



Instructor's Guide to Locus of Control (IE-4)

Laboratory implementation, theoretical foundations,
experimental evidence, and variants

Behavioral and Experimental Economics Research Lab
Department of Economics



Revised edition | October 2026

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

How to use this guide

This guide accompanies the BEER Lab locus of control activity. Its core is the Internal-External Locus of Control Short Scale-4, or IE-4: four statements producing two separate means. It is intended for economics and social science instructors who want to teach how control beliefs are measured and distinguished from capabilities, opportunities and choices. Basic editions administer the questionnaire; extended editions add four original hypothetical situations with explicit probabilities, an activation cost and calculable expected balances. There are no payments or academic grading of personal answers.

The operational route explains navigation, rooms, access, comprehension, omission, closing and reporting. The conceptual route develops the dimensions, scoring rules, denominators and choice comparisons. Twenty-two worked cases support classroom preparation without assuming previous familiarity with the instrument. Figures are genuine captures of local sessions using synthetic participants.

English preserves the wording published by Nießen and colleagues. Spanish is an identified BEER Lab teaching translation without validation. The source's open license permits attributed adaptation, but does not itself provide evidence about a translation. Maintain that distinction when introducing the activity and interpreting its results. Use this guide to support reasoning about measurement and research design rather than assigning personal categories.

Author

This guide was prepared by Stanislao 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

Rehearse with synthetic data, confirm language and edition, and close the access-code panel before projection. Keep both IE-4 means and hypothetical choices separate. State N and missing-data rules before interpreting differences.

Contents

How to use this guide	i
1 The activity and its administration	1
1.1 What is administered and what students can learn	1
1.2 Institutional navigation and room selection	2
1.3 Creating a session and managing its access	2
1.4 Welcome, instructions and comprehension	5
1.5 Completion, participation and score availability	5
2 Control beliefs and measurement	9
2.1 What locus of control means	9
2.2 Two dimensions that must remain separate	9
2.3 What a self-report describes	10
2.4 Control, capability and external conditions	10
2.5 Language form and provenance	11
2.6 Individual scoring and descriptive precision	11
2.7 Omission, pending pages and inclusion	12
3 Choices and contingencies	13
3.1 What extended editions add	13
3.2 The expected-value reference	14
3.3 Positive contingency	14
3.4 Zero contingency	15
3.5 Negative contingency	16
3.6 Comparisons and identification limits	16
4 Reports, data and classroom use	17
4.1 Read denominators first	17
4.2 Distributions and means by option	17
4.3 Disclosure, privacy and feedback	21
4.4 Downloading and reconstructing results	21
4.5 Class plan and concluding discussion	22
4.6 Troubleshooting and operational checks	22
5 Worked cases for classroom preparation	23
5.1 Scoring and missing data	23
5.2 Contingencies, balances and choices	24
5.3 Reporting, export and inference	25
6 Sources and attribution	28

List of Figures

1.1	Select Classroom to reach the teaching activity catalog.	2
1.2	Review the catalog; the new card appears after deployment.	3
1.3	Select language and edition among this family's four rooms.	3
1.4	Check that the basic English room selects only its configuration.	4
1.5	Choose among four configurations; extended editions add hypothetical choices. . .	4
1.6	Assign one link per person and keep synthetic rehearsals separate.	5
1.7	The welcome explains participation rules without suggesting a desirable profile. . .	6
1.8	Explain scale, statement count, omission and the absence of payments.	7
1.9	Comprehension feedback retains the choice and explains its correction.	7
1.10	Answer one statement per page or use explicit omission.	8
1.11	Completion confirms recording; configured feedback requires instructor disclosure. .	8
3.1	Review the account, cost, reward and absence of payments before choices begin. . .	13
3.2	The explanation distinguishes activation from a guaranteed favorable outcome. . .	14
3.3	Each option displays its cost and probability; the account restarts for every situation.	15
4.1	Review progress while results remain hidden; close the access-code panel before projection.	18
4.2	The table reports two dimensions with separate denominators and no global sum. .	19
4.3	Check that the nine frequencies sum to the valid internal-control N.	19
4.4	External control retains its own scale and denominator.	20
4.5	Separate option frequency, dimension-specific N and the expected-balance reference.	20
4.6	Private feedback expresses two descriptive means and preserves interpretation limits.	21

The activity and its administration

Purpose	Explore internal and external control beliefs using IE-4 and distinguish them from action-outcome contingencies.
Experimental unit	Person; individual activity without matching or waiting.
Basic edition	Four IE-4 statements; published English and an unvalidated Spanish teaching translation.
Extended edition	Same scale and four original hypothetical choices with positive, zero and negative contingencies.
Decision	One response per statement and one choice per scenario; explicit omission.
Outcome	Two separate means from 1 to 5, requiring both responses per dimension. Choices and expected values remain separate. No payments.
Topics	locus of control; internal and external control; action-outcome contingency; beliefs; decisions under uncertainty
JEL	A22, C83, C91, D81, D84
Participants	Any positive count; one person per interface.
Suggested duration	Basic: 2-4 minutes; extended: 5-9; class: 50-75. Planning estimates, no automatic time limit.

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

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

https://locuscontrol.beer-lab.org/room/locuscontrol_en

<http://localhost:9171/demo>

1.1 What is administered and what students can learn

IE-4 administers four statements describing control beliefs. Two concern one's own influence over events and two concern external determinants. Basic editions record those answers; extended editions add four independent choices with announced probabilities. Choices do not alter scale scores and do not generate payments. English preserves published wording; Spanish is an explicitly identified teaching translation without psychometric validation. Explain this distinction during the later discussion. The unit is always the individual, without matching, waiting or information about other participants' answers.

1.2 Institutional navigation and room selection

Begin at the BEER Lab website and select Classroom to reach the games catalog. The locus of control card identifies the family, its topics and its editions. Proposed rooms are locuscontrol_es for basic Spanish, locuscontrol_en for basic English, locuscontrol_extendido for extended Spanish and locuscontrol_extended for extended English. Within this family's instance, Demo should contain four configurations and Rooms four rooms. Each room offers one configuration in the corresponding language and edition. If another family appears or a selector is empty, stop distributing links and request an instance check before starting the cohort.

