



Instructor's Guide to Time Preferences

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 accompanies the basic and extended editions of the BEER Lab time-preferences family. It is written for instructors who want to use the activity without being specialists in behavioral or experimental economics. The opening chapters explain how to select a configuration, open a room, and conduct a session.

The central chapters develop discounted utility, dynamic consistency, present bias, and measurement problems. The final chapters explain the instructor report, provide debrief sequences and solved exercises, and connect each extension to its academic foundations. The activity records choices between dated consequences.

It does not diagnose a person's character, patience, or responsibility. An earlier choice may reflect discounting, marginal utility, liquidity, trust in payment, transaction costs, or comprehension. The teaching objective is to formulate and test models, not to label students. Throughout the guide, theoretical predictions, observed session patterns, and causal claims are kept separate.

Author

This guide was prepared by Stanislaw Maldonado, research professor in the Department of Economics at Tecnológico de Monterrey, Monterrey Campus. For questions or suggestions about its content, please contact the author at stanislao.maldonado@tec.mx.

For the instructor

For a first class, read the quick guide, the preparation chapters, and the section on multiple price lists. For an advanced class, add the chapters on quasi-hyperbolic discounting, anomalies, convex time budgets, and commitment. Before projecting results, state a quantitative prediction and keep the instructor report concealed.

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Quick guide

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.

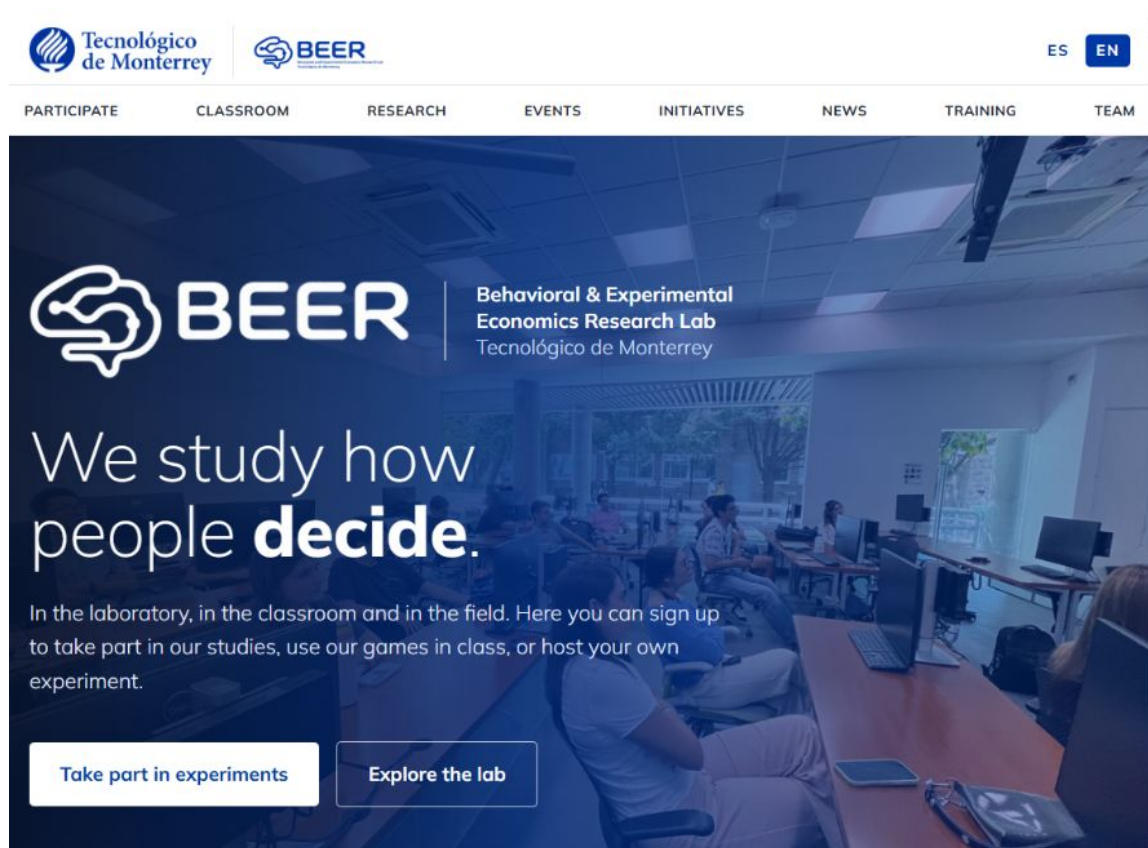


Figure 1.1: Current institutional website. Select **CLASSROOM** in the top navigation menu to open the teaching experiments. Captured on October 7, 2026.

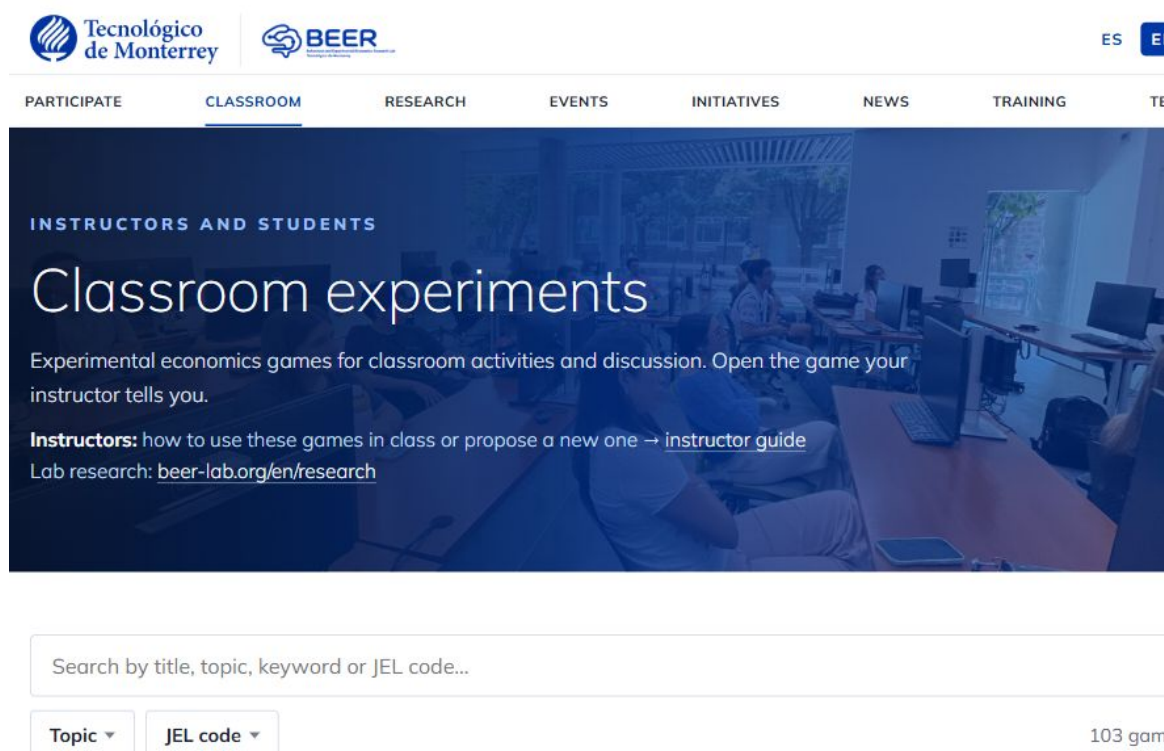


Figure 1.2: Current catalog: search by title, topic, or JEL code. Then locate this family's card and select language and edition. Captured on October 7, 2026.

