



Teacher guide for the hiring market with two colours (statistical discrimination)

Lab implementation, theoretical background,
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 lets you prepare, run and discuss the **hiring market with two colours** developed for the Behavioral and Experimental Economics Research Lab (BEER Lab) at the Department of Economics, Tecnológico de Monterrey. It is written for instructors of labour economics, intermediate microeconomics and the economics of information, with or without prior experience in experimental economics.

The game is a teaching adaptation of Charles Holt’s classroom version (the Veconlab “Statistical Discrimination” program; [Fryer et al., 2005](#)) of the self-confirming-beliefs model of [Coate and Loury \(1993\)](#). It follows that version’s structure: two colours that are only labels, a random training cost, a noisy test, a hiring decision and public feedback by colour. The specific parameters are the lab’s own design, and the wording of the screens and of this guide is our own.

The **quick-start chapter** gets a session running. The operational chapters explain every screen. The conceptual chapters give the theoretical background needed to interpret results and to lead a careful discussion. Shared rules are explained once; each variant lists only what changes relative to the basic game.

Author

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For the instructor

This guide matches the English interface. A separate Spanish version exists. Screenshots in this guide were taken on a local instance of the game with simulated decisions; the numbers shown illustrate the interface and are *not* results from a real class. Project only aggregate results: never link participant codes to names, student IDs, seats or individual decisions.

This game is still being prepared for the lab server. The access steps in Chapter 2 and the screen sequence in Chapter 3 are already final (tested on an identical copy of the game); only the screenshots of YOUR game’s card, login and rooms on teaching-admin.beer-lab.org and teaching.beer-lab.org are still missing — this guide will add them once the game goes live on those sites.

Note

Sensitive topic: do not name it before playing. This guide (and the instructor report) explain that the game is about statistical discrimination. Your students should not know this before or during the activity: the game’s name, the rooms, the configurations and every participant screen are neutral on purpose (“hiring market”). If you announce the topic, decisions stop responding to the game’s incentives and start responding to what each person

thinks is expected of them. Do not project this guide, and reveal the report's results only in the final discussion (section [4.1](#)).

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Quick-start guide

1.1 Fact sheet

Purpose	Show how a gap between two identical groups can appear and persist through beliefs alone: if employers believe that one colour rarely trains, they do not hire it even with a good test; then training does not pay for that colour, and the belief confirms itself.
Participants	Any number. The whole class is one market. Half are workers and half employers, with fixed roles; with an odd number there is one more worker and, each round, one employer evaluates two workers. With a single participant, the computer hires.
Colours	Each worker is randomly given a colour, green or purple (half and half), fixed for the session. The colour changes nothing else: costs, tests and payoffs are identical.
Decisions	A worker sees a training cost (whole number uniform between 0 and 100, new each round) and decides whether to train. An employer sees the colour and a test result (good with probability 80% if trained, 30% if not) and decides whether to hire.
Earnings	Worker: 100 if hired, minus the cost if trained. Employer: +100 for hiring a trained worker, −100 for hiring an untrained one, 0 for not hiring.
Feedback	At the end of each round the whole class sees, by colour, the share who trained, who got a good result and who were hired (also after a good and after a bad result).
Duration	10 minutes for one round; 25–30 minutes for 10 rounds, not counting the discussion.
Instructor (you)	teaching-admin.beer-lab.org/en → the game's card → Open panel . Asks for username and password (section 2.1).
Students	Room link https://hiringmarket.beer-lab.org/room/hiring_market_en , its QR code (section 2.5) or teaching.beer-lab.org .
Report	Theoretical benchmark (high equilibrium, thresholds, low equilibrium), summary by colour, training and hiring charts by round, first vs last rounds with a verdict on the gap, employers' implied hiring rules, training by cost, and a table by round.

Note

There are two different pages. **teaching-admin.beer-lab.org** is yours: from there you open the game's panel and download this guide. **teaching.beer-lab.org** is your students': from there they can only *play*, not create sessions.

1.2 Minimal sequence

Before class

1. Request panel access at lab.economia@servicios.tec.mx, stating the game, course, number of students and date. You will receive the password for the **admin** user.
2. Open teaching-admin.beer-lab.org/en, look for **Hiring market** and click **Open panel**. Enter username and password.
3. Rehearse in **Demo**: open a configuration and play it in several tabs to see both the worker's and the employer's screens, and the report (section 2.3).

In class

4. Count the students present. Introduce the activity only as “a hiring activity” (section 3.2).
5. In the panel, open **Rooms** and the room **[EN] Hiring Market** (or the extended one). Choose the configuration (usually the 10-round one), type the *exact* number of students under **Number of participants** and click **Create**.
6. Share the room link or project its QR code. Each student clicks **Start**.
7. In the room, click **Monitor the session**: the session page opens, with the **Monitor** (progress) and **Report** tabs. Follow progress in **Monitor** on your own screen. When done, open **Report**, click **Show results** and lead the discussion.

After class

8. In the room, click **Close this room**. This frees it for the next group; the session's data stay under **Sessions**.

1.3 Checklist

- ☐ Panel password received and tested at hiringmarket.beer-lab.org/login.
- ☐ Rehearsal done in **Demo**, seeing at least one worker screen and one employer screen.
- ☐ Computers, internet, browser and projector ready.
- ☐ Configuration chosen: one round (short demo) or 10 rounds (recommended).
- ☐ Number of participants in the session equal to the number of students present.
- ☐ Room link or QR code at hand (section 2.5); tested from a phone.
- ☐ Made clear that ECU are experimental units and there is no cash payment.
- ☐ This guide is not projected; the report's results are revealed only in the discussion; the topic is not named before playing.
- ☐ Debrief script ready (section 4.4), including how to discuss real-world relevance respectfully.

Platform access

2.1 Your access: teaching-admin and the game's panel

The instructor page is teaching-admin.beer-lab.org/en. It does not appear in the beer-lab.org menu: type the address directly or bookmark it. It lists every classroom game in the lab; you can search by title, topic or JEL code.

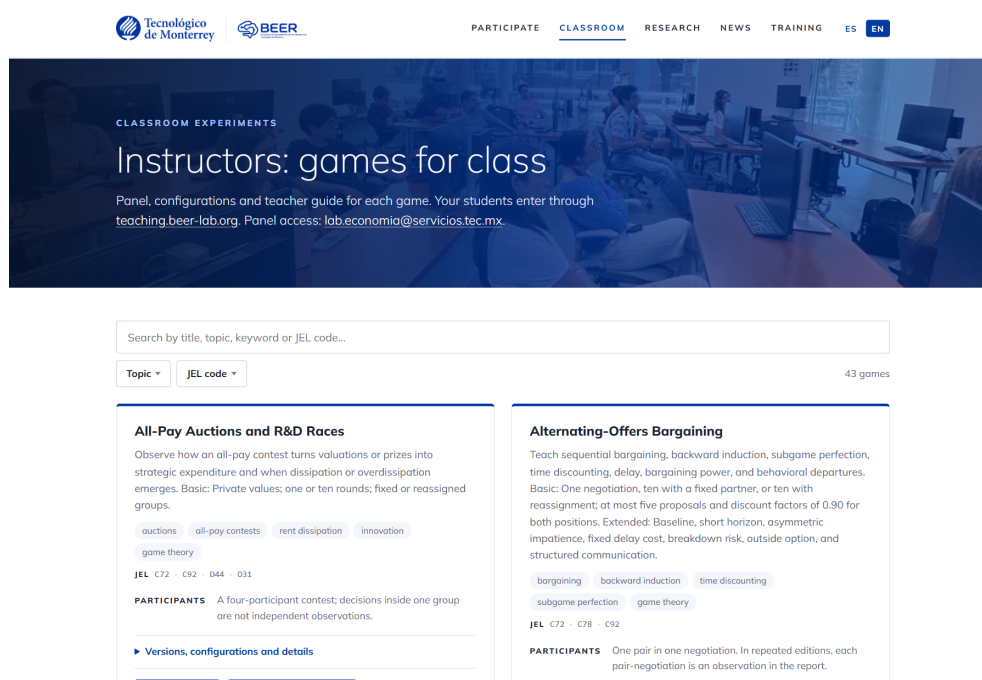


Figure 2.1: Instructor page: teaching-admin.beer-lab.org. Once this game goes live, its card will appear in this same directory (search for **Hiring market**).

Each game has a card with its description, number of participants and duration, and two buttons: **Open panel**, which goes to the game's panel, and **Teacher guide (PDF)**, which downloads this guide. Expanding **Versions, configurations and details** lists the rooms, each with its own **open panel** straight to that room's session-creation form. The game's panel (<https://hiringmarket.beer-lab.org>) is protected: **Open panel** shows the **Admin Login** screen, where you type **admin** under **Username** and the password the lab gave you under **Password**. If you do not have it, request it at lab.economia@servicios.tec.mx.

Note

This game does not yet have its own card in the directory or an active panel at hiringmarket.beer-lab.org: it is still being prepared. The procedure above is identical to every other lab game's (see the Cournot, Bertrand and live market guides); once it goes live, this section will be updated with screenshots specific to **Hiring market**.

2.2 The panel: minimal vocabulary

The panel is oTree's own and is in English. These are the only terms you need:

Demo	Practice sessions. Creates a session with fictitious participants that you play yourself across several tabs. Use it to rehearse, never with students.
Rooms	Fixed addresses for class. This game has four: basic and extended, in Spanish and English. Students always enter through a room.
Create / Number of participants	Create the session in the room and declare how many people will play.
Monitor	A table with each participant's round and screen. It does not show decisions.
Advance slowest participants	The Monitor button that moves along whoever has fallen behind (see section 9.2).
Report	The instructor report, with aggregate results.
Data	Downloads the data as CSV.
Sessions	A list of all your sessions, to return to an earlier one.
Close this room	Frees the room when done, for the next group.

