

ENGLISH FOR WORK / ENGLISH FOR HIGHER EDUCATION AND RESEARCH

Higher Education & Research **English**

Define the question. Defend the evidence.



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Eight practical lessons. Eleven extended conversations.

Vocabulary, phrase banks, guided speaking, and explained answers.

Revised 2026 edition / Upper-intermediate to advanced

Your route through the book

01 Research Questions and Study Design, page 4

Specify a research question and distinguish an observed association from a causal effect.

02 Grant Proposals and Specific Aims, page 18

Align a grant aim with pilot scope and interpret predefined feasibility milestones.

03 Lab Meetings and Data Challenges, page 33

Present an experimental discrepancy, disclose a method change, and propose a controlled check without editing the record to fit a preferred result.

04 Research Ethics and Human Subjects, page 46

Describe a secondary-use proposal and seek an authorized ethics determination without assuming coded data is anonymous.

05 Authorship, Collaboration, and Credit, page 61

Discuss authorship eligibility, outstanding responsibilities, and author order without granting or denying credit by status.

06 Peer Review and Revision Responses, page 74

Respond to a valid reviewer criticism with a precise revision and traceable manuscript locations.

07 Data Management and Reproducibility, page 89

Make a dataset interpretable through verified units, missing-value rules, dates, and traceable processing.

08 Academic Presentations and Conferences, page 102

Give a concise evidence-based conference answer, distinguish task performance from mechanism, and handle an unresolved question.

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Suggested study range: B2-C1. This is an editorial study range, not a certified proficiency assessment.

Strong claims need clear boundaries

Academic confidence comes from showing exactly what a study can support. Connect the question to the design, explain the evidence, and distinguish a promising next step from a result already established.

Define what the study measures

Population, outcome, comparison, and timing change the meaning of a question. A broad word such as works can conceal several different claims.

"We measured course completion in this cohort, not the program's causal effect on all students."

Make disagreement inspectable

Point to the protocol, data, criterion, or manuscript passage at issue. A direct challenge can be a request for evidence rather than a personal attack.

"The exposure time changed between runs; we need to check its contribution to the discrepancy."

Keep permission separate from possibility

Having data, software access, or a technically feasible plan does not settle whether the proposed use is authorized.

"We can describe the proposed analysis, but the required reuse determination is still pending."

Respond at the right scale

Answer the narrow question first, then state the limitation and next test. Avoid turning a pilot, one sample, or a successful rerun into universal proof.

"This result supports the reported observation in our sample; broader testing is still needed."

Professional boundaries

All cases and figures are fictional. This book teaches research communication, not statistical, clinical, or legal advice or ethics approval. Follow the relevant institution, funder, jurisdiction, and journal requirements; obtain required review before conducting or changing research.

A Read the situation

LESSON 01 / RESEARCH QUESTIONS AND STUDY DESIGN

Specify a research question and distinguish an observed association from a causal effect.

What exactly would it mean for tutoring to work?

Doctoral researcher Imani and supervisor Leon revise a proposal asking whether optional tutoring works. Available records cover first-year students in one introductory biology course for one semester: 32 of 40 tutoring participants completed the course, compared with 36 of 60 nonparticipants. Tutoring was self-selected, not randomly assigned. The groups may differ in prior preparation or motivation, which these records do not measure. The immediate analysis can describe the association with completion in this cohort. A future causal study would need a suitable design; it has not been conducted.

People: Imani, Doctoral researcher; Leon, Research supervisor.

Read the record

Choose one answer per question using the facts above.

1. What is the completion rate among tutoring participants?

- A.** 80%
- B.** 60%
- C.** 32%
- D.** 125%

2. What is the difference between the two completion rates?

- A.** Forty percentage points
- B.** Twenty percentage points
- C.** Twenty percent relative
- D.** Eight percentage points

3. Why is a causal claim unsupported here?

- A.** Both groups have identical completion rates.
- B.** Tutoring was self-selected and relevant group differences are unmeasured.
- C.** Every observational record is useless.
- D.** The course has no defined outcome.

[Answers and explanations, page 132](#)

B Vocabulary in use

CORE TERMS

research question

A specific question a study is designed to answer.

refine a research question

study sample

The observed group included in the study.

describe the study sample

outcome variable

The measured result of interest.

specify the outcome variable

comparison group

The group used as a reference for a contrast.

identify the comparison group

self-selection

Entry into a group through participants' own choices.

account for self-selection

random sampling

Selection of units from a population by a random process.

distinguish random sampling

target population

The group to which a research question refers.

define the target population

cohort

A defined group observed over a specified period.

follow a student cohort

exposure

A condition or experience whose relationship with an outcome is studied.

define the exposure

observational study

A study observing conditions without assigning the exposure.

describe an observational study

random assignment

Allocation to study conditions using a random process.

distinguish random assignment

association

An observed relationship between variables.

report an association

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

research question RESEARCH QUESTION

refine a research question

Keep the meaning precise: A specific question a study is designed to answer.

exposure EXPOSURE

define the exposure

Keep the meaning precise: A condition or experience whose relationship with an outcome is studied.

B Precision and professional shorthand

EXTEND YOUR RANGE

causal effect

A change attributable to an intervention or exposure.

estimate a causal effect

baseline difference

A group difference present before the studied exposure or outcome.

examine baseline differences

completion rate

The proportion meeting the defined completion outcome.

calculate the completion rate

percentage-point difference

The arithmetic difference between percentages.

report a percentage-point difference

internal validity

The credibility of the study's inference within its setting.

assess internal validity

confounder

A factor influencing both exposure and outcome that can distort their apparent causal relationship.

address potential confounders

operational definition

A precise specification of how a concept is measured.

state an operational definition

denominator

The base count used in a proportion.

state the denominator

relative difference

A difference expressed in relation to a reference value.

distinguish a relative difference

external validity

The extent to which findings apply beyond the studied setting.

discuss external validity

B Precision and professional shorthand / continued

estimand

The precise quantity a study seeks to estimate.
define the estimand

study protocol

A documented plan for the study's conduct and analysis.
revise the study protocol

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

association ASSOCIATION

report an association

Keep the meaning precise: An observed relationship between variables.

completion rate COMPLETION RATE

calculate the completion rate

Keep the meaning precise: The proportion meeting the defined completion outcome.

C Phrases that move the work forward

Clarify the broad verb

"What outcome would count as working?"

Set the period

"The observation window is one semester."

Identify exposure

"Tutoring participation was optional."

State the comparison

"Thirty-six of sixty nonparticipants completed, or 60%."

Qualify the inference

"This is an observed association, not an isolated causal effect."

Identify missing information

"Prior preparation and motivation are not measured here."

Bound the population claim

"The current result concerns this course cohort."

Preserve the useful result

"The descriptive contrast remains worth reporting."

Specify the population

"The records cover first-year students in this course."

Name the outcome

"We are measuring course completion."

State the first rate

"Thirty-two of forty participants completed, or 80%."

Express the contrast

"That is a 20-percentage-point difference."

Name selection

"Students chose whether to participate."

Avoid inventing an explanation

"Those are possible group differences, not confirmed causes."

Separate future work

"A causal question needs a suitable future design."

Close the revision

"The proposal should match its question to the available evidence."

Precision in real exchanges

Purpose: Name the outcome

Useful wording: "We are measuring course completion."

Purpose: Identify exposure

Useful wording: "Tutoring participation was optional."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which headline fits the available evidence?

- A.** Tutoring participation was associated with higher completion in this course cohort.
- B.** Tutoring increased completion by twenty percentage points in this course cohort.
- C.** Tutoring participants had twenty percent higher completion than nonparticipants.
- D.** Randomly selecting more records would establish the tutoring effect.

2. Which question is still unresolved?

- A.** Whether the course records span one semester
- B.** Whether participation was optional
- C.** Whether tutoring caused the completion difference
- D.** Whether 32 of 40 equals 80%

3. A colleague needs the term for this meaning: A defined group observed over a specified period. Which term fits?

- A.** internal validity
- B.** cohort
- C.** self-selection
- D.** baseline difference

D Choose the response that fits / continued

4. Rebuild the exchange from "What exactly would it mean for tutoring to work?".

Leon: "Walk me through the counts before we discuss the interpretation.

Percentages can conceal different group sizes, especially when the audience sees only a headline." Imani: [missing response] Leon: "The draft says twenty percent higher. Do you mean twenty percentage points, or are you calculating a relative increase from the nonparticipant rate?" Which response belongs in the gap?

- A.** The participant denominator is forty, with thirty-two completing. That is eighty percent. Among sixty nonparticipants, thirty-six completed, giving sixty percent for the comparison group.
- B.** I need a sharper research question. The available records concern first-year students in one introductory biology course during one semester. They record tutoring participation and course completion.
- C.** Correct. The percentage-point difference is twenty. Relative to sixty percent, the difference is about thirty-three point three percent. Neither phrasing, by itself, explains why the groups differ.
- D.** I will call it an association with completion in this cohort. That preserves the finding without treating possible unmeasured group differences as either irrelevant or already proved explanations.

[Answers and explanations, page 132](#)

One useful distinction

32/40 is 80%; 36/60 is 60%. The difference is 20 percentage points. Relative to 60%, the difference is approximately 33.3%, not 20%. Neither calculation removes the design limitation created by self-selection.

E Conversation

What exactly would it mean for tutoring to work?

What exactly would it mean for tutoring to work?

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

research question / self-selection / study protocol / association / causal effect /
outcome variable / Random assignment / percentage-point difference / denominator /
external validity

- 01 **Leon:** The proposal asks whether tutoring works. That sounds important, but what outcome would answer the question, and whose experience are we actually observing?
- 02 **Imani:** I need a sharper ¹ _____. The available records concern first-year students in one introductory biology course during one semester. They record tutoring participation and course completion.
- 03 **Leon:** Then completion, rather than examination performance or long-term retention, is the outcome. We should not let the proposal switch among those meanings without noticing.
- 04 **Imani:** Agreed. The ² _____ is completion as recorded for that semester. I will use the same definition for participants and nonparticipants, so the comparison does not change meaning between groups.
- 05 **Leon:** Walk me through the counts before we discuss the interpretation. Percentages can conceal different group sizes, especially when the audience sees only a headline.
- 06 **Imani:** The participant ³ _____ is forty, with thirty-two completing. That is eighty percent. Among sixty nonparticipants, thirty-six completed, giving sixty percent for the comparison group.

E Conversation / continued

- 07 **Leon:** The draft says twenty percent higher. Do you mean twenty percentage points, or are you calculating a relative increase from the nonparticipant rate?
- 08 **Imani:** Correct. The ⁴ _____ is twenty. Relative to sixty percent, the difference is about thirty-three point three percent. Neither phrasing, by itself, explains why the groups differ.
- 09 **Leon:** Were students allocated to tutoring, or did they choose it? That matters more for the causal claim than how confidently we present the percentages.
- 10 **Imani:** Participation involved ⁵ _____. Students chose whether to attend. The records do not measure prior preparation or motivation, and either could differ between groups. We have not established those differences.

Conversation continues on the next page.

What exactly would it mean for tutoring to work?

CONVERSATION / CONTINUED

- 11 **Leon:** Then the claim that tutoring caused the higher completion rate is stronger than the design supports. We can still report the observed relationship accurately.
- 12 **Imani:** I will call it an ⁶ _____ with completion in this cohort. That preserves the finding without treating possible unmeasured group differences as either irrelevant or already proved explanations.
- 13 **Leon:** A colleague proposed solving the problem by randomly sampling more records from the same optional program. Would that make tutoring itself randomly assigned?
- 14 **Imani:** No. ⁷ _____ concerns allocation to conditions. Random sampling concerns which people enter the sample. A larger randomly sampled record set would not retroactively randomize the tutoring decision.
- 15 **Leon:** Good. We should also avoid implying that one course at one institution establishes what happens for all students in every subject and setting.
- 16 **Imani:** That is an ⁸ _____ question. The current description stays with this course and semester. Broader applicability needs evidence across the relevant settings, not just a less cautious title.
- 17 **Leon:** Let us keep the causal question for the next study. For this paper, can you put the course, semester, and two counts into the abstract?
- 18 **Imani:** The future ⁹ _____ question needs a suitable design and explicit assumptions. We should discuss that design as a proposed next step, not imply that it has already been implemented.

What exactly would it mean for tutoring to work? / continued

- 19 **Leon:** Revise the objective to describe completion by tutoring participation in this cohort. Then make the design limitation visible in the abstract as well.
- 20 **Imani:** I will update the ¹⁰ _____ and the proposal wording together. The useful result is a bounded comparison with clear counts, while the causal and broader-population questions remain open.

CHECK THE GAPS

1. research question / 2. outcome variable / 3. denominator / 4. percentage-point difference / 5. self-selection / 6. association / 7. Random assignment / 8. external validity / 9. causal effect / 10. study protocol

[Why these answers fit, page 134](#)

F Check accuracy and scope

What exactly would it mean for tutoring to work?

Return to the case

Doctoral researcher Imani and supervisor Leon revise a proposal asking whether optional tutoring works. Available records cover first-year students in one introductory biology course for one semester: 32 of 40 tutoring participants completed the course, compared with 36 of 60 nonparticipants. Tutoring was self-selected, not randomly assigned. The groups may differ in prior preparation or motivation, which these records do not measure. The immediate analysis can describe the association with completion in this cohort. A future causal study would need a suitable design; it has not been conducted.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. Which statement about possible confounding is accurate?

- A. Motivation is proved to explain the entire contrast.
- B. Self-selection makes confounding impossible.
- C. A percentage-point calculation adjusts for preparation.
- D. Prior preparation or motivation may differ, but these records do not establish those differences.

2. Which design distinction is correct?

- A. Random assignment guarantees every population is represented.
- B. Random sampling automatically makes an optional program randomized.
- C. Both terms mean the same operation.
- D. Random assignment allocates conditions; random sampling selects sample members.

[Answers and explanations, page 135](#)

Listen for the distinction

Repeat turns 9-14, distinguishing self-selection, random sampling, and random assignment.

Narrowing a claim strengthens the question

A supervisor who challenges the word works may be asking for a testable question, not rejecting the project. Respond with the population, measured outcome, and comparison. Keep the broader ambition visible as a future question instead of presenting it as an answer from the current records.

F Say it / transfer to a new case

A rate difference is not a randomized effect

In a self-selected workshop cohort, 18 of 30 attendees and 20 of 40 nonattendees completed a task. Prior experience was not measured. The records cover one course only.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

10 / 60 / 50 / causal effect

- 01 **Researcher:** The attendee completion rate is ¹ _____ percent.
- 02 **Supervisor:** The nonattendee rate is ² _____ percent.
- 03 **Researcher:** The difference is ³ _____ percentage points.
- 04 **Supervisor:** The contrast establishes an association, not a ⁴ _____.

CHECK THE GAPS

1. 60 / 2. 50 / 3. 10 / 4. causal effect

[Why these answers fit, page 135](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "What exactly would it mean for tutoring to work?". Leon: "A colleague proposed solving the problem by randomly sampling more records from the same optional program. Would that make tutoring itself randomly assigned?" Imani: [missing response] Leon: "Good. We should also avoid implying that one course at one institution establishes what happens for all students in every subject and setting." Which response belongs in the gap?

- A.** Correct. The percentage-point difference is twenty. Relative to sixty percent, the difference is about thirty-three point three percent. Neither phrasing, by itself, explains why the groups differ.
- B.** No. Random assignment concerns allocation to conditions. Random sampling concerns which people enter the sample. A larger randomly sampled record set would not retroactively randomize the tutoring decision.
- C.** I need a sharper research question. The available records concern first-year students in one introductory biology course during one semester. They record tutoring participation and course completion.
- D.** I will call it an association with completion in this cohort. That preserves the finding without treating possible unmeasured group differences as either irrelevant or already proved explanations.

[Answers and explanations, page 136](#)

A Read the situation

LESSON 02 / GRANT PROPOSALS AND SPECIFIC AIMS

Align a grant aim with pilot scope and interpret predefined feasibility milestones.

A feasibility pilot cannot promise a definitive answer

Research lead Sora and grants adviser Ben revise a proposal for a small learning-study pilot. The draft promises to establish that a new workshop improves academic attainment. The actual pilot tests recruitment and follow-up procedures, not efficacy. A completed preparatory pilot recruited 30 students in four weeks and retained 24 at follow-up. The team had specified two local progression criteria: recruit at least 30 in four weeks and retain at least 85% of those recruited. Both must be met for automatic progression to the next planning stage. Only recruitment passed; a redesign or explicit review is needed.

People: Sora, Research lead; Ben, Grants adviser.

Read the record

Choose one answer per question using the facts above.

1. What is the pilot designed to assess?

- A.** All future funding decisions
- B.** Recruitment and follow-up feasibility
- C.** Definitive improvement in attainment
- D.** Universal workshop safety

2. What was the observed retention rate?

- A.** 125%
- B.** 80%
- C.** 85%
- D.** 24%

3. Did both local progression criteria pass?

- A.** No; recruitment passed and retention did not.
- B.** Yes, because thirty students were recruited.
- C.** No; retention passed and recruitment did not.
- D.** Yes, because eighty and eighty-five are equivalent.

[Answers and explanations, page 137](#)

B Vocabulary in use

CORE TERMS

specific aim

A focused objective a proposed study will address.

refine a specific aim

pilot study

A small-scale study testing procedures for later work.

design a feasibility pilot

efficacy

The effect of an intervention under the relevant controlled conditions.

distinguish efficacy from feasibility

recruitment window

The period allowed for enrolling participants.

define the recruitment window

follow-up

A later observation or contact after the initial stage.

complete follow-up

progression criterion

A predefined condition for moving to a next stage.

apply progression criteria

long-term goal

The broader result a research program ultimately seeks.

state the long-term goal

feasibility

Whether proposed methods can be carried out practicably.

assess feasibility

recruitment

Bringing eligible participants into a study.

monitor recruitment

retention

Continued participation through a defined study point.

calculate follow-up retention

attrition

Loss of participants from later study observation.

report participant attrition

milestone

A specified achievement used to assess progress.

set a measurable milestone

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

specific aim SPECIFIC AIM

refine a specific aim

Keep the meaning precise: A focused objective a proposed study will address.

recruitment RECRUITMENT

monitor recruitment

Keep the meaning precise: Bringing eligible participants into a study.

B Precision and professional shorthand

EXTEND YOUR RANGE

deliverable

A defined output the project will provide.
identify the pilot deliverable

rationale

The reasoning that justifies the proposed work.
strengthen the study rationale

innovation

A meaningful new feature of an approach.
describe the innovation precisely

scope

The boundaries of the work and claims.
keep the aims within scope

precision

The degree of uncertainty around an estimate.
discuss estimate precision

contingency

A planned response if assumptions or milestones fail.
specify a contingency

study objective

The particular purpose of a study.
align the study objective

significance

Why the research question or gap matters.
explain research significance

approach

The planned methods for addressing the aims.
evaluate the proposed approach

sample size

The number of units or participants included.
justify the sample size

definitive study

A study designed to provide a robust answer to the main question.
plan a definitive study

funding decision

A determination about financial support.
distinguish a funding decision

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

milestone **MILESTONE**

set a measurable milestone

Keep the meaning precise: A specified achievement used to assess progress.

innovation **INNOVATION**

describe the innovation precisely

Keep the meaning precise: A meaningful new feature of an approach.

Phrases that move the work forward

Separate ambition from aim

"The long-term goal is broader than this pilot deliverable."

Remove an overclaim

"It is not designed to establish efficacy."

Report recruitment

"That target was met."

Give the result

"Twenty-four were retained, which is 80%."

Keep both conditions

"Automatic progression requires both criteria."

Explain the next step

"The shortfall needs redesign or explicit review."

Specify the output

"The deliverable is a revised, tested study procedure."

Bound funding language

"Meeting a local milestone would not guarantee an award."

State the pilot purpose

"This study tests recruitment and follow-up procedures."

Name the recruitment target

"The local target was 30 students in four weeks."

State the retention base

"Retention is calculated among the 30 recruited students."

Apply the threshold

"That is below the predefined 85% criterion."

Avoid convenient rounding

"Eighty percent cannot be reported as meeting 85%."

Preserve uncertainty

"This does not establish that the workshop is ineffective."

Retain significance

"The larger educational question remains important."

Close the aim

"The proposal should promise what this design can deliver."

Precision in real exchanges

Purpose: Name the recruitment target

Useful wording: "The local target was 30 students in four weeks."

Purpose: Report recruitment

Useful wording: "That target was met."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which specific aim matches the supplied pilot?

- A.** Demonstrate that the observed retention rate met both predefined criteria.
- B.** Assess recruitment and follow-up procedures to refine a later study.
- C.** Estimate workshop efficacy by treating retained participants as improved learners.
- D.** Establish feasibility from recruitment alone, leaving follow-up outside the progression rule.

2. How many retained participants would meet at least 85% of thirty?

- A.** Twenty-four
- B.** Twenty-five
- C.** Twenty
- D.** Twenty-six

3. A colleague needs the term for this meaning: Whether proposed methods can be carried out practicably. Which term fits?

- A.** follow-up
- B.** feasibility
- C.** precision
- D.** rationale

D Choose the response that fits / continued

4. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "The preparatory work enrolled thirty students in four weeks. Remind me whether that matches the target set before the results were available." Sora: [missing response] Ben: "Can we replace good retention with the actual rate? We kept twenty-four of thirty, and the milestone table still says eighty-five percent." Which response belongs in the gap?

- A.** It meets the recruitment criterion of at least thirty within four weeks. We should report that success, while checking the other criterion separately instead of treating enrollment as the whole feasibility assessment.
- B.** The deliverable is a refined study procedure, informed by recruitment and follow-up evidence. That is useful preparation for a later study, without pretending the larger question has already been answered.
- C.** That gives us a consistent rationale for the proposed work. We are asking for support to resolve a concrete procedural problem, not claiming that a small pilot has settled the educational effect.
- D.** The progression criterion requires at least twenty-six retained out of thirty. Twenty-five would be approximately eighty-three point three percent, still below the threshold. We should apply the stated rule accurately.

[Answers and explanations, page 137](#)

One useful distinction

24/30 is 80% retention, below the local 85% criterion. With 30 recruited participants, at least 26 retained would reach or exceed 85%; 25 would be only about 83.3%. Do not round a failed threshold into a pass.

E Conversation

A feasibility pilot cannot promise a definitive answer

A feasibility pilot cannot promise a definitive answer

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

Feasibility / specific aim / recruitment / contingency / progression criterion / retention / funding decision / scope / deliverable / rationale

- 01 **Ben:** The draft says this pilot will establish that the workshop improves attainment. Is that really the question the small study was designed to answer?
- 02 **Sora:** No. The ¹ _____ should concern recruitment and follow-up procedures. Improving attainment is our long-term goal, but the pilot does not provide a definitive test of that outcome.
- 03 **Ben:** We can keep the wider educational problem in the significance section. Reviewers still need a concrete account of what this grant would deliver now.
- 04 **Sora:** The ² _____ is a refined study procedure, informed by recruitment and follow-up evidence. That is useful preparation for a later study, without pretending the larger question has already been answered.
- 05 **Ben:** The preparatory work enrolled thirty students in four weeks. Remind me whether that matches the target set before the results were available.
- 06 **Sora:** It meets the ³ _____ criterion of at least thirty within four weeks. We should report that success, while checking the other criterion separately instead of treating enrollment as the whole feasibility assessment.

E Conversation / continued

- 07 **Ben:** Can we replace good retention with the actual rate? We kept twenty-four of thirty, and the milestone table still says eighty-five percent.
- 08 **Sora:** The ⁴ _____ rate is eighty percent. We had set at least eighty-five percent, so this criterion was not met. The denominator is all thirty recruited students.
- 09 **Ben:** Would twenty-five retained students meet the threshold? We need to translate the percentage into a whole-participant count.
- 10 **Sora:** The ⁵ _____ requires at least twenty-six retained out of thirty. Twenty-five would be approximately eighty-three point three percent, still below the threshold. We should apply the stated rule accurately.

Conversation continues on the next page.

A feasibility pilot cannot promise a definitive answer

CONVERSATION / CONTINUED

- 11 **Ben:** Then the milestone table needs one pass and one shortfall. I cannot sign off automatic progression on the recruitment number alone.
- 12 **Sora:** We need a ⁶ _____ such as redesign or explicit review. We should explain what the shortfall means for planning, not silently lower the criterion because we prefer a positive result.
- 13 **Ben:** That does not mean the workshop is educationally ineffective. The missing follow-up information concerns the study procedure, and the pilot was not an efficacy trial.
- 14 **Sora:** Correct. ⁷ _____ and efficacy are different questions. The result tells us the retention procedure missed our local target; it does not establish whether the workshop improves attainment.
- 15 **Ben:** I will also remove the sentence promising a future award once the pilot milestones pass. Our internal progression rule cannot bind a funder's decision.
- 16 **Sora:** A ⁸ _____ remains separate. Even successful local milestones would inform a proposal, not guarantee financial support. We should state the value of the evidence without predicting an external decision.
- 17 **Ben:** The grant can remain ambitious: a clear problem, a bounded pilot, and a reasoned route toward a definitive study.
- 18 **Sora:** Yes. Keep the ⁹ _____ explicit. We can describe the future question and explain how improving follow-up supports it, while keeping the current work focused on procedures and practical uncertainty.

A feasibility pilot cannot promise a definitive answer / continued

- 19 **Ben:** I will revise the aims, summary, and milestone table together. They should all say recruitment passed, retention did not, and the next planning step requires review.
- 20 **Sora:** That gives us a consistent ¹⁰ _____ for the proposed work. We are asking for support to resolve a concrete procedural problem, not claiming that a small pilot has settled the educational effect.