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.

ECU stands for *Experimental Currency Units*: the activity's unit of account. An outcome of 100 ECU does not automatically equal 100 pesos or 100 dollars. Conversion depends on the session configuration. Before announcing a payment, confirm with the laboratory whether money is paid, the conversion rate, and which decisions count for payment. In hypothetical modules, describe amounts as outcomes in the stated situation.

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.

intertemporales — una decisión	Preferencias intertemporales / Time Preferences — BEER Lab Seleccione una variante de este juego. Select a version of this game.
intertemporales — lista de 10 elecciones	
intertemporales — lista de 10 elecciones, orden aleatorio	
ences — one choice	
ences — 10-choice fixed list	
ences — 10-choice randomized list	
intertemporales extendido — referencia, una decisión	
intertemporales extendido — referencia, lista fija	
intertemporales extendido — referencia, lista aleatoria	
intertemporales extendido — sesgo presente	
intertemporales extendido — efecto magnitud	
intertemporales extendido — duración de la demora	
intertemporales extendido — ganancias y pérdidas	
intertemporales extendido — presupuesto temporal convexo	
intertemporales extendido — demanda de compromiso	
me Preferences — baseline, one choice	
me Preferences — baseline, fixed list	
me Preferences — baseline, randomized list	
me Preferences — present bias	
me Preferences — magnitude effect	
me Preferences — delay length	
me Preferences — gains and losses	
me Preferences — convex time budget	
me Preferences — commitment demand	

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

Rooms

Current rooms:

[ES] Preferencias intertemporales
[EN] Time Preferences
[ES] Preferencias intertemporales: extendido
[EN] Time Preferences: extended

Figure 1.4: Rooms contains the four rooms for this family: basic and extended editions in Spanish and English.

Room: [EN] Time Preferences

Create a new session

Session Config

[EN] Time Preferences — one choice

Number of participants

Individual decisions: any positive participant count is allowed.

Create

[Configure session](#) 

App sequence

time_preferences_game (10 rounds)

Time preferences, present bias, dated choice, convex budgets, and commitment.

Figure 1.5: 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	Study dated choices, discounting, switch points, dynamic consistency, present bias, magnitude, delay, and sign effects, convex allocations, and commitment demand.
Experimental unit	One individual. Each choice is an observation, while each complete profile supports participant-level indicators without strategic interaction.
Basic edition	One choice, a fixed ten-choice list, or the same list in randomized order.
Extended edition	Three baseline variants and six treatments: present bias, magnitude, delay length, sign, convex time budget, and commitment.
Payoff	One decision is randomly selected for payment or recording. The software records a dated ECU claim; real incentives require credible delivery at both dates.
Students EN	https://timepreferences.beer-lab.org/room/time_preferences_en
Instructor	https://timepreferences.beer-lab.org/demo
Local test	http://localhost:8033/demo with <code>GAME_FAMILY=timepreferences</code> .
Decision	Choose between payments at different dates or complete the treatment's intertemporal allocation task.
Topics	time discounting; present bias; dynamic consistency; commitment; behavioral economics.
JEL	C91; D15; D91.

Attention

The domain `timepreferences.beer-lab.org` and its routes are the proposed deployment paths. Until the laboratory configures its DNS, oTree process, and database, they should be treated as planned routes. The local instance was validated with 24 configurations and four isolated rooms.

1.2 Learning objectives

By the end of the activity, students should be able to:

- represent an intertemporal choice by separating amount, earlier date, and later date;
- compute present value under exponential discounting and explain the discount factor;
- define dynamic consistency and recognize a preference reversal as a date approaches;
- interpret present bias in a quasi-hyperbolic model;
- read a multiple price list, locate a switch interval, and detect multiple or nonmonotonic switches;
- explain why a switch point alone does not identify pure time preference;
- distinguish magnitude, delay-length, and sign effects from constant discounting;
- compare binary choices with allocation on a convex time budget;
- interpret costly commitment demand without treating it as a direct measure of self-control;
- assess dated-incentive validity, credibility, liquidity, and delivery risk;
- describe a distribution before proposing mechanisms and respect report denominators;
- design a comparison that separates present bias from short-run discounting.

The activity and its logic

2.1 One consequence, two dimensions

Each decision card presents an earlier and a later option. The participant must evaluate both how much is received and when it is received. In the baseline list, the earlier option pays 100 ECU today and the later option rises from 102 to 120 ECU in 30 days. A participant may prefer 100 today to 102 in 30 days and then switch once the later amount reaches 112. Under the exercise's assumptions, that switch locates an interval of temporal compensation.

The interface separates the options visually and keeps dates visible. The header reports progress through the task. There is no partner, strategic wait, or rematching: participants move at their own pace. At the end, the screen lists all choices and highlights one randomly selected decision. The rule is meant to make each row consequential as though it were the only one that could determine the outcome, subject to the credibility of payment or recording.

Amounts are expressed in ECU to preserve generality. In a class without monetary payment, the instructor should clearly describe the activity as a pedagogical adaptation. In an incentivized session, the conversion, delivery method, dates, and responsible person must be announced before the task. The platform does not transmit future payments; it records a dated obligation that the laboratory must implement separately.

2.2 Fixed and randomized lists

The fixed list orders the later reward from low to high. It makes a switch interval easy to locate and is useful for teaching monotonicity. It may also encourage mechanical consistency because participants recognize the sequence. The randomized list preserves amounts and dates while changing order. If answers change sharply across formats, elicitation design is part of the result.

The report reconstructs rows by task code rather than presentation order. It can therefore sort randomized answers by later amount and examine whether there is a single switch. A participant might choose later at 108, earlier at 110, and later at 112. Such a profile may reflect error, indifference, limited attention, or nonstandard preferences. The system preserves it instead of imposing a switch, because the pattern is informative about measurement quality and process.

2.3 Random decision selection

After the task, the system selects one completed decision. The chosen nominal consequence and date are recorded. This prevents payment of every row from turning the list into a portfolio across

dates. Under random selection, each row is intended to act as a separate decision.

Random selection is not a complete solution. Participants must trust both the draw and future delivery. The mechanism also relies on assumptions about compound lotteries. The instructor should explain it in plain language, include it in the comprehension check, and avoid exceptions after choices are made.

Theoretical foundation

An earlier monetary choice is not automatically impatience. Concave utility, liquidity constraints, default risk, or collection costs can change the relative value of the options. Interpretation requires explicit maintained assumptions.