In this panel, **Demo** shows only this game's ten configurations and **Rooms** only its four rooms. Inside each room, the session-creation form filters further: the basic English room ([EN] **Hiring Market**) only offers the two basic English configurations (one round; 10 rounds); the extended English room only offers the three extended ones (no colour shown, cheaper training and more accurate test). If a different game appears, do not start the session and notify the lab.

oTree Demo Sessions Rooms Data Server Check

Demo

[ES] Mercado de contratación — una ronda
[ES] Mercado de contratación — 10 rondas
[EN] Hiring market — one round
[EN] Hiring market — 10 rounds
[ES] Mercado de contratación extendido — sin color visible, 10 rondas
[ES] Mercado de contratación extendido — capacitación más barata (0–60), 10 rondas
[ES] Mercado de contratación extendido — prueba más precisa (90 % / 10 %), 10 rondas
[EN] Hiring market extended — no colour shown, 10 rounds
[EN] Hiring market extended — cheaper training (0–60), 10 rounds
[EN] Hiring market extended — more accurate test (90% / 10%), 10 rounds

Juegos de mercados / Market games — BEER Lab
 Mercado de contratación / Hiring market

Figure 2.2: Demo: the game’s configurations (four basic and six extended, in Spanish and English).

oTree Demo Sessions Rooms Data Server Check

Rooms

Current rooms:

[ES] Mercado de contratación
[EN] Hiring Market
[ES] Mercado de contratación — extendido
[EN] Hiring Market — extended

Figure 2.3: Rooms: the game’s four rooms.

For the instructor

The names your students can see (rooms, configurations, screens) only say “hiring market”. The description of an extended configuration in the panel does say, for example, “no colour shown”: so create the session on your own screen, without projecting it.

2.3 Rehearsing before class

In **Demo**, click a configuration: a practice session with seven participants is created (three employers and four workers; since the number is odd, each round one employer evaluates two workers) and the links page appears. Open each **P1**, **P2**, ... link in a separate tab and play as if you were each student; then open **Report**. These sessions do not affect your classes.

oTree Demo Sessions Rooms Data Server Check

[EN] Hiring market — 10 rounds: session 'jhrb7m4v'

Edit
 Links
 Monitor
 Data
 Payments
 Report
 Description

You can either use the session-wide link, persistent links, or single-use links.

Session-wide link

If it's not practical for you to use a Room, you can distribute the following link to participants.

<http://localhost:8046/join/telozuma>

Persistent links

For a real session, you should use a [room](#).

Single-use links

Below are single-use links.

P1	http://localhost:8046/InitializeParticipant/vqj7180u
P2	http://localhost:8046/InitializeParticipant/a19a5k7t
P3	http://localhost:8046/InitializeParticipant/5820f6tk
P4	http://localhost:8046/InitializeParticipant/yat8phvz
P5	http://localhost:8046/InitializeParticipant/mr7vp9h1
P6	http://localhost:8046/InitializeParticipant/3csbrfan
P7	http://localhost:8046/InitializeParticipant/m5ndkscv
P8	http://localhost:8046/InitializeParticipant/cg00yd64
P9	http://localhost:8046/InitializeParticipant/oek6b87g
P10	http://localhost:8046/InitializeParticipant/qcs4s2vw
P11	http://localhost:8046/InitializeParticipant/1e6oka38
P12	http://localhost:8046/InitializeParticipant/fvevtl6g
P13	http://localhost:8046/InitializeParticipant/nyjvn75y
P14	http://localhost:8046/InitializeParticipant/ir6pc00y
P15	http://localhost:8046/InitializeParticipant/6hdimmg
P16	http://localhost:8046/InitializeParticipant/2wu9edjn
P17	http://localhost:8046/InitializeParticipant/bkpquwix

Figure 2.4: Links for a session. This guide's screenshots were taken on a local copy, which is why the addresses say `localhost`; on the server they say `hiringmarket.beer-lab.org`.

Note

Do not rehearse with the room link open in several tabs of the same browser: oTree recognizes the browser, and every tab would count as the same person. Use **Demo** to rehearse instead.

oTree Demo Sessions Rooms Data Server Check										
[EN] Hiring market — 10 rounds: session 'jhrb7m4v'										
<a>Edit <a>Links <a>Monitor <a>Data <a>Payments <a>Report <a>Description										
ID	Code	Label	Progress	App	Round	PageName	Waiting	WaitsFor	Since	
P1	vgi7180u		44/90	hiring market	5	RoundResult			1m	
P2	a19a5k7t		44/90	hiring market	5	RoundResult			1m	
P3	5820f6tk		44/90	hiring market	5	RoundResult			1m	
P4	yat8phvz		44/90	hiring market	5	RoundResult			1m	
P5	mr7vp9h1		44/90	hiring market	5	RoundResult			1m	
P6	3csbrfan		44/90	hiring market	5	RoundResult			1m	
P7	m5ndkscv		44/90	hiring market	5	RoundResult			1m	
P8	cg00yd64		44/90	hiring market	5	RoundResult			1m	
P9	oek6b87g		44/90	hiring market	5	RoundResult			1m	
P10	qcs4s2vw		44/90	hiring market	5	RoundResult			1m	

Figure 2.5: Monitor of a session in progress: each participant's round and screen.

2.4 Creating the session in class

Under **Rooms**, open the room for the language you will use. The form offers only that room's configurations. Choose the configuration, type the number of students present under **Number of participants** and click **Create**.

oTree Demo Sessions Rooms Data Server Check										
Room: [EN] Hiring Market Create a new session English room. Only the configurations of this game, language and edition are shown below. Session Config [EN] Hiring market — one round ▾ Number of participants Must be a multiple of 1 Create Configure session ⚙️ App sequence										

Figure 2.6: Form for the basic English room: only its own two configurations appear.

Note

Declare the exact number, with no spare seats. Roles and colours are assigned when the session is created, and every round waits for every declared participant. If one more student than declared arrives, they will see a “session is full” message (currently shown in Spanish, “La sesión está llena”, on English rooms too); in that case, before starting, click **Close this room**, create another session with the correct number, and ask the class to reopen the link or the QR code. If you declare more people than actually join, the first

round never ends.

2.5 How your students join

Students need no account and nothing to install; a phone or computer browser is enough. They have three paths, all leading to the same room:

1. **QR code.** Project the one for the room you are using (below, and full-size in appendix A). They scan it with a phone camera.
2. **Room link.** Share it over the class chat or on Canvas: https://hiringmarket.beer-lab.org/room/hiring_market_en.
3. **Catalogue.** At teaching.beer-lab.org they search for **Hiring market** and click their language's button (once the game is live).



English, basic

hiringmarket.beer-lab.org/room/hiring_market_en



English, extended

hiringmarket.beer-lab.org/room/hiring_market_extended



Español, básica

hiringmarket.beer-lab.org/room/hiring_market_es



Español, extendida

hiringmarket.beer-lab.org/room/hiring_market_extendido

What the participant sees

The student opens the room and clicks **Start**. If you have not created the session yet, they see a waiting page and join as soon as you do; so you can share the link or QR code from the start of class. No email or password is needed: they receive an anonymous code.

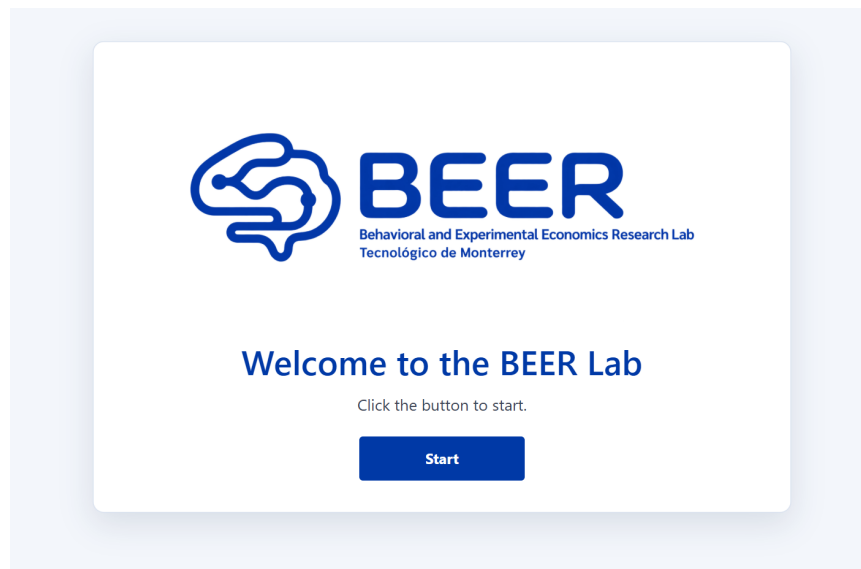


Figure 2.7: Room the student opens.

Language is set per room: a session created in the English room only admits students entering through the English room. If your group is mixed, pick one language for everyone.