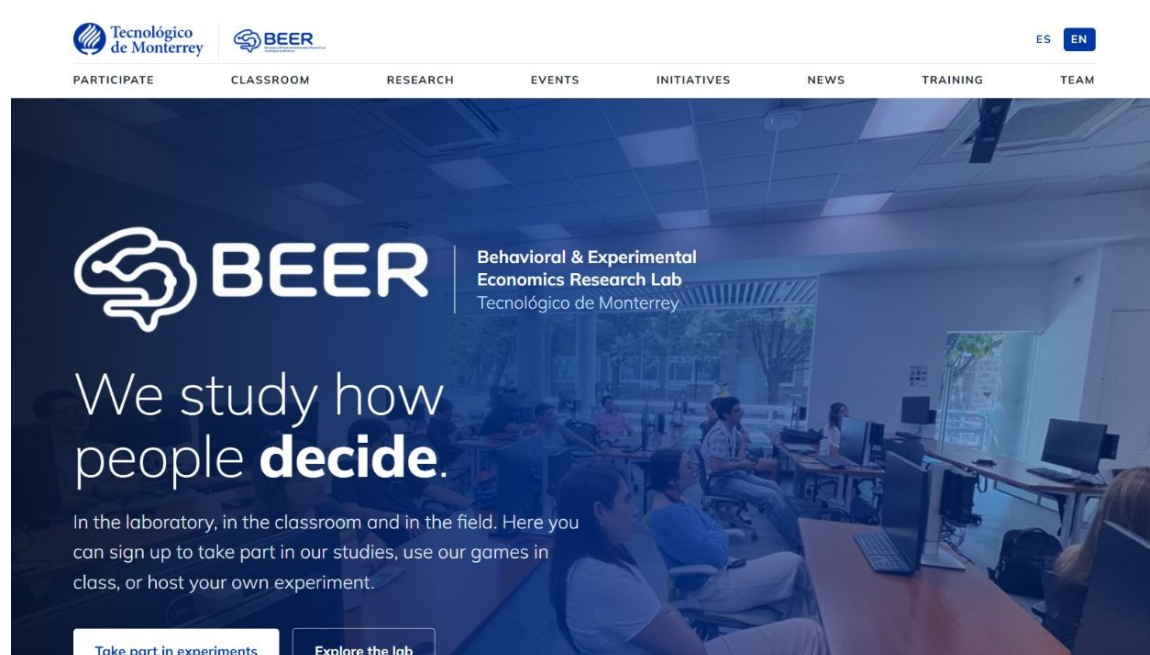


Figure 1.1: Select Classroom to reach the teaching activity catalog.

The verified delivery preview runs on localhost, port 9171, and can be accessed from the same computer. It is not an address for students using other devices. Addresses under locuscontrol.beer-lab.org are the intended deployment routes. A room is a shared entry point, an individual link refers to a position in a session, and a report is an authenticated instructor page. Confusing these addresses can send students to administration or cause two people to use the same position. Distribute the entry route appropriate to the teaching procedure and retain administrative links for staff.

1.3 Creating a session and managing its access

Sign into the instructor panel using the institutional credentials supplied by the laboratory. Do not share those credentials with students. Demo supports rehearsals with synthetic responses; use a separate session and stable rooms for the class. Any positive participant count is admissible because the task is individual. Three people can complete it without waiting for a fourth. Confirm the session size, selected configuration and cohort before distributing individual links. Keep rehearsal sessions separate from classroom data, and avoid interpreting an old demonstration as if it described the current group.

Each session generates a questionnaire access code, available in a collapsed report panel. Share it with the cohort and close that panel before projection. This code differs from the administrative password and technical session code. An incorrect entry produces an explanation and allows

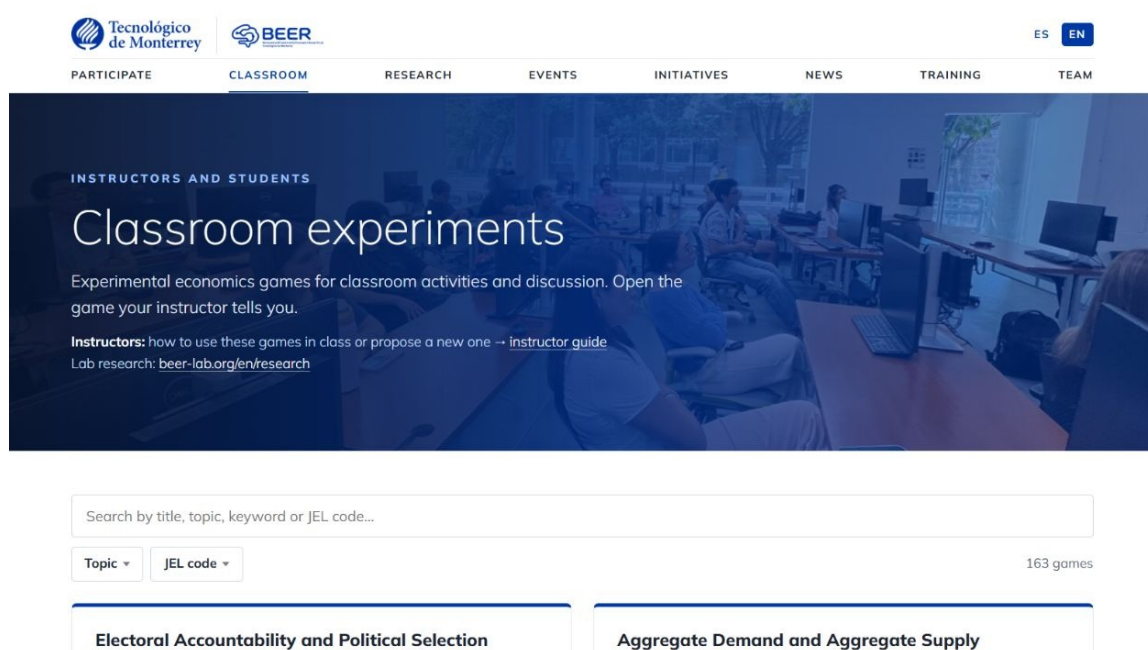


Figure 1.2: Review the catalog; the new card appears after deployment.

Rooms

Current rooms:

IE-4 · Español · básica
IE-4 · English · basic
IE-4 · Español · extendida
IE-4 · English · extended

Figure 1.3: Select language and edition among this family's four rooms.

Room: IE-4 · English · basic

Create a new session

Session Config

IE-4 · 4 statements · basic ▾

Number of participants

Individual decisions: any positive participant count is allowed.

Create

[Configure session](#) ⚙️

App sequence

locuscontrol_assessment (8 rounds) IE-4 in published English source order; original linked scenarios in extended editions.

0 participants present

Start links

These URLs will stay constant for new sessions, even if the database is recreated.

Room-wide URL

Here is the room-wide URL anyone can use. Don't use this link when testing in multiple tabs on the same browser, because all tabs will be assigned to the same participant, using a cookie.

http://localhost:9171/room/locuscontrol_en

Figure 1.4: Check that the basic English room selects only its configuration.

Demo

IE-4 · 4 afirmaciones · básica

IE-4 · 4 statements · basic

IE-4 · 4 afirmaciones y cuatro decisiones · extendida

IE-4 · 4 statements and four choices · extended

**Locus de control
(IE-4) / Locus of
Control (IE-4) —
BEER Lab**

Seleccione una variante
de este juego. Select a
version of this game.

Figure 1.5: Choose among four configurations; extended editions add hypothetical choices.

IE-4 · 4 afirmaciones · básica: session 'kuywyt9v'

[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:9171/join/jifisino>

Persistent links

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

Single-use links

Below are single-use links.

P1	http://localhost:9171/InitializeParticipant/niscmb1u
P2	http://localhost:9171/InitializeParticipant/1nmo98s1
P3	http://localhost:9171/InitializeParticipant/cvpzjr45

Figure 1.6: Assign one link per person and keep synthetic rehearsals separate.

correction; a successful entry is erased from its response field before proceeding. The gate restricts entry to the academic activity, but does not make screenshots or individual links suitable for unrestricted circulation. All demonstration positions shown in this guide are synthetic. The access procedure should remain an operational detail rather than a source of pressure to disclose personal responses.

1.4 Welcome, instructions and comprehension

Before the first statement, a comprehension question asks what to do when a statement does not describe the participant well. The appropriate response is to choose the closest description or omit the item. Selecting what the instructor supposedly wants produces an explanation alongside the retained choice. This check teaches the procedure; it is neither an IE-4 item nor an honesty test. Allow correction without penalty. Answer questions about controls without recommending substantive responses. The purpose is a shared understanding of the task before generating the data that will later enter the discussion.