Exponential discounting and discounted utility

3.1 The benchmark model

The classical formulation evaluates a consumption stream as

$$U_t = \sum_{k=0}^{T-t} \delta^k u(c_{t+k}), \quad 0 < \delta \leq 1.$$

The parameter δ is the per-period discount factor. Values close to one place relatively high weight on future utility; lower values reduce that weight. Samuelson introduced the discounted-utility form as a compact representation and cautioned against reading it as a complete psychological account. Its teaching value comes from temporal separability, stationarity, and transparent present-value comparisons.

For two monetary payments, a simplified comparison is between $u(x_E)$ and $\delta^d u(x_L)$, where d is the delay. Under linear utility and homogeneous periods, the later reward is selected when $x_L \geq x_E / \delta^d$. Indifference between 100 today and 110 in 30 days implies a 30-day discount factor of 100/110. The effective premium is 10 percent for that interval. Annualizing a short interval can create enormous figures, so the guide recommends first reporting the original premium and delay.

3.2 Present value and an implied rate

If a later reward L arrives after d units and the earlier reward is E , linear utility gives $E = L / (1+r)^d$. Hence

$$r = \left(\frac{L}{E} \right)^{1/d} - 1.$$

The unit of d matters. When d is measured in months, r is monthly. Compounding it to a year magnifies measurement error. In an introductory discussion, it is clearer to say that the participant required at least 12 additional ECU to wait 30 days.

A price list identifies an interval. If a participant chooses earlier at 108 and later at 110, the exact indifference amount lies between them. Assigning 110 as a precise rate overstates the data. Multiple switching or never switching produces an even broader interval. The instructor report uses switch categories to preserve this limitation.

3.3 Dynamic consistency

Exponential discounting is stationary: ranking two consequences 30 days apart does not change when both are moved equally into the future. A person who prefers 110 in 30 days to 100 today should also prefer 110 in 60 days to 100 in 30 days, provided amounts, utility, information, and delivery conditions are unchanged.

Dynamic consistency does not mean always choosing later. A person can discount heavily and remain consistent. Nor does it rule out revision after new information. The relevant test moves dates while holding information constant. A systematic reversal when the earlier reward becomes immediate contradicts simple stationarity and motivates models that give special weight to the present.

Present bias and quasi-hyperbolic discounting

4.1 The beta-delta model

A common representation gives a separate weight to all future utility:

$$U_t = u(c_t) + \beta \sum_{k=1}^{T-t} \delta^k u(c_{t+k}), \quad 0 < \beta \leq 1.$$

δ captures long-run discounting and β the discontinuity between now and any future date. When $\beta = 1$, the model reduces to exponential discounting. When $\beta < 1$, an immediate reward receives extra relative weight. For two future payments, β applies to both and largely cancels; when one payment becomes immediate, it changes the comparison.

The present-bias treatment includes today versus 30 days and 30 versus 60 days with aligned amounts. A pattern compatible with present bias requires more compensation in the immediate block than in the fully future block. An earlier choice in the immediate block alone is insufficient. Identification requires the within-person comparison and comparable delivery conditions.

4.2 Sophistication, naivete, and commitment

A sophisticated person anticipates that a future self may reverse a plan and may demand a device that removes the tempting option. A naive person may reverse while expecting to follow the original plan, and thus may not demand commitment. An exponential discounter does not need commitment for time consistency, although other reasons may create demand.

The activity presents a commitment choice after the dated decisions. A participant may pay 2 ECU to remove the earlier option from an equivalent future decision. The cost prevents commitment from being a costless statement. Even so, purchase does not prove sophistication: it may reflect convenience or a general preference for fewer options. Nonpurchase does not prove naivete: the cost may exceed the perceived benefit.

4.3 Applications and welfare

Present bias can organize patterns in saving, studying, exercise, or paperwork. The model does not say that every delay is irrational. Tasks can have immediate costs and uncertain benefits, so waiting may be optimal. The analytical contribution is to describe a conflict between plans and later actions, then ask which institutions alter that conflict.

Commitment devices include self-imposed deadlines, restricted savings accounts, application blockers, and refundable deposits. Welfare analysis must consider rigidity. A device may protect a plan yet prevent adaptation to a shock. The activity separates demand, cost, perceived efficacy, and actual welfare effects.

4.4 How to interpret a reversal

A reversal is a comparison across decisions, not a description of one row. Suppose a participant prefers 115 ECU in 60 days to 100 in 30 days, yet 30 days later chooses 100 immediately over 115 after another 30 days. If information and credibility did not change, the ranking reversed when the earlier consequence became present. The pattern is compatible with present bias. Choosing earlier in both comparisons could instead reflect heavy but dynamically consistent discounting.

The instructor should separate an actual longitudinal reversal from a static classroom analogue. This activity compares immediate and future blocks at one moment; it does not wait 30 days and ask again. A longitudinal design would need to recontact participants, preserve incentives, and hold conditions constant. The distinction is valuable because it shows what evidence a dynamic claim requires.

Plans and actions also differ. Asking what a person expects to do in 30 days measures an intention. Offering a binding future choice measures an anticipated action. A commitment device changes the future opportunity set. During debrief, draw a timeline with the planning moment, the later decision moment, and the consequence dates. The diagram makes clear where beta, delta, and the institution enter.

Anomalies relative to constant discounting

5.1 Magnitude effect

The magnitude effect refers to a different proportional premium across stake sizes. Many people require a larger percentage return to wait for small amounts than for large amounts. The treatment compares 50-ECU and 200-ECU blocks with aligned proportional increments. Under linear utility and constant discounting, later-choice rates should be similar. Differences may also reflect nonlinear utility, fixed transaction costs, or amount perception.

During debrief, compare later-choice shares by block and convert one row in each block to a percentage premium. Absolute increments alone are misleading: 20 extra on 200 differs from 20 extra on 50. Ask whether a fixed cost of collecting a later payment would weigh more heavily in the small block.

5.2 Delay-length effect

The delay treatment compares seven and 90 days. An exponential model applies a stable per-unit factor and imposes a relationship between horizons. Empirically, implied per-period rates often fall as the horizon lengthens. Part of this pattern may arise from perception or from annualizing short intervals.

The interface keeps the earlier amount at 100 ECU and varies the later reward. Discuss both total compensation and the rate per unit. A five-ECU premium for one week is modest in absolute terms but large when mechanically annualized. Annualization illustrates scale; it does not establish that the same rate would hold for years.

5.3 Sign effect

The gain block uses receipts, whereas the loss block uses deductions from a 200-ECU account. In the loss block, choosing later may mean postponing a larger deduction. The nominal result equals the starting account minus the chosen deduction. Standard symmetric discounting suggests a coherent relationship across signs, while evidence often finds differences.

Wording is central. A delayed deduction is not a gain, and choosing later is not always patience. The report separates blocks. Ask which option minimizes the deduction and which changes only the date. Relate the pattern to reference dependence and loss aversion without claiming that this

task alone identifies a prospect-theory value function.