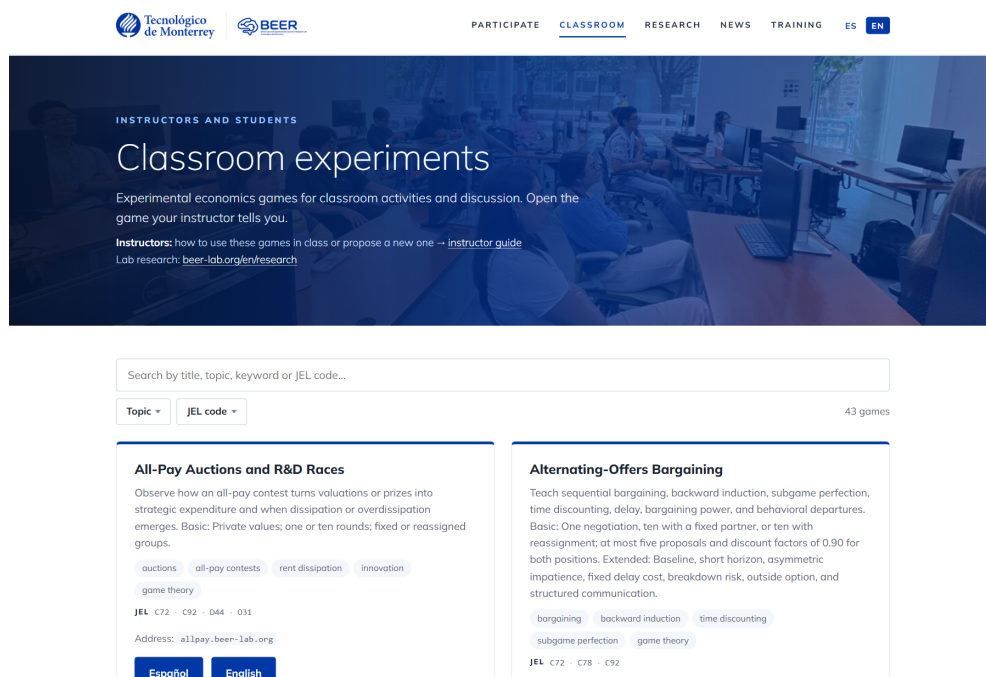


Figure 2.8: Catalogue at teaching.beer-lab.org, the students' page. Once this game goes live, its card will appear here (search for **Hiring market**).

The basic game and its screens

3.1 Rules, incentives and benchmarks

When the session is created, the game splits the class at random: half are **workers** and the other half **employers**, and roles do not change. Among the workers, half get the colour **green** and the other half **purple**, also at random and for the whole session (with an odd number of workers, the extra worker's colour is drawn at random). The colour has no other content: both colours face the same costs, the same test and the same payoffs.

Each round, every worker is paired at random with an employer (new pairs every round), and the round has two steps:

1. **Training.** The worker sees their training cost c , a whole number between 0 and 100, all equally likely, drawn anew each round for each person, and decides whether to train (pay c) or not. Then they take a test: the result is *good* with probability $p_T = 0.8$ if they trained and $p_U = 0.3$ if not.
2. **Hiring.** The employer sees the colour and the test result of their worker, never the cost nor whether they trained, and decides whether to hire.

$$\pi^{\text{worker}} = 100 \cdot \mathbf{1}[\text{hired}] - c \cdot \mathbf{1}[\text{trained}]$$

$$\pi^{\text{employer}} = \begin{cases} +100 & \text{hires a trained worker} \\ -100 & \text{hires an untrained worker} \\ 0 & \text{does not hire} \end{cases}$$

A worker's earnings can be negative (trained and not hired). What the employer earns depends on whether the worker trained, not on the test result: the test is only a clue.

Public feedback. At the end of each round, everyone (both sides) sees a class table with, for each colour, the share who trained, who got a good result, who were hired, and who were hired after a good and after a bad result. Decision screens show that table cumulatively, round by round. This public information is what lets a belief about a colour form, spread and confirm itself.

Odd-sized classes. There is one more worker. Each round, one of the employers (a different one each time, at random) evaluates two workers, decides on each separately and earns the sum. The instructions tell the whole class. With a single participant, that person is a worker and the computer hires when the test is good (only they see the sentence saying so); it is a demonstration case.

3.2 Before playing: how to introduce the activity

Note

Introduce the activity as “a hiring activity” and nothing more. Do **not** say discrimination, stereotypes, bias, prejudice, race, gender or the model’s name, and do not suggest that the colours stand for any group. If someone asks whether the colour matters, answer neutrally: “the instructions tell you everything you need to know”. Reveal the report’s results only in the final discussion.

The reason is the same as in any experiment: if the class knows what is being studied, many people decide according to what they think the instructor expects (or the opposite), not according to the game’s incentives. With this topic the risk is larger, because the words trigger prior opinions. The learning comes in the discussion, when the class looks at its own data and finds that the only ingredient was a colour with no content.

3.3 Cover, instructions and comprehension check

The cover introduces the BEER Lab and the rules of conduct. The instructions describe the actions, the test, both roles’ payoffs, an example and the feedback. They introduce the colour with one neutral sentence and never say whether it matters or should matter.



Welcome to the BEER Lab

The **Behavioral and Experimental Economics Research Lab** of the Department of Economics at Tecnológico de Monterrey is a space for learning about economic decisions through controlled activities.

Today you will take part in a hiring activity. Your earnings depend on your decisions, on other people's decisions and partly on chance.

During the session

- Do not talk or communicate with other people.
- Make your decisions individually.
- Follow the on-screen instructions. Do not refresh or close this page.
- If you need help, raise your hand.

I have read and understood the lab rules.

☐ Yes ☐ No

Start

Powered by [oTree](#)

Figure 3.1: Cover and lab rules.

Instructions

Round 1 of 10

In this activity, half of the people are **workers** and the other half are **employers**. Roles do not change during the session.

- Your role for the whole session: you are a **worker**.
- Each worker is assigned a colour, green or purple, which stays the same for the whole session. The employer sees that colour and the test result.
- Your colour: ● **green**
- In each round, each worker is paired at random with an employer. Pairs change every round.
- If the number of participants is odd, there is one more worker; in each round, one of the employers evaluates two workers, separately.

How each round is decided

1. The worker sees their **training cost** for the round: a whole number between 0 and 100 ECU, drawn again every round for each person; every number is equally likely. The worker decides whether to train (and pay that cost) or not.
2. Then the worker takes a test. If they trained, the result is **good** with probability 80%; if they did not train, it is good with probability 30%. Otherwise the result is **bad**.
3. The employer sees the colour and the test result of the worker they are paired with (not the cost, nor whether the worker trained) and decides whether to hire that worker.

Earnings in each round

- **Worker:** 100 ECU if hired and 0 if not; minus the cost, if they trained. This can be negative.
- **Employer:** 100 ECU for hiring a worker who trained; -100 ECU for hiring a worker who did not train; 0 for not hiring.
- An employer who evaluates two workers decides on each one separately and earns the sum of both results.

Example: a worker with cost 37 trains and is hired. The worker earns $100 - 37 = 63$ ECU, and the employer earns 100 ECU.

- At the end of each round, everyone sees, for each colour, among workers, the percentage who trained, the percentage who got a good result, and the percentage who were hired in that round. This table builds up round after round.
- There will be 10 rounds. Your earnings from all rounds are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

Continue

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Figure 3.2: Instructions as seen by a worker: fixed role, own colour, pairing, odd-class rule, steps of the round, payoffs and example.

Instructions

Round 1 of 10

In this activity, half of the people are **workers** and the other half are **employers**. Roles do not change during the session.

- Your role for the whole session: you are an **employer**.
- Each worker is assigned a colour, green or purple, which stays the same for the whole session. The employer sees that colour and the test result.
- In each round, each worker is paired at random with an employer. Pairs change every round.
- If the number of participants is odd, there is one more worker; in each round, one of the employers evaluates two workers, separately.

How each round is decided

1. The worker sees their **training cost** for the round: a whole number between 0 and 100 ECU, drawn again every round for each person; every number is equally likely. The worker decides whether to train (and pay that cost) or not.
2. Then the worker takes a test. If they trained, the result is **good** with probability 80%; if they did not train, it is **good** with probability 30%. Otherwise the result is **bad**.
3. The employer sees the colour and the test result of the worker they are paired with (not the cost, nor whether the worker trained) and decides whether to hire that worker.

Earnings in each round

- **Worker:** 100 ECU if hired and 0 if not; minus the cost, if they trained. This can be negative.
- **Employer:** 100 ECU for hiring a worker who trained; -100 ECU for hiring a worker who did not train; 0 for not hiring.
- An employer who evaluates two workers decides on each one separately and earns the sum of both results.

Example: a worker with cost 37 trains and is hired. The worker earns $100 - 37 = 63$ ECU, and the employer earns 100 ECU.

- At the end of each round, everyone sees, for each colour, among workers, the percentage who trained, the percentage who got a good result, and the percentage who were hired in that round. This table builds up round after round.
- There will be 10 rounds. Your earnings from all rounds are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

Continue

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Figure 3.3: Instructions as seen by an employer (without the own-colour line).

The example uses a cost of 37: the worker trains, is hired and earns $100 - 37 = 63$ ECU; the employer earns 100. The check asks everyone two questions, whatever their role, because feedback is public and everyone should understand both payoffs: cost 18, trains and is not hired (-18); an employer sees a good result and hires a worker who did not train (-100). No number matches the cost threshold (50), the benchmark rates or the test probabilities, and no sentence says what is best to do.




Before you start

Round 1 of 10

Answer both questions based on the instructions, whatever your role.

A worker has a cost of 18, trains and is not hired. What are the worker's earnings for the round?

☐ -18 ECU
☐ 0 ECU
☐ 82 ECU
☐ 100 ECU

An employer sees a good result and hires the worker. That worker had not trained. What does the employer earn?

☐ -100 ECU
☐ 0 ECU
☐ 100 ECU

Check

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Figure 3.4: Comprehension check.




Por favor corrija los errores.

Before you start

Round 1 of 10

Answer both questions based on the instructions, whatever your role.

A worker has a cost of 18, trains and is not hired. What are the worker's earnings for the round?

☐ -18 ECU
☐ 0 ECU
☐ 82 ECU
☐ 100 ECU

Check: a worker earns 100 if hired and 0 if not, minus the cost if they trained.

An employer sees a good result and hires the worker. That worker had not trained. What does the employer earn?

☐ -100 ECU
☐ 0 ECU
☐ 100 ECU

Check: what the employer earns depends on whether the hired worker trained, not on the test result.

Check

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Figure 3.5: Wrong answers: the message restates the rule without giving the answer and allows another try.

3.4 Training

The worker sees their colour, this round's cost and a reminder of the test probabilities, and chooses **I train** or **I do not train**. From round 2 on, the class table of previous rounds appears below.



Your decision

Round 1 of 10

You are a **worker**.

