltovich et al. \(2012\)](#) report loss-avoidance patterns in multiple-equilibrium games. Negative ECUs here are classroom scores, not monetary losses.

6.4 Hide and Seek with focal labels

Payoffs remain unchanged, but *Central Plaza* receives a star. Excess use relative to 25% is inconsistent with uniform equilibrium play. Compare the hider and seeker: the same salient label can attract both roles while affecting their payoffs in opposite ways ([Crawford and Iriberry, 2007](#)).

6.5 Instructor matrices 2 by 2 and 3 by 3

The templates extend the infrastructure to instructor-selected matrices. The current version uses a declarative catalog in `matrix_games_game/catalog.py`; it does not provide a web-based



HIDE AND SEEK: FOCAL LANDSCAPE - ROUND 1 OF 1

Your role
Hider

Make your decision

Select an action. Your partner decides at the same time and will not see your choice before deciding.

Row ↓ · Column →	North Street	Central Plaza ★	South Street	East Street
North Street	0 , 100	100 , 0	100 , 0	100 , 0
Central Plaza ★	100 , 0	0 , 100	100 , 0	100 , 0
South Street	100 , 0	100 , 0	0 , 100	100 , 0
East Street	100 , 0	100 , 0	100 , 0	0 , 100

Your action

☐ North Street

☐ Central Plaza ★

☐ South Street

☐ East Street

Continue

Con tecnología de [oTree](#)

Figure 6.1: The focal landscape changes labels and prominence while preserving the payoff structure.

graphical editor. Before adding a matrix, solve it, document best responses, review every payoff, add bilingual labels and configurations, and run the full tests.



INSTRUCTOR MATRIX 3×3 · ROUND 1 OF 1

Make your decision

Your role
Row player

Select an action. Your partner decides at the same time and will not see your choice before deciding.

Row ↓ · Column →	Action X	Action Y	Action Z
Action A	60 , 60	20 , 80	40 , 40
Action B	80 , 20	30 , 30	10 , 90
Action C	40 , 40	90 , 10	50 , 50

Your action

☐ Action A

☐ Action B

☐ Action C

Continue

Con tecnología de [oTree](#)

Figure 6.2: A catalog-defined 3 by 3 matrix preserves the same role colors and decision flow.