CHECK THE GAPS

1. specific aim / **2.** deliverable / **3.** recruitment / **4.** retention / **5.** progression criterion / **6.** contingency / **7.** Feasibility / **8.** funding decision / **9.** scope / **10.** rationale

[Why these answers fit, page 139](#)

F Check accuracy and scope

A feasibility pilot cannot promise a definitive answer

Return to the case

Research lead Sora and grants adviser Ben revise a proposal for a small learning-study pilot. The draft promises to establish that a new workshop improves academic attainment. The actual pilot tests recruitment and follow-up procedures, not efficacy. A completed preparatory pilot recruited 30 students in four weeks and retained 24 at follow-up. The team had specified two local progression criteria: recruit at least 30 in four weeks and retain at least 85% of those recruited. Both must be met for automatic progression to the next planning stage. Only recruitment passed; a redesign or explicit review is needed.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. What is the correct progression statement?

- A. Retention should be rounded up to the target.
- B. The target can be changed silently after seeing the result.
- C. Recruitment passed, but retention requires redesign or explicit review before progression.
- D. One passed milestone automatically overrides the other.

2. What does the retention result say about efficacy?

- A. It proves a large effect.
- B. It directly measures examination improvement.
- C. It does not establish whether the workshop improves attainment.
- D. It proves the workshop never works.

[Answers and explanations, page 140](#)

Listen for the distinction

Repeat turns 13-16, separating feasibility, efficacy, and the funding decision.

Ambition and deliverables are different

A proposal can explain a significant long-term problem without promising that a small pilot will solve it. State the pilot deliverable precisely and show how it informs a later study. Credible limits help reviewers understand what their funding would actually produce.

F Say it / transfer to a new case

Two conditions, not one

A local pilot rule requires 20 recruits within three weeks and at least 90% retention. Twenty are recruited on time, but only 17 reach follow-up. Both conditions are needed for automatic progression.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

met / 18 / not supported / 85

- 01 **Researcher:** The recruitment condition was ¹ _____.
- 02 **Adviser:** Retention was ² _____ percent.
- 03 **Researcher:** At least ³ _____ retained students were required.
- 04 **Adviser:** Automatic progression is ⁴ _____ under the stated rule.

CHECK THE GAPS

1. met / 2. 85 / 3. 18 / 4. not supported

[Why these answers fit, page 140](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer".

Ben: "That does not mean the workshop is educationally ineffective. The missing follow-up information concerns the study procedure, and the pilot was not an efficacy trial."

Sora: [missing response] **Ben:** "I will also remove the sentence promising a future award once the pilot milestones pass. Our internal progression rule cannot bind a funder's decision." Which response belongs in the gap?

- A.** No. The specific aim should concern recruitment and follow-up procedures. Improving attainment is our long-term goal, but the pilot does not provide a definitive test of that outcome.
- B.** Yes. Keep the scope explicit. We can describe the future question and explain how improving follow-up supports it, while keeping the current work focused on procedures and practical uncertainty.
- C.** The retention rate is eighty percent. We had set at least eighty-five percent, so this criterion was not met. The denominator is all thirty recruited students.
- D.** Correct. Feasibility and efficacy are different questions. The result tells us the retention procedure missed our local target; it does not establish whether the workshop improves attainment.

[Answers and explanations, page 141](#)

Review 1 / Meaning and context

Use language from the lessons you have completed. Choose one answer per question.

Case file

Revisit "Research Questions and Study Design" and "Grant Proposals and Specific Aims". Choose precise terminology, then reconstruct the missing responses using both neighboring turns. The final two questions also revisit earlier conversations.

1. A colleague needs the term for this meaning: The observed group included in the study. Which term fits?

- A. study sample
- B. confounder
- C. relative difference
- D. observational study

2. A colleague needs the term for this meaning: Continued participation through a defined study point. Which term fits?

- A. scope
- B. specific aim
- C. deliverable
- D. retention

3. Rebuild the exchange from "What exactly would it mean for tutoring to work?". Leon: "Were students allocated to tutoring, or did they choose it? That matters more for the causal claim than how confidently we present the percentages." Imani: [missing response] Leon: "Then the claim that tutoring caused the higher completion rate is stronger than the design supports. We can still report the observed relationship accurately." Which response belongs in the gap?

- A. Agreed. The outcome variable is completion as recorded for that semester. I will use the same definition for participants and nonparticipants, so the comparison does not change meaning between groups.
- B. That is an external validity question. The current description stays with this course and semester. Broader applicability needs evidence across the relevant settings, not just a less cautious title.
- C. Participation involved self-selection. Students chose whether to attend. The records do not measure prior preparation or motivation, and either could differ between groups. We have not established those differences.
- D. I will update the study protocol and the proposal wording together. The useful result is a bounded comparison with clear counts, while the causal and broader-population questions remain open.

Review 1 / Meaning and context / continued

4. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "The grant can remain ambitious: a clear problem, a bounded pilot, and a reasoned route toward a definitive study." Sora: [missing response] Ben: "I will revise the aims, summary, and milestone table together. They should all say recruitment passed, retention did not, and the next planning step requires review." Which response belongs in the gap?

- A.** The deliverable is a refined study procedure, informed by recruitment and follow-up evidence. That is useful preparation for a later study, without pretending the larger question has already been answered.
- B.** The progression criterion requires at least twenty-six retained out of thirty. Twenty-five would be approximately eighty-three point three percent, still below the threshold. We should apply the stated rule accurately.
- C.** Yes. Keep the scope explicit. We can describe the future question and explain how improving follow-up supports it, while keeping the current work focused on procedures and practical uncertainty.
- D.** No. The specific aim should concern recruitment and follow-up procedures. Improving attainment is our long-term goal, but the pilot does not provide a definitive test of that outcome.

[Answers and explanations, page 172](#)

A Read the situation

LESSON 03 / LAB MEETINGS AND DATA CHALLENGES

Present an experimental discrepancy, disclose a method change, and propose a controlled check without editing the record to fit a preferred result.

The repeated run was not performed the same way

Research associate Alex and lab lead Priya compare two nonclinical fluorescence measurements of the same reference material. Run A reports 120 arbitrary units and Run B 180. Instrument files reveal exposure times of ten seconds for A and twenty for B. The summary lab notes had omitted this change. The team has not tested whether it explains the entire difference, and signal response may not be proportional to exposure. They must retain both raw records, add a dated correction to the notes, and plan a repeat with documented matched settings. No misconduct finding has been made.

People: Alex, Research associate; Priya, Lab lead.

Read the record

Choose one answer per question using the facts above.

1. What changed between the runs?

- A. The notes document identical exposure times.
- B. Run A used no reference material.
- C. Run B's result was 120 units.
- D. Exposure time increased from ten to twenty seconds.

2. What is not yet established?

- A. Whether a method change was omitted
- B. Whether raw records exist
- C. Whether exposure time explains the entire signal difference
- D. Whether the reported values are 120 and 180

3. How should the documentation be corrected?

- A. Backdate a replacement note as if nothing changed.
- B. Delete the less convenient raw result.
- C. Announce proven misconduct immediately.
- D. Add a dated correction while preserving the original record.

[Answers and explanations, page 142](#)

B Vocabulary in use

CORE TERMS

lab meeting

A discussion of research progress, methods, and results.

present at a lab meeting

reference material

Material used as a stable point of comparison.

measure the reference material

processed result

A value produced after defined analysis or transformation.

trace a processed result

exposure time

The duration used for signal acquisition in this case.

document exposure time

protocol version

The identified revision of a study procedure.

record the protocol version

batch effect

A systematic difference associated with processing groups.

investigate a batch effect

experimental run

A recorded execution of a measurement or experiment.

compare experimental runs

raw data

Original recorded observations before later processing.

preserve raw data

arbitrary unit

A relative measurement unit defined by the measurement system.

report arbitrary units

instrument setting

A parameter controlling measurement behavior.

match instrument settings

method deviation

A departure from the intended or comparison procedure.

document a method deviation

technical replicate

A repeated measurement used to assess measurement variability.

compare technical replicates

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

lab meeting LAB MEETING

present at a lab meeting

Keep the meaning precise: A discussion of research progress, methods, and results.

arbitrary unit ARBITRARY UNIT

report arbitrary units

Keep the meaning precise: A relative measurement unit defined by the measurement system.

B Precision and professional shorthand

EXTEND YOUR RANGE

biological replicate

An independently derived biological sample or unit.

distinguish biological replicates

linear response

A straight-line input-output relationship over a specified range, possibly with a nonzero offset.

verify a linear response

normalization

Adjustment to a defined reference or scale.

justify normalization

controlled comparison

A comparison with relevant conditions deliberately held consistent.

plan a controlled comparison

dated correction

A visible amendment recording when a correction was made.

add a dated correction

hypothesis

A proposed explanation or prediction to be tested.

test a methodological hypothesis

signal intensity

The magnitude of the detected measurement signal.

compare signal intensity

saturation

A measurement ceiling beyond which more input is not represented proportionally.

check for signal saturation

measurement variability

Variation arising across repeated measurements.

quantify measurement variability

lab notebook

The record of research methods, observations, and changes.

maintain the lab notebook

provenance

The origin and history of data or records.

preserve data provenance

repeatability check

A check of measurement agreement under the same specified short-term conditions.

document a repeatability check

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

technical replicate **TECHNICAL REPLICATE**

compare technical replicates

Keep the meaning precise: A repeated measurement used to assess measurement variability.

normalization **NORMALIZATION**

justify normalization

Keep the meaning precise: Adjustment to a defined reference or scale.

Phrases that move the work forward

Open with the result

"Run A gave 120 units; Run B gave 180."

State the durations

"A used ten seconds and B used twenty."

Preserve the records

"Keep both raw files and their original settings."

Avoid blame

"This is a documentation gap, not a misconduct finding."

Question a shortcut

"Proportional scaling has not been validated."

Plan the comparison

"Repeat with documented matched settings."

Track processing

"State every transformation applied to the raw values."

Make the action traceable

"Link the repeat to the protocol version and instrument files."

Name the verified change

"The instrument files show different exposure times."

Disclose the omission

"The summary notes did not record that change."

Correct transparently

"Add a dated correction to the notebook."

Limit the explanation

"The change may contribute, but we have not isolated its effect."

Check the response

"We need to examine linearity and possible saturation."

Keep replication precise

"These are repeated measurements of the same material."

Separate observation and cause

"The signal changed; the complete cause is unresolved."

Close honestly

"We have a testable explanation, not a resolved discrepancy."

Precision in real exchanges

Purpose: Disclose the omission

Useful wording: "The summary notes did not record that change."

Purpose: Preserve the records

Useful wording: "Keep both raw files and their original settings."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which sentence accurately reports the signal contrast?

- A.** Run A is 180 units.
- B.** The signal difference is exactly zero.
- C.** Run B is 60 units, or 50%, higher than Run A.
- D.** Run B doubled from 120 to 240.

2. Why is dividing Run B by two not justified as a correction?

- A.** The exposure times are identical.
- B.** Arbitrary units mean the records have no information.
- C.** Proportional signal response to exposure has not been established.
- D.** Division is never used in research.

3. A colleague needs the term for this meaning: Original recorded observations before later processing. Which term fits?

- A.** dated correction
- B.** raw data
- C.** linear response
- D.** protocol version

D Choose the response that fits / continued

4. Rebuild the exchange from "The repeated run was not performed the same way".
Priya: "The exposure doubled, so somebody suggested halving the second signal and treating that as the comparable result. Have we established a proportional response?" **Alex:** [missing response] **Priya:** "Check whether the detector reaches a ceiling or other conditions differed. The exposure change is a lead, not a complete explanation." **Which response belongs in the gap?**

- A.** I will add a dated correction linked to the instrument files. It will state the actual exposure for each run and when the omission was identified, without backdating the new entry.
- B.** Preserving provenance keeps the measurement, original notes, and later correction connected. I will record what changed and when, without assigning blame before the facts are checked.
- C.** No. A linear response has not been verified here. Even a straight-line response could include background signal. We cannot simply halve one raw value and call it corrected.
- D.** The instrument setting for exposure changed. The files show ten seconds for Run A and twenty for Run B. That difference was omitted from the summary notes.

[Answers and explanations, page 142](#)

One useful distinction

Run B is 60 arbitrary units higher, a 50% increase relative to Run A. Exposure doubled, but the signal increased by only half. Do not divide or scale signals as though proportional response had been established.

E Conversation

The repeated run was not performed the same way

The repeated run was not performed the same way

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

instrument setting / provenance / repeatability check / saturation / raw data / hypothesis
/ technical replicates / dated correction / controlled comparison / linear response

- 01 **Priya:** The slide calls Run B a repeat, but its signal is one hundred eighty units rather than one hundred twenty. Were the measurement conditions actually matched?
- 02 **Alex:** The ¹ _____ for exposure changed. The files show ten seconds for Run A and twenty for Run B. That difference was omitted from the summary notes.
- 03 **Priya:** Preserve both files, including the unexpected result, before correcting the notes. We need the original evidence intact.
- 04 **Alex:** I have retained the ² _____ and the original metadata. I will not replace either measurement with an adjusted value. Any later processing must remain distinguishable from what the instrument originally recorded.
- 05 **Priya:** The exposure doubled, so somebody suggested halving the second signal and treating that as the comparable result. Have we established a proportional response?
- 06 **Alex:** No. A ³ _____ has not been verified here. Even a straight-line response could include background signal. We cannot simply halve one raw value and call it corrected.

Conversation / continued

- 07 **Priya:** Check whether the detector reaches a ceiling or other conditions differed. The exposure change is a lead, not a complete explanation.
- 08 **Alex:** We can check for ⁴ _____ and review other recorded conditions. I will describe these as possible contributors, not confirmed causes. We have not isolated the exposure effect or explained the full discrepancy.
- 09 **Priya:** How will the correction show when we discovered the omitted setting, without hiding the original note?
- 10 **Alex:** I will add a ⁵ _____ linked to the instrument files. It will state the actual exposure for each run and when the omission was identified, without backdating the new entry.

Conversation continues on the next page.

The repeated run was not performed the same way

CONVERSATION / CONTINUED

- 11 **Priya:** Good. That also avoids implying misconduct before anything has been investigated. The immediate issue is an incomplete method record and a result needing explanation.
- 12 **Alex:** Preserving ⁶ _____ keeps the measurement, original notes, and later correction connected. I will record what changed and when, without assigning blame before the facts are checked.
- 13 **Priya:** For the next measurement, we need documented matched settings and a clear plan. Simply running the instrument again would not address the comparison problem.
- 14 **Alex:** I will propose a ⁷ _____ using matched settings and retained raw files. We should specify the protocol version and checks in advance, so another undocumented change does not create the same uncertainty.
- 15 **Priya:** For that repeat, keep the operator, instrument, location, and procedure the same within one session. We are testing measurement consistency, not collecting new biological samples.
- 16 **Alex:** Those planned measurements are ⁸ _____. The original exposure settings differed, so those two runs are not a matched set. Neither repeating the measurement nor changing exposure adds an independent biological sample.
- 17 **Priya:** The slide should report the observed difference as sixty units, fifty percent relative to Run A. It must not say exposure caused exactly that increase.
- 18 **Alex:** I will separate the observation from the ⁹ _____. The documented change is a plausible contributor. Its role remains to be tested, and other sources of variation have not been ruled out.

The repeated run was not performed the same way / continued

- 19 **Priya:** Bring both raw files, the corrected record, and the matched-settings plan next time. We can then review the evidence together.
- 20 **Alex:** I will label the planned work a ¹⁰ _____. The two original runs and their settings stay in the record. We still need to explain the discrepancy; scheduling a repeat does not close it.

CHECK THE GAPS

1. instrument setting / 2. raw data / 3. linear response / 4. saturation / 5. dated correction / 6. provenance / 7. controlled comparison / 8. technical replicates / 9. hypothesis / 10. repeatability check

[Why these answers fit, page 143](#)

F Check accuracy and scope

The repeated run was not performed the same way

Return to the case

Research associate Alex and lab lead Priya compare two nonclinical fluorescence measurements of the same reference material. Run A reports 120 arbitrary units and Run B 180. Instrument files reveal exposure times of ten seconds for A and twenty for B. The summary lab notes had omitted this change. The team has not tested whether it explains the entire difference, and signal response may not be proportional to exposure. They must retain both raw records, add a dated correction to the notes, and plan a repeat with documented matched settings. No misconduct finding has been made.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. What is the next useful comparison?

- A. Selecting whichever result supports the preferred theory
- B. A documented repeat with matched settings and preserved raw records
- C. A repeat with undisclosed settings
- D. Deleting Run B

2. Which conclusion should be avoided?

- A. Exposure differs between runs.
- B. The complete cause remains unresolved.
- C. The omitted note proves research misconduct.
- D. The summary record needs correction.

[Answers and explanations, page 145](#)

Listen for the distinction

Repeat turns 13-16, stressing same session and technical replicates.

Disclose a discrepancy without assigning blame

A lab meeting should make uncertainty inspectable. Name the observed result, the method difference, and the missing evidence. Correct documentation transparently without accusing a colleague of misconduct or presenting an untested explanation as the established cause.

F Say it / transfer to a new case

Preserve the change history

Two readings of the same reference material used different documented gain settings. The summary omitted the change. No causal check has been completed. Both original files remain available.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

preserved / dated correction / difference / untested

- 01 **Researcher:** The gain change is a verified method ¹ _____.
- 02 **Lead:** Its causal contribution remains ² _____.
- 03 **Researcher:** The notebook needs a ³ _____.
- 04 **Lead:** Both original files should be ⁴ _____.

CHECK THE GAPS

1. difference / 2. untested / 3. dated correction / 4. preserved

[Why these answers fit, page 145](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "The repeated run was not performed the same way".

**Priya: "For the next measurement, we need documented matched settings and a clear plan. Simply running the instrument again would not address the comparison problem."
Alex: [missing response] Priya: "For that repeat, keep the operator, instrument, location, and procedure the same within one session. We are testing measurement consistency, not collecting new biological samples." Which response belongs in the gap?**

- A.** Those planned measurements are technical replicates. The original exposure settings differed, so those two runs are not a matched set. Neither repeating the measurement nor changing exposure adds an independent biological sample.
- B.** We can check for saturation and review other recorded conditions. I will describe these as possible contributors, not confirmed causes. We have not isolated the exposure effect or explained the full discrepancy.
- C.** I will propose a controlled comparison using matched settings and retained raw files. We should specify the protocol version and checks in advance, so another undocumented change does not create the same uncertainty.
- D.** I have retained the raw data and the original metadata. I will not replace either measurement with an adjusted value. Any later processing must remain distinguishable from what the instrument originally recorded.

[Answers and explanations, page 146](#)

A Read the situation

LESSON 04 / RESEARCH ETHICS AND HUMAN SUBJECTS

Describe a secondary-use proposal and seek an authorized ethics determination without assuming coded data is anonymous.

Possessing the data is not permission for a new use

Researcher Tessa wants to reuse coded interviews from a student-stress study for a new employment-discrimination question. Her research team can access the key linking codes to participants. The original approval and consent materials have not been checked against the new purpose. The fictional institution requires its designated ethics office to determine the permitted route before new analysis or sharing begins. No determination, amendment, waiver, or new consent has been granted. Tessa can prepare the proposal and gather existing documents, but must not begin the proposed reuse or promise collaborators access.

People: Tessa, Researcher; Omar, Research ethics coordinator.

Read the record

Choose one answer per question using the facts above.

1. Why are the coded interviews not automatically anonymous to this team?

- A. Interviews never contain private information.
- B. The new topic removes the original identities.
- C. The team can access the code-to-participant key.
- D. All coded data are public.

2. Who determines the permitted route under the supplied local rule?

- A. The researcher acting alone
- B. The software vendor
- C. The designated ethics office
- D. Any collaborator who wants the data

3. What can Tessa do now?

- A. Start the new analysis immediately.
- B. Promise unrestricted collaborator access.
- C. Declare a waiver has been granted.
- D. Prepare the proposal and gather the existing approval and consent documents.

[Answers and explanations, page 147](#)

B Vocabulary in use

CORE TERMS

secondary use

Using previously collected material for a further purpose.

propose a secondary use

ethics review

Examination of a research proposal's ethical acceptability and requirements.

request ethics review

research ethics committee

A body reviewing research ethics under its remit.

seek research ethics committee review

consent scope

The activities and uses covered by the relevant consent.

check the consent scope

protocol amendment

A proposed change to an approved research protocol.

submit a protocol amendment

exemption determination

An authorized decision about an applicable exemption category.

obtain an exemption determination

human-subjects research

Research involving people or qualifying information under applicable rules.

assess human-subjects research status

institutional review board

A U.S. committee reviewing covered human-subjects research.

consult the institutional review board

informed consent

A process supporting an informed, voluntary participation decision.

review informed-consent materials

approval scope

The work permitted by a particular authorization.

verify the approval scope

waiver

An authorized exception to a specified requirement.

distinguish a requested waiver

coded data

Data using codes with a separate identity-linking key.

describe coded data accurately

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

secondary use SECONDARY USE

propose a secondary use

Keep the meaning precise: Using previously collected material for a further purpose.

informed consent INFORMED CONSENT

review informed-consent materials

Keep the meaning precise: A process supporting an informed, voluntary participation decision.

B Precision and professional shorthand

EXTEND YOUR RANGE

linking key

Information connecting study codes to identities.
restrict access to the linking key

de-identification

Removing or reducing identifying information under a specified method.
document de-identification

data-use agreement

Terms governing permitted access and use.
establish a data-use agreement

recontact

Contacting a participant again after earlier involvement.
assess a recontact proposal

voluntariness

Freedom to choose participation without improper pressure.
protect voluntariness

purpose change

A shift from the original use to a different objective.
describe the purpose change

identifiability

The possibility of connecting information with a person.
assess identifiability

confidentiality

Protection against unauthorized information disclosure.
maintain confidentiality

authorized determination

A decision made by the designated competent authority.
await an authorized determination

participant information

Material explaining a study to potential participants.
review participant information

access restriction

A limit on who may obtain or use information.
apply access restrictions

review status

The current stage or outcome of a review request.
state the review status

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

coded data CODED DATA

describe coded data accurately
Keep the meaning precise: Data using codes with a separate identity-linking key.

data-use agreement DATA-USE AGREEMENT

establish a data-use agreement
Keep the meaning precise: Terms governing permitted access and use.

Phrases that move the work forward

Describe the new question

"The proposed reuse concerns employment discrimination."

State the key access

"Our team can access the code-to-participant key."

Check the documents

"We need the original approval and consent materials."

Name the authority

"The designated ethics office determines the permitted route."

Keep requests conditional

"An amendment may be needed; none has been approved."

Prepare useful material

"We can describe the question, fields, recipients, and safeguards."

Limit a collaborator promise

"Access is subject to the authorized determination."

Report status precisely

"The proposal is awaiting review, not approved."

Identify the original purpose

"The interviews were collected for a student-stress study."

Avoid an anonymity claim

"Coding does not make these data anonymous to us."

Clarify the scope

"The new purpose has not been assessed against those documents."

State the hold

"Do not start the new analysis or sharing yet."

Avoid inventing a waiver

"No waiver or new consent has been granted."

Separate preparation from reuse

"Gathering documents is not approval to analyze the interviews."

Preserve confidentiality

"Keep the current access restrictions in place."

Close with the next step

"Submit the complete proposal and wait for the required decision."

Precision in real exchanges

Purpose: Avoid an anonymity claim

Useful wording: "Coding does not make these data anonymous to us."

Purpose: Check the documents

Useful wording: "We need the original approval and consent materials."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which description should be sent to the ethics office?

- A.** Public information requiring no consideration
- B.** Newly consented data for every conceivable purpose
- C.** Coded interviews with a linking key accessible to the research team
- D.** Anonymous data with no possible identity connection

2. What does the old approval establish about this new purpose?

- A.** Automatic approval for all later questions
- B.** A granted waiver of every requirement
- C.** Permission to promise external access immediately
- D.** Nothing conclusive until its scope is checked against the proposal.

3. A colleague needs the term for this meaning: A U.S. committee reviewing covered human-subjects research. Which term fits?

- A.** institutional review board
- B.** de-identification
- C.** protocol amendment
- D.** voluntariness

D Choose the response that fits / continued

4. Rebuild the exchange from "Possessing the data is not permission for a new use".
Tessa: "Yes, the team can access the key. The draft should state that plainly rather than imply there is no possible connection with the people interviewed." **Omar:** [missing response] **Tessa:** "I have the original participant information and consent documents, but I have not checked whether the employment question is within what they describe." **Which response belongs in the gap?**

- A.** Describe the coded data accurately. Does the research team have access to the key connecting the codes with participants? That access changes what the reviewer needs to know about identifiability.
- B.** Exactly. The linking key must be included in the access description. Coding alone does not establish anonymity to your team, and changing the label would not change the underlying arrangement.
- C.** Yes, describe the proposed fields without sharing participant information. The access restriction on the interviews remains. Do not promise that the files themselves will be released before the designated review.
- D.** Keep any protocol amendment conditional. A plausible route is not a completed decision. Likewise, no waiver or new consent has been granted, so neither should appear as an established fact.

[Answers and explanations, page 147](#)

One useful distinction

Coded does not automatically mean anonymous. Here, the team can access a linking key, so the identity connection matters. The new question and access arrangements must be described accurately to the designated reviewer.

E Conversation

Possessing the data is not permission for a new use

Possessing the data is not permission for a new use

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

consent scope / access restriction / protocol amendment / linking key / secondary use /
authorized determination / coded data / data-use agreement / purpose change /
review status

- 01 **Tessa:** We already have the interview files, and the new employment-discrimination question is promising. Can I begin analyzing them while we check the old paperwork?
- 02 **Omar:** The local ¹ _____ does not permit that yet. The designated ethics office must determine the route before new analysis or sharing. You can prepare the proposal and gather the existing documents.
- 03 **Tessa:** The interviews came from our student-stress study. They use participant codes rather than names, so I initially described them as anonymous in the draft.
- 04 **Omar:** Describe the ² _____ accurately. Does the research team have access to the key connecting the codes with participants? That access changes what the reviewer needs to know about identifiability.
- 05 **Tessa:** Yes, the team can access the key. The draft should state that plainly rather than imply there is no possible connection with the people interviewed.
- 06 **Omar:** Exactly. The ³ _____ must be included in the access description. Coding alone does not establish anonymity to your team, and changing the label would not change the underlying arrangement.