For the instructor

Magnitude, delay, and sign effects are stylized facts and specification checks. Each may have several mechanisms. Students should learn to state a comparison and identify omitted variables before declaring a model rejected.

Measurement: price lists and convex budgets

6.1 Multiple price lists

A list provides several prices for waiting. It is simple and quickly locates an interval. Its limitations include order effects, multiple switching, range anchoring, and assumptions about utility. A unique switch is convenient, but enforcing it would erase informative responses. The platform permits any pattern and reports monotonicity.

Use three indicators together: share of later choices, distribution of first later amount, and share of monotonic profiles. The first summarizes rows; the second approximates a threshold; the third describes internal order. A 60-percent later rate could come from six always-later participants or ten participants switching near the middle. Those are different distributions.

6.2 Convex time budgets

The convex-budget method asks participants to allocate 100 tokens across dates. Each later token is transformed at a stated rate, while each earlier token pays one for one. If a tokens are placed later and the rate is q , dated consequences are $100 - a$ ECU earlier and qa ECU later. The slider updates both values.

The design permits interior choices and may use more variation than a binary task. Under smooth preferences, budget slope and allocation contain information about curvature and discounting. Joint identification needs multiple budgets and assumptions. The activity is an introduction to Andreoni and Sprenger, not a full structural estimator.

6.3 Risk, curvature, and delivery

Monetary intertemporal choices mix time preference with utility of money. A participant with diminishing marginal utility may spread resources across dates even without discounting. Different background consumption changes the comparison. Estimating a rate from amounts therefore assumes linearity or requires separate curvature measurement.

A future promise may also be perceived as risky. Paying the earlier option in cash and the later one through a costly return visit introduces transaction differences. A controlled protocol uses symmetric methods, such as scheduled transfers with identical paperwork. The software cannot repair asymmetric delivery; the laboratory protocol must prevent it.

Bilingual architecture and catalog

The family uses one oTree app with Spanish and English text catalogs. Language, edition, and treatment are configuration parameters. This keeps rules aligned and makes a calculation fix apply to both languages. The isolated instance exposes 24 configurations and four rooms.

7.1 Basic configurations

Configuration	Choices	Teaching use
<code>time_preferences_en_one_choice</code>	1	Immediate introduction to amount and date.
<code>time_preferences_en_fixed_list</code>	10	Switch interval, monotonicity, and elicitation.
<code>time_preferences_en_random_list</code>	10	Order effects and measurement robustness.
<code>preferencias_intertemporales_es_1_decision</code>	1	Spanish one-choice counterpart.
<code>preferencias_intertemporales_es_lista_fija</code>	10	Spanish fixed list.
<code>preferencias_intertemporales_es_lista_aleatoria</code>	10	Spanish randomized list.

7.2 Extended configurations

Each language has nine extended configurations: three baselines and six treatments. English names begin with `time_preferences_extended`; Spanish names begin with `preferencias_intertemporales_extendido`. Suffixes identify one-choice baseline, fixed baseline, randomized baseline, present bias, magnitude effect, delay length, sign effect, convex budget, and commitment demand. The instructor can activate one mechanism without running the full package.

Present bias	Aligned today/30-day and 30/60-day blocks.
Magnitude	Small- and large-stake blocks with comparable premiums.
Delay length	Short and long delays.
Sign	Gains and deductions from a starting account.
Convex budget	Allocation of 100 tokens under several transformation rates.
Commitment	A dated list followed by a costly option to remove the earlier alternative.

Accessing the platform

The institutional path begins at <https://beer-lab.org/>. From there, open <https://teaching.beer-lab.org/> and select Time Preferences. The family should run in its own isolated instance: Demo contains only its 24 configurations and Rooms only its four rooms.

Basic ES: https://timepreferences.beer-lab.org/room/preferencias_intertemporales_es

Basic EN: https://timepreferences.beer-lab.org/room/time_preferences_en

Extended ES: https://timepreferences.beer-lab.org/room/preferencias_intertemporales_extendido

Extended EN: https://timepreferences.beer-lab.org/room/time_preferences_extended

Instructor: <https://timepreferences.beer-lab.org/demo>

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

8.1 Instructor workflow

The instructor opens Demo, selects a configuration, and creates a session. Adjust the default participant count before distributing links. Monitor tracks progress; Report contains the aggregate display; Data exports records. Students receive the room or individual link, never the Demo page.

A waiting screen in a room means that the participant has entered but the session has not started. Because this is an individual task, waiting within the activity should not depend on another participant. Check Monitor and the session link before reloading. A message that the participant does not exist usually indicates an old link or a reset local database.

oTree

[Demo](#)[Sessions](#)[Rooms](#)[Data](#)[Server Check](#)

[ES] Preferencias intertemporales — lista de 10 elecciones: session 'e6q71tg5' (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

Not available ⓘ

Grid view

[Launch](#)

Session-wide testing link

Open the below link in up to 10 browser tabs.

<http://127.0.0.1:8033/join/rovvuvgi>

Single-use links

Open each link in its own browser tab.

P1	http://127.0.0.1:8033/initializeParticipant/fzzqjobg
P2	http://127.0.0.1:8033/initializeParticipant/2yo4ajt2
P3	http://127.0.0.1:8033/initializeParticipant/azsjqbll
P4	http://127.0.0.1:8033/initializeParticipant/g6nt92fb
P5	http://127.0.0.1:8033/initializeParticipant/kfsgfzhl
P6	http://127.0.0.1:8033/initializeParticipant/d7r0uql9
P7	http://127.0.0.1:8033/initializeParticipant/61t34929
P8	http://127.0.0.1:8033/initializeParticipant/zfnmfuac
P9	http://127.0.0.1:8033/initializeParticipant/uuyxoja9
P10	http://127.0.0.1:8033/initializeParticipant/m1pelow2

Figure 8.1: Individual links generated for a demo session.

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Preparing a session

9.1 Decisions before class

Start with the learning question. Use one choice for present value, a fixed list for switch intervals, fixed versus random order for elicitation, present bias for dynamic consistency, a convex budget for methods, and commitment for self-control policy. Running every variant at once is rarely useful.

Choose whether consequences are hypothetical or incentivized. For real incentives, document the ECU conversion, delivery method, dates, responsibility, absence policy, and random selection. Conditions should be symmetric across dates. For hypothetical sessions, describe a recorded consequence rather than a guaranteed transfer.

Checkpoint

- Open Demo and confirm that only this family appears.
- Verify language, edition, treatment, and participant count.
- Complete a test session in separate windows.
- Prepare the delivery protocol for real incentives.
- Open Report on the projection computer and keep it concealed.
- Prepare a prediction question before showing data.
- Reserve at least fifteen minutes for debrief.

9.2 Starting the activity

Request silence before distributing the link. The welcome screen explains the laboratory purpose and requires privacy, individual work, and conduct rules. Instructions state that dates are measured from today, one decision is randomly selected, and the summary appears at the end. The comprehension check covers those points.