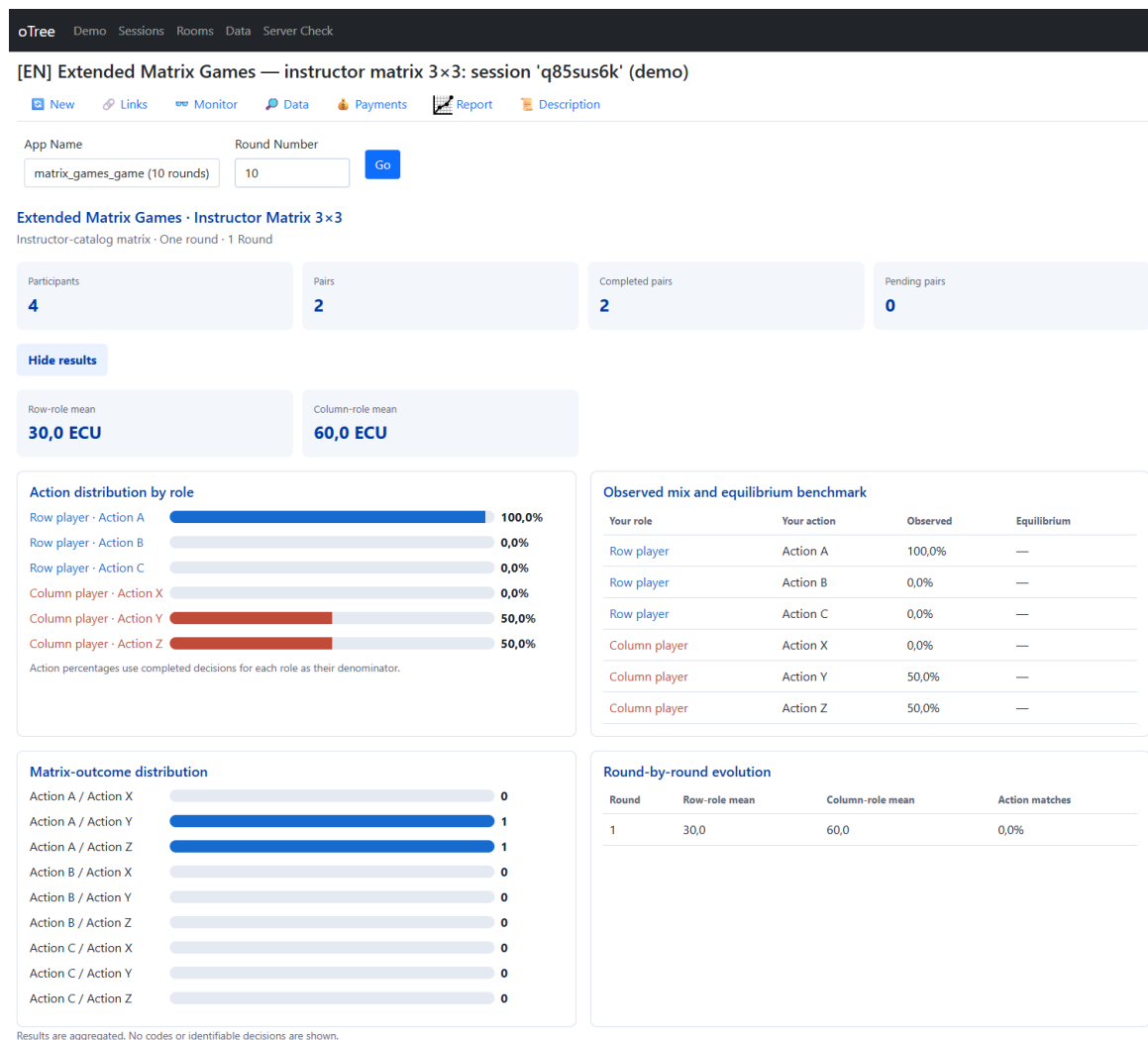


Figure 6.3: The instructor report adapts action and outcome distributions to the 3 by 3 catalog entry.

6.6 Lesson plan

Stage	Time	Action
Preparation	10 min	Create the session, open Monitor and report, verify an even count and test links.
Introduction	5 min	Explain simultaneity, roles, matrix reading, and ECUs.
Comprehension	3–5 min	Let each participant answer without discussion.
Play	3 min or 12–20 min	Run one round or 10 rounds according to the mode.
Prediction	3 min	Elicit expected frequencies before revealing results.
Reveal	5 min	Verify denominators and reveal the report.
Discussion	15–25 min	Solve the equilibrium and compare roles, modes, and treatments.
Closing	5 min	Separate observations, possible mechanisms, and published evidence.

Discussion questions

- What is each role's best response to every action of the other role?
- Does a pure equilibrium exist? If there are several, what could select one?
- Are aggregate frequencies enough to conclude that individuals randomized?
- What changed when partners remained fixed or were reassigned?
- Did communication coordinate expectations or merely state intentions?
- Did behavior change when payoffs became negative although best responses did not?
- Did the focal label affect the hider and seeker in the same way?

6.7 Data, privacy, and troubleshooting

The export records role, own action, partner action, payoffs, round, game key, matching mode, treatment, and pre-play message when applicable. No demographic questions were added. The report presents aggregates and no participant identifiers.

If a participant sees *Please wait*, confirm that the session has an even number, everyone opened a distinct link, and nobody closed the page before submitting. If a link says that the participant does not exist, create a new session because individual links depend on the active database. If *Demo* shows another family, do not start the session; verify `GAME_FAMILY=matrixgames`. If the report cannot be revealed, inspect pending participants in Monitor.

6.8 Operational checklist

- I selected a game and mode aligned with the learning objective.

- I verified language, edition, rounds, and matching.
- I confirmed an even participant count and tested one link.
- I opened Monitor and the report before sharing links.
- I did not reveal the theoretical benchmark before play when measuring initial intuition.
- I waited for session completion before revealing results.
- I read denominators, roles, distributions, cells, and round paths.
- I explained that negative ECUs are not debts.
- I closed by separating data, interpretation, and literature.