E Conversation / continued

- 07 **Tessa:** I have the original participant information and consent documents, but I have not checked whether the employment question is within what they describe.
- 08 **Omar:** Review the ⁴ _____ alongside the original approval. We should not assume that agreement to the student-stress study covers every later question or sharing arrangement.
- 09 **Tessa:** I will send both research questions side by side. The employment topic is not actually named in the documents I have opened so far.
- 10 **Omar:** Yes, state the ⁵ _____ clearly. The reviewer needs the actual new question, intended information, recipients, and safeguards, not a broad assurance that everything is still generally about students.

Conversation continues on the next page.

Possessing the data is not permission for a new use

CONVERSATION / CONTINUED

- 11 **Tessa:** Would this be an amendment, a new submission, or an exemption? Collaborators keep asking me which route applies, and I do not want to guess.
- 12 **Omar:** That requires an ⁶ _____. The designated office will assess the proposal under the applicable rules. We cannot announce the route before that assessment has been made.
- 13 **Tessa:** I can say an amendment might be needed, but none is approved. The draft wrongly implies approval is routine.
- 14 **Omar:** Keep any ⁷ _____ conditional. A plausible route is not a completed decision. Likewise, no waiver or new consent has been granted, so neither should appear as an established fact.
- 15 **Tessa:** The collaborator says they only want to check the available variables. Could I send a description of the proposed fields instead of the interviews?
- 16 **Omar:** Yes, describe the proposed fields without sharing participant information. The ⁸ _____ on the interviews remains. Do not promise that the files themselves will be released before the designated review.
- 17 **Tessa:** I will gather the approval, consent materials, key-access details, and proposed analysis description. That gives the office enough context to assess the new use.
- 18 **Omar:** Include the proposed ⁹ _____ arrangements if collaboration is planned. Such terms may be relevant, but they do not replace the required ethics determination or establish participant consent by themselves.

Possessing the data is not permission for a new use / continued

- 19 **Tessa:** My update will say the proposal is being prepared, no new analysis has begun, and collaborator access remains subject to the designated review.
- 20 **Omar:** That accurately describes the ¹⁰ _____. Keep preparation separate from conducting the new work. Once the authorized decision is recorded, follow its conditions rather than treating review as unlimited permission.

CHECK THE GAPS

1. review status / **2.** coded data / **3.** linking key / **4.** consent scope / **5.** purpose change / **6.** authorized determination / **7.** protocol amendment / **8.** access restriction / **9.** data-use agreement / **10.** secondary use

[Why these answers fit, page 149](#)

F Check accuracy and scope

Possessing the data is not permission for a new use

Return to the case

Researcher Tessa wants to reuse coded interviews from a student-stress study for a new employment-discrimination question. Her research team can access the key linking codes to participants. The original approval and consent materials have not been checked against the new purpose. The fictional institution requires its designated ethics office to determine the permitted route before new analysis or sharing begins. No determination, amendment, waiver, or new consent has been granted. Tessa can prepare the proposal and gather existing documents, but must not begin the proposed reuse or promise collaborators access.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. Which message to a collaborator is accurate?

- A. "Approval is guaranteed because we have the files."
- B. "All participants have already agreed to this new question."
- C. "A requested exemption is the same as a granted one."
- D. "The proposed access awaits the designated ethics determination."

2. Which preparatory step respects the supplied boundary?

- A. Gather documents and describe the proposed use without beginning analysis or sharing.
- B. Run the analysis first and seek retrospective permission.
- C. Remove the key label but keep unrestricted key access.
- D. Email the full interviews to collaborators now.

[Answers and explanations, page 150](#)

Listen for the distinction

Repeat turns 15-18, separating a general field description from sharing participant information.

A review boundary is not a scientific rejection

An ethics coordinator may support the question while withholding permission for the proposed use. Explain the purpose and access conditions accurately. Do not turn a discussion about a possible route into a claim that approval, exemption, or participant agreement has already been obtained.

F Say it / transfer to a new case

A pending route is not a permission

A researcher proposes a new use of coded survey data. The team can access the linking key. The institution requires a designated-office determination before new analysis. The request has been sent but no decision issued.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

key / determination / pending / anonymous

- 01 **Researcher:** The files are coded, not automatically ¹ _____.
- 02 **Coordinator:** The proposed use still awaits an authorized ² _____.
- 03 **Researcher:** Our team can access the linking ³ _____.
- 04 **Coordinator:** We can accurately report that review is ⁴ _____.

CHECK THE GAPS

1. anonymous / 2. determination / 3. key / 4. pending

[Why these answers fit, page 150](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "Possessing the data is not permission for a new use".

Tessa: "I can say an amendment might be needed, but none is approved. The draft wrongly implies approval is routine." Omar: [missing response] Tessa: "The collaborator says they only want to check the available variables. Could I send a description of the proposed fields instead of the interviews?" Which response belongs in the gap?

- A.** Exactly. The linking key must be included in the access description. Coding alone does not establish anonymity to your team, and changing the label would not change the underlying arrangement.
- B.** Keep any protocol amendment conditional. A plausible route is not a completed decision. Likewise, no waiver or new consent has been granted, so neither should appear as an established fact.
- C.** Describe the coded data accurately. Does the research team have access to the key connecting the codes with participants? That access changes what the reviewer needs to know about identifiability.
- D.** Yes, describe the proposed fields without sharing participant information. The access restriction on the interviews remains. Do not promise that the files themselves will be released before the designated review.

[Answers and explanations, page 151](#)

Review 2 / Meaning and context

Use language from the lessons you have completed. Choose one answer per question.

Case file

Revisit "Lab Meetings and Data Challenges" and "Research Ethics and Human Subjects". Choose precise terminology, then reconstruct the missing responses using both neighboring turns. The final two questions also revisit earlier conversations.

1. A colleague needs the term for this meaning: Material used as a stable point of comparison. Which term fits?

- A. reference material
- B. lab notebook
- C. signal intensity
- D. instrument setting

2. A colleague needs the term for this meaning: The work permitted by a particular authorization. Which term fits?

- A. secondary use
- B. approval scope
- C. linking key
- D. recontact

3. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "Would twenty-five retained students meet the threshold? We need to translate the percentage into a whole-participant count." Sora: [missing response] Ben: "Then the milestone table needs one pass and one shortfall. I cannot sign off automatic progression on the recruitment number alone." Which response belongs in the gap?

- A. The progression criterion requires at least twenty-six retained out of thirty. Twenty-five would be approximately eighty-three point three percent, still below the threshold. We should apply the stated rule accurately.
- B. We need a contingency such as redesign or explicit review. We should explain what the shortfall means for planning, not silently lower the criterion because we prefer a positive result.
- C. The deliverable is a refined study procedure, informed by recruitment and follow-up evidence. That is useful preparation for a later study, without pretending the larger question has already been answered.
- D. A funding decision remains separate. Even successful local milestones would inform a proposal, not guarantee financial support. We should state the value of the evidence without predicting an external decision.

Review 2 / Meaning and context / continued

4. Rebuild the exchange from "Possessing the data is not permission for a new use".
Tessa: "I will gather the approval, consent materials, key-access details, and proposed analysis description. That gives the office enough context to assess the new use." Omar: [missing response] Tessa: "My update will say the proposal is being prepared, no new analysis has begun, and collaborator access remains subject to the designated review." Which response belongs in the gap?

- A.** Keep any protocol amendment conditional. A plausible route is not a completed decision. Likewise, no waiver or new consent has been granted, so neither should appear as an established fact.
- B.** Include the proposed data-use agreement arrangements if collaboration is planned. Such terms may be relevant, but they do not replace the required ethics determination or establish participant consent by themselves.
- C.** Exactly. The linking key must be included in the access description. Coding alone does not establish anonymity to your team, and changing the label would not change the underlying arrangement.
- D.** Describe the coded data accurately. Does the research team have access to the key connecting the codes with participants? That access changes what the reviewer needs to know about identifiability.

[Answers and explanations, page 175](#)

A Read the situation

LESSON 05 / AUTHORSHIP, COLLABORATION, AND CREDIT

Discuss authorship eligibility, outstanding responsibilities, and author order without granting or denying credit by status.

Credit follows contributions, not job titles

Research fellow Harper and project lead Marta discuss a manuscript whose target journal uses ICMJE authorship criteria: substantive research contribution, intellectual drafting or review, final-version approval, and accountability. All four are required. Harper designed and performed the main analysis but has not yet been invited to review the manuscript or approve the final version. Professor Nolan obtained funding only. The team has not agreed author order or documented contributions. Harper must have a genuine opportunity to complete the remaining responsibilities; funding alone does not establish Nolan's authorship. No final author list or order is settled.

People: Harper, Research fellow; Marta, Project lead.

Read the record

Choose one answer per question using the facts above.

1. What substantive contribution has Harper made?

- A. Already approved an unseen final manuscript
- B. Determined author order alone
- C. Designed and performed the main analysis
- D. Obtained funding only

2. Does funding alone establish Nolan's authorship under the stated criteria?

- A. Yes, if no contribution record exists
- B. No
- C. Yes, regardless of other work
- D. Yes, if the title is professor

3. What should happen before the author list is finalized?

- A. Guarantee Harper first position immediately.
- B. List everyone who attended a meeting.
- C. Give Harper a genuine opportunity to review, approve, and accept the relevant responsibilities.
- D. Exclude Harper because no invitation was sent.

[Answers and explanations, page 152](#)

B Vocabulary in use

CORE TERMS

authorship

Credited responsibility for a published scholarly work.

establish authorship eligibility

byline

The author names listed on a publication.

finalize the byline

substantive contribution

Significant intellectual or research work on the project.

recognize a substantive contribution

methodology

Development or design of research methods.

record methodology contributions

data curation

Organizing and maintaining data for use.

describe data curation

funding acquisition

Obtaining financial support for a project.

acknowledge funding acquisition

contributorship

A description of what each person did.

document contributorship

author order

The sequence in which authors are listed.

discuss author order

conceptualization

Development of the study's ideas or research goals.

describe conceptualization

formal analysis

Application of analytical methods to study material or data.

credit formal analysis

investigation

Conducting the research or collecting relevant evidence.

record investigation work

supervision

Oversight or guidance of research work.

distinguish supervision from authorship

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

authorship AUTHORSHIP

establish authorship eligibility

Keep the meaning precise: Credited responsibility for a published scholarly work.

conceptualization CONCEPTUALIZATION

describe conceptualization

Keep the meaning precise: Development of the study's ideas or research goals.

B Precision and professional shorthand

EXTEND YOUR RANGE

critical review

Intellectual examination of a manuscript's content.

contribute critical review

accountability

Responsibility for addressing the work's accuracy and integrity.

accept accountability

acknowledgment

Recognition of contributions outside the author byline.

agree an acknowledgment

authorship criteria

The applicable conditions for being listed as an author.

apply authorship criteria

omitted contributor

A contributor whose relevant work is not properly recognized.

address an omitted contributor

dispute resolution

A process for addressing unresolved disagreement.

use the dispute-resolution process

final approval

Agreement to the version intended for publication.

obtain final approval

corresponding author

The author managing the journal communication role.

identify the corresponding author

contribution statement

A record describing each contributor's work.

prepare a contribution statement

honorary authorship

Listing someone without the required authorship basis.

avoid honorary authorship

collaboration agreement

Recorded expectations for joint work.

revisit the collaboration agreement

manuscript version

An identified revision of a paper.

circulate the final manuscript version

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

supervision SUPERVISION

distinguish supervision from authorship

Keep the meaning precise: Oversight or guidance of research work.

acknowledgment ACKNOWLEDGMENT

agree an acknowledgment

Keep the meaning precise: Recognition of contributions outside the author byline.

Phrases that move the work forward

Open factually

"Let us document what each collaborator contributed."

Use the agreed standard

"The target journal requires all four authorship criteria."

Provide a real opportunity

"Harper needs the manuscript and time to review it."

Separate funding

"Funding acquisition alone does not establish authorship here."

Distinguish ordering

"Eligibility does not settle author order."

Make credit visible

"Record contributions accurately in the statement."

Identify the version

"Approval must refer to the final manuscript version."

Handle disagreement

"Use the institutional process if the group cannot resolve the dispute."

Name the analytical work

"Harper designed and performed the main analysis."

Identify what remains

"The manuscript review and final approval have not happened yet."

Avoid exclusion by omission

"Not receiving an invitation should not become a reason to deny credit."

Keep titles out of the test

"Job title is not the criterion."

Avoid a premature promise

"No final position has been agreed."

Keep responsibility explicit

"Authorship includes accountability, not only recognition."

Coordinate communication

"The corresponding-author role should be agreed."

Close before submission

"Settle contributions, responsibilities, and the author list before submitting."

Precision in real exchanges

Purpose: Identify what remains

Useful wording: "The manuscript review and final approval have not happened yet."

Purpose: Provide a real opportunity

Useful wording: "Harper needs the manuscript and time to review it."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which statement about Harper is supported?

- A.** Harper has a substantive analysis contribution and outstanding authorship responsibilities.
- B.** Harper has already approved the final version.
- C.** Harper did no relevant research work.
- D.** Harper must automatically be first author.

2. Which action would unfairly block completion of the criteria?

- A.** Circulating the manuscript for substantive review
- B.** Recording the analysis contribution
- C.** Discussing accountability explicitly
- D.** Withholding the manuscript and then citing lack of review as a reason for exclusion

3. A colleague needs the term for this meaning: The sequence in which authors are listed. Which term fits?

- A.** data curation
- B.** omitted contributor
- C.** author order
- D.** accountability

D Choose the response that fits / continued

4. Rebuild the exchange from "Credit follows contributions, not job titles". Harper: "The journal uses ICMJE criteria, so I understand that doing the analysis is not the only responsibility. What still needs to happen before submission?" Marta: [missing response] Harper: "I will review the full paper and discuss the analysis. Please do not claim my approval before that happens." Which response belongs in the gap?

- A.** The corresponding author role should be agreed explicitly. It concerns communication and associated submission responsibilities. It does not automatically determine first position, and it cannot resolve an unsettled authorship dispute by itself.
- B.** We must discuss author order separately. The criteria establish eligibility, not a universal ordering formula. We need a transparent conversation about the project and the journal's conventions, without promising a position prematurely.
- C.** Beyond the substantive work and intellectual review, we need final approval of the publication version and agreement on accountability. Those are real responsibilities, not boxes we can mark on someone's behalf.
- D.** You need a genuine opportunity for critical review. I will circulate the manuscript and arrange time for your response. We should not withhold that opportunity and then cite its absence against you.

[Answers and explanations, page 152](#)

One useful distinction

Authorship eligibility and author order are separate decisions. A substantive analysis contribution matters, but the supplied journal requires all four responsibilities. Give Harper the opportunity to complete them; do not invent a final approval or a guaranteed first position.

E Conversation

Credit follows contributions, not job titles

Credit follows contributions, not job titles

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

contribution statement / funding acquisition / dispute resolution / final approval / Accountability / critical review / author order / contributorship / byline / corresponding author

- 01 **Harper:** My name was missing from yesterday's draft author list. I designed and performed the main analysis, but nobody discussed credit with me.
- 02 **Marta:** We should start with a ¹ _____. Your analytical work must be recorded accurately. The list is not final, and an informal draft should not substitute for a proper discussion with the collaborators.
- 03 **Harper:** Nobody sent me the manuscript. I need to check whether the methods and interpretation describe my work correctly.
- 04 **Marta:** You need a genuine opportunity for ² _____. I will circulate the manuscript and arrange time for your response. We should not withhold that opportunity and then cite its absence against you.
- 05 **Harper:** The journal uses ICMJE criteria, so I understand that doing the analysis is not the only responsibility. What still needs to happen before submission?
- 06 **Marta:** Beyond the substantive work and intellectual review, we need ³ _____ of the publication version and agreement on accountability. Those are real responsibilities, not boxes we can mark on someone's behalf.

E Conversation / continued

- 07 **Harper:** I will review the full paper and discuss the analysis. Please do not claim my approval before that happens.
- 08 **Marta:** Agreed. ⁴ _____ must be understood and accepted. We will record the status honestly and identify outstanding steps, rather than inventing agreement to meet the submission timetable.
- 09 **Harper:** Professor Nolan is listed already, but his contribution so far was funding, without the other responsibilities.
- 10 **Marta:** We should record ⁵ _____ accurately too. Under the adopted criteria, that alone does not establish authorship. His title should neither replace the criteria nor prevent a respectful discussion of his actual contribution.

Conversation continues on the next page.

Credit follows contributions, not job titles

CONVERSATION / CONTINUED

- 11 **Harper:** I also need us to discuss order. I had expected first authorship for the analysis work, but I realize we never agreed that as a group.
- 12 **Marta:** We must discuss ⁶ _____ separately. The criteria establish eligibility, not a universal ordering formula. We need a transparent conversation about the project and the journal's conventions, without promising a position prematurely.
- 13 **Harper:** Please invite the data collection and curation leads too. I do not want us settling my position without hearing what everyone else contributed.
- 14 **Marta:** Yes. Accurate ⁷ _____ requires the whole project's contribution record. We should not decide credit solely through the loudest objection, personal seniority, or who happened to see the draft first.
- 15 **Harper:** Who will communicate with the journal? People sometimes describe that role as though it always means first author.
- 16 **Marta:** The ⁸ _____ role should be agreed explicitly. It concerns communication and associated submission responsibilities. It does not automatically determine first position, and it cannot resolve an unsettled authorship dispute by itself.
- 17 **Harper:** If the group still cannot agree after reviewing contributions and responsibilities, we need a fair route forward rather than submitting an unresolved list.
- 18 **Marta:** Use the institutional ⁹ _____ process if necessary. We should document the issue and seek the appropriate assistance. A deadline does not justify bypassing a substantive disagreement about credit.

Credit follows contributions, not job titles / continued

- 19 **Harper:** For now, please circulate the manuscript, record the analysis contribution, and arrange a group discussion. I will review the content before giving any final approval.
- 20 **Marta:** Then we can finalize the ¹⁰ _____ on an accurate basis before submission. No final list or order is settled today; the next step is to complete the review and resolve the outstanding decisions.

CHECK THE GAPS

1. contribution statement / 2. critical review / 3. final approval / 4. Accountability / 5. funding acquisition / 6. author order / 7. contributorship / 8. corresponding author / 9. dispute resolution / 10. byline

[Why these answers fit, page 153](#)

F Check accuracy and scope

Credit follows contributions, not job titles

Return to the case

Research fellow Harper and project lead Marta discuss a manuscript whose target journal uses ICMJE authorship criteria: substantive research contribution, intellectual drafting or review, final-version approval, and accountability. All four are required. Harper designed and performed the main analysis but has not yet been invited to review the manuscript or approve the final version. Professor Nolan obtained funding only. The team has not agreed author order or documented contributions. Harper must have a genuine opportunity to complete the remaining responsibilities; funding alone does not establish Nolan's authorship. No final author list or order is settled.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. What does Nolan's funding-only role establish?

- A. Proof that Harper's analysis is irrelevant
- B. A contribution to record, but not sufficient authorship under the adopted criteria
- C. Automatic first authorship
- D. Final approval by every collaborator

2. What remains unresolved after identifying a substantive contribution?

- A. Whether the paper has a funding source
- B. Whether all titles are identical
- C. Whether the analysis ever occurred
- D. Completion of the remaining responsibilities and agreement on the author list and order

[Answers and explanations, page 155](#)

Listen for the distinction

Repeat turns 9-16, distinguishing funding acquisition, author order, and corresponding-author duties.

Discuss contribution and responsibility together

Academic hierarchy can make credit conversations difficult. Refer to the agreed publication criteria and a factual contribution record. Do not frame authorship as a personal favor, and do not exclude a substantive contributor by withholding the chance to fulfill remaining responsibilities.

F Say it / transfer to a new case

An invitation is not an approval

A journal uses the same four criteria. A collaborator made a substantive methods contribution and has just received the manuscript for review. No final approval or accountability agreement is yet recorded, and author order is undecided.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

contribution / outstanding / critical review / author order

- 01 **Lead:** The methods work is a substantive ¹ _____.
- 02 **Collaborator:** Receiving the manuscript gives me an opportunity for ² _____.
- 03 **Lead:** Final approval remains ³ _____.
- 04 **Collaborator:** Eligibility alone does not settle ⁴ _____.

CHECK THE GAPS

1. contribution / 2. critical review / 3. outstanding / 4. author order

[Why these answers fit, page 155](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "Credit follows contributions, not job titles". Harper: "Please invite the data collection and curation leads too. I do not want us settling my position without hearing what everyone else contributed." Marta: [missing response] Harper: "Who will communicate with the journal? People sometimes describe that role as though it always means first author." Which response belongs in the gap?

- A.** Yes. Accurate contributorship requires the whole project's contribution record. We should not decide credit solely through the loudest objection, personal seniority, or who happened to see the draft first.
- B.** Beyond the substantive work and intellectual review, we need final approval of the publication version and agreement on accountability. Those are real responsibilities, not boxes we can mark on someone's behalf.
- C.** Use the institutional dispute resolution process if necessary. We should document the issue and seek the appropriate assistance. A deadline does not justify bypassing a substantive disagreement about credit.
- D.** You need a genuine opportunity for critical review. I will circulate the manuscript and arrange time for your response. We should not withhold that opportunity and then cite its absence against you.

[Answers and explanations, page 156](#)

A Read the situation

LESSON 06 / PEER REVIEW AND REVISION RESPONSES

Respond to a valid reviewer criticism with a precise revision and traceable manuscript locations.

Revise the claim, not the observed result

Authors Mei and Luca respond to a reviewer of a fictional study involving 60 volunteer students at one campus. The study measured self-reported confidence after one workshop, with a mean of 7.1 on a ten-point scale. There was no baseline measurement, comparison group, or direct learning test. The manuscript nevertheless says the workshop improves learning for all adults. The authors agree to remove that claim from the abstract and conclusion, report the observed confidence in the studied sample, and explain the design limits. No new data or reanalysis has been performed.

People: Mei, Corresponding author; Luca, Coauthor.

Read the record

Choose one answer per question using the facts above.

1. What did the study directly measure?

- A. Long-term attainment in all adults
- B. A randomized treatment effect
- C. Self-reported confidence after one workshop
- D. Improvement from a baseline learning test

2. Which original claim goes beyond the evidence?

- A. The mean confidence rating was 7.1 out of ten.
- B. No comparison group was included.
- C. The workshop improves learning for all adults.
- D. Sixty volunteer students participated at one campus.

3. What has been done for this revision?

- A. A randomized trial has been completed.
- B. Every adult population has been sampled.
- C. The reported mean has been replaced by a more impressive number.
- D. Wording is being corrected; no new data or reanalysis has occurred.

[Answers and explanations, page 157](#)

B Vocabulary in use

CORE TERMS

peer review

Expert evaluation of scholarly work before or after publication.

respond to peer review

response letter

The document explaining replies and revisions.

prepare a response letter

revision

A change to a manuscript or associated material.

document the revision

revised manuscript

The updated version submitted for consideration.

check the revised manuscript

conclusion

The manuscript's final interpretation or takeaway.

narrow the conclusion

overgeneralization

Extending a conclusion beyond its support.

remove an overgeneralization

reviewer comment

A point raised by a manuscript evaluator.

address a reviewer comment

point-by-point response

A reply organized against each review issue.

provide a point-by-point response

tracked changes

Visible marking of edits between document versions.

supply tracked changes

abstract

A concise summary of a scholarly work.

revise the abstract

claim

An assertion about what the evidence establishes.

qualify a claim

sampling frame

The operational list or source of units available for selection, which may not fully cover the target population.

describe the sampling frame

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

peer review **PEER REVIEW**

respond to peer review

Keep the meaning precise: Expert evaluation of scholarly work before or after publication.

tracked changes **TRACKED CHANGES**

supply tracked changes

Keep the meaning precise: Visible marking of edits between document versions.

B Precision and professional shorthand

EXTEND YOUR RANGE

volunteer sample

Participants who chose to take part.
acknowledge the volunteer sample

self-report

Information supplied by participants about themselves.
distinguish self-report from direct measurement

baseline measure

An observation collected before the relevant intervention or period.
identify the missing baseline measure

construct

The concept a measure is intended to represent.
identify the measured construct

limitation

A feature restricting interpretation or application.
state the study limitation

page-and-line reference

A precise locator for manuscript text.
provide page-and-line references

single-site study

Research conducted at one location.
state the single-site limitation

post-only measure

An outcome recorded after an event without a baseline measure.
interpret a post-only measure

comparison condition

A reference condition for evaluating a contrast.
specify a comparison condition

learning assessment

A task directly assessing relevant learning.
distinguish a learning assessment

reanalysis

A new analysis of existing data.
distinguish revision from reanalysis

editorial decision

A journal editor's determination about the manuscript.
await the editorial decision

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

sampling frame SAMPLING FRAME

describe the sampling frame

Keep the meaning precise: The operational list or source of units available for selection, which may not fully cover the target population.

baseline measure BASELINE MEASURE

identify the missing baseline measure

Keep the meaning precise: An observation collected before the relevant intervention or period.

Phrases that move the work forward

Acknowledge the point

"We agree that the original claim exceeded the design."

State the population

"The sample comprised 60 volunteers at one campus."

Remove an unsupported change

"Without a baseline, we cannot claim improvement."

Bound generalization

"The result should not be stated for all adults."

Make the location traceable

"The response identifies the revised page and lines."

Separate honesty from repair

"The limitation is now explicit, not eliminated."

Check consistency

"The same claim boundary appears throughout the manuscript."

Respect the decision

"The editor will assess the revised submission."

Identify the measured construct

"We measured self-reported confidence, not demonstrated learning."

Keep the observation

"The observed mean remains 7.1 out of ten."

Remove a causal claim

"There was no comparison group to support that inference."

Describe the revision

"We have narrowed the abstract and conclusion."

Avoid inventing work

"No new data collection or reanalysis was performed."

Answer the comment

"The revised wording reports the observation in the studied sample."

Use a clean response

"We state the change and its reason directly."

Close the issue

"The response and manuscript now describe the same evidence."

Precision in real exchanges

Purpose: Keep the observation

Useful wording: "The observed mean remains 7.1 out of ten."