1.5 Completion, participation and score availability

Basic editions close after four statements. Eight technical rounds share the structure with extended editions; the remaining four are skipped automatically without additional choices or waiting. The scale uses numbers from 1 to 5, verbal endpoints and numeric intermediate positions. Omission is a separate option, never the value 3. Extended editions explain the initial account, cost and reward before the first scenario; a comprehension check prevents confusing activation with guaranteed success. Private closing feedback describes both dimensions only after instructor disclosure and can be hidden again.

Questionnaire completion means all four screens were submitted, including any omitted statement. Scoring requires both substantive answers for each dimension. An activity can finish with internal control available and external control missing. A complete scale can also coexist with pending additional choices. Read these indicators separately before making any judgment about participation.



Individual questionnaire

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

Participation rules

- Work individually and privately.
- Remain silent and do not discuss your responses with others.
- Follow the instructions on each screen.
- Do not refresh or close the page while responding.
- If you need help, raise your hand or contact staff privately.

Responses are private. The instructor may show aggregate results after choosing to reveal them. Individual profiles will not be projected.

Access code provided by the instructor

☐ I have read the rules and wish to start.

Start

Figure 1.7: The welcome explains participation rules without suggesting a desirable profile.

BEER Lab

Instructions

The following statements may apply more or less to you. To what extent do you think each statement applies to you personally?

Read each statement and respond according to how you usually describe yourself. There are no correct or incorrect answers and no academic grade. The scale ranges from 1 (does not apply at all) to 5 (applies completely); 2, 3 and 4 are intermediate positions. You may prefer not to answer.

This is an individual activity. There are no partners, endowments or payments linked to responses. You may indicate that you prefer not to answer an item.

Responses are private. The instructor may show aggregate results after choosing to reveal them. Individual profiles will not be projected.

4 statements.

Continue

Figure 1.8: Explain scale, statement count, omission and the absence of payments.

BEER Lab

Before you start

If a statement does not describe you well, what should you do?

- ☐ Choose the option that best reflects how you are or indicate that you prefer not to answer
- ☒ Choose what you think the instructor wants to read

Your answer: Choose what you think the instructor wants to read. The correct answer is Choose the option that best reflects how you are or indicate that you prefer not to answer. Choose the first option: respond about yourself without trying to meet expectations. You may also omit an item using the corresponding option.

Continue

Figure 1.9: Comprehension feedback retains the choice and explains its correction.

BEER Lab

Statement 1 of 4

To what extent does this statement apply to you personally?

I'm my own boss.

Your response

☐ 1 — does not apply at all

☐ 2

☐ 3

☐ 4

☐ 5 — applies completely

☐ I prefer not to answer

Confirm response

Figure 1.10: Answer one statement per page or use explicit omission.

BEER Lab

Activity complete

Your responses have been recorded. Keep this screen open and wait for the instructor's directions.

If private feedback is enabled, it will appear here after the instructor reveals the results.

Figure 1.11: Completion confirms recording; configured feedback requires instructor disclosure.

Control beliefs and measurement

2.1 What locus of control means

Locus of control concerns generalized expectations about what determines a person's outcomes. An internal expectation connects events to one's own actions; an external expectation gives greater influence to other people, fate or circumstances outside one's control. The object being measured is a belief expressed by the respondent. The questionnaire does not directly observe effective power within an institution or identify how much of a past outcome was caused by the person's behavior. Keeping those questions separate allows beliefs to be studied without turning them into automatic explanations of success and failure.

Imagine two students preparing for the same examination. One believes that changing study methods can improve the result; the other considers the unpredictable selection of questions decisive. Both may study for many hours, have similar skills and face different constraints. Their expectations provide a hypothesis about how they understand the connection between conduct and outcomes. Establishing whether those expectations are accurate would require information about the task, opportunities and possible results. The scale alone does not supply that comparison. It records agreement with statements about control, rather than a complete account of either student's situation.

Rotter's social learning theory locates these expectations in accumulated experience with reinforcement and consequences. The activity introduces that tradition, but administers IE-4, rather than Rotter's original forced-choice questionnaire or Levenson's IPC scale. These instruments are not interchangeable: their items, structure and scoring differ. Always name the version actually administered and explain what its brevity offers. Four statements make a classroom measurement demonstration practical while covering fewer nuances than a longer battery. Do not describe a different instrument as already implemented merely because it studies a related construct.

2.2 Two dimensions that must remain separate

IE-4 organizes four statements into two dimensions with two items each. Internal control uses positions 1 and 2; external control uses positions 3 and 4. The results remain separate. A person can agree with both internal and external statements: they may believe that their work matters while recognizing that other people constrain what they achieve. That pattern is not a logical error for software to correct. The structure allows both orientations to vary without forcing one to be the arithmetic complement of the other. The meaning of an external response must therefore be retained.

Whether the dimensions correlate negatively in a population is an empirical question. It does not require a constant sum for each individual. If someone obtains internal control 4 and external

control 4, the platform retains both values rather than turning them into an apparent neutrality of zero. Subtracting means would erase the difference between that profile and another scoring 1 and 1. Averaging all four items would also combine distinct conceptual directions. Official scoring documentation discourages a total mean across dimensions; this implementation follows that recommendation and does not introduce an alternative total.

Theoretical foundation

For person i , $I(i) = [x(i,1) + x(i,2)] / 2$ and $E(i) = [x(i,3) + x(i,4)] / 2$. Each x is an answer from 1 to 5. Both answers are required for each mean. No item is reversed: higher E means greater agreement with external control, and higher I greater agreement with internal control. Neither $I + E$ nor $I - E$ is computed as a scale score.

2.3 What a self-report describes

A personality measure summarizes regularities in how people describe themselves. Participants rate statements about habitual behavior, feelings or preferences, and a published rule combines those responses. The resulting score depends on those regularities, the response context, understanding of the wording and willingness to answer. An individual observation therefore does not exhaust what we know about a person. The exercise is useful for teaching the distinction between a theoretical characteristic, an observable response and a constructed measure. Those are connected concepts, but they are not interchangeable objects.

Traits can help formulate economic questions: do participants reporting greater conscientiousness maintain a plan more often, or do social dimensions relate to contributions in a game? The questionnaire does not directly measure a utility function. A classroom correlation also leaves causal mechanisms unresolved. Teaching connects concepts, measurement and evidence while examining alternative explanations.

The initial unit of analysis is the person. Items are observations contributing to that person's measurement; they are not additional participants. Four answers from one person do not create a sample of four independent people. This matters when reading histograms, discussing uncertainty and linking questionnaires with repeated games. A student making ten game decisions and answering one questionnaire provides one individual profile and ten related decisions. This family's report identifies valid observations separately for each dimension and retains that individual unit rather than treating each item as an independent person.

Theoretical foundation

The construct is not directly observed. We observe responses, apply a key and obtain a score. Interpretation requires a justification for each connection between those levels. The platform automates the scoring key, but it does not replace that reasoning.

2.4 Control, capability and external conditions

General self-efficacy concerns belief in one's ability to cope with difficulties. Locus of control concerns the perceived dependence of outcomes on conduct or external forces. Someone may feel capable of performing a task while believing that an authority determines the final decision. Another person may believe an examination rewards effort while doubting their own ability to solve it. Connect this activity to the GSE already available in the platform while keeping definitions and records separate. A correlation between questionnaires does not make them one measure or

allow either to substitute for the other.