Your colour

green

Your training cost this round

5 ECU

If you train, you pay this cost and your test result is good with probability 80%; if you do not train, you pay nothing and the result is good with probability 30%. If you are hired you earn 100 ECU.

Do you train this round?

☒ I train

☐ I do not train

Confirm

Figure 3.6: Training decision in round 1 (simulated decisions).




Your decision

Round 4 of 10

You are a **worker**.

Your colour

purple

Your training cost this round

96 ECU

If you train, you pay this cost and your test result is good with probability 80%; if you do not train, you pay nothing and the result is good with probability 30%. If you are hired you earn 100 ECU.

Do you train this round?

☐ I train
☒ I do not train

Confirm

Class results in previous rounds

Round	Colour	Workers	Trained	Good result	Hired	Hired with a good result	Hired with a bad result
1	● green	5	80%	80%	80%	100%	0%
1	● purple	4	0%	50%	50%	100%	0%
2	● green	5	40%	40%	40%	100%	0%
2	● purple	4	0%	75%	25%	33%	0%
3	● green	5	20%	0%	0%	—	0%
3	● purple	4	25%	25%	0%	0%	0%

Percentages among workers.

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Figure 3.7: Training decision in round 4, with the class table for rounds 1–3 (simulated decisions; session A in Chapter 4).

Meanwhile, employers wait; afterwards, workers wait for the hiring decisions.

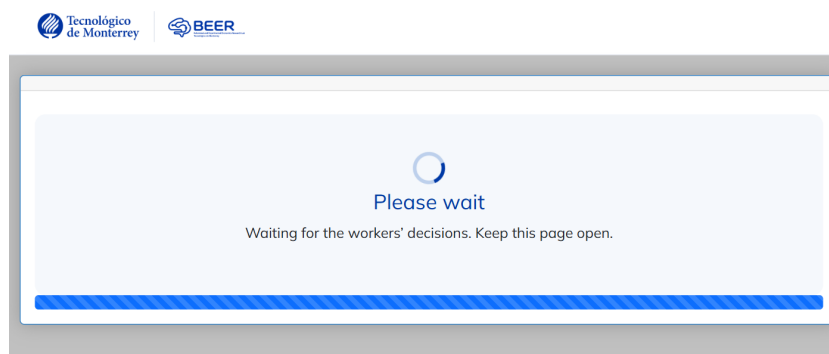


Figure 3.8: Waiting while other people's decisions are missing.

What the participant sees

“Please wait” means that other people’s decisions are still missing. It is not an error. Participants should not close or refresh the page.

3.5 Hiring

The employer sees the payoff reminder, the colour and the test result of the worker they evaluate, and chooses **Hire** or **Do not hire**. From round 2 on they also see the cumulative class table.

The screenshot shows the 'Your decision' screen for Round 1 of 10. At the top, logos for 'Tecnológico de Monterrey' and 'BEER' are displayed. The main heading is 'Your decision' with a sub-header 'Round 1 of 10'. Below this, it states 'You are an employer.' and provides a payoff reminder: 'Hiring a worker who trained earns you 100 ECU; hiring one who did not train, -100 ECU; not hiring, 0.' The interface is divided into two main sections: 'Colour' and 'Test result'. The 'Colour' section shows a purple dot and the word 'purple'. The 'Test result' section shows the word 'bad'. Below these sections are two radio buttons: 'Hire' (unselected) and 'Do not hire' (selected). At the bottom, there is a blue 'Confirm' button. The footer indicates 'Powered by oTree'.

Figure 3.9: Hiring decision with one worker (simulated decisions).

In an odd-sized class, one employer evaluates two workers in the round and decides on each separately.



Your decision

Round 1 of 10

You are an **employer**. This round you evaluate two workers. Decide on each one separately.

Hiring a worker who trained earns you 100 ECU; hiring one who did not train, -100 ECU; not hiring, 0.

Worker 1

Colour


purple

Test result

bad

☐ Hire ☒ Do not hire

Worker 2

Colour


green

Test result

good

☒ Hire ☐ Do not hire

Confirm

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Figure 3.10: An employer evaluates two workers (odd class; simulated decisions).

Your decision

Round 4 of 10

You are an **employer**.

Hiring a worker who trained earns you 100 ECU; hiring one who did not train, -100 ECU; not hiring, 0.

 Colour

 purple

 Test result
 good

☐ Hire
 ☒ Do not hire

Confirm

Class results in previous rounds

Round	Colour	Workers	Trained	Good result	Hired	Hired with a good result	Hired with a bad result
1	 green	5	80%	80%	80%	100%	0%
1	 purple	4	0%	50%	50%	100%	0%
2	 green	5	40%	40%	40%	100%	0%
2	 purple	4	0%	75%	25%	33%	0%
3	 green	5	20%	0%	0%	—	0%
3	 purple	4	25%	25%	0%	0%	0%

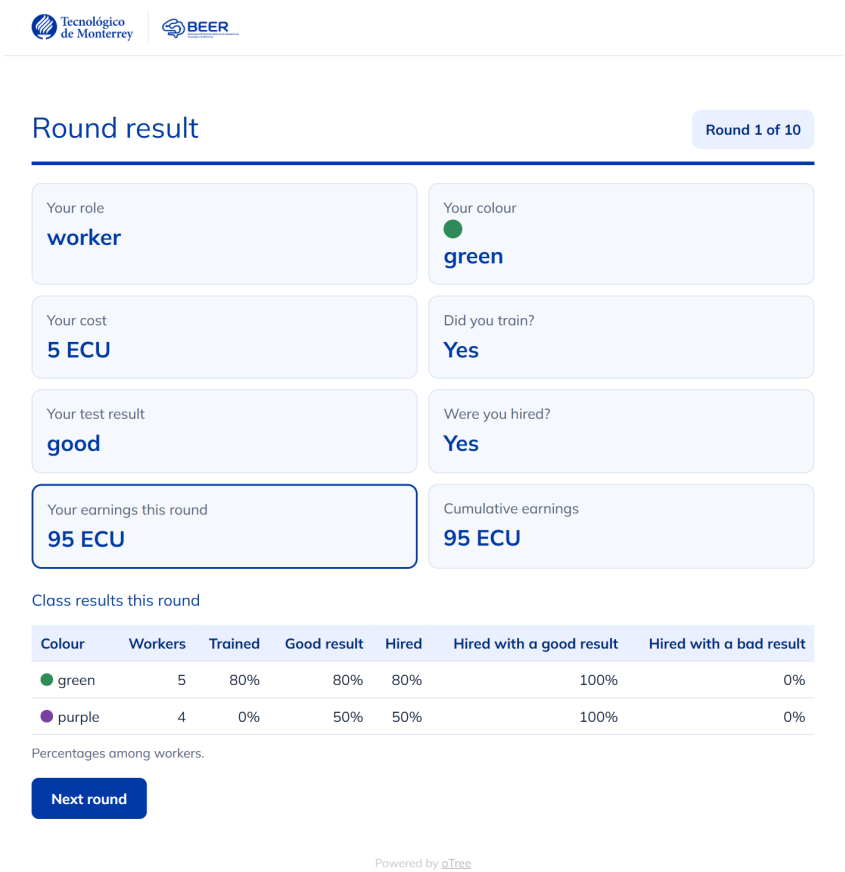
Percentages among workers.

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Figure 3.11: Hiring decision in round 4, with the class table: the information from which beliefs about each colour are formed (simulated decisions; session A).

3.6 Result and wrap-up

The result shows the worker their colour, cost, whether they trained, their test, whether they were hired and their earnings; it shows the employer each evaluation with its colour, test, decision and earnings. Both sides see the class table for that round. Negative earnings appear in red.



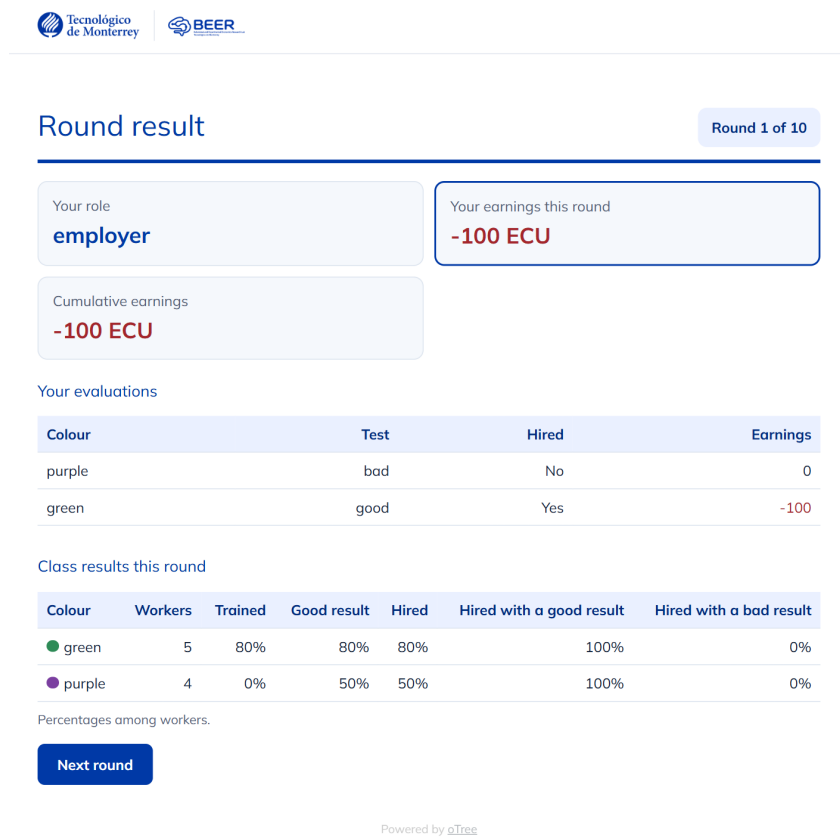


Figure 3.13: An employer's result; here, the employer who evaluated two workers (simulated decisions).