Expanded teaching manual for nonspecialist instructors

This part brings together what an instructor needs to turn Matrix games into a learning experience. It complements the operational material above. It can be read before the first session and reused as a script during the discussion of results. The central question is how best responses, coordination, and conflict depend on the payoff structure of a simultaneous game. The guide always separates four levels: rules, benchmark prediction, observed behavior, and interpretation. Moving directly from a bar in a chart to a psychological explanation confuses those levels.

7.1 Conceptual map before opening the session

7.1.1 Unit of analysis

The relevant unit is the pair or matched group for one matrix in one round. One data row is not always one independent person: the same person may decide repeatedly, and interacting participants share information, payoffs, or history. The instructor should therefore state what enters the numerator, what enters the denominator, and whether observations are people, decisions, pairs, groups, or rounds. This prevents thirty repeated decisions from being presented as thirty independent participants.

The task is to simultaneously choose a strategy represented by a row or column. Before presenting theory, ask students to restate the rule and identify what information is available when they decide. A correct calculation does not guarantee understanding of the strategic or behavioral structure. Check available actions, information, payoffs, order, and feedback timing separately.

7.1.2 Benchmark prediction

The starting point is: identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium. The benchmark is a disciplined comparison, not a moral statement about what a person ought to do. First write the assumptions that support it, then derive the action or pattern, and only then compare it with the class. If information, repetition, incentives, matching, or the reference point changes, derive the prediction again instead of carrying it over automatically.

Keep equilibrium, efficiency, and fairness separate. An action can be a best response and generate a poor joint outcome; another action can raise surplus and remain vulnerable to unilateral deviation. Likewise, an equal outcome need not be efficient, and an efficient distribution does not reveal the process that produced it. Asking the class to label each statement as positive, normative, or

strategic reduces confusion.

7.1.3 Alternative mechanisms

The literature and treatments permit discussion of coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication. These mechanisms are not interchangeable labels. Two can predict the same baseline action and separate only when a treatment changes. The informative comparison therefore asks not only how much behavior occurred but also what experimental change should increase, reduce, or leave the pattern unchanged if one mechanism matters.

Organize discussion in three columns. Write the observed fact in the first, such as a share, median, or trajectory. List compatible mechanisms in the second. Record the additional evidence needed to distinguish them in the third. The third column is essential because a classroom session rarely identifies a stable preference or causal relationship by itself.

7.2 Worked example and explanation

In Matching Pennies, one person wins when actions match and the other when they differ. There is no pure equilibrium: any deterministic action can be exploited. A 50–50 mixture makes the opponent indifferent. In Stag Hunt, by contrast, two pure equilibria exist and the problem is coordinating expectations. Comparing them prevents treating all matrix games as the same strategic problem.

Solve the example in six steps. First list actions and possible states. Second calculate payoffs or consequences without interpreting motives. Third derive the theoretical benchmark under its assumptions. Fourth identify the minimum observation needed to evaluate that benchmark. Fifth compare treatments while stating what is held constant and what changes. Sixth formulate a limited conclusion: “the pattern is consistent with” is more accurate than “the experiment proves” when rival explanations remain.

Then change one parameter and ask for a new prediction before calculating. This pause turns the example into a reasoning tool. It also reveals whether students memorized an answer or understood the mechanism. If answers diverge, ask each group to identify the assumption producing the difference.

7.3 Reading the instructor report

The central measures are strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds. Write the denominator next to every indicator. A rate can divide by eligible participants, completed decisions, formed pairs, groups, or rounds; these alternatives are not equivalent. If records are incomplete, show how many were excluded and why.

Use this reading order:

1. Verify participants, groups, and completed decisions. Do not interpret percentages before checking coverage.
2. Inspect the full distribution. A mean can hide two groups with opposing responses or a concentration at focal values.