Perceived control must also be distinguished from objective control. If a mechanism awards a prize through an independent draw, greater knowledge or confidence does not change the probability. If an action changes an announced probability, the example has an action-outcome contingency, even though its result remains uncertain. The value of the action also depends on its cost. These three questions - what do I believe, what changes, and what does it cost - organize extended editions. They prevent treating every active choice as sufficient evidence of an internal orientation or as an economically advantageous decision.

Interpretation requires attention to living conditions. Recognizing institutional obstacles can be a reasonable description of restricted opportunities. A high external-control value does not establish passivity, irresponsibility or a preference for dependence. Equally, high internal responses do not certify that every barrier can be overcome through determination. Ask for invented examples involving rules and resources rather than personal histories that expose students. The learning objective is to distinguish levels of analysis, not establish a moral ranking of profiles. A careful instructor can discuss agency and constraints without presenting either as a complete explanation of behavior.

2.5 Language form and provenance

The English source is Table 1 in Nießen, Schmidt, Groskurth, Rammstedt and Lechner (2022), published in PLOS ONE under CC BY 4.0. The application preserves all four statements and their order. It uses five response positions with the published verbal endpoints; positions 2, 3 and 4 remain numeric. Digital administration adds one statement per screen, procedural comprehension and an explicit omission option. These choices are documented as adaptations rather than attributed to the study's original administration. The source attribution and language status remain visible in the private instructor report.

Spanish was translated for teaching by the BEER Lab. The first English item uses the idiom about being one's own boss, interpreted here as directing one's own life. This avoids limiting the question to employment status, but needs empirical assessment before equivalence can be claimed. The remaining items retain references to effort, other people's influence and fate. Do not infer Spanish validation merely because the translation reads clearly. Cognitive interviews, independent language review and psychometric studies would be later steps in a separate research project. Reusing a published score formula does not resolve these translation questions.

English validation examined quota samples in the United Kingdom and Germany, with 468 and 474 respondents respectively. Findings support a two-dimensional structure and metric comparability between those language forms. They do not automatically establish equality of means across countries or extend to this activity's Spanish translation. In class, identify the form with supporting evidence, the adaptation actually made and the inference requiring further study. Licensing enables attributed reuse; validity depends on evidence and intended use. Keeping both issues explicit is more informative than treating a classroom activity as a diagnostic service.

2.6 Individual scoring and descriptive precision

Substantive responses are integers from 1 to 5. A pair of 5 and 4 produces 4.5; a pair of 2 and 1 produces 1.5. Each dimension has nine possible values, from 1 through 5 in half-point steps. The platform displays two decimal places to ease comparison, but that formatting does not add measurement precision. A difference between 3.50 and 4.00 is a half-point difference in an observed average, without an automatic threshold separating kinds of people. No clinical norms, percentiles

or personal categories are applied to either dimension.

Brevity limits information about consistency. Two answers cannot describe every domain in which someone experiences control. Disagreement between items within a dimension may reflect differing meanings, context, attention or a nuanced belief. Before treating it as noise, return to the wording and the scale's purpose. Do not remove observations merely because they conflict with the story you expected to tell. The report does not issue individual certificates, and extended private feedback explicitly remains descriptive. If a later research project needs more detailed measurement, instrument choice and validation should be reconsidered rather than inferred from this exercise.

2.7 Omission, pending pages and inclusion

A dimension is scored only with a complete pair. If someone answers 4 to the first item and omits the second, the application does not report an internal mean of 4. The internal score remains missing. If external answers are 2 and 3, the external mean is nevertheless 2.5. A pair is never completed using the midpoint, another participant's answer or the classroom average. This follows the instrument documentation's scoring recommendation while preserving the distinction between absent information and an intermediate substantive response. Each dimension's valid count is therefore meaningful in its own right.

A submitted omission differs from a pending page. Omission records an explicit choice not to answer; pending means the screen has not yet been confirmed. Neither supplies a substantive numeric value, but their statuses help reconstruct why information is absent. Progress counts submissions, whereas scores count valid answers. If class ends with people still active, describe that point in the record and save the file. Do not convert remaining time into a response or assume that a participant with pending pages rejected the questionnaire. These procedural distinctions matter before any statistical interpretation begins.

Attention

Spanish is an unvalidated teaching translation. Score each dimension only when both answers are present. Do not reverse external items or construct a total, difference score or personal categories.

Choices and contingencies

3.1 What extended editions add

Extended editions preserve IE-4 exactly and then present four original independent imaginary situations. In every situation, the participant starts with a hypothetical account of 20 ECU. They can activate an option by paying 10 ECU, or leave it inactive at no cost. A favorable outcome adds 100 ECU; an unfavorable outcome adds zero. Probabilities for both options are announced. There are no executed draws, accumulation across situations, conversion into money or real obligations. ECU is the example's unit of account. The choice expresses a stated preference between two hypothetical distributions of balances.

The extension illustrates differences among generalized beliefs, environmental rules and chosen behavior. Its situations are not additional IE-4 items, an illusion-of-control test or a replication of a published experiment. Their exact mechanism is specified so it can be analyzed in class. The report compares frequencies and descriptive dimension means by option, without attributing differences to questionnaire responses or treating a situation as a randomly assigned experimental intervention. Everyone receives the same sequence, making order part of the context. Instructors should explain these limits before interpreting associations as evidence about a mechanism.

BEER Lab

An additional choice

Four independent imaginary situations follow. In each, you start with a hypothetical account of 20 ECU. You can pay 10 ECU to activate an option or leave it inactive at no cost. A favorable outcome adds 100 ECU to the balance. Each option's probabilities are displayed before you choose and are the complete rules of the example. No draws or payments occur. ECU is a unit of account for the example and is not converted into money. These choices are separate from the questionnaire.

What happens if you activate an option?

- ☐ 10 ECU are deducted from the hypothetical balance; the displayed probability applies and there is no real payment.
- ☐ Activating always guarantees a favorable outcome and a real payment.

Continue

Figure 3.1: Review the account, cost, reward and absence of payments before choices begin.

BEER Lab

An additional choice

Four independent imaginary situations follow. In each, you start with a hypothetical account of 20 ECU. You can pay 10 ECU to activate an option or leave it inactive at no cost. A favorable outcome adds 100 ECU to the balance. Each option's probabilities are displayed before you choose and are the complete rules of the example. No draws or payments occur. ECU is a unit of account for the example and is not converted into money. These choices are separate from the questionnaire.

What happens if you activate an option?

- ☐ 10 ECU are deducted from the hypothetical balance; the displayed probability applies and there is no real payment.
- ☒ Activating always guarantees a favorable outcome and a real payment.

Your answer: Activating always guarantees a favorable outcome and a real payment.. The correct answer is 10 ECU are deducted from the hypothetical balance; the displayed probability applies and there is no real payment.. Activating costs 10 ECU in the example but does not guarantee a favorable outcome. Each scenario shows its own probability. No draws or real payments occur.

Continue

Figure 3.2: The explanation distinguishes activation from a guaranteed favorable outcome.