End of the activity

Round 10 of 10

Your total earnings

357 ECU

Your rounds

Round	Colour	Cost	Trained	Test	Hired	Earnings
1	green	5	Yes	good	Yes	95
2	green	20	Yes	good	Yes	80
3	green	16	Yes	bad	No	-16
4	green	2	Yes	good	Yes	98
5	green	95	No	bad	No	0
6	green	81	No	bad	No	0
7	green	89	No	good	Yes	100
8	green	58	No	bad	No	0
9	green	82	No	bad	No	0
10	green	90	No	bad	No	0

Thank you for taking part. Please wait for the instructor.

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Figure 3.14: Wrap-up: total earnings, own history and a note to wait for the instructor (simulated decisions).

Instructor report and debrief

4.1 When to reveal

Report is a tab of the session page: reach it from the room with **Monitor the session**, or from **Sessions** if the session has ended. It opens with results hidden. At the top it shows participants, workers of each colour, employers and completed rounds. Click **Show results** when the last round ends; **Refresh** adds new rounds and **Hide results** covers them again.

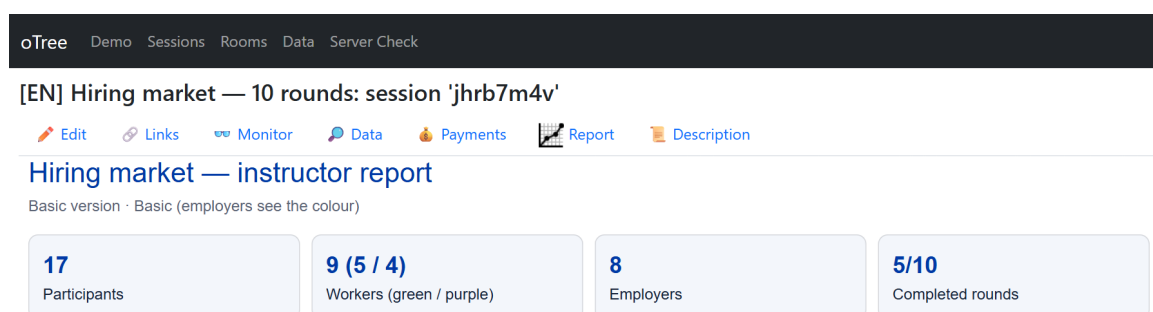


Figure 4.1: Report with results hidden.

For the instructor

With results hidden, the report can be projected: its title is neutral (“Hiring market — instructor report”) and the model is named only inside the hidden results, in the heading of the theoretical benchmark. Click **Show results** only in the final discussion, never between rounds: seeing the table by colour or the benchmark mid-session would change decisions.

4.2 Two simulated sessions: with a gap and without one

To show the range of possible outcomes, this chapter’s figures come from **two simulated 10-round sessions**. The decisions are *scripted*: they illustrate the mechanism; they are not results from a class nor evidence about how people behave. Costs and tests were drawn by the game.

- **Session A (a gap appears and persists).** 17 participants: 8 employers and 9 workers (5 green and 4 purple). By the script, the workers who happened to get purple were cautious in round 1 (they trained only with costs below 0–12) and the green ones were not (costs below 55–65). Employers start by assuming that half train (an assumption worth four observations), update that rate with each colour’s cumulative public table, and hire on a good result only if it

is at least 35–40% (one employer always hires on a good result, regardless of colour); nobody hires on a bad result. From round 2 on, each worker trains if their cost is below $50\times$ (share of their colour hired after a good result in the last three rounds), plus or minus a few personal ECU.

- **Session B (no gap).** 16 participants: 8 employers and 8 workers (4 and 4). The same rules, except that in round 1 all workers train with costs below 45–60, and employers ask for a rate of only 25–30%.

Because the game draws costs and tests, the same script does not always produce the intended pattern. The capture program repeats the session with fresh draws until the report's verdict matches the illustration. For these figures both sessions came out on the first attempt. In an earlier capture with the same script, however, session B took six attempts: in the first five, although employers treated both colours the same, the verdict said by pure chance that a gap closed (three times), opened or persisted. With four workers per colour the verdict is very noisy (the report warns about it); always read it together with hiring by colour.

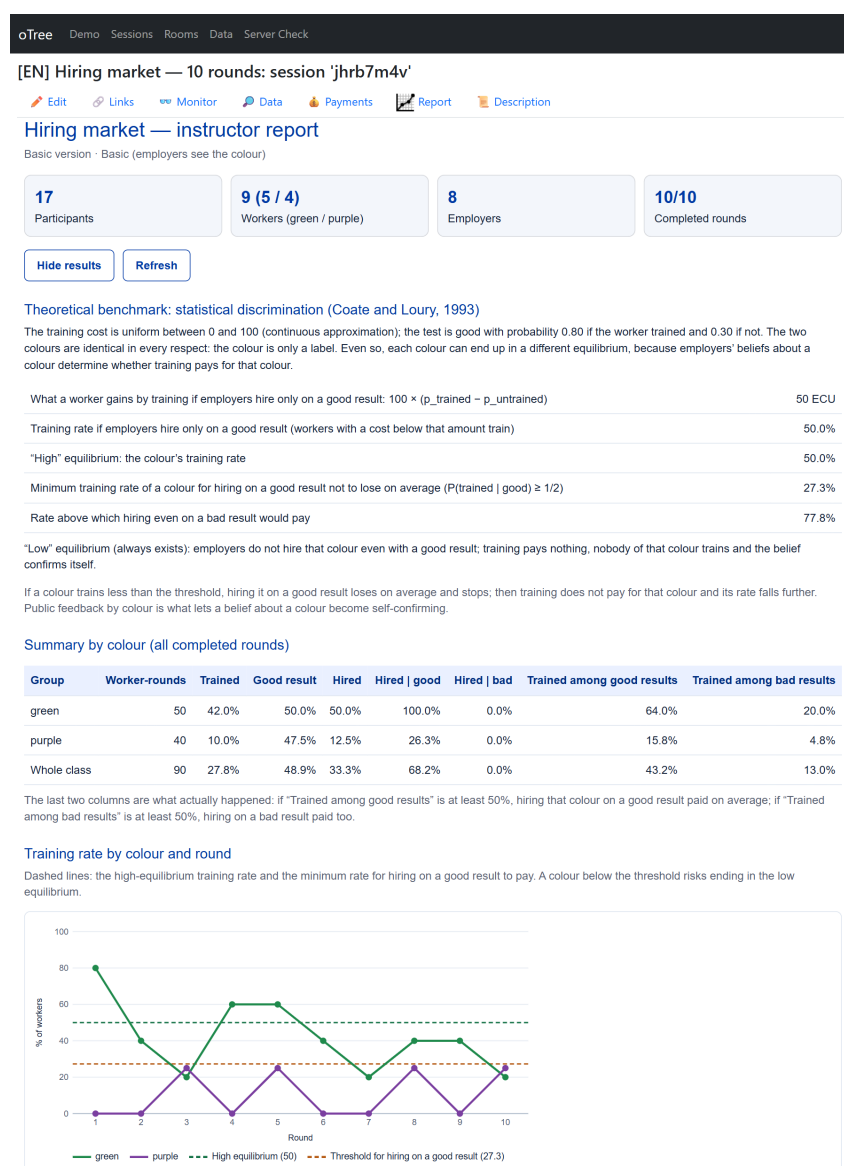


Figure 4.2: Session A, report revealed: theoretical benchmark, summary by colour and training rate by round (simulated decisions).



Figure 4.3: Session A: hiring rate by round and first vs last rounds, with the verdict on the gap and the small-class warning (simulated decisions).

Employers' implied hiring rules

For each colour, each employer is classified from all their decisions on workers of that colour: hired all, only on a good result, none, or another combination. Only employers who saw both good and bad results for that colour are classified; the rest cannot be. An employer counts for a colour only if they evaluated at least one worker of that colour.

Group	Only on a good result	All	None	Other combination	Not classifiable (saw only one kind of result)
green	8	0	0	0	0
purple	1	0	5	1	1

Training decision by cost

If employers hire only on a good result, training pays when the cost is below 50.

Cost	Benchmark	Green: cases	Green: trained	Purple: cases	Purple: trained
0–9	train	6	100.0%	5	80.0%
10–19	train	3	100.0%	2	0.0%
20–29	train	4	100.0%	4	0.0%
30–39	train	3	100.0%	6	0.0%
40–49	train	4	100.0%	1	0.0%
50–59	do not train	5	20.0%	4	0.0%
60–69	do not train	6	0.0%	5	0.0%
70–79	do not train	5	0.0%	4	0.0%
80–89	do not train	6	0.0%	5	0.0%
90–99	do not train	8	0.0%	4	0.0%

Results by round

Round	Green: trained	Purple: trained	Training gap (green – purple)	Green: hired	Purple: hired	Green: hired good	Purple: hired good	Green: hired bad	Purple: hired bad
1	80.0%	0.0%	80.0%	80.0%	50.0%	100.0%	100.0%	0.0%	0.0%
2	40.0%	0.0%	40.0%	40.0%	25.0%	100.0%	33.3%	0.0%	0.0%
3	20.0%	25.0%	-5.0%	0.0%	0.0%	—	0.0%	0.0%	0.0%
4	60.0%	0.0%	60.0%	40.0%	0.0%	100.0%	0.0%	0.0%	0.0%
5	60.0%	25.0%	35.0%	40.0%	0.0%	100.0%	0.0%	0.0%	0.0%
6	40.0%	0.0%	40.0%	60.0%	0.0%	100.0%	0.0%	0.0%	0.0%
7	20.0%	0.0%	20.0%	100.0%	25.0%	100.0%	50.0%	—	0.0%
8	40.0%	25.0%	15.0%	40.0%	25.0%	100.0%	50.0%	0.0%	0.0%
9	40.0%	0.0%	40.0%	60.0%	0.0%	100.0%	0.0%	0.0%	0.0%
10	20.0%	25.0%	-5.0%	40.0%	0.0%	100.0%	0.0%	0.0%	0.0%

Individual data: Data → Custom export (hiring_market). Model: Coate and Loury (1993); classroom version by Fryer, Goeree and Holt (2005) and Holt (Veconlab, "Statistical Discrimination"). Participant screens never name the topic.