Do not describe one option as patient or correct. Explain the interface without recommending a choice. If many participants fail comprehension, restate the rule with a new example. Choices are interpretable only after amount and date are understood.

9.3 During and after choices

Watch Monitor without projecting responses. One choice takes only a few minutes; lists and treatments may take eight to fifteen. Convex budgets may need additional time. Do not invite public explanations while others decide because they can create anchors or social signals.

After completion, participants see a personal summary and wait. Before revealing Report, solicit a prediction about later-choice share, modal switch, or a block difference. Record it. This makes the difference between prior belief and observation explicit.

Participant flow

The page identifies the BEER Lab of the Department of Economics at Tecnológico de Monterrey. It explains that dated consequences will be compared and that there are no correct answers. Rules must be accepted to continue.

The timeline reduces date errors. The note distinguishes recorded claims from automatic transfers and declares the teaching nature of the task. An incentivized implementation needs the external payment protocol.

The questions test rules, not preferences. An error shows that subsequent choice data would be hard to interpret. The participant cannot advance until the correct rules are selected.

Amounts, dates, and progress are visible. Color distinguishes options without assigning normative value. The participant confirms the selected alternative.

The summary replaces the generic “No more pages left” endpoint. It highlights the selected row, nominal consequence, and date, and asks the participant to wait.



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 compare economic consequences available at different dates. There are no morally correct answers: the purpose is to study how amount and time are valued.

General laboratory rules

- Remain silent throughout the activity.
- Do not talk to or observe other participants.
- Make decisions individually and privately.
- Do not refresh, close, or leave this page.
- If you have a problem, raise your hand and wait quietly for help.

☐ I understand and will follow these rules.

Start

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Figure 10.1: Institutional welcome, activity purpose, and general laboratory rules.



Instructions

Instructions

ECU · 1

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.

Choice list



Each decision compares an earlier consequence with a later consequence. Dates are always expressed as days from today.

One completed decision will be selected at random. If real incentives are used, the laboratory must honor both the amount and date in that decision. The screen records dated claims in ECU; it does not automatically advance a future payment.

You will not receive feedback between decisions. A summary and the selected decision appear at the end.

This is a teaching adaptation. Measuring time preferences with real incentives requires credible delivery mechanisms at both dates.

Continue

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Figure 10.2: Current instructions for the basic edition: initial resources, decision rules, and experimental units.



Comprehension check

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

Comprehension check

Choice list

Should you consider both the amount and date of each option?

☐ Yes

☒ No

Your answer: No. The correct answer is Yes. Review the instructions: compare amount and date; one decision is selected at random; the summary appears at the end.

How many decisions will be selected at random for final payment or recording?

☒ One decision

☐ All decisions

When will you see the summary of your decisions?

☒ At the end of the activity

☐ After every decision

Continue

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Figure 10.3: Current comprehension check with an incorrect answer, its specific explanation, and retained responses.



Intertemporal decision

Intertemporal decision

Decision 1 of 1

Choose one option.

EARLIER OPTION

Receive 100 ECU in today

today

vs

LATER OPTION

Receive 110 ECU in 30 days

30 days

Confirm decision

Con tecnología de [oTree](#)

Figure 10.4: Binary card with an earlier and a later option.



Activity complete

Activity complete

110 ECU

Recorded nominal value

The activity is complete. Keep this page open and wait for the instructor.

Randomly selected decision: 1

Later option · today / 30 days

Decision	Dates	Choice	Nominal ECU
1 ★	today / 30 days	Later option	110

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Figure 10.5: Explicit completion screen with the randomly selected row.

Extended variants in the interface



Intertemporal decision

Intertemporal decision

Decision 1 of 10

Choose one option.

EARLIER OPTION Receive 100 ECU in today today	vs	LATER OPTION Receive 115 ECU in 30 days 30 days
Confirm decision		

Con tecnología de [oTree](#)

Figure 11.1: Present-bias block with two dates 30 days apart.

The same increment is compared when one date is today and when both dates are future. Identification requires the complete two-block profile.

Interpret the premium proportionally and compare it with the large-stake block.

Read the action verb and account frame carefully. Later does not have the same meaning in every sign block.

The slider translates tokens into dated consequences. Fifty tokens need not produce equal dated amounts when the later rate differs from one.

Use both total compensation and compensation per unit of time during debrief.

Paying 2 ECU removes the earlier alternative from a future equivalent choice; it does not alter completed rows.

Intertemporal decision

Intertemporal decision

Decision 1 of 10

Choose one option.

EARLIER OPTION Receive 50 ECU in today today	vs	LATER OPTION Receive 65 ECU in 30 days 30 days
Confirm decision		

Con tecnología de [oTree](#)

Figure 11.2: Small-stake block in the magnitude comparison.

Intertemporal decision

Intertemporal decision

Decision 1 of 10

Choose one option.

EARLIER OPTION Receive 100 ECU in today today	vs	LATER OPTION Receive 120 ECU in 30 days 30 days
Confirm decision		

Con tecnología de [oTree](#)

Figure 11.3: A dated choice from the gains or deductions treatment.



Allocation across dates

Allocation across dates

Each token kept for the earlier date is worth 1 ECU; each token assigned to the later date is worth 1.02 ECU.

Decision 1 of 10

How many of the 100 tokens do you want to assign to the later date?

today

50 ECU

50

30 days

0 ECU

Confirm decision

Con tecnología de [oTree](#)

Figure 11.4: Token allocation on a convex time budget.



Intertemporal decision

Intertemporal decision

Decision 1 of 10

Choose one option.

EARLIER OPTION

Receive 100 ECU in today

today

vs

LATER OPTION

Receive 125 ECU in 90 days

90 days

Confirm decision

Con tecnología de [oTree](#)

Figure 11.5: Short-delay block with a seven-day horizon.



Commitment decision

Commitment decision

2 ECU

Imagine that in 30 days you will face an equivalent choice again. Would you pay 2 ECU now to remove the earlier option and preserve only the later alternative?

☐ Yes, pay 2 ECU and block the earlier option

☐ Do not purchase the commitment device

Confirm decision

Con tecnología de [oTree](#)

Figure 11.6: Costly commitment choice after the dated decisions.

Instructor report

12.1 Controlled reveal

The report displays participants, expected decisions, completed decisions, and pending decisions. Results remain unavailable while a row is missing. After completion, they remain concealed until the instructor presses *Reveal aggregate results*. This double gate allows Report to be open from the beginning.