3.2 The expected-value reference

Let a denote the choice: $a = 0$ leaves the option inactive and $a = 1$ activates it. Let $p(a)$ be the favorable probability between zero and one. Expected balance is $20 - 10a + 100p(a)$. The first term is the initial account; the second is the cost, paid only with activation; the third weights the reward by its probability. Activating minus leaving inactive gives $100[p(1) - p(0)] - 10$. This subtraction compares alternatives within a situation. It does not subtract the questionnaire's internal and external dimensions or create an additional personality score.

Maximizing expected balance assumes linear utility of balances and acceptance of announced probabilities. With risk aversion, utility of each possible outcome matters rather than only its monetary average. In the first situation activation changes both probabilities and cost, so a choice differing from maximum expected value does not by itself identify a false belief. When probabilities are identical, paying shifts both balances downward. That comparison introduces dominance under a preference for more balance, without making the class a moral assessment of the respondent. State the relevant assumption before presenting a prediction as a benchmark.

3.3 Positive contingency

In the first situation, the favorable probability rises from 20% without activation to 80% with activation. Contingency is positive: the probability difference is 60 percentage points. Inactive balances are 20 and 120 ECU; active balances are 10 and 110. Expected balances are 40 and 90 respectively, making activation's net expected gain 50 ECU. The active option makes a favorable outcome much more likely, although its balances conditional on the same outcome are lower because of the cost. Explain both components before asking whether the observed choices follow the reference prediction.

Under linear utility, activation is the benchmark. If the class chooses differently, enumerate compatible interpretations: risk attitudes, probability reading, attention or preferences about action itself. The questionnaire cannot select one as the cause. A higher internal mean among those activating would be an association within this cohort, rather than an isolated confirmation of Rotter's theory. Before discussing it, read how many people answered and how many supplied both internal items. A one-person subgroup cannot sustain population generalization, even when its average is reported with two decimal places. Its numerical clarity should not be mistaken for strong evidence.

Hypothetical scenario · 1 / 4

Situation 1

In this situation, the probability of a favorable outcome is 20% if you leave the option inactive and 80% if you activate it. The remaining probability corresponds to the unfavorable outcome. Choose for this independent situation.

Hypothetical initial account: 20 ECU. Activating costs 10 ECU; leaving inactive costs 0. Favorable outcome: +100 ECU; unfavorable: +0. ECU is a unit of account without conversion into money. No draws or real payments occur.

Your response

- ☐ Leave inactive: cost 0 ECU; favorable probability 20%
- ☐ Activate: cost 10 ECU; favorable probability 80%
- ☐ I prefer not to answer

Confirm response

Figure 3.3: Each option displays its cost and probability; the account restarts for every situation.

3.4 Zero contingency

In the second situation, the favorable probability is 50% for either option. Activation does not alter the chance of the reward and lowers balance by 10 ECU for either outcome. Expected balances are 70 inactive and 60 active. The fourth situation has the same structure with an 80% favorable probability: expected balances are 100 and 90. Both have zero contingency despite the fourth environment being more favorable overall. Together they separate the level of possible success from activation's causal benefit within the announced rules. High success rates do not necessarily indicate effective action.

A common error is to see 80% and conclude activation is useful. The relevant question is 80% compared with what. If inactivity also offers 80%, no probability improvement compensates for the cost. Use two columns during discussion to keep the counterfactual visible. Favorable describes the outcome, not the desirability of an option. If someone activates, do not label them as suffering from an illusion of control: the record does not elicit their probability belief or the reason for their choice. The example provides a transparent rule for analysis, not a validated diagnosis from a single response.

3.5 Negative contingency

In the third situation, leaving inactive offers 80%, while activation lowers that probability to 20% and costs 10 ECU. Expected balances are 100 and 30, a difference of -70. Here the available action worsens the example's opportunities. Under increasing preferences over balances, the inactive option also first-order stochastically dominates the active option: it avoids the cost and assigns more probability to the high outcome. The lesson is not that action is generally bad, but that the concrete rule linking a particular action to consequences determines its value. Initiative alone cannot establish that rule.

An institutional analogy can help if it remains hypothetical. A poorly designed rule can make intervention reduce expected benefits. That does not establish that people with internal beliefs always act or that an external response is necessarily inaccurate. Ask students to invent a rule modification that would make activation attractive and calculate the required improvement. With a fixed cost of 10 and a reward of 100, the favorable probability must improve by more than ten percentage points for expected balance to increase. At exactly ten points, the two options have equal expected balances under linear utility.

3.6 Comparisons and identification limits

Observe four activation rates, each among those answering that situation. Under linear utility the reference pattern is activation in the first and inactivity in the other three. Departures begin a discussion about information and assumptions. There is no automatic estimate of risk aversion, measure of learning or test of irrationality. Hypothetical responses may depend on attention, interpretation or unobserved preferences. Fixed order prevents separating those factors from familiarity with screens. The platform does not observe realized successes because no draws are executed; expected balances must not be reported as earnings or measured performance.

A future study might randomize order or costs, elicit subjective probabilities and establish payments within its own protocol. Those changes support different questions, but they are not implemented features here. This delivery does not claim an instruction changed locus of control or that scenario differences estimate effects of an assigned treatment. The guide uses conditional references: given this rule and this utility assumption, this alternative maximizes expected balance. Making that conditional explicit improves the discussion and provides a natural bridge from a classroom illustration to a properly specified research design.

Reports, data and classroom use

4.1 Read denominators first

The report distinguishes registered people, completed questionnaires, completed activities and people with both dimensions scoreable. These counts answer different questions. A person omitting an item may have finished the questionnaire; someone with four complete responses may still be working on the extension. After disclosure, each internal or external row shows its valid N and count without a score. Mean, median and standard deviation use only that set. Sample standard deviation requires at least two scores; a dash indicates insufficient information rather than zero variation. Read counts before interpreting a central value or comparing dimensions.

Use a complete sentence before projection: among N people with both internal answers, the mean was M. Repeat the sentence for external control using its own N. If sample sizes differ, the means do not describe exactly the same people. Do not compare a row's mean with total participants as though everyone contributed. When N is zero, there is no group score to interpret. The row remains visible to document absence; no calculation supplies missing information. If the class has only a small available sample, a transparent descriptive account is more appropriate than strong population claims.

4.2 Distributions and means by option

Each chart displays nine exact values rather than personality categories. A bar at 3.5 counts people whose mean for that dimension was 3.5. Frequencies must sum to the N printed on that chart. Bar widths are scaled to the panel's largest frequency, so do not compare widths across dimensions without reading numbers. A concentrated distribution and a divided distribution can have the same mean. Ask about frequencies, center and dispersion before linking a pattern to a psychological mechanism. Neither the graphical midpoint nor the largest bar creates a diagnostic cutoff.

In extended reports, each situation lists answered, omitted and pending responses. An option's percentage divides its count by substantive answers to that situation. Below, internal and external means describe people selecting that option who supplied the corresponding complete pair. A dimension's N can be smaller than the option's count. Both are retained to distinguish participation from score availability. Conditional means do not adjust for selection or preexisting differences and cannot assign a participant a reason for choosing. Read the option frequency and each dimension's count before drawing even a descriptive comparison.

BEER Lab

Locus of control instructor report (IE-4)

Internal–External Locus of Control Short Scale–4 (IE-4) · Extended · en

Language version: Published English IE-4 wording, Nießen et al. (2022), Table 1; endpoint anchors preserved.