Figure 4.4: Session A: implied hiring rules, training by cost and table by round (simulated decisions).

Summary by colour (all completed rounds)

Group	Worker-rounds	Trained	Good result	Hired	Hired good	Hired bad	Trained among good results	Trained among bad results
green	40	45.0%	45.0%	45.0%	100.0%	0.0%	72.2%	22.7%
purple	40	42.5%	60.0%	60.0%	100.0%	0.0%	54.2%	25.0%
Whole class	80	43.8%	52.5%	52.5%	100.0%	0.0%	61.9%	23.7%

The last two columns are what actually happened: if "Trained among good results" is at least 50%, hiring that colour on a good result paid on average; if "Trained among bad results" is at least 50%, hiring on a bad result paid too.

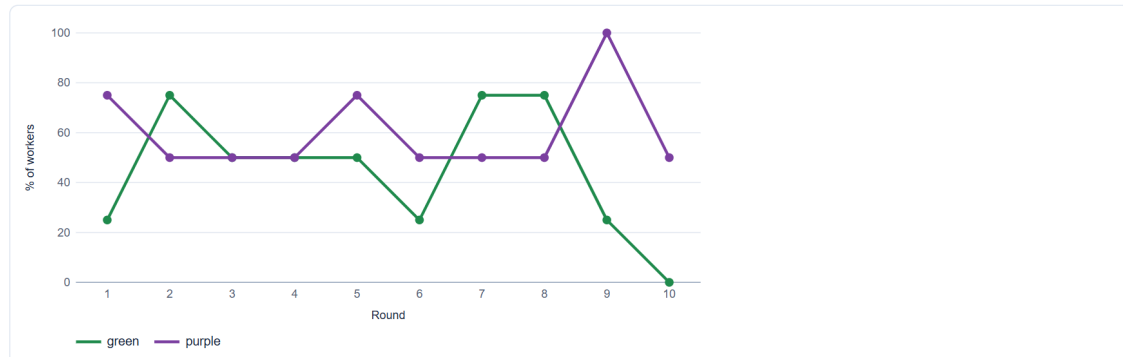
Training rate by colour and round

Dashed lines: the high-equilibrium training rate and the minimum rate for hiring on a good result to pay. A colour below the threshold risks ending in the low equilibrium.



Figure 4.5: Session B: summary by colour and training rate by round; both colours stay near the high equilibrium (simulated decisions).

Hiring rate by colour and round



First and last rounds

	Green: trained	Purple: trained	Training gap (green – purple)	Green: hired	Purple: hired
Rounds 1–3	41.7%	41.7%	0.0%	50.0%	58.3%
Rounds 8–10	50.0%	41.7%	8.3%	33.3%	66.7%

The training gap is not clear (under 10 points at the start and at the end).

With fewer than 10 workers per colour, a single decision moves that colour's rate by 10 points or more: treat this verdict as very noisy.

Figure 4.6: Session B: hiring by round and first vs last rounds; the gap is not clear, with the small-class warning (simulated decisions).

For the instructor

In session A, green trained in 42.0% of worker-rounds and purple in 10.0%; after a good result, 100% of green and 26.3% of purple workers were hired. The training gap went from 38.3 points (rounds 1–3) to 16.7 (rounds 8–10): it persists, with the report’s noise warning. For purple, five of the eight employers hired nobody. The “Trained among good results” column gives 64.0% for green and 15.8% for purple: hiring purple after a good result did lose on average. The belief came true because it removed purple’s incentive to train; that is the mechanism. In session B, green trained 45.0% and purple 42.5% of the time, both colours were hired after 100% of their good results, and the gap was 0.0 points at the start and 8.3 at the end: not clear. In your class the numbers will differ, and either pattern (or one in between) can appear. With 4 or 5 workers per colour, a single changed decision moves a colour’s rate by 20 or 25 points: read the percentages together with the counts.

4.3 How to read the report

1. The **theoretical benchmark** gives, with the session’s parameters, what a worker gains by training if employers hire only on a good result ($100 \times (0.8 - 0.3) = 50$), the training rate this produces (50%), the high-equilibrium rate, the minimum training rate of a colour for hiring it on a good result not to lose on average (27.3%), the rate above which hiring even on a bad result would pay (77.8%), and the low equilibrium. Section 5.1 derives each number.
2. The **summary by colour** adds up all completed rounds (worker-rounds): training rate, good results, hiring overall and conditional on the result. The last two columns say what actually happened: the share of trained workers among good results and among bad results. If the first is at least 50%, hiring that colour on a good result paid on average. In session A that share was 15.8% for purple: the belief ended up confirmed by the data, which is precisely the model’s mechanism. If in your class a colour stops being hired even though that share exceeds 50%, the belief no longer matches the data.
3. The **charts by round** show the training rate (with dashed lines at the high equilibrium, 50%, and at the threshold, 27.3%) and the hiring rate of each colour. A colour that falls below the threshold risks staying in the low equilibrium. The lines use the screens’ green and purple.
4. **First and last rounds** compares up to three initial with up to three final rounds: each colour’s training and hiring and the green – purple gap. The verdict (persists, closes, opens, reverses or is not clear) uses a 10-percentage-point threshold; it is a descriptive criterion, not a statistical test. If a colour has fewer than 10 workers, a warning appears below the verdict: a single decision moves that colour’s percentage by 10 points or more, so the verdict is very noisy. In a class of 30–35 (about 8 workers per colour) the warning will almost always appear; take it seriously and look at hiring by colour too.
5. **Implied hiring rules**: each employer is classified, for each colour, from all their decisions on workers of that colour: only on a good result, all, none, or another combination. It shows whether rules differ by colour without singling anyone out. Only employers who saw both good *and* bad results from that colour are classified: with a single kind of result, “only on a good result” cannot be told apart from “all” or “none”. Those who saw only one kind appear in the **Not classifiable** column; with few rounds or few workers per colour that column can be large.
6. **Training by cost**: training rate by cost brackets of 10, by colour, against the benchmark (train if the cost is below 50). If a colour trains little even at low costs, its decision responds to what it expects from employers, not to the cost.

7. The **table by round** gives all of the above round by round, without identifying anyone.

4.4 Debrief script

Debrief script

1. **The facts, without names.** Project the report and start with the table and charts. Ask employers how they decided, and workers why they trained or not. Let the class describe what it sees (“purple workers were rarely hired”, “purple workers stopped training”, or “there was no difference”).
2. **Reveal the design.** Say explicitly that colours were assigned at random and that green and purple were identical in everything: same costs, same test, same payoffs. The colour carried no information about the people.
3. **The mechanism.** If a gap appeared, rebuild the chain with the class: a few rounds with little training in one colour → employers see it in the table and stop hiring that colour even after a good result → training no longer pays for that colour → it trains less → the table confirms the belief. Nobody acted in bad faith: each person responded reasonably to what they saw, and the collective outcome was a gap with no underlying difference. If none appeared, ask what it would have taken and show this guide’s session A as an illustration (making clear it is simulated).
4. **The name.** Only then name the phenomenon: *statistical discrimination* and *self-confirming beliefs* (Coate and Loury, 1993). Derive the two equilibria (section 5.1).
5. **Beyond the classroom.** Move to real-world relevance following section 4.5.

4.5 Discussing real-world relevance respectfully

- **Judge the mechanism, not the people.** Never identify who hired or did not hire whom. The class’s decisions responded to a game’s incentives; they are not a measure of anyone’s values.
- **Say what the game shows and what it does not.** It shows that a gap can arise and persist between identical groups through beliefs and feedback alone, and that employers holding those beliefs need not lose money even though the outcome is inefficient and unfair. It does not show how much of any real gap is due to this mechanism rather than others (unequal prior opportunities, discriminatory preferences, institutions). Avoid causal claims about real groups.
- **Separate two ideas.** Statistical discrimination uses a visible trait as a clue to something unseen; discrimination based on preferences (a taste for not dealing with a group) is something else. The game contains only the first: the colour enters no payoff.
- **Look after your group.** Some students may have their own experiences of discrimination. Do not ask for testimonies in public; if someone wishes to share, let it be voluntary. Use examples from your course’s literature rather than cases about people in the room.
- **Public policy, in one line.** Coate and Loury (1993) analyse whether affirmative-action policies eliminate negative beliefs; this game includes no such treatment.

Theory and evidence

5.1 Benchmark: the Coate–Loury model

Theoretical background

Take one colour on its own: if employers condition on colour, each colour is a separate market. Let π be the colour's training rate, $c \sim U[0, C]$ the cost ($C = 100$), and $p_T = 0.8$, $p_U = 0.3$ the probabilities of a good result.

Worker. If employers hire on a good result and not on a bad one, training raises the probability of being hired from p_U to p_T , so it is worth $100(p_T - p_U) = 50$. Workers with $c < 50$ train: the rate is $50/C = 0.5$.

Employer. Hiring a worker with a good result pays +100 or −100; it pays if $\Pr(\text{trained} \mid \text{good}) \geq 1/2$:

$$\frac{p_T \pi}{p_T \pi + p_U(1 - \pi)} \geq \frac{1}{2} \iff \pi \geq \frac{p_U}{p_T + p_U} = \frac{0.3}{1.1} \approx 0.273.$$

Hiring on a bad result would pay if $\pi \geq (1 - p_U)/(2 - p_T - p_U) = 0.7/0.9 \approx 0.778$.

High equilibrium. Hire only on a good result, training rate 0.5: since $0.273 \leq 0.5 < 0.778$, the employers' rule is a best response to the rate, and the rate is a best response to the rule.