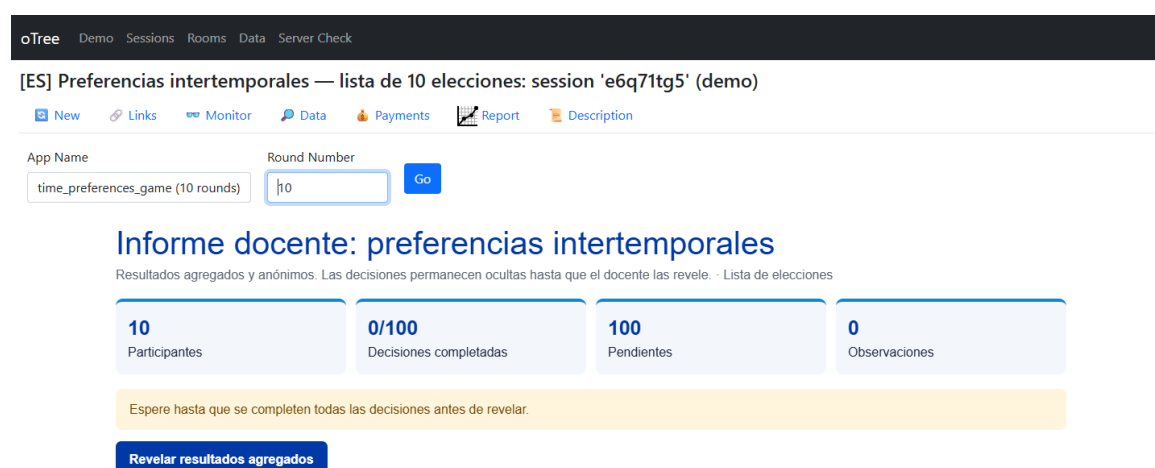
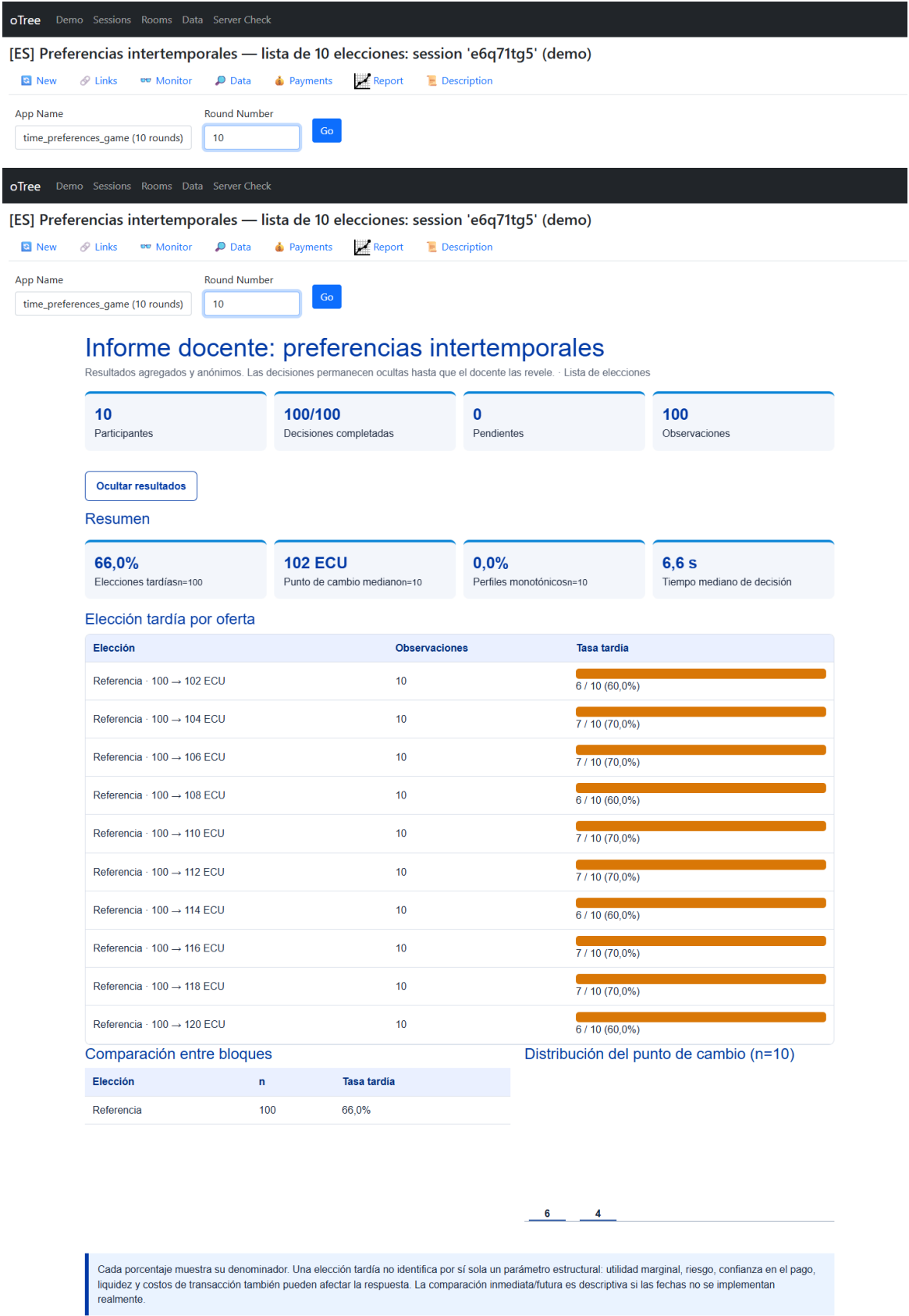


Figure 12.1: Instructor report concealed while decisions remain pending.

12.2 Reading order

Begin with coverage and require completed to equal expected. Next inspect later-choice share and its denominator. Read the table by offer, where each row gives observations and later-choice percentage. Move to block comparisons. Finish with the switch distribution and monotonicity as measures of heterogeneity and response structure.

Median decision time is descriptive. A short time can mean clarity or inattention; a long time can mean deliberation or confusion. Monotonicity reports profiles that do not return to earlier after selecting later as the later amount rises within a block.



12.3 Switch points

The histogram counts participants by the first later amount selected and includes never later. In multiblock treatments, use it with block labels because a pooled summary can conceal present-future or small-large differences. The block table is primary for treatment comparisons.

Do not convert every bar into an annual rate. First describe the distribution and denominator. Then select one category for an illustrative calculation and state utility, liquidity, and credibility assumptions. This prevents false precision.

12.4 Temporal classification and commitment

For present bias and commitment, the report compares later-choice shares in immediate and future blocks. It labels a profile present-biased when the future share is higher, consistent when equal, and future-biased when the reverse holds. These are operational pattern labels, not psychological identities.

The commitment panel adds purchase rate and sample size. Ask whether demand is common among profiles compatible with present bias. The projected report is anonymous; individual cross-tabulation requires a protected data export.

Debrief scripts

13.1 Fifteen-minute sequence

Feedback script

Minutes 0–3: describe. Show coverage and the distribution. Ask where it concentrates and whether profiles are nonmonotonic. Do not name a mechanism yet.

Minutes 3–7: benchmark. Write a present-value comparison for one row. Compute the required premium and explain the switch interval.

Minutes 7–11: mechanism. Compare relevant blocks. Use immediate versus future for present bias, percentages for magnitude, and the starting account for sign.