3. Compare the median, range, and theoretically relevant categories. Explain whether the graph counts people or decisions.
4. Inspect time paths only when rounds are comparable. Changes in matching or treatment must be marked.
5. Compare treatments with absolute differences and denominators, not merely with bars of different heights.
6. Select one anonymous case or sequence connecting rules and the aggregate. Never use it to identify or ridicule a student.

A visible difference in a small class is descriptive evidence from that session. Do not call it a causal effect without appropriate assignment, adequate size, and a comparison defined before seeing the data. Across classes, composition, time, and prior experience may change together. The pedagogical value lies in stating a prediction, confronting it with evidence, and asking what design would teach us more.

7.4 Step-by-step debrief script

Begin without revealing results. Ask for the benchmark prediction and which assumption students find most demanding. Record two quantitative class predictions. Next reveal the observation count and distribution, initially withholding the mean if it would distract from heterogeneity. Ask students to describe the chart without explaining causes.

In a second stage, show aggregate measures and ask: which observation contradicts the simplest prediction, which remains compatible with it, and what heterogeneity disappears in the average? Accept multiple explanations, but require each to yield a testable prediction. Introduce the variants: Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history. For each variant, identify the single changed element, predicted direction, and report measure to inspect.

Close by connecting the laboratory to competition, security, bargaining, conventions, and standard selection. Point out which elements of the real setting are absent: institutions, selection, repetition, long-run consequences, or rich information. The analogy is useful when it isolates a mechanism; it becomes misleading if the class assumes that the laboratory reproduces the full context.

A verbal sequence that works well is: “first describe,” “now derive,” “then interpret,” and “finally ask what evidence is missing.” This discipline allows a nonspecialist instructor to lead a rigorous discussion without treating every departure as a bias or every match as definitive confirmation.

7.5 Comparable class plans

7.5.1 A 50-minute class

Use one mode. Spend five minutes on rules and comprehension, five on private predictions, ten on the activity, five collecting predictions about the aggregate, fifteen revealing the report in layers, and ten connecting the result to theory. The goal is not to cover every variant but to ensure that every student can explain how best responses, coordination, and conflict depend on the payoff structure of a simultaneous game. End with one written sentence separating outcome from mechanism.

7.5.2 An 80-minute class

Run the baseline and one variant from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history. Allow ten minutes for instructions, fifteen for each treatment, twenty for comparing distributions, and fifteen for theory and applications. Before the second treatment, request a directional prediction. If the result points the other way, do not dismiss it: inspect comprehension, composition, denominators, and descriptive power.

7.5.3 A 110-minute class

Combine experience, derivation, and design. After two treatments, give small groups a rival explanation and ask them to propose a third condition that distinguishes it. Each group must define the manipulated variable, outcome, unit of analysis, and prediction. Close by comparing proposals with existing variants and with competition, security, bargaining, conventions, and standard selection. This stage turns the student from participant into experimental designer.

7.6 Exercises with answer guidance

7.6.1 1. Reconstructing the prediction

Question. State the benchmark and three indispensable assumptions. What observation would be a departure?

Guidance. Begin from identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium. Mention incentives, information, and horizon, and define the observation at the correct level. A departure is inconsistent with the full assumption set; it does not automatically identify its cause.

7.6.2 2. Auditing a percentage

Question. The report displays 60 percent. Propose two possible denominators and explain how interpretation changes.

Guidance. It could be 60 percent of eligible people or of completed decisions. If some people did not decide, the rates differ. A complete answer names numerator, denominator, exclusions, and aggregation level.

7.6.3 3. Reading heterogeneity

Question. Two classes have the same mean, but one is concentrated around it and the other has two modes. What does the instructor learn?

Guidance. The mean does not exhaust the distribution. The second class may combine different strategies or interpretations. Compare the median, dispersion, and categories linked to strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds before explaining mechanisms.

7.6.4 4. Separating explanations

Question. Select two mechanisms from this list: coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication. Design a contrast that produces

different predictions.

Guidance. Change one relevant element, hold others constant, and state each directional prediction. A variant from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history may help, but the justification must connect manipulation and report measure.

7.6.5 5. Interpreting no difference

Question. Two treatments produce similar means. Does the manipulation not matter?