Purpose: Remove an unsupported change

Useful wording: "Without a baseline, we cannot claim improvement."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which revised claim is supported?

- A.** Sixty volunteer students at one campus reported mean post-workshop confidence of 7.1 out of ten.
- B.** The workshop raised confidence by 7.1 points.
- C.** All adults learned more because of the workshop.
- D.** Random assignment proved the effect.

2. Which response accurately describes the work?

- A.** The abstract and conclusion are narrowed; no reanalysis was performed.
- B.** New trial results solve the issue.
- C.** The original mean is now invalid solely because the wording was too broad.
- D.** The reviewer has guaranteed acceptance.

3. A colleague needs the term for this meaning: A reply organized against each review issue. Which term fits?

- A.** limitation
- B.** self-report
- C.** conclusion
- D.** point-by-point response

D Choose the response that fits / continued

4. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "We also had no comparison group. Narrowing the claim should therefore address both the measured outcome and the lack of a design supporting that causal language." Luca: [missing response] Mei: "What about all adults? Even if we had measured learning, sixty volunteers at one campus would not establish the same result in every adult population." Which response belongs in the gap?

- A.** A checked page-and-line reference matters. Use the submitted revision's locations, not an earlier draft's numbering. We should also keep the response wording consistent with the actual replacement text.
- B.** Say the revision makes the boundary explicit. That is accurate and useful. We have improved the manuscript's claims, not repaired the completed design or established an effect through wording alone.
- C.** State the limitation directly. The study reports post-workshop confidence in this sample. It does not isolate the workshop's effect, and revising the wording does not change that design boundary.
- D.** Remove that overgeneralization. The revised statement should name the observed sample. We can discuss broader questions as future research without presenting them as conclusions already established by these participants.

[Answers and explanations, page 157](#)

One useful distinction

A post-workshop confidence mean describes a measured state, not improvement from baseline. Confidence and demonstrated learning are also different constructs. Changing the claim can correct reporting without altering the observed 7.1 mean.

E Conversation

Revise the claim, not the observed result

Revise the claim, not the observed result

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

limitation / editorial decision / overgeneralization / page-and-line reference / revision / reanalysis / revised manuscript / post-only measure / point-by-point response / construct

- 01 **Mei:** The reviewer says our claim about improving learning for all adults exceeds the sample and design. I agree, but the response needs to explain the correction precisely.
- 02 **Luca:** Start with the measured ¹ _____. We asked sixty volunteer students at one campus about confidence after the workshop. We did not directly assess learning, and the distinction belongs in the revised wording.
- 03 **Mei:** The mean was seven point one on a ten-point scale. That observed number can remain, provided we do not call it a seven-point improvement.
- 04 **Luca:** Right. It is a ² _____. We have no baseline measurement, so we cannot calculate a before-and-after change. The original sentence implied a comparison we never measured.
- 05 **Mei:** We also had no comparison group. Narrowing the claim should therefore address both the measured outcome and the lack of a design supporting that causal language.
- 06 **Luca:** State the ³ _____ directly. The study reports post-workshop confidence in this sample. It does not isolate the workshop's effect, and revising the wording does not change that design boundary.

E Conversation / continued

- 07 **Mei:** What about all adults? Even if we had measured learning, sixty volunteers at one campus would not establish the same result in every adult population.
- 08 **Luca:** Remove that ⁴ _____. The revised statement should name the observed sample. We can discuss broader questions as future research without presenting them as conclusions already established by these participants.
- 09 **Mei:** The abstract and conclusion both contain the overclaim. We need to change both, not just the quoted sentence.
- 10 **Luca:** Check the ⁵ _____ throughout. The title, summary, results description, and final interpretation should not quietly restore the same unsupported claim after we have corrected it elsewhere.

Conversation continues on the next page.

Revise the claim, not the observed result

CONVERSATION / CONTINUED

- 11 **Mei:** I will quote the replacement sentence in our reply, then give its location. Could you check that the conclusion now says the same thing?
- 12 **Luca:** Use a ⁶ _____. For this comment, identify the outcome correction, the population boundary, and the design limitation. The reviewer should be able to verify each without guessing what we meant.
- 13 **Mei:** I will add the page and line numbers after the revised file is finalized. The current numbers could shift as we edit the abstract.
- 14 **Luca:** A checked ⁷ _____ matters. Use the submitted revision's locations, not an earlier draft's numbering. We should also keep the response wording consistent with the actual replacement text.
- 15 **Mei:** Someone suggested claiming additional analyses. We have not done them, and an impressive-sounding statement would not solve the problem.
- 16 **Luca:** Do not claim ⁸ _____. No new data or analysis was added. This revision corrects the interpretation and reporting of the existing observation; it does not create evidence the study never collected.
- 17 **Mei:** I have written limitation addressed. That sounds as though we fixed the study design. Would limitation clarified describe what we actually did?
- 18 **Luca:** Say the ⁹ _____ makes the boundary explicit. That is accurate and useful. We have improved the manuscript's claims, not repaired the completed design or established an effect through wording alone.

Revise the claim, not the observed result / continued

- 19 **Mei:** I will keep the mean, remove the improvement and all-adults claims, and verify locations before resubmission.
- 20 **Luca:** Then await the ¹⁰ _____. A clear correction supports evaluation, but it does not guarantee acceptance. Our responsibility is to make the evidence, changes, and remaining limitations straightforward to inspect.

CHECK THE GAPS

1. construct / **2.** post-only measure / **3.** limitation / **4.** overgeneralization / **5.** revised manuscript / **6.** point-by-point response / **7.** page-and-line reference / **8.** reanalysis / **9.** revision / **10.** editorial decision

[Why these answers fit, page 159](#)

F Check accuracy and scope

Revise the claim, not the observed result

Return to the case

Authors Mei and Luca respond to a reviewer of a fictional study involving 60 volunteer students at one campus. The study measured self-reported confidence after one workshop, with a mean of 7.1 on a ten-point scale. There was no baseline measurement, comparison group, or direct learning test. The manuscript nevertheless says the workshop improves learning for all adults. The authors agree to remove that claim from the abstract and conclusion, report the observed confidence in the studied sample, and explain the design limits. No new data or reanalysis has been performed.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. What does acknowledging the limitation accomplish?

- A. Makes a volunteer sample nationally representative
- B. Makes the interpretation more accurate without removing the design constraint
- C. Creates an unmeasured baseline
- D. Converts confidence to learning

2. Which locator should the response use?

- A. Only the phrase somewhere in the paper
- B. A fabricated appendix
- C. Page and line numbers verified against the revised manuscript
- D. Numbers copied without checking from an older version

[Answers and explanations, page 160](#)

Listen for the distinction

Repeat turns 11-18, making the revision location and lack of reanalysis explicit.

Agreement can be specific and professional

A reviewer response need not defend every original sentence. Acknowledge the valid point, say exactly what changed, and identify where it changed. Do not claim a limitation has been solved merely because the revised text now describes it honestly.

F Say it / transfer to a new case

A corrected claim, unchanged observations

A single-campus survey records post-session satisfaction from 45 volunteers, with no baseline or comparison group. Authors remove a claim of improved performance. They change wording only and collect no new data.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

satisfaction / revision / eliminated / baseline

- 01 **Author:** The measured outcome was ¹ _____.
- 02 **Reviewer:** The study cannot calculate improvement without a ² _____.
- 03 **Author:** The work completed here is a wording ³ _____.
- 04 **Reviewer:** The design limitation is explicit, not ⁴ _____.

CHECK THE GAPS

1. satisfaction / 2. baseline / 3. revision / 4. eliminated

[Why these answers fit, page 160](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "I will add the page and line numbers after the revised file is finalized. The current numbers could shift as we edit the abstract." Luca: [missing response] Mei: "Someone suggested claiming additional analyses. We have not done them, and an impressive-sounding statement would not solve the problem." Which response belongs in the gap?

- A.** Right. It is a post-only measure. We have no baseline measurement, so we cannot calculate a before-and-after change. The original sentence implied a comparison we never measured.
- B.** State the limitation directly. The study reports post-workshop confidence in this sample. It does not isolate the workshop's effect, and revising the wording does not change that design boundary.
- C.** Remove that overgeneralization. The revised statement should name the observed sample. We can discuss broader questions as future research without presenting them as conclusions already established by these participants.
- D.** A checked page-and-line reference matters. Use the submitted revision's locations, not an earlier draft's numbering. We should also keep the response wording consistent with the actual replacement text.

[Answers and explanations, page 161](#)

Review 3 / Meaning and context

Use language from the lessons you have completed. Choose one answer per question.

Case file

Revisit "Authorship, Collaboration, and Credit" and "Peer Review and Revision Responses". Choose precise terminology, then reconstruct the missing responses using both neighboring turns. The final two questions also revisit earlier conversations.

1. A colleague needs the term for this meaning: The author names listed on a publication. Which term fits?

- A. final approval
- B. formal analysis
- C. honorary authorship
- D. byline

2. A colleague needs the term for this meaning: A concise summary of a scholarly work. Which term fits?

- A. volunteer sample
- B. construct
- C. abstract
- D. peer review

3. Rebuild the exchange from "Possessing the data is not permission for a new use". Tessa: "I will send both research questions side by side. The employment topic is not actually named in the documents I have opened so far." Omar: [missing response] Tessa: "Would this be an amendment, a new submission, or an exemption? Collaborators keep asking me which route applies, and I do not want to guess." Which response belongs in the gap?

- A. Keep any protocol amendment conditional. A plausible route is not a completed decision. Likewise, no waiver or new consent has been granted, so neither should appear as an established fact.
- B. Yes, state the purpose change clearly. The reviewer needs the actual new question, intended information, recipients, and safeguards, not a broad assurance that everything is still generally about students.
- C. Exactly. The linking key must be included in the access description. Coding alone does not establish anonymity to your team, and changing the label would not change the underlying arrangement.
- D. Describe the coded data accurately. Does the research team have access to the key connecting the codes with participants? That access changes what the reviewer needs to know about identifiability.

Review 3 / Meaning and context / continued

4. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "I have written limitation addressed. That sounds as though we fixed the study design. Would limitation clarified describe what we actually did?" Luca: [missing response] Mei: "I will keep the mean, remove the improvement and all-adults claims, and verify locations before resubmission." Which response belongs in the gap?

- A.** Then await the editorial decision. A clear correction supports evaluation, but it does not guarantee acceptance. Our responsibility is to make the evidence, changes, and remaining limitations straightforward to inspect.
- B.** State the limitation directly. The study reports post-workshop confidence in this sample. It does not isolate the workshop's effect, and revising the wording does not change that design boundary.
- C.** Say the revision makes the boundary explicit. That is accurate and useful. We have improved the manuscript's claims, not repaired the completed design or established an effect through wording alone.
- D.** Remove that overgeneralization. The revised statement should name the observed sample. We can discuss broader questions as future research without presenting them as conclusions already established by these participants.

[Answers and explanations, page 178](#)

A Read the situation

LESSON 07 / DATA MANAGEMENT AND REPRODUCIBILITY

Make a dataset interpretable through verified units, missing-value rules, dates, and traceable processing.

The missing-value code is not a temperature

Research data steward Elena helps analyst Ravi prepare a small environmental dataset. The column *t* contains 20, 22, -999, 24, and 26. The collector confirms that *t* is air temperature in degrees Celsius and -999 means a failed reading, not a temperature or zero. The date label 04/05/26 is confirmed as May 4, 2026; readings were taken at 09:00 UTC. The raw file must remain unchanged. An analysis copy will mark the failed reading as missing and calculate the mean of the four valid values. The release needs a data dictionary, processing record, and identified software version.

People: Elena, Research data steward; Ravi, Analyst.

Read the record

Choose one answer per question using the facts above.

1. What does -999 represent in this dataset?

- A. A Fahrenheit value requiring conversion
- B. A failed reading coded as missing
- C. A valid Celsius temperature
- D. Exactly zero degrees

2. What is the mean of the four valid temperatures?

- A. 92 degrees Celsius
- B. 23 degrees Celsius
- C. -181.4 degrees Celsius
- D. 18.4 degrees Celsius

3. How should 04/05/26 be represented unambiguously after confirmation?

- A. 2026-05-26
- B. 2004-05-26
- C. 2026-05-04
- D. 2026-04-05

[Answers and explanations, page 162](#)

B Vocabulary in use

CORE TERMS

data dictionary

Definitions and coding rules for dataset variables.

publish a data dictionary

variable name

The label assigned to a data field.

clarify variable names

missing-value code

A designated value representing absent information.

document missing-value codes

failed reading

A measurement attempt without a valid recorded result.

mark a failed reading

raw file

The original dataset before later cleaning or transformation.

preserve the raw file

transformation log

A record of changes from source to derived data.

maintain a transformation log

metadata

Information describing data, collection, or processing.

supply essential metadata

unit of measurement

The scale used to express a quantity.

specify units of measurement

sentinel value

A special value used to mark a status rather than an observation.

identify a sentinel value

valid observation

A recorded value meeting the applicable inclusion rules.

count valid observations

analysis copy

A derived dataset used for analysis.

create a documented analysis copy

data cleaning

Applying documented rules to correct or prepare data.

document data cleaning

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

data dictionary DATA DICTIONARY

publish a data dictionary

Keep the meaning precise: Definitions and coding rules for dataset variables.

sentinel value SENTINEL VALUE

identify a sentinel value

Keep the meaning precise: A special value used to mark a status rather than an observation.

B Precision and professional shorthand

EXTEND YOUR RANGE

imputation

Replacing missing values using a specified estimation method.

distinguish cleaning from imputation

date format

The convention used to represent a calendar date.

standardize the date format

collection timestamp

The recorded date and time of observation.

preserve collection timestamps

software environment

The tools and versions used to run an analysis.

document the software environment

readme

An introductory file explaining a dataset or project.

include a readme

computational reproducibility

Reobtaining results with the specified data and computation.

check computational reproducibility

complete-case calculation

A calculation using records with required observed values.

describe a complete-case calculation

time zone

The reference used to interpret recorded times.

record the time zone

version identifier

A label identifying a particular dataset or software revision.

record the version identifier

dependency

A required library or component for a process.

list analysis dependencies

repository

A managed location for preserving and accessing materials.

select a suitable repository

data validation

Checks that data meet specified rules or expectations.

perform data validation

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

data cleaning DATA CLEANING

document data cleaning

Keep the meaning precise: Applying documented rules to correct or prepare data.

collection timestamp COLLECTION TIMESTAMP

preserve collection timestamps

Keep the meaning precise: The recorded date and time of observation.

Phrases that move the work forward

Ask for meaning

"What does the variable t represent?"

Identify the special code

"Minus 999 marks a failed reading."

Keep the original

"The raw file remains unchanged."

State the calculation base

"The mean uses four valid observations."

Avoid invented data

"We have not imputed the failed reading."

Use an unambiguous format

"Record the date as 2026-05-04."

Document the fields

"The data dictionary must include units and missing codes."

Identify the environment

"State the software version used for the analysis."

Confirm the unit

"The collector confirms degrees Celsius."

Reject a false zero

"Missing is not the same as zero."

Describe the derived copy

"The analysis copy marks that code as missing."

Give the result with units

"The valid-observation mean is 23 degrees Celsius."

Resolve the date

"The collector confirms May 4, 2026."

Keep time meaningful

"The collection time is 09:00 UTC."

Record the transformation

"Log the conversion and the calculation rule."

Check the release

"Another analyst should be able to reproduce the reported mean."

Precision in real exchanges

Purpose: Reject a false zero

Useful wording: "Missing is not the same as zero."

Purpose: Keep the original

Useful wording: "The raw file remains unchanged."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which data-handling description is correct?

- A.** Overwrite the raw value without a record.
- B.** Replace the failed reading with zero and call it observed.
- C.** Treat -999 as a valid air temperature.
- D.** Preserve the raw file and convert the sentinel to missing in a documented analysis copy.

2. What does using four valid observations imply?

- A.** The missing temperature is proved to be zero.
- B.** Five valid temperatures were measured.
- C.** The raw file must be deleted.
- D.** No value has been imputed for the failed reading.

3. A colleague needs the term for this meaning: The scale used to express a quantity. Which term fits?

- A.** date format
- B.** unit of measurement
- C.** raw file
- D.** readme

D Choose the response that fits / continued

4. Rebuild the exchange from "The missing-value code is not a temperature". Ravi: "Including the code gives a mean of minus one hundred eighty-one point four, which is not the supported calculation." Elena: [missing response] Ravi: "Replacing the code with zero would give eighteen point four instead. That is also wrong for this requested mean, even though it looks less obviously unusual." Which response belongs in the gap?

- A.** Use the four valid observations for this mean: twenty, twenty-two, twenty-four, and twenty-six. They sum to ninety-two, so the mean is twenty-three degrees Celsius. State the four-observation base alongside it.
- B.** Document the software environment with the data and instructions. Even a simple calculation benefits from a traceable version, especially when this small example becomes part of a larger processing workflow.
- C.** Preserve the raw file. Keep the original code and create a documented analysis copy. Future users need both the source record and the explanation of how the derived data were produced.
- D.** Use an unambiguous date format such as 2026-05-04 in the documented copy. Record how you resolved the source label. A plausible regional assumption would not be enough without that confirmation.

[Answers and explanations, page 162](#)

One useful distinction

The valid values are 20, 22, 24, and 26: their mean is 23 degrees Celsius. Treating -999 as a temperature would produce -181.4. Replacing it with zero would produce 18.4. Neither represents the stated valid-observation calculation.

E Conversation

The missing-value code is not a temperature

The missing-value code is not a temperature

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

date format / time zone / imputation / raw file / computational reproducibility /
valid observations / software environment / transformation log / unit of measurement /
missing-value code

- 01 **Ravi:** The shared file has a column called t and five values. Four look like ordinary temperatures, but the fifth is minus nine hundred ninety-nine.
- 02 **Elena:** Do not guess the ¹ _____ from the values. The collector confirms air temperature in degrees Celsius. We need that definition in the documentation, because the column name alone does not establish it.
- 03 **Ravi:** The collector confirmed that minus nine hundred ninety-nine codes a failed reading, not a cold observation.
- 04 **Elena:** Document the ² _____ and mark it missing in the analysis copy. Do not use zero: that would turn a failed reading into an invented temperature.
- 05 **Ravi:** Including the code gives a mean of minus one hundred eighty-one point four, which is not the supported calculation.
- 06 **Elena:** Use the four ³ _____ for this mean: twenty, twenty-two, twenty-four, and twenty-six. They sum to ninety-two, so the mean is twenty-three degrees Celsius. State the four-observation base alongside it.

Conversation / continued

- 07 **Ravi:** Replacing the code with zero would give eighteen point four instead. That is also wrong for this requested mean, even though it looks less obviously unusual.
- 08 **Elena:** Correct. We are not performing ⁴ _____. We have no estimated replacement for the failed reading. The analysis should say exactly which observed values were used, without turning an absent measurement into a convenient number.
- 09 **Ravi:** I can make a separate cleaned file. Should the original keep minus nine hundred ninety-nine so the transformation can be checked later?
- 10 **Elena:** Preserve the ⁵ _____. Keep the original code and create a documented analysis copy. Future users need both the source record and the explanation of how the derived data were produced.

Conversation continues on the next page.

The missing-value code is not a temperature

CONVERSATION / CONTINUED

- 11 **Ravi:** There is also a date labeled zero-four slash zero-five slash twenty-six. The collector says it means May fourth, twenty twenty-six, not April fifth.
- 12 **Elena:** Use an unambiguous ⁶ _____ such as 2026-05-04 in the documented copy. Record how you resolved the source label. A plausible regional assumption would not be enough without that confirmation.
- 13 **Ravi:** The readings were taken at nine in the morning UTC. I will include that reference, because nine o'clock alone could mean different local times.
- 14 **Elena:** Yes, the ⁷ _____ belongs with the collection information. Keep the timestamp meaning explicit so another researcher does not align these readings with observations from a different hour.
- 15 **Ravi:** The data dictionary will define t, the Celsius unit, the failed-reading code, and the confirmed date and time conventions. What else belongs in the release?
- 16 **Elena:** Add a ⁸ _____ describing the missing-code conversion and mean calculation. It should connect the raw file to the analysis copy and reported result without requiring a colleague to reconstruct undocumented choices.
- 17 **Ravi:** I will add the software version and dependencies to the readme. Could you check that the instructions start from the raw file?
- 18 **Elena:** Document the ⁹ _____ with the data and instructions. Even a simple calculation benefits from a traceable version, especially when this small example becomes part of a larger processing workflow.

The missing-value code is not a temperature / continued

- 19 **Ravi:** I will ask another analyst to follow the release instructions and reproduce the twenty-three-degree mean from the preserved source and documented rules.
- 20 **Elena:** That checks ¹⁰ _____. A matching result is useful, but it does not prove scientific validity. Keep the variable definitions with the calculation so readers can check both.

CHECK THE GAPS

1. unit of measurement / **2.** missing-value code / **3.** valid observations / **4.** imputation / **5.** raw file / **6.** date format / **7.** time zone / **8.** transformation log / **9.** software environment / **10.** computational reproducibility

[Why these answers fit, page 164](#)

F Check accuracy and scope

The missing-value code is not a temperature

Return to the case

Research data steward Elena helps analyst Ravi prepare a small environmental dataset. The column `t` contains 20, 22, -999, 24, and 26. The collector confirms that `t` is air temperature in degrees Celsius and -999 means a failed reading, not a temperature or zero. The date label 04/05/26 is confirmed as May 4, 2026; readings were taken at 09:00 UTC. The raw file must remain unchanged. An analysis copy will mark the failed reading as missing and calculate the mean of the four valid values. The release needs a data dictionary, processing record, and identified software version.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. Why is the collector's date confirmation necessary?

- A. The original numeric label could otherwise be interpreted in different date orders.
- B. All countries use the same numeric date order.
- C. Time zone alone decides the calendar format.
- D. The date should be chosen to improve the mean.

2. Which release package best supports reproducibility?

- A. A screenshot with an unexplained missing code
- B. Data, dictionary, processing steps, and the identified software environment
- C. Only a column named `t`
- D. Only the final mean without units

[Answers and explanations, page 165](#)

Listen for the distinction

Repeat turns 11-14 with May fourth and UTC clearly audible.

Make the file usable by someone outside the team

A familiar variable name can hide assumptions that a new collaborator cannot recover. Confirm definitions with the collector instead of guessing from plausible values. Document the transformation so a later reader can distinguish an observed value from a missing code and reproduce the analysis.

F Say it / transfer to a new case

Do not turn missing into zero

A confirmed Celsius column contains 10, 12, -999, and 14. The collector defines -999 as missing. The requested mean uses only observed temperatures, and the original file must be preserved.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

imputed / original file / three / 12

- 01 **Analyst:** There are ¹ _____ valid observations.
- 02 **Steward:** Their mean is ² _____ degrees Celsius.
- 03 **Analyst:** The raw sentinel is retained in the ³ _____.
- 04 **Steward:** No missing temperature has been ⁴ _____.

CHECK THE GAPS

1. three / 2. 12 / 3. original file / 4. imputed

[Why these answers fit, page 165](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "The missing-value code is not a temperature". Ravi: "The readings were taken at nine in the morning UTC. I will include that reference, because nine o'clock alone could mean different local times." Elena: [missing response] Ravi: "The data dictionary will define t, the Celsius unit, the failed-reading code, and the confirmed date and time conventions. What else belongs in the release?" Which response belongs in the gap?

- A.** That checks computational reproducibility. A matching result is useful, but it does not prove scientific validity. Keep the variable definitions with the calculation so readers can check both.
- B.** Use the four valid observations for this mean: twenty, twenty-two, twenty-four, and twenty-six. They sum to ninety-two, so the mean is twenty-three degrees Celsius. State the four-observation base alongside it.
- C.** Yes, the time zone belongs with the collection information. Keep the timestamp meaning explicit so another researcher does not align these readings with observations from a different hour.
- D.** Document the missing-value code and mark it missing in the analysis copy. Do not use zero: that would turn a failed reading into an invented temperature.

[Answers and explanations, page 166](#)

A Read the situation

LESSON 08 / ACADEMIC PRESENTATIONS AND CONFERENCES

Give a concise evidence-based conference answer, distinguish task performance from mechanism, and handle an unresolved question.

Answer the challenge without claiming universal proof

Presenter Noor answers a conference question about a memory-strategy study. All 24 volunteers completed one laboratory task in a fixed before-then-after order. Mean response time was 600 milliseconds before training and 540 afterward, a 60-millisecond or 10% reduction. There was no untrained comparison group, so practice and order effects are not isolated from training. No confidence interval or significance test is supplied for this exercise. An audience member asks whether the study proves a general memory theory. During the follow-up discussion, Noor must answer concisely, stating observations, limits, and the next test without inventing evidence.

People: Audience member, Conference participant; Noor, Presenter.

Read the record

Choose one answer per question using the facts above.

1. What change was observed in mean response time?

- A.** A reduction of 540 milliseconds, or 90%
- B.** A 60% increase
- C.** No before-and-after difference
- D.** A reduction of 60 milliseconds, or 10%

2. Which alternative explanations are not isolated?

- A.** Randomized group allocation
- B.** Practice and order effects
- C.** A confirmed change in all adult memory systems
- D.** A published confidence interval

3. What should Noor say about a confidence interval?

- A.** It must be 95% to 100%.
- B.** None is supplied here, so no interval should be invented.
- C.** It is exactly zero to sixty.
- D.** It proves the general theory.

[Answers and explanations, page 167](#)

B Vocabulary in use

CORE TERMS

conference presentation

A spoken account of research for a scholarly audience.

deliver a conference presentation

central finding

The main observation or result being reported.

state the central finding

response time

The elapsed time to produce a response in a task.

measure response time

within-participant comparison

A comparison of observations from the same participants.

describe a within-participant comparison

practice effect

A performance change associated with repeated task exposure.

consider a practice effect

comparison arm

A study group or condition serving as a reference.

include a comparison arm

audience question

A query raised by someone attending a talk.

answer an audience question

take-home message

The concise main point an audience should retain.

clarify the take-home message

millisecond

One thousandth of a second.

report milliseconds

fixed order

The same sequence of conditions for all participants.

acknowledge a fixed order

order effect

A change associated with the sequence of conditions.

control for order effects

counterbalancing

Varying condition order across participants under a design.

plan appropriate counterbalancing

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

conference presentation CONFERENCE PRESENTATION

deliver a conference presentation

Keep the meaning precise: A spoken account of research for a scholarly audience.

millisecond MILLISECOND

report milliseconds

Keep the meaning precise: One thousandth of a second.