► Class access code

Participants 3	Activities finished 1	Questionnaires finished 1	Both dimensions scoreable 1
--------------------------	---------------------------------	-------------------------------------	---------------------------------------

[Reveal aggregates and enable configured feedback](#) [Download this session's responses and scores](#)

Aggregates remain hidden. You can review progress without revealing profiles.

Instrument and provenance

Nießen, Schmidt, Groskurth, Rammstedt & Lechner (2022), Table 1; PLOS ONE 17(7), e0271289; CC BY 4.0. Spanish teaching translation: BEER Lab (2026), unvalidated.

IE-4: average items 1–2 for internal control and 3–4 for external control. No reversing and no total. Both answers are required per dimension. Published English; Spanish: unvalidated BEER Lab teaching translation.

Figure 4.1: Review progress while results remain hidden; close the access-code panel before projection.

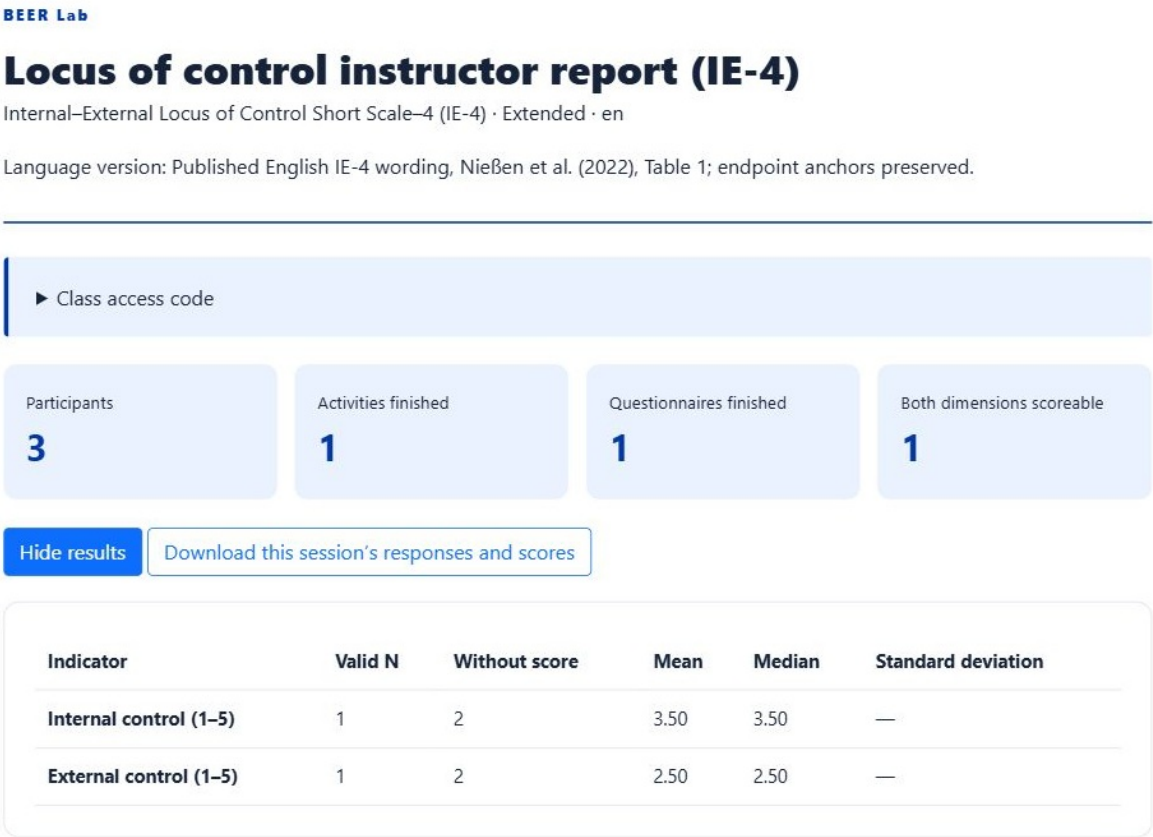


Figure 4.2: The table reports two dimensions with separate denominators and no global sum.

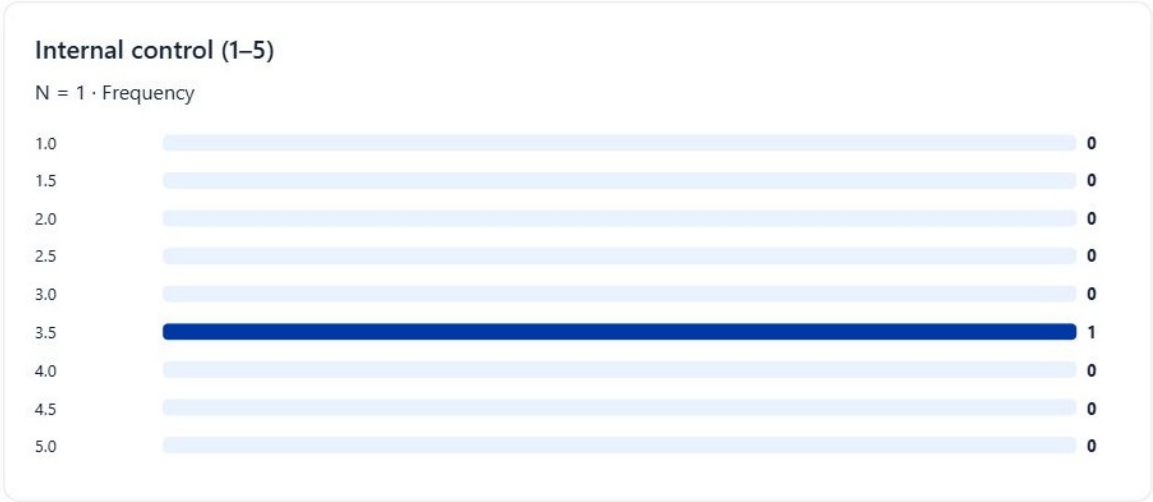


Figure 4.3: Check that the nine frequencies sum to the valid internal-control N.



Figure 4.4: External control retains its own scale and denominator.

Situation 1

Answered: 1 · Omitted: 0 · Pending: 2

Expected balance: inactive / active (ECU): 40 / 90. $\Delta = 50$

Expected-value reference for linear utility of the balance; this is not a participant score. The difference is the second value minus the first.

Leave inactive: cost 0 ECU; favorable probability 20% · 0 · 0.0%

Indicator	Dimension N	Dimension mean
Internal control (1–5)	0	—
External control (1–5)	0	—

Activate: cost 10 ECU; favorable probability 80% · 1 · 100.0%

Indicator	Dimension N	Dimension mean
Internal control (1–5)	1	3.50
External control (1–5)	1	2.50

Figure 4.5: Separate option frequency, dimension-specific N and the expected-balance reference.

4.3 Disclosure, privacy and feedback

Disclosure is an instructor decision in an authenticated report. Confirm session, language and cohort size before using it. Basic editions display aggregates only; extended editions can enable private closing feedback with two means. The closing screen requests feedback periodically and hides it again when the instructor withdraws disclosure. A participant must finish the whole activity to receive it. Do not project individual closing screens, access codes or response files. Avoid discussing very small cells that could reveal someone even though the report contains no names. Aggregate formatting alone does not eliminate disclosure through classroom context.

BEER Lab

Activity complete

Your responses have been recorded. Keep this screen open and wait for the instructor's directions.