Minutes 11–15: limits. Ask about utility, liquidity, delivery risk, and order. End with a design that could separate two explanations.

13.2 Thirty-minute sequence

Start with a vote on the modal switch. Reveal the histogram and request a neutral description. Assign small groups to defend exponential discounting, present bias, or a measurement explanation. Each group must cite one compatible observation and one missing observation needed for discrimination.

Compute one implied rate in its original interval and one annualized rate. Discuss the scale difference. If the randomized list was used, compare monotonicity with the fixed list or a stated prediction. Finish by asking for a credible and symmetric delivery protocol.

13.3 Variant prompts

For magnitude: does the required percentage premium fall with stakes, and could fixed collection cost explain it? For delay: what happens to the per-day rate? For sign: is delaying a deduction equivalent to waiting for a reward? For the convex budget: what does an interior allocation add? For commitment: who should buy it and when does the expected benefit exceed two ECU?

Solved examples

14.1 Switch interval

A participant selects 100 today over 102, 104, 106, and 108 in 30 days, then selects later from 110 onward. The observed threshold lies between 108 and 110. With linear utility, the 30-day premium lies between 8 and 10 percent. Reporting exactly 10 percent ignores unoffered intermediate values.

If the participant later returns to earlier at 116, the profile is nonmonotonic. No unique threshold rationalizes all rows under the simple rule. The first switch remains a descriptive summary, but the inconsistency should remain visible.

14.2 Present value

With monthly $\delta = 0.95$ and linear utility, 110 ECU in one month has present value 104.5 and exceeds 100 today. In two months it is worth $110(0.95)^2 = 99.275$. The same later amount can change rank as delay changes even with stationary preferences.

14.3 Present bias

A participant chooses 100 today over 115 in 30 days but chooses 115 in 60 days over 100 in 30 days. In beta-delta discounting, the first comparison applies β only to the future option; in the second it applies to both and cancels. The pattern is compatible with $\beta < 1$ but does not identify a unique parameter pair.

14.4 Convex budget

With 100 tokens and a later rate of 1.20, allocating 40 tokens later yields 60 ECU earlier and 48 later. Allocating 70 yields 30 earlier and 84 later. Moving one token costs one earlier ECU and returns 1.20 later ECU. Changing the rate rotates the budget.

14.5 Commitment

Commitment costing 2 ECU can be worthwhile when removing the earlier option raises expected future value by more than 2. Present bias need not imply purchase: demand also depends on anticipation, price, and expected effectiveness.

Class activities and assignments

15.1 Before the laboratory

Ask students to choose between 100 today and 110 in one month, then between 100 in six months and 110 in seven months. Do not yet introduce present bias. Collect anonymous predictions and compare them with the lab distribution. This activates intuition without defining a correct choice.

15.2 During debrief

Assign groups one explanation: exponential discounting, present bias, concave utility, liquidity constraint, or delivery risk. Each group proposes a one-variable modification and predicts a distinguishing pattern. Require a denominator and unit of analysis.

15.3 After the laboratory

Request a short memo containing a graph description, benchmark prediction, discrepancy, and limitation. Disallow claims that participants were irrational unless the model and violated assumption are specified. Grade denominator accuracy and the quality of the proposed follow-up test.

15.4 Exercises

1. Compute the present value of 125 ECU in 60 days with monthly discount factor 0.96.
2. A participant switches between 112 and 114 against 100 today. State the 30-day premium interval.
3. Construct one present-biased pattern and one dynamically consistent pattern.
4. Explain why annualizing a seven-day premium can mislead.
5. Design symmetric delivery for today and 30 days.
6. Separate a magnitude effect from fixed transaction cost.
7. Interpret an allocation of 65 tokens at a later rate of 1.30.
8. Explain why commitment purchase does not by itself prove self-control problems.

15.5 Answer guide

For exercise 1, two months gives $125(0.96)^2 = 115.2$. For 2, the premium is between 12 and 14 percent over 30 days. For 3, earlier in the immediate block and later in the shifted block is compatible with present bias; the same ranking is consistent. For 4, compounding assumes stability beyond observed data. For 5, use scheduled transfers with identical procedures. For 6, equalize the fixed collection cost across stakes. For 7, the consequences are 35 earlier and 84.5 later. For 8, purchase may reflect convenience, while a biased participant may decline because of cost or naivete.

Interpretation and limitations

16.1 Description, association, and causality

The report describes one session. Within-person block differences have more control than comparisons across classes, yet order, fatigue, and learning can intervene. A causal comparison requires randomized treatment, a common protocol, and sufficient sample size. A teaching activity is not automatically a publishable experiment.

Use language that matches evidence: “62 percent of choices were later in this session” or “the future block was 12 percentage points higher.” State that a pattern is compatible with present bias rather than assigning a beta without estimation. Do not say a treatment caused patience without identification.

16.2 Unit of analysis

Ten rows from one person are not ten independent individuals. Decisions are clustered within participants and sessions. The switch histogram uses participants; the row table uses decisions and reports n . This difference is a useful lesson about dependence and pseudoreplication.

16.3 Incentives and implementation

Hypothetical choices can teach models but need not generalize to real stakes. Incentivized choices are not automatically valid either: stakes, trust, exchange rates, and payment costs matter. Document the protocol and never promise a future transfer the laboratory cannot deliver.

16.4 Privacy

The projected report contains no participant codes. Do not require a participant to defend a choice in public. Store exports in approved systems and remove session links from presentations. A teaching exercise should not become an individual psychological assessment.

Advanced interpretation and design bridges

17.1 Interval censoring and identification

A multiple price list does not reveal an exact indifference amount. It places that amount between the largest later reward rejected and the smallest later reward accepted. Statistically, the observation is interval censored. Treating the first accepted amount as the exact threshold creates artificial precision. The classroom report therefore emphasizes categories and counts. A research analysis could estimate a model that respects intervals, but the estimate would still depend on assumptions about utility, response error, and delivery credibility.

The endpoints also matter. A participant who always selects earlier has a threshold above the largest offered amount; one who always selects later has a threshold below the smallest offered amount. Neither response implies an infinite or zero discount rate. The list did not bracket the threshold. Expanding the range reduces censoring but can introduce implausible amounts and stronger anchors. Good design balances coverage, realism, and cognitive burden.

17.2 Joint measurement of risk and time

Future monetary promises may be perceived as risky. If participants assign a lower probability to receiving the later reward, a choice that looks like discounting partly reflects risk preference. Utility curvature also matters because each increment is evaluated through marginal utility. The work by Andersen and coauthors explains why joint elicitation can change estimated discount rates. In class, ask what should happen if both dated rewards were guaranteed by an escrow account.

For an advanced course, pair this task with a risk-elicitation family. Comparisons still require caution because interfaces and response errors differ. A rigorous design aligns stakes, randomizes order, and specifies analysis before observing outcomes. The broader lesson is that a parameter is identified by a system of observations and assumptions, not by the label attached to an exercise.