B Precision and professional shorthand

EXTEND YOUR RANGE

mechanism

The process proposed to explain an observed effect.

test a proposed mechanism

generalizability

The extent to which results apply beyond the study context.

assess generalizability

confidence interval

An interval produced by a method with stated long-run coverage.

report a confidence interval

independent replication

A new study testing a finding with independent evidence.

seek independent replication

controlled follow-up

A later study designed to address relevant alternative explanations.

propose a controlled follow-up

time allocation

The speaking time available for a response.

respect the time allocation

theoretical claim

An assertion about a broader explanatory account.

bound a theoretical claim

statistical uncertainty

Uncertainty associated with estimation from data.

communicate statistical uncertainty

significance test

A statistical assessment under a specified null model.

interpret a significance test

boundary condition

A circumstance limiting when a finding or explanation applies.

identify boundary conditions

clarifying question

A question used to resolve ambiguity in what is being asked.

ask a clarifying question

unresolved question

An issue not answered by the current evidence.

state the unresolved question

Say it in context

Stress the highlighted expression. Keep the surrounding words connected; pause at the end of the phrase.

counterbalancing COUNTERBALANCING

plan appropriate counterbalancing

Keep the meaning precise: Varying condition order across participants under a design.

confidence interval CONFIDENCE INTERVAL

report a confidence interval

Keep the meaning precise: An interval produced by a method with stated long-run coverage.

Phrases that move the work forward

Answer directly

"No, this study does not prove the general theory."

Give the relative change

"That is a 10% reduction from the initial mean."

Specify the setting

"This was one laboratory task."

Name the alternative

"Practice and order effects remain possible explanations."

Separate mechanism

"Faster responses do not establish the proposed memory mechanism."

Keep the contribution

"The observation is worth testing under stronger controls."

Bound generalization

"Broader populations and tasks need separate evidence."

Respect the time

"The short answer is that the finding is limited but informative."

State the observed change

"Mean response time fell from 600 to 540 milliseconds."

Name the sample

"All 24 volunteers completed the task."

Describe the design

"Everyone completed the same before-then-after sequence."

Avoid a causal shortcut

"We have not isolated training from those effects."

Handle missing statistics

"I do not have a verified interval or test result to report here."

Propose the next test

"A controlled follow-up should address the alternative explanations."

Clarify the question

"Are you asking about the observed change or the proposed mechanism?"

Close without overpromising

"The next study would test the explanation, not guarantee confirmation."

Precision in real exchanges

Purpose: Name the sample

Useful wording: "All 24 volunteers completed the task."

Purpose: Specify the setting

Useful wording: "This was one laboratory task."

D Choose the response that fits

Choose one response for each situation. Preserve the facts, the decision boundary, and the purpose of the exchange.

1. Which opening best answers the audience's question?

- A.** "The question is hostile and cannot be answered."
- B.** "The effect is definitely statistically significant."
- C.** "No; the study reports a task-specific change, not proof of the general theory."
- D.** "Yes; every theory is proved by one lower mean."

2. Which causal claim is unsupported?

- A.** The study used 24 volunteers.
- B.** Training alone caused the entire reduction.
- C.** Mean response time was lower afterward.
- D.** All participants followed the same sequence.

3. A colleague needs the term for this meaning: The concise main point an audience should retain. Which term fits?

- A.** controlled follow-up
- B.** practice effect
- C.** generalizability
- D.** take-home message

D Choose the response that fits / continued

4. Rebuild the exchange from "Answer the challenge without claiming universal proof". Audience member: "Did different groups perform the before and after conditions, or were these repeated observations from the same people?" Noor: [missing response] Audience member: "People may be faster through practice. How did you separate that possibility from training?" Which response belongs in the gap?

- A.** It was a within-participant comparison. Everyone completed the before condition and then the after condition in the same order. That controls neither every time-related influence nor the effect of repeating the task.
- B.** I do not have a verified confidence interval to report here, and I should not guess. The sample size and two means alone do not provide enough information for a defensible interval calculation.
- C.** The response time reduction is ten percent of the initial mean. All twenty-four volunteers completed the task. That calculation describes the observed change, without explaining its cause or importance beyond this setting.
- D.** Exactly. The unresolved question is what produced the change and how broadly it applies. We will keep those questions explicit rather than promise that the next study must confirm our preferred explanation.

[Answers and explanations, page 167](#)

One useful distinction

The mean fell from 600 to 540 milliseconds: $60/600$ equals 10%. Lower response time is faster performance on this task. That observation alone does not identify the mechanism, isolate training from practice, or establish a universal memory theory.

E Conversation

Answer the challenge without claiming universal proof

Answer the challenge without claiming universal proof

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

unresolved question / controlled follow-up / mechanism / take-home message /
central finding / within-participant comparison / response time / Generalizability /
confidence interval / practice effect

- 01 **Audience member:** You showed a faster response after training. Does that prove the general memory theory, or are you making a narrower claim about this task?
- 02 **Noor:** Our ¹ _____ is narrower. Mean response time fell from six hundred to five hundred forty milliseconds. This does not prove the general theory.
- 03 **Audience member:** What percentage is that reduction? We need the initial response time to interpret its relative size.
- 04 **Noor:** The ² _____ reduction is ten percent of the initial mean. All twenty-four volunteers completed the task. That calculation describes the observed change, without explaining its cause or importance beyond this setting.
- 05 **Audience member:** Did different groups perform the before and after conditions, or were these repeated observations from the same people?
- 06 **Noor:** It was a ³ _____. Everyone completed the before condition and then the after condition in the same order. That controls neither every time-related influence nor the effect of repeating the task.

E Conversation / continued

- 07 **Audience member:** People may be faster through practice. How did you separate that possibility from training?
- 08 **Noor:** We did not isolate the ⁴ _____. There was no untrained comparison group. Repetition may contribute to the reduction, and the fixed order leaves related explanations open. I cannot attribute the entire change to training alone.
- 09 **Audience member:** Did you measure the memory process itself, or is it a proposed explanation for faster responses?
- 10 **Noor:** It remains a proposed ⁵ _____. Faster responses do not identify the underlying process. This observation motivates testing that explanation; it cannot replace such a test.

Conversation continues on the next page.

Answer the challenge without claiming universal proof

CONVERSATION / CONTINUED

- 11 **Audience member:** What confidence interval surrounds the reduction? It would help us judge how much uncertainty there is around the estimated change.
- 12 **Noor:** I do not have a verified ⁶ _____ to report here, and I should not guess. The sample size and two means alone do not provide enough information for a defensible interval calculation.
- 13 **Audience member:** Fair enough. Would a controlled follow-up be aimed at repeating the same observation, or at separating the competing explanations?
- 14 **Noor:** A ⁷ _____ should address those alternatives explicitly. The design needs an appropriate comparison and attention to sequence, with its analysis planned before results are examined. That is proposed work, not a completed validation.
- 15 **Audience member:** Even if that study supports a training effect, would you still need evidence beyond this task and these volunteers before making the broad theory claim?
- 16 **Noor:** Yes. ⁸ _____ remains a separate issue. Other populations, tasks, and conditions could behave differently. A better-controlled local result would not automatically establish every application of the theory.
- 17 **Audience member:** The chair is asking us to wrap up. Could you give us the main result in one sentence, with that qualification?
- 18 **Noor:** The ⁹ _____ is this: response time fell ten percent in twenty-four volunteers, but we have not separated the training effect from practice and order effects.

Answer the challenge without claiming universal proof / continued

- 19 **Audience member:** Thank you. That distinguishes the observed change from a general explanation. The planned test sounds like the important next step.
- 20 **Noor:** Exactly. The ¹⁰ _____ is what produced the change and how broadly it applies. We will keep those questions explicit rather than promise that the next study must confirm our preferred explanation.

CHECK THE GAPS

1. central finding / **2.** response time / **3.** within-participant comparison / **4.** practice effect / **5.** mechanism / **6.** confidence interval / **7.** controlled follow-up / **8.** Generalizability / **9.** take-home message / **10.** unresolved question

[Why these answers fit, page 168](#)

F Check accuracy and scope

Answer the challenge without claiming universal proof

Return to the case

Presenter Noor answers a conference question about a memory-strategy study. All 24 volunteers completed one laboratory task in a fixed before-then-after order. Mean response time was 600 milliseconds before training and 540 afterward, a 60-millisecond or 10% reduction. There was no untrained comparison group, so practice and order effects are not isolated from training. No confidence interval or significance test is supplied for this exercise. An audience member asks whether the study proves a general memory theory. During the follow-up discussion, Noor must answer concisely, stating observations, limits, and the next test without inventing evidence.

Choose one answer per question. Use the case facts and keep any uncertainty or limits intact.

1. Which next step best addresses the limitation?

- A. Hiding the fixed sequence
- B. Calling the same data an independent replication
- C. A controlled follow-up designed to separate training from practice and order effects
- D. Repeating the universal claim more confidently

2. Which statement about the mechanism is accurate?

- A. Lower response time identifies every internal memory process.
- B. The mechanism was directly measured because the talk was accepted.
- C. A proposed theory and an observed mean are identical evidence.
- D. The observed response-time change does not by itself establish the memory mechanism.

[Answers and explanations, page 170](#)

Listen for the distinction

Repeat turns 11-14 without inventing a confidence interval; keep the follow-up study in the future tense.

Answer the strongest reasonable version of the question

A challenging question can help clarify the contribution. Give the direct answer first, then the main evidence and limitation. You can reject an overstatement without dismissing your own result or treating the questioner as hostile. Offer a relevant next study rather than an unsupported promise.

F Say it / transfer to a new case

Give the observation and its boundary

A fixed-order task study records mean times of 800 milliseconds before training and 720 afterward in 16 volunteers. There is no untrained comparison group, and no interval or significance result is supplied.

Complete the four gaps. With a partner, read alternate roles, then switch. Studying alone, read both roles and pause before each response.

WORD AND PHRASE BANK

practice and order effects / 10 / 80 / invented

- 01 **Presenter:** The mean reduction is ¹ _____ milliseconds.
- 02 **Questioner:** Relative to the initial mean, that is ² _____ percent.
- 03 **Presenter:** Training has not been isolated from ³ _____.
- 04 **Questioner:** A significance result must not be ⁴ _____.

CHECK THE GAPS

1. 80 / 2. 10 / 3. practice and order effects / 4. invented

[Why these answers fit, page 170](#)

F Say it / transfer to a new case / continued

Rebuild the exchange

Choose the missing response. Read the completed three-turn exchange aloud, changing roles on the second reading.

1. Rebuild the exchange from "Answer the challenge without claiming universal proof".
Audience member: "Fair enough. Would a controlled follow-up be aimed at repeating the same observation, or at separating the competing explanations?" **Noor:** [missing response]
Audience member: "Even if that study supports a training effect, would you still need evidence beyond this task and these volunteers before making the broad theory claim?" **Which response belongs in the gap?**

- A.** A controlled follow-up should address those alternatives explicitly. The design needs an appropriate comparison and attention to sequence, with its analysis planned before results are examined. That is proposed work, not a completed validation.
- B.** The response time reduction is ten percent of the initial mean. All twenty-four volunteers completed the task. That calculation describes the observed change, without explaining its cause or importance beyond this setting.
- C.** It was a within-participant comparison. Everyone completed the before condition and then the after condition in the same order. That controls neither every time-related influence nor the effect of repeating the task.
- D.** I do not have a verified confidence interval to report here, and I should not guess. The sample size and two means alone do not provide enough information for a defensible interval calculation.

[Answers and explanations, page 171](#)

Review 4 / Meaning and context

Use language from the lessons you have completed. Choose one answer per question.

Case file

Revisit "Data Management and Reproducibility" and "Academic Presentations and Conferences". Choose precise terminology, then reconstruct the missing responses using both neighboring turns. The final two questions also revisit earlier conversations.

1. A colleague needs the term for this meaning: The label assigned to a data field. Which term fits?

- A. valid observation
- B. dependency
- C. variable name
- D. complete-case calculation

2. A colleague needs the term for this meaning: The same sequence of conditions for all participants. Which term fits?

- A. independent replication
- B. conference presentation
- C. mechanism
- D. fixed order

3. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "The abstract and conclusion both contain the overclaim. We need to change both, not just the quoted sentence." Luca: [missing response] Mei: "I will quote the replacement sentence in our reply, then give its location. Could you check that the conclusion now says the same thing?" Which response belongs in the gap?

- A. Check the revised manuscript throughout. The title, summary, results description, and final interpretation should not quietly restore the same unsupported claim after we have corrected it elsewhere.
- B. Right. It is a post-only measure. We have no baseline measurement, so we cannot calculate a before-and-after change. The original sentence implied a comparison we never measured.
- C. State the limitation directly. The study reports post-workshop confidence in this sample. It does not isolate the workshop's effect, and revising the wording does not change that design boundary.
- D. A checked page-and-line reference matters. Use the submitted revision's locations, not an earlier draft's numbering. We should also keep the response wording consistent with the actual replacement text.

Review 4 / Meaning and context / continued

4. Rebuild the exchange from "Answer the challenge without claiming universal proof". Audience member: "The chair is asking us to wrap up. Could you give us the main result in one sentence, with that qualification?" Noor: [missing response] Audience member: "Thank you. That distinguishes the observed change from a general explanation. The planned test sounds like the important next step." Which response belongs in the gap?

- A.** Our central finding is narrower. Mean response time fell from six hundred to five hundred forty milliseconds. This does not prove the general theory.
- B.** Yes. Generalizability remains a separate issue. Other populations, tasks, and conditions could behave differently. A better-controlled local result would not automatically establish every application of the theory.
- C.** It remains a proposed mechanism. Faster responses do not identify the underlying process. This observation motivates testing that explanation; it cannot replace such a test.
- D.** The take-home message is this: response time fell ten percent in twenty-four volunteers, but we have not separated the training effect from practice and order effects.

[Answers and explanations, page 181](#)

Language for the next case

The smallest p-value was not the primary outcome

primary outcome

The primary outcome was specified before data collection; selecting another outcome after viewing results does not make it the original primary test.

Dev: We can report it, but not replace the primary outcome in the account of what we planned. The registered analysis still belongs in the results.

multiple testing

Multiple testing concerns the twenty outcomes examined; reporting only the smallest unadjusted p-value conceals the selection process relevant to interpretation.

Dev: That hides the multiple testing issue. Describe the family of analyses, the selection, and that the reported p-value is unadjusted.

independent confirmation

Independent confirmation requires a new appropriately planned test, rather than presenting the same inspected data as a fresh confirmatory sample.

Dev: That would support an independent confirmation attempt. Define the design and sample-size rationale first; do not promise the new result will agree.

exploratory

Exploratory identifies the analysis performed after inspecting the data, rather than presenting it as the prespecified confirmatory test.

Dev: This particular test came after inspection. Label it exploratory. An earlier informal discussion is not evidence that this analysis was the registered test.

p-value

A p-value concerns data under a specified null model and assumptions; subtracting it from one does not give the probability that a hypothesis is true.

Dev: No. A p-value is not the probability that our hypothesis is true. We need the estimate, uncertainty, and modeling assumptions, not that conversion.

deviation statement

The deviation statement records departures from the registered plan, including their timing and reasons, without rewriting the original plan after results are known.

Dev: Exactly. Add a deviation statement for the exclusion change. We can present a useful finding without rewriting the study's history.

Read the phrases aloud. Then complete the conversation on the following pages using the word bank.

Conversation

The smallest p-value was not the primary outcome

Before collecting data, a fictional team registered one primary outcome and a 0.05 significance threshold. Its planned test gives $p = 0.18$. Afterward, the team explores twenty other outcomes; the smallest unadjusted p-value is 0.03. No multiple-testing adjustment or independent confirmation has been performed.

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

primary outcome / p-value / multiple testing / independent confirmation /
deviation statement / exploratory

- 01 **Alina:** The main test was not significant, but I found an outcome with p point zero three. Could we lead with that one instead?
- 02 **Dev:** We can report it, but not replace the ¹ _____ in the account of what we planned. The registered analysis still belongs in the results.
- 03 **Alina:** Its p-value is point one eight against our point zero five threshold. I will show that result rather than remove the table.
- 04 **Dev:** Good. Say that the planned test did not meet that threshold, not that we proved there is no effect.
- 05 **Alina:** For the other outcome, I was going to write that our hypothesis was confirmed. We did discuss it informally before the project.
- 06 **Dev:** This particular test came after inspection. Label it ² _____. An earlier informal discussion is not evidence that this analysis was the registered test.

Conversation / continued

- 07 **Alina:** Should we omit the exploratory work altogether? The pattern might help us design the next study.
- 08 **Dev:** Keep useful exploration. Be clear about the sequence of decisions and what the analysis can support. Transparency does not mean pretending discovery has no value.
- 09 **Alina:** The draft lists only the outcome with point zero three. The other nineteen are in my notebook but not in the manuscript.
- 10 **Dev:** That hides the ³ _____ issue. Describe the family of analyses, the selection, and that the reported p-value is unadjusted.

Conversation continues on the next page.

The smallest p-value was not the primary outcome

CONVERSATION / CONTINUED

- 11 **Alina:** Could I call point zero three a ninety-seven percent probability that the hypothesis is correct? That wording would be easier for the audience.
- 12 **Dev:** No. A ⁴ _____ is not the probability that our hypothesis is true. We need the estimate, uncertainty, and modeling assumptions, not that conversion.
- 13 **Alina:** We have the estimate in the output. I will check its units and the interval calculation with you before using either in the summary.
- 14 **Dev:** Yes. And keep the exploratory status visible even if a later analysis uses a different adjustment. A new calculation does not change when we selected the outcome.
- 15 **Alina:** For the follow-up, could we specify this outcome and analysis before collecting new data?
- 16 **Dev:** That would support an ⁵ _____ attempt. Define the design and sample-size rationale first; do not promise the new result will agree.
- 17 **Alina:** I will also link the original registration. There was one exclusion change during analysis that the methods section does not currently explain.
- 18 **Dev:** Document the original rule, what changed, when, and why. Readers need to distinguish that deviation from the planned analysis rather than infer it from mismatched sample counts.
- 19 **Alina:** Then we retain the primary result, report the twenty exploratory tests transparently, and propose a separately planned follow-up.
- 20 **Dev:** Exactly. Add a ⁶ _____ for the exclusion change. We can present a useful finding without rewriting the study's history.

CHECK THE GAPS

1. primary outcome / 2. exploratory / 3. multiple testing / 4. p-value / 5. independent confirmation / 6. deviation statement

[Why these answers fit, page 184](#)

Keep the planned and discovered results separate

A registered primary test has $p = 0.12$ against a 0.05 threshold. Twelve unplanned outcomes are explored; the smallest unadjusted p-value is 0.02. The same dataset is used throughout.

Complete the exchange using each phrase once. Read both roles, then switch roles and repeat with the bank covered.

WORD AND PHRASE BANK

threshold / exploratory / unadjusted / confirmation

- 01 **Researcher:** The registered test did not meet the specified ¹ _____.
- 02 **Collaborator:** The twelve later tests are ² _____.
- 03 **Researcher:** The reported minimum p-value is ³ _____.
- 04 **Collaborator:** Reusing these inspected data is not independent ⁴ _____.

CHECK THE GAPS

1. threshold / 2. exploratory / 3. unadjusted / 4. confirmation

[Why these answers fit, page 184](#)

Keep the distinction audible

Distinguish a prespecified analysis from a result selected after inspection.

Language for the next case

The indirect-cost rate applies to the base, not every line

cost base

The cost base is the amount to which the rate applies; the supplied foundation terms exclude equipment from that amount.

Reuben: The addition is arithmetically right, but it uses the wrong cost base. This foundation excludes equipment before applying the indirect-cost rate.

budget justification

The budget justification must connect requested costs to the project and permitted categories; room below a ceiling does not itself justify a new charge.

Reuben: Do not add an unsupported budget justification. We should request supported project costs, not fill the ceiling merely because space remains.

cost sharing

Cost sharing means project costs supported from another source; the \$800 unused ceiling is not an institutional contribution or expenditure.

Reuben: Good. Do not label the difference below the ceiling cost sharing. An unused ceiling is not an institutional promise to fund part of the project.

indirect costs

Indirect costs are \$5,200 under the supplied 10% rate and \$52,000 base, not 10% of every direct line.

Reuben: Correct. Those are the indirect costs under these particular terms. Use the foundation's rule here, not a rate copied from another award.

personnel total

The personnel total already includes benefits in this case; applying another benefits charge would double-count the same supplied cost.

Reuben: Remove that duplicate addition. The personnel total is the agreed forty thousand. Make the inclusion explicit in the explanatory note.

total request

The total request combines \$64,000 direct costs with \$5,200 indirect costs, for \$69,200 subject to submission approval and the funder's decision.

Reuben: Then the total request is sixty-nine thousand two hundred, subject to internal approval. The direct costs, indirect base, rate, and overall ceiling should each remain visible.

Read the phrases aloud. Then complete the conversation on the following pages using the word bank.

Conversation

The indirect-cost rate applies to the base, not every line

A fictional foundation permits \$70,000 total costs. Agreed direct lines are personnel including benefits \$40,000, supplies \$8,000, equipment \$12,000, and travel \$4,000. Its specific terms allow 10% indirect costs on direct costs excluding equipment. These are supplied grant terms, not a general funding rule. Internal submission approval remains pending.

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

indirect costs / cost sharing / personnel total / budget justification / total request / cost base

- 01 **Mina:** My budget totals sixty-four thousand in direct costs. I added ten percent to that and got seventy thousand four hundred overall.
- 02 **Reuben:** The addition is arithmetically right, but it uses the wrong ¹ _____. This foundation excludes equipment before applying the indirect-cost rate.
- 03 **Mina:** So the twelve-thousand equipment line is removed from the calculation, not removed from the amount we are requesting.
- 04 **Reuben:** Exactly. The equipment remains a direct project cost. Subtract twelve thousand from sixty-four thousand only to calculate the eligible base.
- 05 **Mina:** That leaves fifty-two thousand. Ten percent is five thousand two hundred. I had overstated the indirect amount by twelve hundred.
- 06 **Reuben:** Correct. Those are the ² _____ under these particular terms. Use the foundation's rule here, not a rate copied from another award.

Conversation / continued

- 07 **Mina:** Then the full request is sixty-four thousand plus five thousand two hundred, or sixty-nine thousand two hundred.
- 08 **Reuben:** Yes. That is eight hundred below the seventy-thousand total-cost ceiling. It is not eight hundred of money already awarded or available to spend.
- 09 **Mina:** Should I use the spare eight hundred as a contingency line? There is no separate contingency category in this call.
- 10 **Reuben:** Do not add an unsupported ³ _____. We should request supported project costs, not fill the ceiling merely because space remains.

Conversation continues on the next page.

The indirect-cost rate applies to the base, not every line

CONVERSATION / CONTINUED

- 11 **Mina:** For personnel, the forty thousand already includes benefits. I see another benefits percentage on the spreadsheet template. That would count them twice.
- 12 **Reuben:** Remove that duplicate addition. The ⁴ _____ is the agreed forty thousand. Make the inclusion explicit in the explanatory note.
- 13 **Mina:** The foundation template also asks for effort. My commitment is twenty percent of a twelve-month appointment for this project year.
- 14 **Reuben:** That is two point four person-months. Effort describes time committed; it is not automatically an additional budget line beyond the personnel costs already calculated.
- 15 **Mina:** I will show two point four person-months and explain the salary calculation separately. We are not proposing an unpaid contribution in this budget.
- 16 **Reuben:** Good. Do not label the difference below the ceiling ⁵ _____. An unused ceiling is not an institutional promise to fund part of the project.
- 17 **Mina:** The totals now reconcile. Can I press submit, or is the internal approval still needed even though we are below the maximum?
- 18 **Reuben:** It is still needed. I will send the corrected budget for the authorized review. This calculation does not commit the university or confirm an award.
- 19 **Mina:** I will keep the submission pending and attach the foundation's costing terms, the line-item budget, and the explanations.
- 20 **Reuben:** Then the ⁶ _____ is sixty-nine thousand two hundred, subject to internal approval. The direct costs, indirect base, rate, and overall ceiling should each remain visible.

CHECK THE GAPS

1. cost base / 2. indirect costs / 3. budget justification / 4. personnel total / 5. cost sharing / 6. total request

[Why these answers fit, page 186](#)

Exclude from the base, retain in the request

A fictional grant has \$50,000 direct costs, including \$10,000 equipment. Its terms permit 15% indirect costs on direct costs excluding equipment. The total-cost ceiling is \$60,000. No award has been made.

Complete the exchange using each phrase once. Read both roles, then switch roles and repeat with the bank covered.

WORD AND PHRASE BANK

6,000 / 56,000 / 40,000 / 4,000

- 01 **Investigator:** The indirect-cost base is ¹ _____ dollars.
- 02 **Officer:** The indirect-cost amount is ² _____ dollars.
- 03 **Investigator:** The combined request is ³ _____ dollars.
- 04 **Officer:** The unused ceiling is ⁴ _____ dollars, not an award.

CHECK THE GAPS

1. 40,000 / 2. 6,000 / 3. 56,000 / 4. 4,000

[Why these answers fit, page 186](#)

Keep the distinction audible

Read back a research budget while distinguishing cost totals, exclusions, and commitments.

Language for the next case

Which manuscript can the repository release?

accepted manuscript

The accepted manuscript includes the peer-reviewed changes accepted for publication but is distinct from the publisher's formatted PDF.

Ellis: Not under this agreement. We need the accepted manuscript, including the changes accepted by the journal, before the publisher's typesetting.

embargo

The embargo delays public access to the deposited manuscript until the stated date; it does not prevent the permitted closed deposit in this case.