Your descriptive profile in this activity

Internal control (1–5): 3.50 / 5

External control (1–5): 2.50 / 5

Each result averages two statements: internal control and external control, both from 1 to 5. They are reported separately. A dash means one of that dimension's answers is missing. These are descriptions without diagnoses, categories or percentiles. The Spanish teaching translation has not been validated.

Figure 4.6: Private feedback expresses two descriptive means and preserves interpretation limits.

Feedback script

Today we observed responses to four statements and choices under explicit rules. Internal and external means retain their own meanings and sample sizes. An active choice can be useful, irrelevant or harmful depending on contingency and cost. Before explaining someone's choice, distinguish what we observed from beliefs and preferences that were not measured. Spanish is a teaching translation, and these results do not classify people.

4.4 Downloading and reconstructing results

The private download contains only the selected session. It includes one row per active period per participant, including pending periods, plus two dimension-score rows. A basic session with three people has 12 item rows and six dimension rows; an extended session has 24 item and choice rows plus six dimension rows. The header has 28 columns. Participant codes link records within a session but are pseudonyms rather than irreversible anonymization. The entry code and administrator password are not exported. Keep files within the intended teaching team and review identifiers before any broader sharing.

Columns identify session, configuration, participant, version, language, edition, content hash and scoring version. `row_type` distinguishes item, choice, internal and external; `item_number` identifies the position within the questionnaire or extension. `source_item_id` preserves the published position.

response_status distinguishes answered, omitted and pending. dimension records item membership; scored_response equals the response because nothing is reversed. Dimension rows use metric, score, valid_items and expected_items to document scoring. The two completion fields distinguish questionnaire completion from completion of the whole activity. Do not treat derived dimension rows as additional respondents when computing sample sizes.

choice_code identifies positive, independent, negative or favorable_independent; choices_version identifies the scenario specification. Response duration measures time between presentation and submission rather than effort or sincerity. The inherited name anonymous_link_code holds an optional participant label and may enable external linkage if the administrator supplied one. Review it before sharing. To reproduce a mean, filter session and row type first, exclude missing scores and count people. Never sum item rows together with score rows. Exported version information makes calculations auditable, but analysts must still state their own inclusion rules and avoid unsupported pooling across languages.

4.5 Class plan and concluding discussion

For a sixty-minute class, reserve ten minutes for access, reading and comprehension; five to nine for extended participation; ten to reconstruct both scores using invented data; fifteen for the four situations; ten to examine the report; and five for a written conclusion. Durations in the opening table are planning estimates without an enforced timer. For a shorter class, administer the basic edition and discuss one scenario on the board. For a longer class, distribute worked answers after small groups attempt their own calculations. Protect private response time before inviting discussion of theory.

Start discussion by asking what information would establish that an action helps. Draw two possible outcomes for each option, placing the cost alongside activation. Only then introduce internal and external means. This sequence avoids using a psychological label as the answer to an arithmetic problem. Finish by asking for one sentence describing an observation, another proposing a compatible interpretation and a third naming additional evidence needed to distinguish that interpretation from an alternative. Assess reasoning quality rather than personal questionnaire responses. Students should leave able to articulate the difference between description, mechanism and identification.

4.6 Troubleshooting and operational checks

If an entry code fails, confirm it belongs to the same session and communicate it again privately. If another family appears in Demo or Rooms, stop distributing links and consult the lab. If a dimension is empty, check for a missing member of its pair before suspecting an arithmetic error. If the download has more rows than expected, distinguish periods from derived-score rows before counting participants. A participant remaining on the explicit closing screen is behaving as intended and does not need to submit another answer. Do not interpret a blank score as a minimum response.

Restarting an instance should preserve its database. If the database was recreated, old individual links may stop working and a new session is required; room paths remain stable entry points. If a report has not updated after a response, refresh the instructor view without altering a participant's questionnaire. Preserve other families and keep rehearsal sessions separate from the class. Before leaving, download the intended cohort, hide results and record the version and analytical decisions used. These checks make instruction reproducible while leaving substantive answers under participants' control.

Worked cases for classroom preparation

What participants will see

First solve cases with synthetic data. Identify response, status, inclusion rule, numerator and denominator. For a scenario, record probabilities, cost and expected balances separately.

5.1 Scoring and missing data

1 Two complete means

A participant answers 5, 4, 2 and 3. Internal control is $(5 + 4)/2 = 4.5$ and external control is $(2 + 3)/2 = 2.5$. Each dimension has two valid items. A sum of 14 is not an instrument score. Explain that the respondent expressed greater agreement with internal than external statements in this administration, without assigning a personality type or predicting conduct in a new task. The two values should remain visible rather than replaced by a single summary.

2 An internal omission

Responses are 4, omission, 2 and 3. The internal mean is missing with one valid item out of two; the external mean is 2.5 with two out of two. Omission is not zero, three or four. The respondent may have completed all four screens while contributing nothing to the internal distribution. Ask which counts change: questionnaire completion increases, internal N does not, external N does. This is an intended result of the inclusion rule rather than a file error requiring imputation.

3 A pending external page

Someone submitted 3, 5 and 4 but has not confirmed the fourth screen. Their internal mean is 4. External control is missing with one available item, but its reason is pending rather than explicit omission. The questionnaire is unfinished. A subsequent answer of 2 makes external control 3 without altering internal control. This case checks that the report includes partial information from the last technical round and does not require global completion before counting a complete pair.

4 High agreement on both dimensions

With responses 5, 5, 5 and 5, the means are 5 and 5. Do not convert the pattern into zero through subtraction or reverse external items. The respondent expressed strong agreement with two sets of statements. A study could investigate the contextual meaning of that combination, but the interface does not classify it as inconsistent. Compare it with 1, 1, 1 and 1: both would have a zero difference despite completely different responses. Retaining two dimensions preserves that distinction.

5 A midpoint is not missing information

Answering 3 and 3 produces a mean of 3 with two valid responses. Omitting both produces a missing result with zero valid responses. The chart counts the first case at 3.0 and excludes the second. A dash does not place someone at the center. During reconstruction, use `response_status` and `score` columns rather than substituting three for blanks. Such substitution creates artificial concentration and changes the classroom mean, even if it makes a spreadsheet look more complete.

6 Group mean and median

Three valid internal means are 2, 3 and 5. Their mean is $10/3 = 3.33$ and median is 3. Sample standard deviation is approximately 1.53, using $N - 1 = 2$ as divisor. A fourth participant without a complete pair raises registered participants to four while valid N remains three. Do not divide ten by four. Standard deviation describes variation in observed means; it does not itself quantify population uncertainty or establish the instrument's reliability in this cohort.

7 Frequencies and distribution shape

Four external means are 1, 1, 5 and 5. Their mean is 3, but nobody scored 3. The chart contains two cases at 1.0 and two at 5.0, with zero in the other seven bars. Frequencies sum to four. A display highlighting only the mean would hide this division. Compare 3, 3, 3 and 3, which preserves the mean while changing dispersion completely. Neither distribution establishes clinical categories or a validated boundary between types of people.

5.2 Contingencies, balances and choices

8 Calculating positive contingency

Without activation, expected balance is $0.2 \times 120 + 0.8 \times 20 = 40$ ECU. With activation, it is $0.8 \times 110 + 0.2 \times 10 = 90$. The difference is 50. The 10 ECU cost is deducted for either favorable or unfavorable outcomes, rather than only after failure. Linear utility therefore favors activation. Check the shorter calculation $100 \times (0.8 - 0.2) - 10 = 50$ and explain each component before interpreting the class's choices.