Low equilibrium. If employers do not hire a colour even after a good result, training pays nothing and nobody of that colour trains ($\pi = 0$); with $\pi = 0$, hiring on a good result always loses, so not hiring is the best response. The belief confirms itself. This equilibrium always exists.

The two colours are identical, but nothing forces them into the same equilibrium: one can sit in the high one and the other in the low one. The difference lies not in the people but in what employers expect of each colour, and that expectation validates itself. This is the central idea of [Coate and Loury \(1993\)](#). There are also unstable mixed equilibria (for example, with the rate exactly at the 0.273 threshold); the report does not list them.

Whole numbers. The game draws whole-number costs from 0 to 100; the report uses the continuous approximation. With whole-number costs and half of the workers indifferent at $c = 50$, the exact rate is also 0.5.

Efficiency. In the low equilibrium all the value of that colour's training is lost, and employers stop hiring people who, on average, would have been profitable if the colour were in the high equilibrium. The gap is not only unfair: it is also inefficient.

5.2 Experimental evidence

The classroom version this game follows is that of [Fryer et al. \(2005\)](#) and [Holt \(2019\)](#), with the Veconlab “Statistical Discrimination” program (<https://veconlab.com>). [Feltovich and Papageorgiou \(2004\)](#) study statistical discrimination by employers in the lab, and [Kidd et al. \(2008\)](#) implement the Coate–Loury model in the lab, with affirmative-action treatments this game does not include. This guide does not summarize those studies’ results: if you wish to cite them in class, consult them directly.

5.3 What to expect in a class

- The two simulated sessions in Chapter 4 show the two possible extremes; in a real class either may appear, or a pattern in between. There is no “correct” result: if no gap appears, the class is in the high equilibrium, which is also a lesson.
- With few workers per colour, a few early decisions can push a colour below the threshold. That this can happen by chance is part of the mechanism: the belief needs no underlying cause to sustain itself.
- Watch the relation between hiring after a good result and the actual share of trained workers among good results: if a colour stops being hired even though that share exceeds 50%, the belief no longer matches the data.

Note

A class’s results are descriptive. The same person’s decisions across rounds are not independent observations, and with 4 to 10 workers per colour, differences between colours may be pure noise. The report’s verdict is descriptive, not a statistical test.

Basic modes

The two basic modes live in the same room (basic, in each language); the panel allows only one active session per room at a time.

6.1 One round

`hiring_market_en_1_round`: a single round. It presents the mechanics, but there is no feedback before any decision, so there is nothing from which to form a belief about a colour: the game's mechanism cannot appear. Use it only as a short demonstration.

6.2 10 rounds

`hiring_market_en_10_rounds`: the reference configuration, described in Chapter 3. Ten rounds give time for a belief to form from the public table and to see whether it persists.

Extended variants

Variant	What changes	What it is for
No colour shown	Nobody sees colours on screen; employers see only the test. Colours exist only in the data and the report.	Control: with no colour, there is no basis for treating the groups differently.
Cheaper training	Cost between 0 and 60.	The high equilibrium becomes mixed (rate 77.8%).
More accurate test	Good result with 90% if trained and 10% if not.	Training pays more and the hiring threshold falls to 10%.

All three live in the extended room ([EN] **Hiring Market** — **extended**) and have 10 rounds.

7.1 No colour shown

`hiring_market_extended_colour_hidden`: the game assigns colours as always, but **no participant sees them**: not in the instructions, the decisions or the feedback, which is shown for the whole class without a split. Employers see only the test result. The report does split by colour, from the data, as a control: any difference between colours in this variant is noise, because nobody could condition on colour.

Instructions

Round 1 of 10

In this activity, half of the people are **workers** and the other half are **employers**. Roles do not change during the session.

- Your role for the whole session: you are a **worker**.
- In each round, each worker is paired at random with an employer. Pairs change every round.
- If the number of participants is odd, there is one more worker; in each round, one of the employers evaluates two workers, separately.

How each round is decided

1. The worker sees their **training cost** for the round: a whole number between 0 and 100 ECU, drawn again every round for each person; every number is equally likely. The worker decides whether to train (and pay that cost) or not.
2. Then the worker takes a test. If they trained, the result is **good** with probability 80%; if they did not train, it is good with probability 30%. Otherwise the result is **bad**.
3. The employer sees the test result of the worker they are paired with (not the cost, nor whether the worker trained) and decides whether to hire that worker.

Earnings in each round

- **Worker:** 100 ECU if hired and 0 if not; minus the cost, if they trained. This can be negative.
- **Employer:** 100 ECU for hiring a worker who trained; -100 ECU for hiring a worker who did not train; 0 for not hiring.
- An employer who evaluates two workers decides on each one separately and earns the sum of both results.

Example: a worker with cost 37 trains and is hired. The worker earns $100 - 37 = 63$ ECU, and the employer earns 100 ECU.

- At the end of each round, everyone sees among workers, the percentage who trained, the percentage who got a good result, and the percentage who were hired in that round. This table builds up round after round.
- There will be 10 rounds. Your earnings from all rounds are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

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Figure 7.1: No colour shown: instructions (no sentence about colour, no own colour).



Your decision

Round 1 of 10

You are a **worker**.

Your training cost this round

30 ECU

If you train, you pay this cost and your test result is good with probability 80%; if you do not train, you pay nothing and the result is good with probability 30%. If you are hired you earn 100 ECU.

Do you train this round?

☒ I train ☐ I do not train

Confirm

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Figure 7.2: No colour shown: training decision (simulated decisions).



Your decision

Round 1 of 10

You are an **employer**. This round you evaluate two workers. Decide on each one separately.

Hiring a worker who trained earns you 100 ECU; hiring one who did not train, -100 ECU; not hiring, 0.

Worker 1

Test result

good

☒ Hire ☐ Do not hire

Worker 2

Test result

bad

☐ Hire ☒ Do not hire

Confirm

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Figure 7.3: No colour shown: the employer sees only the test result (simulated decisions).

Round result

Round 1 of 10

Your role

worker

Your cost

30 ECU

Did you train?

Yes

Your test result

good

Were you hired?

Yes

Your earnings this round

70 ECU

Cumulative earnings

70 ECU

Class results this round

Workers	Trained	Good result	Hired	Hired with a good result	Hired with a bad result
4	75%	75%	75%	100%	0%

Percentages among workers.

Next round

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Figure 7.4: No colour shown: the class table is not split by colour (simulated decisions).

Debrief script

If you played both versions with different groups, ask: what information allowed a difference between colours to appear (or not)? Note that a comparison between two classes is not a causal effect.

7.2 Cheaper training

`hiring_market_extended_cheap_training`: the cost is a whole number between 0 and 60. If employers hired only on a good result, workers with a cost below 50 would train, a rate of $50/60 \approx 83.3\%$; but at that rate hiring on a bad result would also pay (threshold 77.8%). So the high equilibrium is **mixed**, and the report says so: the training rate is 77.8% and, after a bad result, workers are hired with probability $\approx 6.7\%$.

Theoretical background

If a bad result is hired with probability h , training is worth $100(p_T - p_U)(1 - h) = 50(1 - h)$, and the rate is $50(1 - h)/60$. An employer is indifferent about a bad result exactly when the rate is $0.7/0.9 \approx 0.778$. Setting them equal, $50(1 - h)/60 = 0.778$, so $h = 1 - 0.778 \times 60/50 \approx 0.067$. After a good result, hiring pays strictly. The low equilibrium still exists.

Instructions

Round 1 of 10

In this activity, half of the people are **workers** and the other half are **employers**. Roles do not change during the session.

- Your role for the whole session: you are a **worker**.
- Each worker is assigned a colour, green or purple, which stays the same for the whole session. The employer sees that colour and the test result.
- Your colour: ● **green**
- In each round, each worker is paired at random with an employer. Pairs change every round.
- If the number of participants is odd, there is one more worker; in each round, one of the employers evaluates two workers, separately.

How each round is decided

1. The worker sees their **training cost** for the round: a whole number between 0 and 60 ECU, drawn again every round for each person; every number is equally likely. The worker decides whether to train (and pay that cost) or not.
2. Then the worker takes a test. If they trained, the result is **good** with probability 80%; if they did not train, it is good with probability 30%. Otherwise the result is **bad**.
3. The employer sees the colour and the test result of the worker they are paired with (not the cost, nor whether the worker trained) and decides whether to hire that worker.

Earnings in each round

- **Worker:** 100 ECU if hired and 0 if not; minus the cost, if they trained. This can be negative.
- **Employer:** 100 ECU for hiring a worker who trained; -100 ECU for hiring a worker who did not train; 0 for not hiring.
- An employer who evaluates two workers decides on each one separately and earns the sum of both results.

Example: a worker with cost 37 trains and is hired. The worker earns $100 - 37 = 63$ ECU, and the employer earns 100 ECU.

- At the end of each round, everyone sees, for each colour, among workers, the percentage who trained, the percentage who got a good result, and the percentage who were hired in that round. This table builds up round after round.
- There will be 10 rounds. Your earnings from all rounds are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

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Figure 7.5: Cheaper training: instructions (cost between 0 and 60).

Theoretical benchmark: statistical discrimination (Coate and Loury, 1993)

The training cost is uniform between 0 and 60 (continuous approximation); the test is good with probability 0.80 if the worker trained and 0.30 if not. The two colours are identical in every respect: the colour is only a label. Even so, each colour can end up in a different equilibrium, because employers' beliefs about a colour determine whether training pays for that colour.

What a worker gains by training if employers hire only on a good result: $100 \times (p_{\text{trained}} - p_{\text{untrained}})$	50 ECU
Training rate if employers hire only on a good result (workers with a cost below that amount train)	83.3%
"High" equilibrium: the colour's training rate	77.8%
With these parameters that rate would make hiring on a bad result profitable too; the high equilibrium is then mixed: a bad result is hired with probability	6.7%
Minimum training rate of a colour for hiring on a good result not to lose on average ($P(\text{trained} \text{good}) \geq 1/2$)	27.3%
Rate above which hiring even on a bad result would pay	77.8%

"Low" equilibrium (always exists): employers do not hire that colour even with a good result; training pays nothing, nobody of that colour trains and the belief confirms itself.