Ellis: Yes. The embargo controls the full-text release. We will configure the record according to these specific terms rather than assume every deposit is immediately open.

metadata

Metadata describe and identify the article and its version; they help users find the published work without substituting for full-text permissions.

Ellis: Those metadata help readers identify the work. We will also label the deposited file's version clearly so they know what they are opening.

version of record

The version of record is the formally published article; permission to link to it does not grant permission to deposit its PDF.

Ellis: We can link to the version of record through its identifier. That does not give us permission to deposit the publisher PDF when this agreement excludes it.

third-party material

Third-party material can have separate permissions; the article's deposit permission does not automatically resolve the rights to the reproduced chart.

Ellis: Flag the third-party material for a rights check before release. We should not infer its status from permission covering your own manuscript text.

release conditions

The release conditions include the October 15 date and resolution of the chart permissions; deposit alone does not satisfy both conditions.

Ellis: Correct. I will record the release conditions. We can prepare the record now without promising public access before those conditions are met.

Read the phrases aloud. Then complete the conversation on the following pages using the word bank.

Conversation

Which manuscript can the repository release?

For a fictional article published January 15, 2026, the checked agreement permits repository deposit of the accepted manuscript now, but public release only from October 15, 2026. It does not permit deposit of the publisher PDF. Today is October 1. No conflicting funder requirement applies in this case.

Complete the numbered gaps. Use each bank entry once; some entries contain several words.

WORD AND PHRASE BANK

metadata / version of record / third-party material / accepted manuscript / embargo / release conditions

- 01 **Nadia:** I have the journal PDF and would like it on my university profile today. Is that the file I should upload to the repository?
- 02 **Ellis:** Not under this agreement. We need the ¹ _____, including the changes accepted by the journal, before the publisher's typesetting.
- 03 **Nadia:** There are three files in our folder: the original submission, the accepted Word file, and the formatted journal PDF. I can supply the middle one.
- 04 **Ellis:** Please do. Check that it is the actual accepted text, not a later personal edit or a draft that predates the reviewers' changes.
- 05 **Nadia:** The formatted file has the final page numbers and logo. Would using it make the record more accurate?
- 06 **Ellis:** We can link to the ² _____ through its identifier. That does not give us permission to deposit the publisher PDF when this agreement excludes it.

Conversation / continued

- 07 **Nadia:** The article was published January fifteenth. The agreement lists October fifteenth as the public-release date. Today is October first, so I thought we were close enough.
- 08 **Ellis:** The date has not arrived. The checked terms allow deposit now with access closed, then public release on October fifteenth. We should not round the date down.
- 09 **Nadia:** So an item can be in the repository without its full text already being available to every visitor?
- 10 **Ellis:** Yes. The ³ _____ controls the full-text release. We will configure the record according to these specific terms rather than assume every deposit is immediately open.

Conversation continues on the next page.

Which manuscript can the repository release?

CONVERSATION / CONTINUED

- 11 **Nadia:** I have also attached a chart reproduced from another publisher. The article agreement does not say whether that chart can be included in repository copies.
- 12 **Ellis:** Flag the ⁴ _____ for a rights check before release. We should not infer its status from permission covering your own manuscript text.
- 13 **Nadia:** I can send the chart permission with the agreement. If that permission is limited, you will tell me what version can lawfully be made available?
- 14 **Ellis:** Yes, we will establish the permitted route with the relevant support team. Do not silently alter the accepted paper and label the result as the unmodified accepted version.
- 15 **Nadia:** For the repository description, I will add the article title, author list, journal reference, and persistent identifier.
- 16 **Ellis:** Those ⁵ _____ help readers identify the work. We will also label the deposited file's version clearly so they know what they are opening.
- 17 **Nadia:** Can I add a Creative Commons license to make it easier for people to reuse? I do not see one granted in the documents we have checked.
- 18 **Ellis:** Not on that basis alone. We need authority for the license applied to the deposited material. Availability and permission to redistribute are not the same thing.
- 19 **Nadia:** I will supply the accepted file and chart permission today. The public full text stays closed until the date and the rights check are satisfied.
- 20 **Ellis:** Correct. I will record the ⁶ _____. We can prepare the record now without promising public access before those conditions are met.

CHECK THE GAPS

1. accepted manuscript / 2. version of record / 3. embargo / 4. third-party material / 5. metadata / 6. release conditions

[Why these answers fit, page 188](#)

Deposit permission has a version and a date

A fictional checked agreement allows the accepted manuscript to be deposited now and released publicly from December 1. Today is November 20. The publisher PDF is excluded, and no third-party permissions are unresolved.

Complete the exchange using each phrase once. Read both roles, then switch roles and repeat with the bank covered.

WORD AND PHRASE BANK

embargo / excluded / manuscript / December 1

- 01 **Researcher:** The permitted file is the accepted ¹ _____.
- 02 **Librarian:** Public full-text access remains closed during the ² _____.
- 03 **Researcher:** The earliest stated public-release date is ³ _____.
- 04 **Librarian:** The publisher PDF remains ⁴ _____.

CHECK THE GAPS

1. manuscript / 2. embargo / 3. December 1 / 4. excluded

[Why these answers fit, page 188](#)

Keep the distinction audible

Identify an article version and explain a specific deposit condition without inventing broader rights.

01 / Answers and explanations

A / Read the situation

A1. What is the completion rate among tutoring participants?

A. 80%

Thirty-two completers divided by forty participants equals eighty percent.

[Return to the exercise, page 4](#)

A2. What is the difference between the two completion rates?

B. Twenty percentage points

Participant completion is eighty percent and nonparticipant completion is sixty percent, a twenty-point difference.

[Return to the exercise, page 4](#)

A3. Why is a causal claim unsupported here?

B. Tutoring was self-selected and relevant group differences are unmeasured.

Self-selection and unmeasured differences prevent the observed contrast from isolating tutoring's causal effect.

[Return to the exercise, page 4](#)

D / Response choices

D1. Which headline fits the available evidence?

A. Tutoring participation was associated with higher completion in this course cohort.

The supported headline preserves an association; the alternatives add causation, misstate relative change, or confuse sampling with assignment.

[Return to the exercise, page 9](#)

D2. Which question is still unresolved?

C. Whether tutoring caused the completion difference

The current observational records do not isolate the causal contribution of tutoring.

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01 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: A defined group observed over a specified period. Which term fits?

B. cohort

A Not here. internal validity: The credibility of the study's inference within its setting. The usual combination is "assess internal validity".

B Correct. cohort: A defined group observed over a specified period. The usual combination is "follow a student cohort".

C Not here. self-selection: Entry into a group through participants' own choices. The usual combination is "account for self-selection".

D Not here. baseline difference: A group difference present before the studied exposure or outcome. The usual combination is "examine baseline differences".

[Return to the exercise, page 9](#)

D4. Rebuild the exchange from "What exactly would it mean for tutoring to work?". Leon: "Walk me through the counts before we discuss the interpretation. Percentages can conceal different group sizes, especially when the audience sees only a headline." Imani: [missing response] Leon: "The draft says twenty percent higher. Do you mean twenty percentage points, or are you calculating a relative increase from the nonparticipant rate?" Which response belongs in the gap?

A. The participant denominator is forty, with thirty-two completing. That is eighty percent. Among sixty nonparticipants, thirty-six completed, giving sixty percent for the comparison group.

A Correct. This is Imani's response in turn 6. It connects Leon's preceding point with Leon's follow-up. The denominator is forty tutoring participants; pairing it with thirty-two completers yields the eighty-percent completion rate.

B Not here. This line belongs to turn 2, after Leon says: "The proposal asks whether tutoring works. That sounds important, but what outcome would answer the question, and whose experience are we actually observing?" It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 8, after Leon says: "The draft says twenty percent higher. Do you mean twenty percentage points, or are you calculating a relative increase from the nonparticipant rate?" It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 12, after Leon says: "Then the claim that tutoring caused the higher completion rate is stronger than the design supports. We can still report the observed relationship accurately." It addresses that point, not the missing turn in the supplied exchange.

[Return to the exercise, page 9](#)

01 / Answers and explanations / continued

E / Conversation

1. research question

Turn 2. The research question must specify what is being measured and for whom rather than relying on the broad word works.

2. outcome variable

Turn 4. The outcome variable is course completion, not every possible academic benefit that tutoring might produce.

3. denominator

Turn 6. The denominator is forty tutoring participants; pairing it with thirty-two completers yields the eighty-percent completion rate.

4. percentage-point difference

Turn 8. The percentage-point difference subtracts sixty percent from eighty percent, producing twenty points rather than a twenty-percent relative change.

5. self-selection

Turn 10. Self-selection means students chose tutoring, so the groups may differ in ways other than the tutoring exposure.

6. association

Turn 12. Association describes the observed relationship without claiming that the current design isolates a causal effect.

7. Random assignment

Turn 14. Random assignment allocates study conditions; selecting additional records randomly would not change the original self-selected tutoring exposure.

8. external validity

Turn 16. External validity concerns application beyond the studied course and cohort, which the supplied records do not establish.

9. causal effect

Turn 18. A causal effect is the contribution attributable to tutoring, which requires a suitable design beyond the current descriptive comparison.

01 / Answers and explanations / continued

10. study protocol

Turn 20. The study protocol should record the precise question, definitions, and analysis boundaries so later reporting follows the same plan.

[Return to the conversation, page 11](#)

F / Accuracy and scope

F1. Which statement about possible confounding is accurate?

D. Prior preparation or motivation may differ, but these records do not establish those differences.

The brief identifies plausible unmeasured factors, not verified explanations or adjusted estimates.

[Return to the exercise, page 15](#)

F2. Which design distinction is correct?

D. Random assignment allocates conditions; random sampling selects sample members.

The two random processes concern different stages and do not substitute for one another.

[Return to the exercise, page 15](#)

F / Guided speaking

1. 60

Researcher: The attendee completion rate is 60 percent.

Turn 1. Eighteen completers divided by thirty attendees equals sixty percent.

2. 50

Supervisor: The nonattendee rate is 50 percent.

Turn 2. Twenty completers divided by forty nonattendees equals fifty percent.

3. 10

Researcher: The difference is 10 percentage points.

Turn 3. Sixty percent minus fifty percent is ten percentage points.

4. causal effect

Supervisor: The contrast establishes an association, not a causal effect.

Turn 4. Self-selection and unmeasured differences prevent this comparison from isolating causation.

[Return to the conversation, page 16](#)

01 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "What exactly would it mean for tutoring to work?".

Leon: "A colleague proposed solving the problem by randomly sampling more records from the same optional program. Would that make tutoring itself randomly assigned?" Imani: [missing response] Leon: "Good. We should also avoid implying that one course at one institution establishes what happens for all students in every subject and setting." Which response belongs in the gap?

B. No. Random assignment concerns allocation to conditions. Random sampling concerns which people enter the sample. A larger randomly sampled record set would not retroactively randomize the tutoring decision.

A Not here. This line belongs to turn 8, after Leon says: "The draft says twenty percent higher. Do you mean twenty percentage points, or are you calculating a relative increase from the nonparticipant rate?" It addresses that point, not the missing turn in the supplied exchange.

B Correct. This is Imani's response in turn 14. It connects Leon's preceding point with Leon's follow-up. Random assignment allocates study conditions; selecting additional records randomly would not change the original self-selected tutoring exposure.

C Not here. This line belongs to turn 2, after Leon says: "The proposal asks whether tutoring works. That sounds important, but what outcome would answer the question, and whose experience are we actually observing?" It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 12, after Leon says: "Then the claim that tutoring caused the higher completion rate is stronger than the design supports. We can still report the observed relationship accurately." It addresses that point, not the missing turn in the supplied exchange.

[Return to the exercise, page 16](#)

02 / Answers and explanations

A / Read the situation

A1. What is the pilot designed to assess?

B. Recruitment and follow-up feasibility

The brief defines the pilot's scope as procedures, not efficacy or universal conclusions.

[Return to the exercise, page 18](#)

A2. What was the observed retention rate?

B. 80%

Twenty-four retained students out of thirty recruited equals eighty percent.

[Return to the exercise, page 18](#)

A3. Did both local progression criteria pass?

A. No; recruitment passed and retention did not.

Recruitment met its threshold, but eighty-percent retention fell below the specified eighty-five percent.

[Return to the exercise, page 18](#)

D / Response choices

D1. Which specific aim matches the supplied pilot?

B. Assess recruitment and follow-up procedures to refine a later study.

Recruitment and follow-up procedures are the pilot's actual focus; retention is not an attainment measure, and both stated criteria still apply.

[Return to the exercise, page 22](#)

D2. How many retained participants would meet at least 85% of thirty?

D. Twenty-six

Twenty-six out of thirty exceeds eighty-five percent, whereas twenty-five is below it.

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02 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: Whether proposed methods can be carried out practicably. Which term fits?

B. feasibility

A Not here. follow-up: A later observation or contact after the initial stage. The usual combination is "complete follow-up".

B Correct. feasibility: Whether proposed methods can be carried out practicably. The usual combination is "assess feasibility".

C Not here. precision: The degree of uncertainty around an estimate. The usual combination is "discuss estimate precision".

D Not here. rationale: The reasoning that justifies the proposed work. The usual combination is "strengthen the study rationale".

[Return to the exercise, page 22](#)

D4. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "The preparatory work enrolled thirty students in four weeks. Remind me whether that matches the target set before the results were available." Sora: [missing response] Ben: "Can we replace good retention with the actual rate? We kept twenty-four of thirty, and the milestone table still says eighty-five percent." Which response belongs in the gap?

A. It meets the recruitment criterion of at least thirty within four weeks. We should report that success, while checking the other criterion separately instead of treating enrollment as the whole feasibility assessment.

A Correct. This is Sora's response in turn 6. It connects Ben's preceding point with Ben's follow-up. Recruitment concerns bringing students into the study; thirty within four weeks meets the supplied local recruitment threshold.

B Not here. This line belongs to turn 4, after Ben says: "We can keep the wider educational problem in the significance section. Reviewers still need a concrete account of what this grant would deliver now." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 20, after Ben says: "I will revise the aims, summary, and milestone table together. They should all say recruitment passed, retention did not, and the next planning step requires review." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 10, after Ben says: "Would twenty-five retained students meet the threshold? We need to translate the percentage into a whole-participant count." It addresses that point, not the missing turn in the supplied exchange.

[Return to the exercise, page 22](#)

02 / Answers and explanations / continued

E / Conversation

1. specific aim

Turn 2. The specific aim must describe the work this study can address, which is procedural feasibility rather than definitive attainment improvement.

2. deliverable

Turn 4. The deliverable is the practical output of the pilot, here a refined and tested procedure for later research.

3. recruitment

Turn 6. Recruitment concerns bringing students into the study; thirty within four weeks meets the supplied local recruitment threshold.

4. retention

Turn 8. Retention is twenty-four of thirty recruited students, or eighty percent, at the specified follow-up point.

5. progression criterion

Turn 10. The progression criterion requires at least eighty-five percent, which with thirty recruited students needs at least twenty-six retained.

6. contingency

Turn 12. A contingency addresses the failed milestone through redesign or explicit review rather than ignoring or silently changing the predefined rule.

7. Feasibility

Turn 14. Feasibility concerns whether the proposed methods can be carried out, which is distinct from the intervention's effect on attainment.

8. funding decision

Turn 16. A funding decision is made by the relevant funder and is not guaranteed by satisfying an internal planning milestone.

9. scope

Turn 18. Scope defines what the pilot will do and claim, preventing the long-term research ambition from becoming an unsupported present promise.

02 / Answers and explanations / continued

10. rationale

Turn 20. The rationale explains why the bounded pilot work remains valuable while acknowledging the evidence and unresolved milestone.

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F / Accuracy and scope

F1. What is the correct progression statement?

C. Recruitment passed, but retention requires redesign or explicit review before progression.

Both criteria were required, and the retention shortfall prevents automatic progression under that rule.

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F2. What does the retention result say about efficacy?

C. It does not establish whether the workshop improves attainment.

Retention describes follow-up feasibility, not the workshop's effect on academic attainment.

[Return to the exercise, page 28](#)

F / Guided speaking

1. met

Researcher: The recruitment condition was met.

Turn 1. Twenty students were recruited within the stated three-week window.

2. 85

Adviser: Retention was 85 percent.

Turn 2. Seventeen divided by twenty equals eighty-five percent, below ninety percent.

3. 18

Researcher: At least 18 retained students were required.

Turn 3. Eighteen out of twenty equals the required ninety-percent retention threshold.

4. not supported

Adviser: Automatic progression is not supported under the stated rule.

Turn 4. Only recruitment passed, while the rule requires both conditions to be satisfied.

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02 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "That does not mean the workshop is educationally ineffective. The missing follow-up information concerns the study procedure, and the pilot was not an efficacy trial." Sora: [missing response] Ben: "I will also remove the sentence promising a future award once the pilot milestones pass. Our internal progression rule cannot bind a funder's decision." Which response belongs in the gap?

D. Correct. Feasibility and efficacy are different questions. The result tells us the retention procedure missed our local target; it does not establish whether the workshop improves attainment.

A Not here. This line belongs to turn 2, after Ben says: "The draft says this pilot will establish that the workshop improves attainment. Is that really the question the small study was designed to answer?" It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 18, after Ben says: "The grant can remain ambitious: a clear problem, a bounded pilot, and a reasoned route toward a definitive study." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 8, after Ben says: "Can we replace good retention with the actual rate? We kept twenty-four of thirty, and the milestone table still says eighty-five percent." It addresses that point, not the missing turn in the supplied exchange.

D Correct. This is Sora's response in turn 14. It connects Ben's preceding point with Ben's follow-up. Feasibility concerns whether the proposed methods can be carried out, which is distinct from the intervention's effect on attainment.

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03 / Answers and explanations

A / Read the situation

A1. What changed between the runs?

D. Exposure time increased from ten to twenty seconds.

Instrument files establish different exposure times for the two recorded measurements.

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A2. What is not yet established?

C. Whether exposure time explains the entire signal difference

The method difference is known, but its full contribution to the result has not been tested.

[Return to the exercise, page 33](#)

A3. How should the documentation be corrected?

D. Add a dated correction while preserving the original record.

Transparent correction preserves provenance without concealing the original omission or inventing a misconduct finding.

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D / Response choices

D1. Which sentence accurately reports the signal contrast?

C. Run B is 60 units, or 50%, higher than Run A.

One hundred eighty minus one hundred twenty is sixty, which is half of the original value.

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D2. Why is dividing Run B by two not justified as a correction?

C. Proportional signal response to exposure has not been established.

Scaling assumes a relationship that the brief explicitly says has not been verified.

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03 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: Original recorded observations before later processing. Which term fits?

B. raw data

A Not here. dated correction: A visible amendment recording when a correction was made. The usual combination is "add a dated correction".

B Correct. raw data: Original recorded observations before later processing. The usual combination is "preserve raw data".

C Not here. linear response: A straight-line input-output relationship over a specified range, possibly with a nonzero offset. The usual combination is "verify a linear response".

D Not here. protocol version: The identified revision of a study procedure. The usual combination is "record the protocol version".

[Return to the exercise, page 37](#)

D4. Rebuild the exchange from "The repeated run was not performed the same way". Priya: "The exposure doubled, so somebody suggested halving the second signal and treating that as the comparable result. Have we established a proportional response?" Alex: [missing response] Priya: "Check whether the detector reaches a ceiling or other conditions differed. The exposure change is a lead, not a complete explanation." Which response belongs in the gap?

C. No. A linear response has not been verified here. Even a straight-line response could include background signal. We cannot simply halve one raw value and call it corrected.

A Not here. This line belongs to turn 10, after Priya says: "How will the correction show when we discovered the omitted setting, without hiding the original note?" It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 12, after Priya says: "Good. That also avoids implying misconduct before anything has been investigated. The immediate issue is an incomplete method record and a result needing explanation." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Alex's response in turn 6. It connects Priya's preceding point with Priya's follow-up. A linear response can include an offset; proportional rescaling also requires a justified zero or background correction and a validated range.

D Not here. This line belongs to turn 2, after Priya says: "The slide calls Run B a repeat, but its signal is one hundred eighty units rather than one hundred twenty. Were the measurement conditions actually matched?" It addresses that point, not the missing turn in the supplied exchange.

[Return to the exercise, page 37](#)

E / Conversation

1. instrument setting

Turn 2. The instrument setting difference is established by the files: exposure was ten seconds in one run and twenty in the other.

03 / Answers and explanations / continued

2. raw data

Turn 4. Raw data preserves the original observations and settings, allowing later checks without losing an inconvenient result.

3. linear response

Turn 6. A linear response can include an offset; proportional rescaling also requires a justified zero or background correction and a validated range.

4. saturation

Turn 8. Saturation could make the signal response nonproportional, but it is only a possibility to investigate in this case.

5. dated correction

Turn 10. A dated correction records the discovery transparently while preserving the original note and the history of the omission.

6. provenance

Turn 12. Provenance records the origin and history of the data and corrections, making the discrepancy traceable without prejudging responsibility.

7. controlled comparison

Turn 14. A controlled comparison holds relevant settings consistent so the team can investigate the discrepancy more meaningfully.

8. technical replicates

Turn 16. The planned matched measurements assess measurement variability on the same material, not additional independent biological samples.

9. hypothesis

Turn 18. The hypothesis proposes that the method change contributes to the discrepancy, but it still requires testing rather than being reported as established.

10. repeatability check

Turn 20. The same operator, instrument, method, location, and session specify repeatability conditions, unlike a changed-condition measurement reproducibility study.

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03 / Answers and explanations / continued

F / Accuracy and scope

F1. What is the next useful comparison?

B. A documented repeat with matched settings and preserved raw records

Matching and documenting conditions helps examine the discrepancy without concealing existing evidence.

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F2. Which conclusion should be avoided?

C. The omitted note proves research misconduct.

An omission requires examination and correction but does not by itself establish a misconduct finding.

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F / Guided speaking

1. difference

Researcher: The gain change is a verified method difference.

Turn 1. The instrument records establish a setting difference, not merely a suspected change.

2. untested

Lead: Its causal contribution remains untested.

Turn 2. No check has isolated the effect of the setting change.

3. dated correction

Researcher: The notebook needs a dated correction.

Turn 3. A dated correction transparently records the omission without rewriting the past.

4. preserved

Lead: Both original files should be preserved.

Turn 4. Retaining original records allows later verification and avoids selective removal of evidence.

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03 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "The repeated run was not performed the same way".

Priya: "For the next measurement, we need documented matched settings and a clear plan. Simply running the instrument again would not address the comparison problem." **Alex:** [missing response] **Priya:** "For that repeat, keep the operator, instrument, location, and procedure the same within one session. We are testing measurement consistency, not collecting new biological samples." Which response belongs in the gap?

C. I will propose a controlled comparison using matched settings and retained raw files. We should specify the protocol version and checks in advance, so another undocumented change does not create the same uncertainty.

A Not here. This line belongs to turn 16, after Priya says: "For that repeat, keep the operator, instrument, location, and procedure the same within one session. We are testing measurement consistency, not collecting new biological samples." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 8, after Priya says: "Check whether the detector reaches a ceiling or other conditions differed. The exposure change is a lead, not a complete explanation." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Alex's response in turn 14. It connects Priya's preceding point with Priya's follow-up. A controlled comparison holds relevant settings consistent so the team can investigate the discrepancy more meaningfully.

D Not here. This line belongs to turn 4, after Priya says: "Preserve both files, including the unexpected result, before correcting the notes. We need the original evidence intact." It addresses that point, not the missing turn in the supplied exchange.

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04 / Answers and explanations

A / Read the situation

A1. Why are the coded interviews not automatically anonymous to this team?

C. The team can access the code-to-participant key.

The accessible linking key allows the team to connect codes with participants.

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A2. Who determines the permitted route under the supplied local rule?

C. The designated ethics office

The fictional institutional procedure assigns the determination to its designated ethics office.

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A3. What can Tessa do now?

D. Prepare the proposal and gather the existing approval and consent documents.

Preparatory documentation is permitted, while the new use and sharing must await the required determination.

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D / Response choices

D1. Which description should be sent to the ethics office?

C. Coded interviews with a linking key accessible to the research team

The correct description accurately reports the team's actual ability to link codes with people.

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D2. What does the old approval establish about this new purpose?

D. Nothing conclusive until its scope is checked against the proposal.

The original materials have not been reviewed against the new use, so their coverage cannot be assumed.

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04 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: A U.S. committee reviewing covered human-subjects research. Which term fits?

A. institutional review board

A Correct. institutional review board: A U.S. committee reviewing covered human-subjects research. The usual combination is "consult the institutional review board".

B Not here. de-identification: Removing or reducing identifying information under a specified method. The usual combination is "document de-identification".

C Not here. protocol amendment: A proposed change to an approved research protocol. The usual combination is "submit a protocol amendment".

D Not here. voluntariness: Freedom to choose participation without improper pressure. The usual combination is "protect voluntariness".

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D4. Rebuild the exchange from "Possessing the data is not permission for a new use". Tessa: "Yes, the team can access the key. The draft should state that plainly rather than imply there is no possible connection with the people interviewed."

Omar: [missing response] Tessa: "I have the original participant information and consent documents, but I have not checked whether the employment question is within what they describe." Which response belongs in the gap?

B. Exactly. The linking key must be included in the access description. Coding alone does not establish anonymity to your team, and changing the label would not change the underlying arrangement.

A Not here. This line belongs to turn 4, after Tessa says: "The interviews came from our student-stress study. They use participant codes rather than names, so I initially described them as anonymous in the draft." It addresses that point, not the missing turn in the supplied exchange.

B Correct. This is Omar's response in turn 6. It connects Tessa's preceding point with Tessa's follow-up. The linking key connects the interview codes to participant identities and must be disclosed in the description of access conditions.

C Not here. This line belongs to turn 16, after Tessa says: "The collaborator says they only want to check the available variables. Could I send a description of the proposed fields instead of the interviews?" It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 14, after Tessa says: "I can say an amendment might be needed, but none is approved. The draft wrongly implies approval is routine." It addresses that point, not the missing turn in the supplied exchange.