17.3 Money, effort, and domain specificity

Monetary tasks are convenient, but students may borrow or save outside the experiment. When outside substitution is easy and stakes are small, choices may reveal financial frictions as much as consumption timing. Real-effort tasks replace money with work and can generate different reversals. Augenblick, Niederle, and Sprenger document an important contrast between monetary and effort choices.

Ask students to design an effort counterpart: complete a tedious task today or a larger task next week. That design introduces new problems, including uncertainty about difficulty, scheduling, and enforcement. Effort is not automatically superior. Each domain changes what is held constant and which outside options are available. A careful debrief maps those differences before comparing results.

17.4 Order, fatigue, and response noise

More rows improve resolution but can create fatigue and pattern completion. Fixed order may encourage a single switch because the progression is obvious. Random order reduces that cue while raising attention demands. A difference in monotonicity across formats need not mean preferences changed; it can mean the measurement process changed. The family offers both formats so the issue can become a teaching object.

When comparing class sections, keep instructions, devices, and time limits similar. Do not present one format as the correct version. If randomized order creates more multiple switching, ask whether fixed order measured preference cleanly or merely imposed coherence. Repeating a subset of rows would provide evidence on response stability.

17.5 Random incentives and portfolio concerns

Selecting one row at random prevents participants from deliberately building a portfolio of payments across dates. It also creates a compound procedure: choose within every row, then face a draw across rows. Under expected utility and independence assumptions, treating each row separately is defensible. Behavioral responses to compound lotteries can complicate the argument.

For teaching, implementation should be consistent. Explain selection before choices, give every row the same chance, and execute the draw transparently. Do not suggest that a particular row is more likely. In a hypothetical session, preserve the selection explanation because it shows how a real experiment would avoid paying every row. Invite students to name the assumptions connecting the rule to incentive compatibility.

17.6 Replicating across cohorts

Repeated use across semesters can teach replication. Keep a log with configuration, date, class, participant count, incentive protocol, and deviations. Compare cohorts only after checking that treatment and delivery conditions match. A change in the modal switch can reflect sampling, inflation, framing, or classroom procedure.

Use prior cohorts as a benchmark after current choices, not as a social norm before them. Showing last year's distribution in advance creates an information treatment. Afterward, it supports discussion of external validity and sampling variation. Ask whether the difference is large relative to sample size and whether it appears in several indicators.

17.7 From classroom evidence to a research proposal

Students can turn the activity into a pre-analysis exercise. They should state a primary contrast, outcome, unit of analysis, exclusion rule, and predicted direction before seeing data. For present bias, a natural outcome is the within-person difference in later-choice share between future and

immediate blocks. For magnitude, it is the difference between large- and small-stake blocks. For commitment, it can be purchase rate, with a separate descriptive link to temporal classification.

A strong proposal lists threats such as order, unequal delivery trust, liquidity shocks, and ceiling effects. It states whether the goal is description, a treatment comparison, or structural estimation. This exercise makes clear that polished software is one component of an experiment. Identification, implementation, and analysis must support the same question.

17.8 Writing a defensible empirical conclusion

After the advanced comparisons, require students to write a conclusion with four parts: the observed pattern, a calculation under named assumptions, a compatible mechanism, and one limitation. A strong statement might read: “The participant switched between 108 and 110 ECU. Under linear utility and certain delivery, the 30-day premium lies between 8 and 10 percent. The pattern is compatible with positive discounting, but it does not identify pure time preference because liquidity and curvature were not measured.”

This format prevents two common mistakes. The first is a purely descriptive answer with no economic model. The second is an overconfident causal or psychological claim. The calculation creates discipline, while the limitation preserves the distinction between a maintained benchmark and identification.

Ask for one follow-up prediction. If fixed collection cost explains the result, automatic transfers should reduce the premium, especially for small stakes. If delivery risk matters, an institutional guarantee should change later choices. If present bias is central, shifting both dates into the future should affect the relative ranking in a particular direction. An explanation becomes scientifically useful when it produces a new test.

17.9 Troubleshooting

Situation	Likely diagnosis	Action
Demo lists other games	Wrong or missing family variable	Set <code>GAME_FAMILY=timepreferences</code> ; do not use the full catalog in production.
Room lists many configurations	Wrong room name or filter	Use one of the four registered rooms.
“Please wait”	Room session not started	Check Monitor and start the session; avoid duplicates.
Participant does not exist	Old link or reset database	Create a new session and redistribute links.
Report remains concealed	Decisions are pending	Inspect counters and open participant tabs.
No switch histogram	No complete binary profiles	Confirm the configuration and completion.
Mixed language	Wrong configuration or stale tab	Open the correct room in a new window.

Situation	Likely diagnosis	Action
Future payment missing	App records but does not transfer	Apply the external protocol announced in class.

Attention

Never run `otree resetdb` or `devserver` against a production database. Family isolation requires its own process, database, and environment variable.

17.10 Class plans

17.11 Fifty minutes

Use a fixed list. Allocate five minutes to rules, ten to decisions, ten to prediction and reveal, fifteen to present value and switch intervals, and ten to limitations. The goal is to understand the list without treating the threshold as pure time preference.

17.12 Ninety minutes

Compare a fixed list with present bias in separate sessions or groups. Add beta-delta calculations, dynamic consistency, and payment-protocol design. Reserve twenty minutes for groups to propose alternative explanations.

17.13 One hundred twenty minutes

Combine baseline, convex budget, and commitment. Introduce joint identification of curvature and discounting, sophistication and naivete, and experimental design. Require every conclusion to state the unit, denominator, and maintained assumption.

17.14 Glossary

Commitment device

A restriction chosen now to alter future options.

Convex time budget

A divisible allocation across dates under transformation rates.

Dynamic consistency

Stability of a plan as time passes without new information.

Exponential discounting

Future utility weighted by a constant factor per period.

Implied rate

A return that equalizes options under stated assumptions.

Magnitude effect

A change in proportional compensation with stake size.

Monotonicity

No return to earlier after choosing later as the later amount increases.

Present bias

Extra relative weight on the immediate consequence.

Quasi-hyperbolic discounting

Beta-delta discounting with a present discontinuity.

Sign effect

Different dated choice patterns for gains and losses or deductions.

Switch point

The first category at which later is chosen in an ordered list.

Temporal compensation

The increase in a later amount required to wait.

Closing guidance

The activity works best when data discipline theory and theory organizes questions, rather than when results label students. A heterogeneous distribution is a starting point. Describe it, construct a benchmark, compare blocks, and acknowledge what prevents a unique interpretation.

The basic edition offers a quick entry to present value. The extended edition reaches dynamic consistency, anomalies, measurement, and commitment without changing family or architecture. Shared interface and reporting keep attention on economics.

Checkpoint

Before closing, confirm that the session ended, results were revealed only afterward, denominators were explained, future delivery was described accurately, students were not identified, compatibility was distinguished from causality, and the class proposed at least one additional test.

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