Guidance. Not necessarily. There may be weak comprehension, a small sample, offsetting responses, manipulation failure, or effects in tails and dispersion. Inspect descriptive uncertainty and the full distribution before concluding.

7.6.6 6. Transferring carefully

Question. Relate the activity to competition, security, bargaining, conventions, and standard selection and identify two contextual differences.

Guidance. A convincing application states the common mechanism and the limits. Real consequences, selection, experience, institutions, and repetition can change behavior. The conclusion should be an informed hypothesis rather than a universal prediction.

7.7 Frequently asked questions and model answers

Should theory be explained before play? In a first session, collect predictions without revealing the full solution. Explain rules, payoffs, and information. Then derive identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium. In a second session, reverse the order and assess whether theory improves prediction or only changes vocabulary.

Is there a correct answer? Separate a normative or equilibrium solution from a behavioral prediction. Theory supplies a conditional benchmark. The laboratory reveals what occurs and why a reasonable person may choose differently.

Does a departure prove irrationality? No. It may reflect omitted preferences, beliefs, error, weak comprehension, or a different institution. Check controls and incentives. Then treat coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication as hypotheses requiring further comparisons.

Why show the distribution? The same mean can arise from moderate consensus or two opposing groups. A distribution reveals focal values, boundaries, and heterogeneity. In Matrix games, connect those shapes to strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds.

How many observations are enough? There is no universal threshold for debriefing. A small class is useful when described cautiously. Treatment comparisons require several independent units, clear assignment, and common protocols. Repeated decisions do not create new participants.

Can sessions be pooled? Yes, if parameters and definitions remain fixed. Retain session identifiers and inspect each cohort first. If instructions, composition, or incentives change, document the heterogeneity.

What if results contradict the literature? Check rules, treatment, comprehension, exclusions, and calculation. If no error exists, preserve the result. A class need not reproduce a published

estimate. Ask what design would distinguish chance, composition, and mechanism.

How can embarrassment be avoided? Project aggregates and anonymous sequences. Avoid personal labels. Describe actions and consequences. The laboratory studies decisions under specific rules; it does not diagnose traits.

Should the decision be graded? Do not grade agreement with a prediction. Assess understanding: derive the benchmark, calculate a measure, explain a limitation, and design a comparison. Experimental incentives and academic assessment serve different purposes.

How should a variant be chosen? Begin with the mechanism to separate. Select from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history, state a direction and measure, and hold other elements constant. Do not run more conditions than can be analyzed.

What conclusion is appropriate? Use three sentences: what was observed, which mechanism it is consistent with, and what evidence is missing. The connection to competition, security, bargaining, conventions, and standard selection should preserve those limits.

What should students remember? They should reconstruct the central tension, explain the benchmark, read the main denominator, and propose an institution that could change the outcome.

7.8 Diagnostic cases for interpretation practice

7.8.1 Agreement with the benchmark

The distribution is concentrated near the prediction derived from identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium. Do not conclude that everyone shared the same motive. Some calculated, others followed a signal, and others chose intuitively. The evidence supports the aggregate prediction under session conditions but does not identify individual reasoning. Ask what belief, process, or response-time measure would distinguish those routes.

Then introduce a variant from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history. If the pattern remains when the seemingly obvious mechanism weakens, the original explanation needs revision. A correct prediction does not automatically validate all its assumptions.

7.8.2 Two groups with opposite behavior

Half the class is at one extreme and half at the other; the mean lies where almost nobody chose. Showing only the average would create a fictional description. Calculate the median, modes, range, and share in theoretical categories. Ask whether heterogeneity is related to role, round, treatment, or comprehension.

Consider coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication. Write one additional observation for each. If it predicts role differences and none appear, it receives less relative support. If it predicts learning, inspect the trajectory. Do not fill missing measurement with a compelling story.

7.8.3 A large difference with few units

One treatment apparently doubles the main measure but contains two groups and the comparison contains three. Display each group before pooling. One extreme unit can create the difference. Twenty decisions nested in two groups are not twenty independent units.

Ask students to plan the next session: groups, assignment, primary measure, and exclusions. The answer should mention strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds and incomplete data. The experience thereby introduces design and transparency.