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04 / Answers and explanations / continued

E / Conversation

1. review status

Turn 2. The review status is unresolved: the required determination has not been made, so the new analysis cannot start under the supplied rule.

2. coded data

Turn 4. Coded data uses substitute labels but may remain identifiable through a linking key, which this team can access.

3. linking key

Turn 6. The linking key connects the interview codes to participant identities and must be disclosed in the description of access conditions.

4. consent scope

Turn 8. Consent scope concerns the uses covered by the relevant participant materials, which have not been checked against the new purpose.

5. purpose change

Turn 10. The purpose change distinguishes the proposed employment-discrimination question from the original student-stress research and requires assessment.

6. authorized determination

Turn 12. The authorized determination is made by the designated ethics office, not inferred by collaborators or the researcher from possession of the files.

7. protocol amendment

Turn 14. A protocol amendment is a proposed change to approved work and must not be described as already authorized when none has been granted.

8. access restriction

Turn 16. The access restriction remains in force for the interviews while the determination is pending; a general description does not authorize disclosure.

9. data-use agreement

Turn 18. A data-use agreement can describe intended access and use conditions, but it does not replace the required ethics determination.

04 / Answers and explanations / continued

10. secondary use

Turn 20. Secondary use is the proposed reuse for a new research purpose, which remains pending rather than already permitted.

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F / Accuracy and scope

F1. Which message to a collaborator is accurate?

D. "The proposed access awaits the designated ethics determination."

The correct message states the pending status without inventing approval or participant agreement.

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F2. Which preparatory step respects the supplied boundary?

A. Gather documents and describe the proposed use without beginning analysis or sharing.

The local procedure permits proposal preparation while holding the proposed research use and disclosure.

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F / Guided speaking

1. anonymous

Researcher: The files are coded, not automatically anonymous.

Turn 1. The accessible linking key means coding does not establish anonymity to the team.

2. determination

Coordinator: The proposed use still awaits an authorized determination.

Turn 2. Sending the request does not complete the required institutional decision.

3. key

Researcher: Our team can access the linking key.

Turn 3. The brief confirms that the team can link participant codes to identities.

4. pending

Coordinator: We can accurately report that review is pending.

Turn 4. No decision has been issued, so pending is the supported status.

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04 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "Possessing the data is not permission for a new use".
Tessa: "I can say an amendment might be needed, but none is approved. The draft wrongly implies approval is routine." **Omar:** [missing response] **Tessa:** "The collaborator says they only want to check the available variables. Could I send a description of the proposed fields instead of the interviews?" Which response belongs in the gap?

B. Keep any protocol amendment conditional. A plausible route is not a completed decision. Likewise, no waiver or new consent has been granted, so neither should appear as an established fact.

A Not here. This line belongs to turn 6, after Tessa says: "Yes, the team can access the key. The draft should state that plainly rather than imply there is no possible connection with the people interviewed." It addresses that point, not the missing turn in the supplied exchange.

B Correct. This is Omar's response in turn 14. It connects Tessa's preceding point with Tessa's follow-up. A protocol amendment is a proposed change to approved work and must not be described as already authorized when none has been granted.

C Not here. This line belongs to turn 4, after Tessa says: "The interviews came from our student-stress study. They use participant codes rather than names, so I initially described them as anonymous in the draft." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 16, after Tessa says: "The collaborator says they only want to check the available variables. Could I send a description of the proposed fields instead of the interviews?" It addresses that point, not the missing turn in the supplied exchange.

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05 / Answers and explanations

A / Read the situation

A1. What substantive contribution has Harper made?

C. Designed and performed the main analysis

The brief records Harper's analysis design and execution as the substantive contribution.

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A2. Does funding alone establish Nolan's authorship under the stated criteria?

B. No

The adopted criteria require more than obtaining funding alone.

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A3. What should happen before the author list is finalized?

C. Give Harper a genuine opportunity to review, approve, and accept the relevant responsibilities.

A substantive contributor should not be excluded by denying opportunities to fulfill the remaining criteria.

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D / Response choices

D1. Which statement about Harper is supported?

A. Harper has a substantive analysis contribution and outstanding authorship responsibilities.

The analysis is documented, while review, final approval, and related responsibilities remain to be completed.

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D2. Which action would unfairly block completion of the criteria?

D. Withholding the manuscript and then citing lack of review as a reason for exclusion

The contributor cannot fulfill review responsibilities if the group denies the opportunity to do so.

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05 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: The sequence in which authors are listed. Which term fits?

C. author order

A Not here. data curation: Organizing and maintaining data for use. The usual combination is "describe data curation".

B Not here. omitted contributor: A contributor whose relevant work is not properly recognized. The usual combination is "address an omitted contributor".

C Correct. author order: The sequence in which authors are listed. The usual combination is "discuss author order".

D Not here. accountability: Responsibility for addressing the work's accuracy and integrity. The usual combination is "accept accountability".

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D4. Rebuild the exchange from "Credit follows contributions, not job titles". Harper: "The journal uses ICMJE criteria, so I understand that doing the analysis is not the only responsibility. What still needs to happen before submission?" Marta: [missing response] Harper: "I will review the full paper and discuss the analysis. Please do not claim my approval before that happens." Which response belongs in the gap?

C. Beyond the substantive work and intellectual review, we need final approval of the publication version and agreement on accountability. Those are real responsibilities, not boxes we can mark on someone's behalf.

A Not here. This line belongs to turn 16, after Harper says: "Who will communicate with the journal? People sometimes describe that role as though it always means first author." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 12, after Harper says: "I also need us to discuss order. I had expected first authorship for the analysis work, but I realize we never agreed that as a group." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Marta's response in turn 6. It connects Harper's preceding point with Harper's follow-up. Final approval concerns the identified publication version and cannot be assumed before Harper has seen and agreed to it.

D Not here. This line belongs to turn 4, after Harper says: "Nobody sent me the manuscript. I need to check whether the methods and interpretation describe my work correctly." It addresses that point, not the missing turn in the supplied exchange.

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E / Conversation

1. contribution statement

Turn 2. A contribution statement records the actual work performed, providing a factual basis for the credit discussion.

05 / Answers and explanations / continued

2. critical review

Turn 4. Critical review is an intellectual examination of the manuscript, which Harper should be able to undertake rather than being excluded for not receiving it.

3. final approval

Turn 6. Final approval concerns the identified publication version and cannot be assumed before Harper has seen and agreed to it.

4. Accountability

Turn 8. Accountability connects authorship with responsibility for addressing accuracy and integrity questions, not merely receiving credit.

5. funding acquisition

Turn 10. Funding acquisition is a contribution to recognize, but by itself does not meet the adopted journal's authorship criteria.

6. author order

Turn 12. Author order is a separate collective decision and is not automatically determined by identifying one substantive contribution.

7. contributorship

Turn 14. Contributorship describes each person's work and helps the group avoid overlooking relevant contributions while assessing the author list.

8. corresponding author

Turn 16. The corresponding author handles journal communications, a role distinct from a guaranteed first position in the byline.

9. dispute resolution

Turn 18. Dispute resolution provides a process for unresolved authorship disagreement rather than treating submission or hierarchy as a substitute for agreement.

10. byline

Turn 20. The byline is the eventual list of authors, which should reflect resolved eligibility and agreed responsibilities rather than the current informal draft.

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05 / Answers and explanations / continued

F / Accuracy and scope

F1. What does Nolan's funding-only role establish?

B. A contribution to record, but not sufficient authorship under the adopted criteria

Funding is a real contribution but does not alone meet the journal's stated authorship requirements.

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F2. What remains unresolved after identifying a substantive contribution?

D. Completion of the remaining responsibilities and agreement on the author list and order

Substantive contribution is only part of the process, and the brief leaves final authorship decisions unsettled.

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F / Guided speaking

1. contribution

Lead: The methods work is a substantive contribution.

Turn 1. The supplied methods work satisfies the stated substantive-contribution element.

2. critical review

Collaborator: Receiving the manuscript gives me an opportunity for critical review.

Turn 2. Circulation enables review but does not mean that intellectual review has already occurred.

3. outstanding

Lead: Final approval remains outstanding.

Turn 3. The brief states that no final approval has yet been recorded.

4. author order

Collaborator: Eligibility alone does not settle author order.

Turn 4. The ordering decision remains separate and explicitly unresolved in this case.

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05 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "Credit follows contributions, not job titles". Harper: "Please invite the data collection and curation leads too. I do not want us settling my position without hearing what everyone else contributed." Marta: [missing response] Harper: "Who will communicate with the journal? People sometimes describe that role as though it always means first author." Which response belongs in the gap?

A. Yes. Accurate contributorship requires the whole project's contribution record. We should not decide credit solely through the loudest objection, personal seniority, or who happened to see the draft first.

A Correct. This is Marta's response in turn 14. It connects Harper's preceding point with Harper's follow-up. Contributorship describes each person's work and helps the group avoid overlooking relevant contributions while assessing the author list.

B Not here. This line belongs to turn 6, after Harper says: "The journal uses ICMJE criteria, so I understand that doing the analysis is not the only responsibility. What still needs to happen before submission?" It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 18, after Harper says: "If the group still cannot agree after reviewing contributions and responsibilities, we need a fair route forward rather than submitting an unresolved list." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 4, after Harper says: "Nobody sent me the manuscript. I need to check whether the methods and interpretation describe my work correctly." It addresses that point, not the missing turn in the supplied exchange.

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06 / Answers and explanations

A / Read the situation

A1. What did the study directly measure?

C. Self-reported confidence after one workshop

The measured outcome was post-workshop confidence, not demonstrated learning or change.

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A2. Which original claim goes beyond the evidence?

C. The workshop improves learning for all adults.

The original claim substitutes learning for confidence and extends beyond the study population and design.

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A3. What has been done for this revision?

D. Wording is being corrected; no new data or reanalysis has occurred.

The brief permits a reporting correction and explicitly states no new data or reanalysis.

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D / Response choices

D1. Which revised claim is supported?

A. Sixty volunteer students at one campus reported mean post-workshop confidence of 7.1 out of ten.

The supported statement reports the measured outcome and sample without inventing a baseline or causal design.

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D2. Which response accurately describes the work?

A. The abstract and conclusion are narrowed; no reanalysis was performed.

The revision changes interpretation and reporting, not the dataset or analysis.

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06 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: A reply organized against each review issue. Which term fits?

D. point-by-point response

A Not here. limitation: A feature restricting interpretation or application. The usual combination is "state the study limitation".

B Not here. self-report: Information supplied by participants about themselves. The usual combination is "distinguish self-report from direct measurement".

C Not here. conclusion: The manuscript's final interpretation or takeaway. The usual combination is "narrow the conclusion".

D Correct. point-by-point response: A reply organized against each review issue. The usual combination is "provide a point-by-point response".

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D4. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "We also had no comparison group. Narrowing the claim should therefore address both the measured outcome and the lack of a design supporting that causal language." Luca: [missing response] Mei: "What about all adults? Even if we had measured learning, sixty volunteers at one campus would not establish the same result in every adult population." Which response belongs in the gap?

C. State the limitation directly. The study reports post-workshop confidence in this sample. It does not isolate the workshop's effect, and revising the wording does not change that design boundary.

A Not here. This line belongs to turn 14, after Mei says: "I will add the page and line numbers after the revised file is finalized. The current numbers could shift as we edit the abstract." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 18, after Mei says: "I have written limitation addressed. That sounds as though we fixed the study design. Would limitation clarified describe what we actually did?" It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Luca's response in turn 6. It connects Mei's preceding point with Mei's follow-up. The limitation restricts interpretation; making it explicit does not retroactively add a baseline or comparison group.

D Not here. This line belongs to turn 8, after Mei says: "What about all adults? Even if we had measured learning, sixty volunteers at one campus would not establish the same result in every adult population." It addresses that point, not the missing turn in the supplied exchange.

[Return to the exercise, page 78](#)

06 / Answers and explanations / continued

E / Conversation

1. construct

Turn 2. The measured construct was self-reported confidence, not demonstrated learning, so the original claim described a different outcome.

2. post-only measure

Turn 4. A post-only measure records the state after the workshop without a baseline from which to calculate improvement.

3. limitation

Turn 6. The limitation restricts interpretation; making it explicit does not retroactively add a baseline or comparison group.

4. overgeneralization

Turn 8. Overgeneralization extends the conclusion beyond the volunteer, single-campus sample without supporting evidence.

5. revised manuscript

Turn 10. The revised manuscript must use consistent claim boundaries across sections, rather than correcting only one quoted sentence.

6. point-by-point response

Turn 12. A point-by-point response links the specific reviewer concern to the corresponding explanation and revision.

7. page-and-line reference

Turn 14. A page-and-line reference must match the revised version so the reviewer can locate the actual correction.

8. reanalysis

Turn 16. Reanalysis means new analysis of existing data, which the brief explicitly says has not occurred.

9. revision

Turn 18. The revision clarifies the interpretation and limitation rather than eliminating the underlying design constraint.

06 / Answers and explanations / continued

10. editorial decision

Turn 20. The editorial decision remains with the journal; a valid correction does not guarantee acceptance.

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F / Accuracy and scope

F1. What does acknowledging the limitation accomplish?

B. Makes the interpretation more accurate without removing the design constraint

Explicit reporting improves transparency but cannot alter how the completed study was designed.

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F2. Which locator should the response use?

C. Page and line numbers verified against the revised manuscript

Accurate locations let the reviewer find the actual correction in the submitted revision.

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F / Guided speaking

1. satisfaction

Author: The measured outcome was satisfaction.

Turn 1. The survey asks about satisfaction, not directly observed performance.

2. baseline

Reviewer: The study cannot calculate improvement without a baseline.

Turn 2. A post-only observation lacks the starting measure needed for a before-and-after change.

3. revision

Author: The work completed here is a wording revision.

Turn 3. The authors changed the claim without collecting data or performing a new analysis.

4. eliminated

Reviewer: The design limitation is explicit, not eliminated.

Turn 4. More accurate wording does not change the completed study's design.

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06 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "I will add the page and line numbers after the revised file is finalized. The current numbers could shift as we edit the abstract." Luca: [missing response] Mei: "Someone suggested claiming additional analyses. We have not done them, and an impressive-sounding statement would not solve the problem." Which response belongs in the gap?

D. A checked page-and-line reference matters. Use the submitted revision's locations, not an earlier draft's numbering. We should also keep the response wording consistent with the actual replacement text.

A Not here. This line belongs to turn 4, after Mei says: "The mean was seven point one on a ten-point scale. That observed number can remain, provided we do not call it a seven-point improvement." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 6, after Mei says: "We also had no comparison group. Narrowing the claim should therefore address both the measured outcome and the lack of a design supporting that causal language." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 8, after Mei says: "What about all adults? Even if we had measured learning, sixty volunteers at one campus would not establish the same result in every adult population." It addresses that point, not the missing turn in the supplied exchange.

D Correct. This is Luca's response in turn 14. It connects Mei's preceding point with Mei's follow-up. A page-and-line reference must match the revised version so the reviewer can locate the actual correction.

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07 / Answers and explanations

A / Read the situation

A1. What does -999 represent in this dataset?

B. A failed reading coded as missing

The collector explicitly confirms that minus nine hundred ninety-nine is the failed-reading code.

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A2. What is the mean of the four valid temperatures?

B. 23 degrees Celsius

The valid values sum to ninety-two, and ninety-two divided by four equals twenty-three.

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A3. How should 04/05/26 be represented unambiguously after confirmation?

C. 2026-05-04

The collector confirms May fourth, twenty twenty-six, which matches the year-month-day representation.

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D / Response choices

D1. Which data-handling description is correct?

D. Preserve the raw file and convert the sentinel to missing in a documented analysis copy.

Preserving the raw file retains provenance. The documented analysis copy applies the collector's confirmed missing-value rule without inventing a measurement.

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D2. What does using four valid observations imply?

D. No value has been imputed for the failed reading.

The calculation uses observed values only and does not estimate the failed measurement.

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07 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: The scale used to express a quantity. Which term fits?

B. unit of measurement

A Not here. date format: The convention used to represent a calendar date. The usual combination is "standardize the date format".

B Correct. unit of measurement: The scale used to express a quantity. The usual combination is "specify units of measurement".

C Not here. raw file: The original dataset before later cleaning or transformation. The usual combination is "preserve the raw file".

D Not here. readme: An introductory file explaining a dataset or project. The usual combination is "include a readme".

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D4. Rebuild the exchange from "The missing-value code is not a temperature". Ravi: "Including the code gives a mean of minus one hundred eighty-one point four, which is not the supported calculation." Elena: [missing response] Ravi: "Replacing the code with zero would give eighteen point four instead. That is also wrong for this requested mean, even though it looks less obviously unusual." Which response belongs in the gap?

A. Use the four valid observations for this mean: twenty, twenty-two, twenty-four, and twenty-six. They sum to ninety-two, so the mean is twenty-three degrees Celsius. State the four-observation base alongside it.

A Correct. This is Elena's response in turn 6. It connects Ravi's preceding point with Ravi's follow-up. The valid observations are twenty, twenty-two, twenty-four, and twenty-six, excluding the failed-reading code from the stated mean.

B Not here. This line belongs to turn 18, after Ravi says: "I will add the software version and dependencies to the readme. Could you check that the instructions start from the raw file?" It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 10, after Ravi says: "I can make a separate cleaned file. Should the original keep minus nine hundred ninety-nine so the transformation can be checked later?" It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 12, after Ravi says: "There is also a date labeled zero-four slash zero-five slash twenty-six. The collector says it means May fourth, twenty twenty-six, not April fifth." It addresses that point, not the missing turn in the supplied exchange.

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07 / Answers and explanations / continued

E / Conversation

1. unit of measurement

Turn 2. The unit of measurement must come from verified collection information; the collector confirms degrees Celsius in this case.

2. missing-value code

Turn 4. The missing-value code represents an absent valid reading, not an observed temperature or a zero measurement.

3. valid observations

Turn 6. The valid observations are twenty, twenty-two, twenty-four, and twenty-six, excluding the failed-reading code from the stated mean.

4. imputation

Turn 8. Imputation would estimate a replacement value, whereas this case calculates a mean from four observed temperatures without filling the missing reading.

5. raw file

Turn 10. The raw file retains the original record, including its sentinel, while documented transformations belong in a separate derived copy.

6. date format

Turn 12. The date format should reflect the confirmed May fourth date, written as 2026-05-04 rather than guessed from regional convention.

7. time zone

Turn 14. The time zone anchors the collection time; 09:00 UTC is more precise than an unspecified nine o'clock.

8. transformation log

Turn 16. The transformation log records conversion of the sentinel and the calculation rule so the result can be traced to the original data.

9. software environment

Turn 18. The software environment identifies the tools and versions used to produce the result, supporting a repeatable computation.

07 / Answers and explanations / continued

10. computational reproducibility

Turn 20. Computational reproducibility checks whether the specified data and steps reproduce the result, not whether every scientific assumption is thereby validated.

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F / Accuracy and scope

F1. Why is the collector's date confirmation necessary?

A. The original numeric label could otherwise be interpreted in different date orders.

The source label is ambiguous without verified knowledge of its intended date convention.

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F2. Which release package best supports reproducibility?

B. Data, dictionary, processing steps, and the identified software environment

Interpretable data and traceable computation allow another analyst to understand and rerun the result.

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F / Guided speaking

1. three

Analyst: There are three valid observations.

Turn 1. Ten, twelve, and fourteen are valid; the sentinel marks the missing reading.

2. 12

Steward: Their mean is 12 degrees Celsius.

Turn 2. The three valid values sum to thirty-six, which divided by three equals twelve.

3. original file

Analyst: The raw sentinel is retained in the original file.

Turn 3. The source record remains unchanged while a derived copy handles missing values.

4. imputed

Steward: No missing temperature has been imputed.

Turn 4. The calculation uses observed values rather than estimating a replacement temperature.

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07 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "The missing-value code is not a temperature". Ravi: "The readings were taken at nine in the morning UTC. I will include that reference, because nine o'clock alone could mean different local times." Elena: [missing response] Ravi: "The data dictionary will define t, the Celsius unit, the failed-reading code, and the confirmed date and time conventions. What else belongs in the release?" Which response belongs in the gap?

C. Yes, the time zone belongs with the collection information. Keep the timestamp meaning explicit so another researcher does not align these readings with observations from a different hour.

A Not here. This line belongs to turn 20, after Ravi says: "I will ask another analyst to follow the release instructions and reproduce the twenty-three-degree mean from the preserved source and documented rules." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 6, after Ravi says: "Including the code gives a mean of minus one hundred eighty-one point four, which is not the supported calculation." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Elena's response in turn 14. It connects Ravi's preceding point with Ravi's follow-up. The time zone anchors the collection time; 09:00 UTC is more precise than an unspecified nine o'clock.

D Not here. This line belongs to turn 4, after Ravi says: "The collector confirmed that minus nine hundred ninety-nine codes a failed reading, not a cold observation." It addresses that point, not the missing turn in the supplied exchange.

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08 / Answers and explanations

A / Read the situation

A1. What change was observed in mean response time?

D. A reduction of 60 milliseconds, or 10%

Six hundred minus five hundred forty is sixty milliseconds, one tenth of the initial mean.

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A2. Which alternative explanations are not isolated?

B. Practice and order effects

The fixed sequence and absent untrained group leave practice and order effects unresolved.

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A3. What should Noor say about a confidence interval?

B. None is supplied here, so no interval should be invented.

The brief provides no interval calculation, so the response must not fabricate one.

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D / Response choices

D1. Which opening best answers the audience's question?

C. "No; the study reports a task-specific change, not proof of the general theory."

The correct opening directly rejects the overstatement while preserving the actual observed result.

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D2. Which causal claim is unsupported?

B. Training alone caused the entire reduction.

The missing comparison group and fixed order leave alternatives to a training-only explanation.

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08 / Answers and explanations / continued

D3. A colleague needs the term for this meaning: The concise main point an audience should retain. Which term fits?

D. take-home message

A Not here. controlled follow-up: A later study designed to address relevant alternative explanations. The usual combination is "propose a controlled follow-up".

B Not here. practice effect: A performance change associated with repeated task exposure. The usual combination is "consider a practice effect".

C Not here. generalizability: The extent to which results apply beyond the study context. The usual combination is "assess generalizability".

D Correct. take-home message: The concise main point an audience should retain. The usual combination is "clarify the take-home message".

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D4. Rebuild the exchange from "Answer the challenge without claiming universal proof". Audience member: "Did different groups perform the before and after conditions, or were these repeated observations from the same people?" Noor: [missing response] Audience member: "People may be faster through practice. How did you separate that possibility from training?" Which response belongs in the gap?

A. It was a within-participant comparison. Everyone completed the before condition and then the after condition in the same order. That controls neither every time-related influence nor the effect of repeating the task.

A Correct. This is Noor's response in turn 6. It connects Audience member's preceding point with Audience member's follow-up. A within-participant comparison uses observations from the same people, here before and after in a fixed sequence.

B Not here. This line belongs to turn 12, after Audience member says: "What confidence interval surrounds the reduction? It would help us judge how much uncertainty there is around the estimated change." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 4, after Audience member says: "What percentage is that reduction? We need the initial response time to interpret its relative size." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 20, after Audience member says: "Thank you. That distinguishes the observed change from a general explanation. The planned test sounds like the important next step." It addresses that point, not the missing turn in the supplied exchange.

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E / Conversation

1. central finding

Turn 2. The central finding is the observed response-time reduction in the supplied task and sample, not universal proof of the theory.

08 / Answers and explanations / continued

2. response time

Turn 4. Response time is the measured task duration; sixty milliseconds is ten percent of the initial six-hundred-millisecond mean.

3. within-participant comparison

Turn 6. A within-participant comparison uses observations from the same people, here before and after in a fixed sequence.

4. practice effect

Turn 8. A practice effect is an alternative explanation arising from repeated task exposure, which the current design does not separate from training.

5. mechanism

Turn 10. The mechanism is an explanation for performance, not something established merely by observing lower response times.

6. confidence interval

Turn 12. No confidence interval is supplied for this exercise, so the presenter must not invent an interval or claim certainty.

7. controlled follow-up

Turn 14. A controlled follow-up should address practice and order alternatives rather than merely repeat the original uncontrolled sequence.

8. Generalizability

Turn 16. Generalizability concerns application beyond the observed volunteers and laboratory task, which requires additional relevant evidence.

9. take-home message

Turn 18. The take-home message summarizes the observation and its limits rather than converting a task-specific result into a universal causal claim.

10. unresolved question

Turn 20. The unresolved question is what produced the change and how broadly it applies, not whether the reported means differ arithmetically.

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08 / Answers and explanations / continued

F / Accuracy and scope

F1. Which next step best addresses the limitation?

C. A controlled follow-up designed to separate training from practice and order effects

A stronger comparison design can test competing explanations that the current study does not isolate.

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F2. Which statement about the mechanism is accurate?

D. The observed response-time change does not by itself establish the memory mechanism.

Task performance and its explanatory mechanism are different claims requiring appropriate evidence.

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F / Guided speaking

1. 80

Presenter: The mean reduction is 80 milliseconds.

Turn 1. Eight hundred minus seven hundred twenty equals eighty milliseconds.

2. 10

Questioner: Relative to the initial mean, that is 10 percent.

Turn 2. Eighty divided by eight hundred equals ten percent.

3. practice and order effects

Presenter: Training has not been isolated from practice and order effects.

Turn 3. The fixed sequence and absent comparison group leave those alternative explanations unresolved.

4. invented

Questioner: A significance result must not be invented.

Turn 4. No significance test result is supplied in the case.

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08 / Answers and explanations / continued

F / Rebuild the exchange

1. Rebuild the exchange from "Answer the challenge without claiming universal proof". Audience member: "Fair enough. Would a controlled follow-up be aimed at repeating the same observation, or at separating the competing explanations?" Noor: [missing response] Audience member: "Even if that study supports a training effect, would you still need evidence beyond this task and these volunteers before making the broad theory claim?" Which response belongs in the gap?