If a colour trains less than the threshold, hiring it on a good result loses on average and stops; then training does not pay for that colour and its rate falls further. Public feedback by colour is what lets a belief about a colour become self-confirming.

Figure 7.6: Cheaper training: the report's theoretical benchmark, with the mixed high equilibrium.

It shows that cheaper training makes the high equilibrium more attractive but does not remove the low one: if employers do not hire a colour, training still does not pay, however cheap it is.

7.3 More accurate test

`hiring_market_extended_accurate_test`: the result is good with probability 90% if the worker trained and 10% if not. Training is worth $100 \times 0.8 = 80$ if employers hire only on a good result (rate 80%), the threshold for hiring on a good result to pay falls to $0.1/1.0 = 10\%$, and the one for hiring on a bad result rises to 90%. The low equilibrium still exists but is harder to sustain: a colour only needs to train a little for hiring it on a good result to pay.



Instructions

Round 1 of 10

In this activity, half of the people are **workers** and the other half are **employers**. Roles do not change during the session.

- Your role for the whole session: you are a **worker**.
- Each worker is assigned a colour, green or purple, which stays the same for the whole session. The employer sees that colour and the test result.
- Your colour: ● **green**
- In each round, each worker is paired at random with an employer. Pairs change every round.
- If the number of participants is odd, there is one more worker; in each round, one of the employers evaluates two workers, separately.

How each round is decided

1. The worker sees their **training cost** for the round: a whole number between 0 and 100 ECU, drawn again every round for each person; every number is equally likely. The worker decides whether to train (and pay that cost) or not.
2. Then the worker takes a test. If they trained, the result is **good** with probability 90%; if they did not train, it is good with probability 10%. Otherwise the result is **bad**.
3. The employer sees the colour and the test result of the worker they are paired with (not the cost, nor whether the worker trained) and decides whether to hire that worker.

Earnings in each round

- **Worker**: 100 ECU if hired and 0 if not; minus the cost, if they trained. This can be negative.
- **Employer**: 100 ECU for hiring a worker who trained; -100 ECU for hiring a worker who did not train; 0 for not hiring.
- An employer who evaluates two workers decides on each one separately and earns the sum of both results.

Example: a worker with cost 37 trains and is hired. The worker earns $100 - 37 = 63$ ECU, and the employer earns 100 ECU.

- At the end of each round, everyone sees, for each colour, among workers, the percentage who trained, the percentage who got a good result, and the percentage who were hired in that round. This table builds up round after round.
- There will be 10 rounds. Your earnings from all rounds are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

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Figure 7.7: More accurate test: instructions (90% and 10%).

Class plan and reading the results

8.1 Suggested 50-minute session

0–5 min	Introduce “a hiring activity” without naming the topic. Create the session on your screen (room [EN] Hiring Market , configuration <code>hiring_market_en_10_rounds</code>). Students join by QR code or link.
5–10 min	Cover, instructions and comprehension check. Answer procedural questions without saying what is best to do.
10–35 min	10 rounds of training and hiring (two to two and a half minutes per round). Follow progress in the Monitor, without projecting it.
35–40 min	Project the report and reveal results. Ask the class to describe what it sees (steps 1 and 2 of the script).
40–47 min	Mechanism and name: rebuild the self-confirming chain and derive the two equilibria (steps 3 and 4).
47–50 min	Real-world relevance, following section 4.5.

8.2 Discussion questions

- Employers: what did you look at, besides the test? Did the class table change how you decided?
- Workers: did you train more or less depending on what the table showed for your colour? Why?
- If the two colours were identical, where did the difference come from (or why did none appear)?
- Did employers who stopped hiring a colour lose money? Look at the actual share of trained workers among good results.
- What would it take to leave the low equilibrium? Would cheaper training or a more accurate test be enough?
- What changes if employers cannot see the colour?
- In which real situations is a visible trait used as a clue to something unseen? What distinguishes this mechanism from a discriminatory preference?

8.3 Common misinterpretations

Misreading	Clarification
“Purple trained less, so not hiring purple was right.”	Purple trained less <i>because</i> it was not hired: training did not pay. Causality runs both ways, and the difference was not in the people.
“If a gap appeared, employers were prejudiced.”	No prejudice is needed: it is enough to use the colour as a clue and for the public table to confirm the belief. That is why it is called <i>statistical</i> discrimination.
“If there was no gap, the model does not work.”	The model has two equilibria; the class ended up in the high one. That the low one exists does not mean it always happens.
“The game proves that real gaps are due to beliefs.”	The game shows that a gap <i>can</i> arise this way; it does not measure how much this mechanism weighs in any real gap.
“The employer’s payoff depends on the test.”	It depends on whether the worker trained; the test is only a noisy clue.
“A 20-point difference between colours is large.”	With 4 or 5 workers per colour, a single decision moves the rate by 20–25 points. Look at the counts and at persistence across rounds.

Operations, privacy and troubleshooting

9.1 Privacy and conduct

Participant codes are anonymous: never ask for or display names, student IDs or seats together with individual decisions. Project only aggregate results (percentages by colour, charts). In this game it is especially important that nobody can tell who hired or did not hire whom. The session's data are available to you under **Data**; do not share them beyond teaching or research use authorized by the lab.

9.2 If someone disconnects: Advance slowest participants

Each round waits for every worker to decide whether to train and for every employer to decide. If someone disconnects, ask them to reopen the room in the same browser: they resume where they were. If they cannot, use **Advance slowest participants** in the Monitor. This is what the game records in that case:

- **A worker who had not decided** is recorded as **not trained**: pays no cost and their test is good with probability 30%. That “no” *does* count as a real decision in the public table and in the report: it lowers their colour's training rate. With 4 or 5 workers per colour, a single absence lowers the rate by 20–25 points, and the class will see it in the table as if that colour had trained less. That can push the belief about a colour without anyone having chosen it: if you had to advance someone, say so in the discussion.
- **An employer who had not decided** is recorded as **not hiring** (one or both of the workers they evaluated): earns 0 and the worker is not hired. This also counts in the table and in the report (hiring after a good or bad result, implied rules).
- On the cover, instructions and comprehension check, advancing someone just moves them to the next screen.

9.3 Common problems

Situation	What to do
Someone sees “La sesión está llena” (session full).	You declared fewer participants than arrived. Close the room and create another session with the correct number.
The round keeps waiting.	Someone has not decided. Ask them to reopen the room in the same browser, or use Advance slowest participants (section 9.2).
Someone asks whether the colour matters or what it means.	Answer neutrally: the instructions tell you everything you need to know.
An employer sees two workers.	It is the odd class: they decide on each separately and earn the sum.
Negative earnings.	They are part of the game (training without being hired); ECU are not converted into money.
A different game appears in Demo or Rooms.	The panel does not belong to this game. Do not start the session; notify the lab.
You need to repeat the activity with the same group.	Create a new session in the same room; the earlier session’s data remain under Sessions . Bear in mind that after the discussion the group knows the topic.

9.4 Data for later analysis

Data → **Custom export (hiring_market)** gives one row per participant and round: session, anonymous code, round, language, edition, treatment, parameters (maximum cost, test probabilities, colour visible), role, colour, who evaluated whom (the employer’s position in the group and the evaluation number), cost, training decision, test result, whether hired, number of workers evaluated, hiring decisions, earnings and comprehension-check attempts. It contains no personal identifiers.

Annotated bibliography

- [Coate and Loury \(1993\)](#): the self-confirming-beliefs model; it also analyses affirmative-action policies.
- [Fryer et al. \(2005\)](#): the classroom game this version is based on.
- [Holt \(2019\)](#): the classroom version and its Veconlab program (“Statistical Discrimination”).
- [Feltovich and Papageorgiou \(2004\)](#): a lab study of statistical discrimination by employers.
- [Kidd et al. \(2008\)](#): a lab implementation of the Coate–Loury model, with affirmative-action treatments this game does not include.

Bibliography

- Coate, S., & Loury, G. C. (1993). Will affirmative-action policies eliminate negative stereotypes? *American Economic Review*, 83(5), 1220–1240. No DOI in Crossref (JSTOR only); volume, issue and pages **not verified**.
- Feltovich, N., & Papageorgiou, C. (2004). An experimental study of statistical discrimination by employers. *Southern Economic Journal*, 70(4), 837–849. doi:10.2307/4135275.
- Fryer, R. G., Goeree, J. K., & Holt, C. A. (2005). Experience-based discrimination: Classroom games. *The Journal of Economic Education*, 36(2), 160–170. doi:10.3200/JECE.36.2.160-170.
- Holt, C. A. (2019). *Markets, Games, and Strategic Behavior: An Introduction to Experimental Economics* (2nd ed.). Princeton University Press. No DOI. “Statistical Discrimination” program on Veconlab: <https://veconlab.com>.
- Kidd, M. P., Carlin, P. S., & Pot, J. (2008). Experimenting with affirmative action: The Coate and Loury model. *Economic Record*, 84(266), 322–337. doi:10.1111/j.1475-4932.2008.00494.x.

Room QR codes

Project or print the page for the room you will use. Students scan it with their phone camera and click **Start**. The pages only say “Hiring market”: you can project them without giving away the topic.

Hiring market

English room



`hiringmarket.beer-lab.org/room/hiring_market_en`

Scan the code and press **Start**.

Hiring market

English room, extended version



hiringmarket.beer-lab.org/room/hiring_market_extended

Scan the code and press **Start**.

Hiring market

Sala en español



hiringmarket.beer-lab.org/room/hiring_market_es

Escanee el código y pulse **Comenzar**.

Hiring market

Sala en español, versión extendida



`hiringmarket.beer-lab.org/room/hiring_market_extendido`

Escanee el código y pulse **Comenzar**.