7.8.4 A null difference

Two conditions have the same mean. Before declaring that the manipulation does not matter, inspect compliance, comprehension, tails, and dispersion. Opposing subgroup effects can cancel. Define what range of differences would be pedagogically or economically meaningful and what size could distinguish it.

The cases teach four disciplines: do not infer motives from agreement, hide heterogeneity, confuse rows with units, or treat absence of evidence as evidence of absence.

7.9 Explanatory sequence for a complete class

7.9.1 Step 1: pose the problem without labels

Present the decision as a concrete situation and ask what information is missing. Do not announce the name of the bias, equilibrium, or preference at the start. The question is how best responses, coordination, and conflict depend on the payoff structure of a simultaneous game. Collect private responses so the first speaker does not become a focal point.

7.9.2 Step 2: reconstruct rules and incentives

Ask one student to describe actions and another to describe consequences. A third explains available information. Draw the sequence. In Matrix games, the decision is to simultaneously choose a strategy represented by a row or column. Do not move to interpretation until the class can calculate a simple case.

7.9.3 Step 3: derive the benchmark

Write identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium. Underline each assumption. Ask what happens if one fails. Distinguish a logical derivation from an empirical expectation: an equilibrium strategy need not be played immediately by everyone.

7.9.4 Step 4: record predictions

Request one prediction about the mean, another about the distribution, and a third about a variant. Predictions should use strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds. Preserve the record; later comparison reveals learning and reduces hindsight.

7.9.5 Step 5: reveal in layers

Show coverage first, then distribution, measures, and comparisons. At every layer request description before explanation. If someone proposes coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication, ask what observation would distinguish it from another mechanism.

7.9.6 Step 6: work through one sequence

Use the worked example in this guide. Recalculate slowly and change one parameter. Ask each team to find one excessive conclusion and rewrite it with limited language. Editing claims is as important as calculation.

7.9.7 Step 7: compare institutions

Choose one condition from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history. Write a table with constant, change, prediction, and measure. If the variant changes several elements, acknowledge it. Ask whether a third treatment would separate explanations.

7.9.8 Step 8: transfer and close

Connect the mechanism to competition, security, bargaining, conventions, and standard selection. Identify two differences between the laboratory and the real context. End with an exit response: prediction, evidence, compatible mechanism, and limitation. This structure assesses understanding without rewarding a particular decision.

7.9.9 A short script to read aloud

“Describe what happened before explaining why. Identify the prediction and its assumptions. Compare the distribution with the mean. Propose two compatible mechanisms. Finally, state which treatment or additional evidence could distinguish them.” The script keeps discussion in a common sequence across families.

7.10 Assessment bank with solutions

Exercise 1. List actions, information, and payoffs. **Solution:** reconstruct simultaneously choose a strategy represented by a row or column without adding information unavailable to the participant.

Exercise 2. Derive the material benchmark. **Solution:** begin from identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium and name at least two assumptions. For an interactive game, state best responses; for an individual task, state the decision rule.

Exercise 3. The report shows 40 percent. **Solution:** it cannot be interpreted without numerator, denominator, exclusions, and unit. Eligible people and completed decisions are alternative denominators.

Exercise 4. The mean matches the prediction. **Solution:** inspect the distribution. A correct mean can combine extremes, offsetting errors, or different strategies. Agreement does not identify

reasoning.

Exercise 5. Select two mechanisms from coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication. **Solution:** design a condition changing one prediction but not the other, with an outcome from strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds.

Exercise 6. Compare treatments of different sizes. **Solution:** report counts and shares, preserve the independent unit, and do not compensate for a small group by multiplying rounds.

Exercise 7. Mean differences are absent. **Solution:** inspect dispersion, tails, compliance, and comprehension; define a relevant difference. A broad null does not establish equivalence.

Exercise 8. Propose a figure. **Solution:** use histograms or dots for distributions, lines for rounds, separate bars for roles, and bivariate plots when a response depends on a prior action.

Exercise 9. Explain a variant from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history. **Solution:** identify what changes, what remains constant, predicted direction, and an interpretive threat.