A. A controlled follow-up should address those alternatives explicitly. The design needs an appropriate comparison and attention to sequence, with its analysis planned before results are examined. That is proposed work, not a completed validation.

A Correct. This is Noor's response in turn 14. It connects Audience member's preceding point with Audience member's follow-up. A controlled follow-up should address practice and order alternatives rather than merely repeat the original uncontrolled sequence.

B Not here. This line belongs to turn 4, after Audience member says: "What percentage is that reduction? We need the initial response time to interpret its relative size." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 6, after Audience member says: "Did different groups perform the before and after conditions, or were these repeated observations from the same people?" It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 12, after Audience member says: "What confidence interval surrounds the reduction? It would help us judge how much uncertainty there is around the estimated change." It addresses that point, not the missing turn in the supplied exchange.

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Review 1 / Explanations

Cumulative review

1. A colleague needs the term for this meaning: The observed group included in the study. Which term fits?

A. study sample

A Correct. study sample: The observed group included in the study. The usual combination is "describe the study sample".

B Not here. confounder: A factor influencing both exposure and outcome that can distort their apparent causal relationship. The usual combination is "address potential confounders".

C Not here. relative difference: A difference expressed in relation to a reference value. The usual combination is "distinguish a relative difference".

D Not here. observational study: A study observing conditions without assigning the exposure. The usual combination is "describe an observational study".

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2. A colleague needs the term for this meaning: Continued participation through a defined study point. Which term fits?

D. retention

A Not here. scope: The boundaries of the work and claims. The usual combination is "keep the aims within scope".

B Not here. specific aim: A focused objective a proposed study will address. The usual combination is "refine a specific aim".

C Not here. deliverable: A defined output the project will provide. The usual combination is "identify the pilot deliverable".

D Correct. retention: Continued participation through a defined study point. The usual combination is "calculate follow-up retention".

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Review 1 / Explanations / continued

3. Rebuild the exchange from "What exactly would it mean for tutoring to work?".

Leon: "Were students allocated to tutoring, or did they choose it? That matters more for the causal claim than how confidently we present the percentages." Imani: [missing response] Leon: "Then the claim that tutoring caused the higher completion rate is stronger than the design supports. We can still report the observed relationship accurately." Which response belongs in the gap?

C. Participation involved self-selection. Students chose whether to attend. The records do not measure prior preparation or motivation, and either could differ between groups. We have not established those differences.

A Not here. This line belongs to turn 4, after Leon says: "Then completion, rather than examination performance or long-term retention, is the outcome. We should not let the proposal switch among those meanings without noticing." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 16, after Leon says: "Good. We should also avoid implying that one course at one institution establishes what happens for all students in every subject and setting." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Imani's response in turn 10. It connects Leon's preceding point with Leon's follow-up. Self-selection means students chose tutoring, so the groups may differ in ways other than the tutoring exposure.

D Not here. This line belongs to turn 20, after Leon says: "Revise the objective to describe completion by tutoring participation in this cohort. Then make the design limitation visible in the abstract as well." It addresses that point, not the missing turn in the supplied exchange.

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Review 1 / Explanations / continued

4. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "The grant can remain ambitious: a clear problem, a bounded pilot, and a reasoned route toward a definitive study." Sora: [missing response] Ben: "I will revise the aims, summary, and milestone table together. They should all say recruitment passed, retention did not, and the next planning step requires review." Which response belongs in the gap?

C. Yes. Keep the scope explicit. We can describe the future question and explain how improving follow-up supports it, while keeping the current work focused on procedures and practical uncertainty.

A Not here. This line belongs to turn 4, after Ben says: "We can keep the wider educational problem in the significance section. Reviewers still need a concrete account of what this grant would deliver now." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 10, after Ben says: "Would twenty-five retained students meet the threshold? We need to translate the percentage into a whole-participant count." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Sora's response in turn 18. It connects Ben's preceding point with Ben's follow-up. Scope defines what the pilot will do and claim, preventing the long-term research ambition from becoming an unsupported present promise.

D Not here. This line belongs to turn 2, after Ben says: "The draft says this pilot will establish that the workshop improves attainment. Is that really the question the small study was designed to answer?" It addresses that point, not the missing turn in the supplied exchange.

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Review 2 / Explanations

Cumulative review

1. A colleague needs the term for this meaning: Material used as a stable point of comparison. Which term fits?

A. reference material

A Correct. reference material: Material used as a stable point of comparison. The usual combination is "measure the reference material".

B Not here. lab notebook: The record of research methods, observations, and changes. The usual combination is "maintain the lab notebook".

C Not here. signal intensity: The magnitude of the detected measurement signal. The usual combination is "compare signal intensity".

D Not here. instrument setting: A parameter controlling measurement behavior. The usual combination is "match instrument settings".

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2. A colleague needs the term for this meaning: The work permitted by a particular authorization. Which term fits?

B. approval scope

A Not here. secondary use: Using previously collected material for a further purpose. The usual combination is "propose a secondary use".

B Correct. approval scope: The work permitted by a particular authorization. The usual combination is "verify the approval scope".

C Not here. linking key: Information connecting study codes to identities. The usual combination is "restrict access to the linking key".

D Not here. recontact: Contacting a participant again after earlier involvement. The usual combination is "assess a recontact proposal".

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Review 2 / Explanations / continued

3. Rebuild the exchange from "A feasibility pilot cannot promise a definitive answer". Ben: "Would twenty-five retained students meet the threshold? We need to translate the percentage into a whole-participant count." Sora: [missing response] Ben: "Then the milestone table needs one pass and one shortfall. I cannot sign off automatic progression on the recruitment number alone." Which response belongs in the gap?

A. The progression criterion requires at least twenty-six retained out of thirty. Twenty-five would be approximately eighty-three point three percent, still below the threshold. We should apply the stated rule accurately.

A Correct. This is Sora's response in turn 10. It connects Ben's preceding point with Ben's follow-up. The progression criterion requires at least eighty-five percent, which with thirty recruited students needs at least twenty-six retained.

B Not here. This line belongs to turn 12, after Ben says: "Then the milestone table needs one pass and one shortfall. I cannot sign off automatic progression on the recruitment number alone." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 4, after Ben says: "We can keep the wider educational problem in the significance section. Reviewers still need a concrete account of what this grant would deliver now." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 16, after Ben says: "I will also remove the sentence promising a future award once the pilot milestones pass. Our internal progression rule cannot bind a funder's decision." It addresses that point, not the missing turn in the supplied exchange.

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Review 2 / Explanations / continued

4. Rebuild the exchange from "Possessing the data is not permission for a new use". Tessa: "I will gather the approval, consent materials, key-access details, and proposed analysis description. That gives the office enough context to assess the new use." Omar: [missing response] Tessa: "My update will say the proposal is being prepared, no new analysis has begun, and collaborator access remains subject to the designated review." Which response belongs in the gap?

B. Include the proposed data-use agreement arrangements if collaboration is planned. Such terms may be relevant, but they do not replace the required ethics determination or establish participant consent by themselves.

A Not here. This line belongs to turn 14, after Tessa says: "I can say an amendment might be needed, but none is approved. The draft wrongly implies approval is routine." It addresses that point, not the missing turn in the supplied exchange.

B Correct. This is Omar's response in turn 18. It connects Tessa's preceding point with Tessa's follow-up. A data-use agreement can describe intended access and use conditions, but it does not replace the required ethics determination.

C Not here. This line belongs to turn 6, after Tessa says: "Yes, the team can access the key. The draft should state that plainly rather than imply there is no possible connection with the people interviewed." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 4, after Tessa says: "The interviews came from our student-stress study. They use participant codes rather than names, so I initially described them as anonymous in the draft." It addresses that point, not the missing turn in the supplied exchange.

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Review 3 / Explanations

Cumulative review

1. A colleague needs the term for this meaning: The author names listed on a publication. Which term fits?

D. byline

A Not here. final approval: Agreement to the version intended for publication. The usual combination is "obtain final approval".

B Not here. formal analysis: Application of analytical methods to study material or data. The usual combination is "credit formal analysis".

C Not here. honorary authorship: Listing someone without the required authorship basis. The usual combination is "avoid honorary authorship".

D Correct. byline: The author names listed on a publication. The usual combination is "finalize the byline".

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2. A colleague needs the term for this meaning: A concise summary of a scholarly work. Which term fits?

C. abstract

A Not here. volunteer sample: Participants who chose to take part. The usual combination is "acknowledge the volunteer sample".

B Not here. construct: The concept a measure is intended to represent. The usual combination is "identify the measured construct".

C Correct. abstract: A concise summary of a scholarly work. The usual combination is "revise the abstract".

D Not here. peer review: Expert evaluation of scholarly work before or after publication. The usual combination is "respond to peer review".

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Review 3 / Explanations / continued

3. Rebuild the exchange from "Possessing the data is not permission for a new use".
Tessa: "I will send both research questions side by side. The employment topic is not actually named in the documents I have opened so far." **Omar:** [missing response]
Tessa: "Would this be an amendment, a new submission, or an exemption?
Collaborators keep asking me which route applies, and I do not want to guess."
Which response belongs in the gap?

B. Yes, state the purpose change clearly. The reviewer needs the actual new question, intended information, recipients, and safeguards, not a broad assurance that everything is still generally about students.

A Not here. This line belongs to turn 14, after Tessa says: "I can say an amendment might be needed, but none is approved. The draft wrongly implies approval is routine." It addresses that point, not the missing turn in the supplied exchange.

B Correct. This is Omar's response in turn 10. It connects Tessa's preceding point with Tessa's follow-up. The purpose change distinguishes the proposed employment-discrimination question from the original student-stress research and requires assessment.

C Not here. This line belongs to turn 6, after Tessa says: "Yes, the team can access the key. The draft should state that plainly rather than imply there is no possible connection with the people interviewed." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 4, after Tessa says: "The interviews came from our student-stress study. They use participant codes rather than names, so I initially described them as anonymous in the draft." It addresses that point, not the missing turn in the supplied exchange.

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Review 3 / Explanations / continued

4. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "I have written limitation addressed. That sounds as though we fixed the study design. Would limitation clarified describe what we actually did?" Luca: [missing response] Mei: "I will keep the mean, remove the improvement and all-adults claims, and verify locations before resubmission." Which response belongs in the gap?

C. Say the revision makes the boundary explicit. That is accurate and useful. We have improved the manuscript's claims, not repaired the completed design or established an effect through wording alone.

A Not here. This line belongs to turn 20, after Mei says: "I will keep the mean, remove the improvement and all-adults claims, and verify locations before resubmission." It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 6, after Mei says: "We also had no comparison group. Narrowing the claim should therefore address both the measured outcome and the lack of a design supporting that causal language." It addresses that point, not the missing turn in the supplied exchange.

C Correct. This is Luca's response in turn 18. It connects Mei's preceding point with Mei's follow-up. The revision clarifies the interpretation and limitation rather than eliminating the underlying design constraint.

D Not here. This line belongs to turn 8, after Mei says: "What about all adults? Even if we had measured learning, sixty volunteers at one campus would not establish the same result in every adult population." It addresses that point, not the missing turn in the supplied exchange.

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Review 4 / Explanations

Cumulative review

1. A colleague needs the term for this meaning: The label assigned to a data field. Which term fits?

C. variable name

A Not here. valid observation: A recorded value meeting the applicable inclusion rules. The usual combination is "count valid observations".

B Not here. dependency: A required library or component for a process. The usual combination is "list analysis dependencies".

C Correct. variable name: The label assigned to a data field. The usual combination is "clarify variable names".

D Not here. complete-case calculation: A calculation using records with required observed values. The usual combination is "describe a complete-case calculation".

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2. A colleague needs the term for this meaning: The same sequence of conditions for all participants. Which term fits?

D. fixed order

A Not here. independent replication: A new study testing a finding with independent evidence. The usual combination is "seek independent replication".

B Not here. conference presentation: A spoken account of research for a scholarly audience. The usual combination is "deliver a conference presentation".

C Not here. mechanism: The process proposed to explain an observed effect. The usual combination is "test a proposed mechanism".

D Correct. fixed order: The same sequence of conditions for all participants. The usual combination is "acknowledge a fixed order".

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Review 4 / Explanations / continued

3. Rebuild the exchange from "Revise the claim, not the observed result". Mei: "The abstract and conclusion both contain the overclaim. We need to change both, not just the quoted sentence." Luca: [missing response] Mei: "I will quote the replacement sentence in our reply, then give its location. Could you check that the conclusion now says the same thing?" Which response belongs in the gap?

A. Check the revised manuscript throughout. The title, summary, results description, and final interpretation should not quietly restore the same unsupported claim after we have corrected it elsewhere.

A Correct. This is Luca's response in turn 10. It connects Mei's preceding point with Mei's follow-up. The revised manuscript must use consistent claim boundaries across sections, rather than correcting only one quoted sentence.

B Not here. This line belongs to turn 4, after Mei says: "The mean was seven point one on a ten-point scale. That observed number can remain, provided we do not call it a seven-point improvement." It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 6, after Mei says: "We also had no comparison group. Narrowing the claim should therefore address both the measured outcome and the lack of a design supporting that causal language." It addresses that point, not the missing turn in the supplied exchange.

D Not here. This line belongs to turn 14, after Mei says: "I will add the page and line numbers after the revised file is finalized. The current numbers could shift as we edit the abstract." It addresses that point, not the missing turn in the supplied exchange.

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Review 4 / Explanations / continued

4. Rebuild the exchange from "Answer the challenge without claiming universal proof". Audience member: "The chair is asking us to wrap up. Could you give us the main result in one sentence, with that qualification?" Noor: [missing response] Audience member: "Thank you. That distinguishes the observed change from a general explanation. The planned test sounds like the important next step." Which response belongs in the gap?

D. The take-home message is this: response time fell ten percent in twenty-four volunteers, but we have not separated the training effect from practice and order effects.

A Not here. This line belongs to turn 2, after Audience member says: "You showed a faster response after training. Does that prove the general memory theory, or are you making a narrower claim about this task?" It addresses that point, not the missing turn in the supplied exchange.

B Not here. This line belongs to turn 16, after Audience member says: "Even if that study supports a training effect, would you still need evidence beyond this task and these volunteers before making the broad theory claim?" It addresses that point, not the missing turn in the supplied exchange.

C Not here. This line belongs to turn 10, after Audience member says: "Did you measure the memory process itself, or is it a proposed explanation for faster responses?" It addresses that point, not the missing turn in the supplied exchange.

D Correct. This is Noor's response in turn 18. It connects Audience member's preceding point with Audience member's follow-up. The take-home message summarizes the observation and its limits rather than converting a task-specific result into a universal causal claim.

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Additional case 1 / Explanations

Extended conversation

1. primary outcome

Turn 2. The primary outcome was specified before data collection; selecting another outcome after viewing results does not make it the original primary test.

2. exploratory

Turn 6. Exploratory identifies the analysis performed after inspecting the data, rather than presenting it as the prespecified confirmatory test.

3. multiple testing

Turn 10. Multiple testing concerns the twenty outcomes examined; reporting only the smallest unadjusted p-value conceals the selection process relevant to interpretation.

4. p-value

Turn 12. A p-value concerns data under a specified null model and assumptions; subtracting it from one does not give the probability that a hypothesis is true.

5. independent confirmation

Turn 16. Independent confirmation requires a new appropriately planned test, rather than presenting the same inspected data as a fresh confirmatory sample.

6. deviation statement

Turn 20. The deviation statement records departures from the registered plan, including their timing and reasons, without rewriting the original plan after results are known.

[Return to the conversation, page 118](#)

Transfer exchange

1. threshold

Researcher: The registered test did not meet the specified threshold.

Turn 1. The primary p-value of 0.12 is above the stated 0.05 threshold.

Additional case 1 / Explanations / continued

2. exploratory

Collaborator: The twelve later tests are exploratory.

Turn 2. The tests were not in the registered plan and followed data inspection.

3. unadjusted

Researcher: The reported minimum p-value is unadjusted.

Turn 3. The brief explicitly states that the selected 0.02 value has no multiple-testing adjustment.

4. confirmation

Collaborator: Reusing these inspected data is not independent confirmation.

Turn 4. The same inspected dataset is not a new independent test of the selected result.

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Additional case 2 / Explanations

Extended conversation

1. cost base

Turn 2. The cost base is the amount to which the rate applies; the supplied foundation terms exclude equipment from that amount.

2. indirect costs

Turn 6. Indirect costs are \$5,200 under the supplied 10% rate and \$52,000 base, not 10% of every direct line.

3. budget justification

Turn 10. The budget justification must connect requested costs to the project and permitted categories; room below a ceiling does not itself justify a new charge.

4. personnel total

Turn 12. The personnel total already includes benefits in this case; applying another benefits charge would double-count the same supplied cost.

5. cost sharing

Turn 16. Cost sharing means project costs supported from another source; the \$800 unused ceiling is not an institutional contribution or expenditure.

6. total request

Turn 20. The total request combines \$64,000 direct costs with \$5,200 indirect costs, for \$69,200 subject to submission approval and the funder's decision.

[Return to the conversation, page 123](#)

Transfer exchange

1. 40,000

Investigator: The indirect-cost base is 40,000 dollars.

Turn 1. Subtracting the ten-thousand equipment exclusion from fifty thousand leaves forty thousand.

Additional case 2 / Explanations / continued

2. 6,000

Officer: The indirect-cost amount is 6,000 dollars.

Turn 2. Fifteen percent of the forty-thousand eligible base equals six thousand.

3. 56,000

Investigator: The combined request is 56,000 dollars.

Turn 3. All fifty thousand direct costs remain in the request, plus six thousand indirect costs.

4. 4,000

Officer: The unused ceiling is 4,000 dollars, not an award.

Turn 4. The sixty-thousand ceiling exceeds the fifty-six-thousand request by four thousand dollars.

[Return to the conversation, page 126](#)

Additional case 3 / Explanations

Extended conversation

1. accepted manuscript

Turn 2. The accepted manuscript includes the peer-reviewed changes accepted for publication but is distinct from the publisher's formatted PDF.

2. version of record

Turn 6. The version of record is the formally published article; permission to link to it does not grant permission to deposit its PDF.

3. embargo

Turn 10. The embargo delays public access to the deposited manuscript until the stated date; it does not prevent the permitted closed deposit in this case.

4. third-party material

Turn 12. Third-party material can have separate permissions; the article's deposit permission does not automatically resolve the rights to the reproduced chart.

5. metadata

Turn 16. Metadata describe and identify the article and its version; they help users find the published work without substituting for full-text permissions.

6. release conditions

Turn 20. The release conditions include the October 15 date and resolution of the chart permissions; deposit alone does not satisfy both conditions.

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Transfer exchange

1. manuscript

Researcher: The permitted file is the accepted manuscript.

Turn 1. The agreement permits the accepted manuscript rather than the excluded publisher PDF.

Additional case 3 / Explanations / continued

2. embargo

Librarian: Public full-text access remains closed during the embargo.

Turn 2. The public-release date has not arrived, although deposit is permitted now.

3. December 1

Researcher: The earliest stated public-release date is December 1.

Turn 3. The supplied agreement names December first, not the current November date.

4. excluded

Librarian: The publisher PDF remains excluded.

Turn 4. The date condition does not expand permission to a file version the agreement excludes.

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Find a phrase by purpose

Research Questions and Study Design

Clarify the broad verb: "What outcome would count as working?"

Specify the population: "The records cover first-year students in this course."

Set the period: "The observation window is one semester."

[Full phrase bank, page 8](#)

Grant Proposals and Specific Aims

Separate ambition from aim: "The long-term goal is broader than this pilot deliverable."

State the pilot purpose: "This study tests recruitment and follow-up procedures."

Remove an overclaim: "It is not designed to establish efficacy."

[Full phrase bank, page 21](#)

Lab Meetings and Data Challenges

Open with the result: "Run A gave 120 units; Run B gave 180."

Name the verified change: "The instrument files show different exposure times."

State the durations: "A used ten seconds and B used twenty."

[Full phrase bank, page 36](#)

Research Ethics and Human Subjects

Describe the new question: "The proposed reuse concerns employment discrimination."

Identify the original purpose: "The interviews were collected for a student-stress study."

State the key access: "Our team can access the code-to-participant key."

[Full phrase bank, page 49](#)

Find a phrase by purpose / continued

Authorship, Collaboration, and Credit

Open factually: "Let us document what each collaborator contributed."

Name the analytical work: "Harper designed and performed the main analysis."

Use the agreed standard: "The target journal requires all four authorship criteria."

[Full phrase bank, page 64](#)

Peer Review and Revision Responses

Acknowledge the point: "We agree that the original claim exceeded the design."

Identify the measured construct: "We measured self-reported confidence, not demonstrated learning."

State the population: "The sample comprised 60 volunteers at one campus."

[Full phrase bank, page 77](#)

Data Management and Reproducibility

Ask for meaning: "What does the variable t represent?"

Confirm the unit: "The collector confirms degrees Celsius."

Identify the special code: "Minus 999 marks a failed reading."

[Full phrase bank, page 92](#)

Academic Presentations and Conferences

Answer directly: "No, this study does not prove the general theory."

State the observed change: "Mean response time fell from 600 to 540 milliseconds."

Give the relative change: "That is a 10% reduction from the initial mean."

[Full phrase bank, page 105](#)

Vocabulary index

abstract[Lesson 06, p. 75](#)**access restriction**[Lesson 04, p. 48](#)**acknowledgment**[Lesson 05, p. 63](#)**approach**[Lesson 02, p. 20](#)**arbitrary unit**[Lesson 03, p. 34](#)**attrition**[Lesson 02, p. 19](#)**author order**[Lesson 05, p. 62](#)**authorship**[Lesson 05, p. 62](#)**baseline difference**[Lesson 01, p. 6](#)**batch effect**[Lesson 03, p. 34](#)**boundary condition**[Lesson 08, p. 104](#)**byline**[Lesson 05, p. 62](#)**central finding**[Lesson 08, p. 103](#)**clarifying question**[Lesson 08, p. 104](#)**cohort**[Lesson 01, p. 5](#)**collection timestamp**[Lesson 07, p. 91](#)**comparison condition**[Lesson 06, p. 76](#)**complete-case calculation**[Lesson 07, p. 91](#)**computational reproducibility**[Lesson 07, p. 91](#)**conclusion**[Lesson 06, p. 75](#)**confidence interval**[Lesson 08, p. 104](#)**confounder**[Lesson 01, p. 6](#)**accepted manuscript**[Case 3, p. 127](#)**accountability**[Lesson 05, p. 63](#)**analysis copy**[Lesson 07, p. 90](#)**approval scope**[Lesson 04, p. 47](#)**association**[Lesson 01, p. 5](#)**audience question**[Lesson 08, p. 103](#)**authorized determination**[Lesson 04, p. 48](#)**authorship criteria**[Lesson 05, p. 63](#)**baseline measure**[Lesson 06, p. 76](#)**biological replicate**[Lesson 03, p. 35](#)**budget justification**[Case 2, p. 122](#)**causal effect**[Lesson 01, p. 6](#)**claim**[Lesson 06, p. 75](#)**coded data**[Lesson 04, p. 47](#)**collaboration agreement**[Lesson 05, p. 63](#)**comparison arm**[Lesson 08, p. 103](#)**comparison group**[Lesson 01, p. 5](#)**completion rate**[Lesson 01, p. 6](#)**conceptualization**[Lesson 05, p. 62](#)**conference presentation**[Lesson 08, p. 103](#)**confidentiality**[Lesson 04, p. 48](#)**consent scope**[Lesson 04, p. 47](#)

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References and publication notes

All cases, organizations, figures, and conversations are fictional teaching material, not transcripts. Communication practice does not replace qualified advice or current workplace procedures.

[1] National Center for Complementary and Integrative Health. Pilot Studies: Common Uses and Misuses.

Background on feasibility pilots and limits on efficacy claims. The learning-study milestones in this book are original fictional criteria, not a funder requirement. Source checked 30 September 2026.

<https://www.nccih.nih.gov/grants/pilot-studies-common-uses-and-misuses>

[2] U.S. Office for Human Research Protections. Coded Private Information or Biospecimens Used in Research.

U.S. guidance on coded information and authorized determinations for secondary research. The exercises supply a fictional local review requirement and do not determine exemption status. Source checked 30 September 2026.

<https://www.hhs.gov/ohrp/coded-private-information-or-biospecimens-used-research.html>

[3] International Committee of Medical Journal Editors. Defining the Role of Authors and Contributors.

Background for the authorship case, which explicitly adopts these criteria. Authorship rules and ordering conventions differ among journals and disciplines. Source checked 30 September 2026.

<https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html>

[4] National Institutes of Health. Writing a Data Management and Sharing Plan.

Background for data documentation, methods, tools, and appropriate sharing. The environmental dataset and laboratory records are original teaching cases. Source checked 30 September 2026.

<https://grants.nih.gov/policy-and-compliance/policy-topics/sharing-policies/dms/writing-dms-plan>

Companion course

The website offers the eight-lesson course and related practice. This book can be used independently. No audio access or external account is needed for its exercises.

<https://englishladder.com/efsp-higher-education-research.html>

Define the question. Defend the evidence.

Eight research conversations: sharpen a study question, bound a grant aim, investigate a lab discrepancy, clarify data reuse, agree credit, respond to review, document a dataset, and answer a conference challenge.

Research Questions and Study Design

32/40 is 80%; 36/60 is 60%. The difference is 20 percentage points. Relative to 60%, the difference is approximately 33.3%, not 20%. Neither calculation removes the design limitation created by self-selection.

Grant Proposals and Specific Aims

24/30 is 80% retention, below the local 85% criterion. With 30 recruited participants, at least 26 retained would reach or exceed 85%; 25 would be only about 83.3%. Do not round a failed threshold into a pass.

Lab Meetings and Data Challenges

Run B is 60 arbitrary units higher, a 50% increase relative to Run A. Exposure doubled, but the signal increased by only half. Do not divide or scale signals as though proportional response had been established.

Research Ethics and Human Subjects

Coded does not automatically mean anonymous. Here, the team can access a linking key, so the identity connection matters. The new question and access arrangements must be described accurately to the designated reviewer.

Phil Stilwell

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