9 Independence at fifty percent

The favorable probability is 0.5 for either option. Expected balance without activation is $20 + 100 \times 0.5 = 70$; with activation it is $10 + 100 \times 0.5 = 60$. Probability difference is zero and balance difference is -10. Activation improves no possible balance and imposes a cost. If someone selects it,

describe the choice and ask what information is missing to explain it. A single hypothetical choice is not a validated diagnosis of illusion of control.

10 An action that worsens opportunities

The third situation offers 80% without activation and 20% with activation. Expected balance falls from 100 to 30, a difference of -70 ECU. Multiplying only 100 by 20% and forgetting the account and cost would be incorrect: 20 is not the active option's expected final balance. The correct calculation is $20 - 10 + 20 = 30$. This case shows why effort, activity and desirability are not equivalent when the rules connect an action negatively to favorable outcomes.

11 Frequent success without an activation effect

In the fourth situation both options offer 80%. Expected balances are 100 and 90. A high favorable probability does not imply positive contingency: the relevant difference remains $0.8 - 0.8 = 0$. Compare this with the second situation. The level of success changes, but both have the same expected difference of -10 from the cost. A precise description distinguishes the opportunity to receive a reward from the increment attributable to the action within the announced rules.

12 Recovering the cost

With reward 100 and cost 10, activation breaks even when it improves probability by 0.1, or ten percentage points. If probability moves from 40% to 50%, expected balances are 60 and 60. Activation must improve probability by more than ten points to exceed inactivity. This is a board exercise rather than an implemented fifth situation. Ask students to identify the changed parameter and explain why the calculation does not belong in an IE-4 score or alter either dimension's interpretation.

13 The linear-utility assumption

Someone faces the first situation and prefers inactivity. The program does not automatically conclude they misunderstood: the 90 versus 40 reference maximizes expected balance under linear utility. The active minimum is 10 while the inactive minimum is 20, so preferences highly sensitive to the worst outcome may matter. No utility function or subjective probability is elicited. Appropriate interpretation keeps those explanations open and preserves the hypothetical status of the response rather than treating the reference as an individual knowledge-test score.

14 No observed earnings

A student activates in all four situations. Expected balances for the chosen alternatives are 90, 60, 30 and 90 ECU. These numbers are not payments, draw outcomes or an accumulating account. Each example starts again at 20. Summing 270 and announcing that the student earned that amount would be incorrect. If the sum is used as an arithmetic exercise, identify it as an external construction without an interpretation as activity income. Nothing in the interface implements the random events that would realize these balances.

5.3 Reporting, export and inference

15 An option's percentage

A session contains twelve people: eight answer the first situation, two omit it and two remain pending. Five of the eight choose activation. The displayed percentage is $5/8 = 62.5\%$, not $5/12$. Option counts sum to eight; answered, omitted and pending counts sum to twelve. Stating both denominators prevents interpreting delay as a preference for inactivity. The calculation does not require all eight respondents to have complete questionnaires because choice frequencies and dimension scores are different indicators with different inclusion conditions.

16 Dimension N within an option

Of five people activating, four have complete internal pairs and three complete external pairs. Conditional means use $N = 4$ and $N = 3$ respectively. If internal means are 2, 3, 4 and 5, their mean is 3.5; fourteen should not be divided by five. The report retains option frequency five alongside those sizes. Missing dimensions are not additional choices. Before comparing groups, state how many scores support each average and whether the same people contribute to the two dimensions.

17 A zero-N table

Nobody selects inactivity in the first situation although three people answer. Its frequency is zero and percentage is 0.0%. Internal and external means appear as dashes with N zero. They are not means of zero or minimum scores of one. An empty cell cannot support a mean difference against those activating. Discuss the observed frequency while recognizing that a profile comparison has no available reference group. Avoid turning the absence of respondents into evidence about the beliefs they would have expressed.

18 Counting download rows

An extended session with three participants contains $3 \times 8 = 24$ active rows and $3 \times 2 = 6$ derived rows: 30 in total, plus the header. An equivalent basic session has $12 + 6 = 18$. Pending rows are exported too, so counts do not shrink to completed participants. Count distinct participant codes within the session to count people. For dimension means, select internal or external rows and exclude blank score cells rather than averaging the entire response column.

19 Description and causal explanation

Those activating have an internal mean of 4 and those leaving inactive a mean of 3. The observed difference is one point between sets with complete responses. It does not establish that increasing internal control would cause activation: the belief was not randomly assigned, and comprehension, experience and preferences may differ. Ask for a sentence compatible with the data and another that is too strong. One describes association in this cohort; the other assigns a causal effect. The study needed to distinguish them is a later question.

20 Comparing languages

English mean is 3.8 and Spanish mean is 3.2 in different groups. Do not attribute 0.6 points to culture or a language effect. Participants and language form both differ; the Spanish translation is unvalidated and there is no random assignment. Both summaries can be reported with their N,

versions and limits. Equivalence research needs additional design and evidence. Published metric invariance for English and German does not transfer by analogy to this comparison or establish equality of classroom means.

21 Completion and disclosure conditions

A person completed the questionnaire and only three of four situations. Although both means are available in the revealed report, the activity is unfinished and private feedback is not enabled. After the last submission, closing feedback appears when extended policy and instructor disclosure permit it. If the instructor hides results, it disappears on the next periodic request. Basic editions never enable this feedback. The case distinguishes statistical availability, operational progress and permission to display information, three conditions that should not be conflated.

22 A future research proposal

A group proposes raising cost to 30 and paying one randomly selected situation. First specify the question, condition assignment and payment mechanism participants would need to understand. This would be a different study from the unpaid version here, rather than an already available option. With reward 100, the new break-even probability improvement is thirty points; calculating it helps check the hypothesis. Independent language review and a missing-data plan would also be needed before evidence collection. Treat the proposal as research design, not as a feature claim.

Checkpoint

Check session, language, edition and access. Review N per measure, choose disclosure and download only the intended cohort. Keep choices and scale separate.

Sources and attribution

Nießen, D., Schmidt, I., Groskurth, K., Rammstedt, B., and Lechner, C. M. (2022). The Internal-External Locus of Control Short Scale-4 (IE-4): A comprehensive validation of the English-language adaptation. PLOS ONE, 17(7), e0271289. English wording and the item table are published under CC BY 4.0. <https://doi.org/10.1371/journal.pone.0271289>

The same authors (2022). Internal-External Locus of Control Short Scale-4 (IE-4). ZIS, GESIS. Documentation of instructions, response endpoints and complete-pair scoring. https://doi.org/10.6102/zis323_exz

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs: General and Applied, 80(1), 1-28. Theoretical reference; its questionnaire is not reproduced here. <https://doi.org/10.1037/h0092976>

American Economic Association. JEL classification: A22, undergraduate teaching; C83, survey methods; C91, individual laboratory behavior; D81, decisions under risk and uncertainty; D84, expectations. Descriptors were checked for this family. <https://www.aeaweb.org/econlit/jelCodes.php?view=jel>

BEER Lab (2026). Spanish teaching translation and four hypothetical contingency situations, version 1.0.0. Original classroom development for this activity; no Spanish validation or individual diagnosis. The published source retains its attribution. Interface adaptations include one item per screen, explicit omission, class entry code and instructor disclosure. Open reproduction does not replace empirical assessment of adaptations or establish language equivalence.