Exercise 10. Transfer to competition, security, bargaining, conventions, and standard selection. **Solution:** describe the common mechanism and two institutional differences. Do not claim that one session determines policy.

Exercise 11. Write a three-sentence conclusion. **Solution:** observation with denominator; compatible mechanisms; evidence needed to distinguish them.

Exercise 12. Design a replication. **Solution:** preserve parameters, record assignment, announce the primary measure, set exclusions, and archive the export.

A twelve-point rubric awards one point for each correct component. For a short assignment use Exercises 2, 3, 5, and 11. For a project use all twelve and request a reproducible figure.

7.11 Advanced seminar: from evidence to mechanism

Divide the class into four teams: benchmark model, alternative preferences or beliefs, institutions, and identification critique. Each interprets the same report from its assigned role. The first derives identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium; the second uses coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication; the third selects a variant from Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history; the fourth identifies missing evidence.

In a replication round, every team writes a quantitative prediction and a condition that could refute it. It exchanges the proposal with another team, which audits unit, denominator, and manipulation. A useful explanation does not merely accommodate past outcomes; it risks a prediction about new evidence.

End with a one-page memo containing question, benchmark, descriptive finding, two mechanisms, discriminating design, application to competition, security, bargaining, conventions, and standard selection, and limitation. Grade causal clarity, technical correctness, use of evidence, and inferential restraint.

For a quantitative extension, export data and reproduce three figures: individual distribution, aggregate by independent unit, and treatment comparison. All three require titles, denominators, and exclusion notes. Compare how the narrative changes when the correct unit is used.

An ethics extension asks which decisions should remain private, when an incentive is proportionate,

and how to communicate results without turning group patterns into personal judgments. The answer should separate participant protection, instructional integrity, and analytical transparency.

7.12 Quality control before teaching

7.12.1 Full rehearsal

Open a test session and complete one full participant path. Check cover, language, comprehension, decision, waiting, result, and close. In Matrix games, verify especially that the participant understands how to simultaneously choose a strategy represented by a row or column. Open the report before class, keep it hidden, and confirm that strategy frequencies; best-response frequency; coordination; payoffs; deviation from equilibrium mixing and transitions across rounds appear with their denominators.

7.12.2 Fifteen control questions

1. Does the configuration belong only to this family and the correct language?
2. Can expected attendance form every required unit?
3. Do the rules describe actions, information, order, and payoffs?
4. Does the comprehension question detect the most likely mistake?
5. Is the benchmark derived rather than merely asserted?
6. Will students record a prediction before seeing the result?
7. Does the report show counts as well as percentages?
8. Does every rate state numerator and denominator?
9. Is the distribution readable from the classroom?
10. Are roles, treatments, and rounds labeled and colored consistently?
11. Was the main comparison selected before observing data?
12. Is there time to describe results before interpreting them?
13. Do questions avoid judgments about individual participants?
14. Does the link to competition, security, bargaining, conventions, and standard selection state explicit limits?
15. Will the export and incidents be documented?

7.12.3 A micro-rehearsal of the debrief

Practice a three-minute explanation. Begin with identify best responses and Nash equilibria; some games have a pure equilibrium, multiple equilibria, or a mixed equilibrium. Then show a hypothetical distribution and state two compatible interpretations from coordination, focal points, strategic risk aversion, learning, mixing, exploitation of patterns, and communication. Identify which variant among Bach or Stravinsky; Matching Pennies; Stag Hunt; Rock-Paper-Scissors; MinMax; Hide and Seek; communication and history would distinguish them. End with one limitation. If the sequence cannot fit in three minutes, simplify the session objective.

7.12.4 After class

Record attendance, completed decisions, parameters, and incidents. Note which explanation caused confusion and which graph worked. Preserve one question for the next cohort. Cumulative improvement depends on documenting experience rather than changing parameters without a record.

The closing condition is concrete: a person who did not attend should be able to read the report and know what was decided, what the benchmark was, how many units participated, what pattern appeared, and what cannot be concluded. If any element is missing, complete the instructor note before archiving the session.

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