

Clever Hans: Testing Competing Explanations

Natalia Borrego | Whole-class case discussion used to teach skepticism, hypothesis formulation, empiricism, and experimental reasoning

Format	Whole-class case discussion. Students make predictions before the historical tests and results are revealed.
Course context	Scientific Thinking; early in the course, when students are learning skepticism, the scientific process, falsifiability, and hypothesis testing.
Learning goals	Turn a broad claim into testable explanations; identify evidence that distinguishes among explanations; interpret an experiment without claiming more than the results support.

DISCUSSION SEQUENCE

1 Begin with the observation, not the answer.

Introduce the historical claim: Clever Hans answered questions by tapping his hoof. Reported abilities included arithmetic, telling time, identifying musical intervals, and naming people.

Ask: What, exactly, is the claim? What would you need to observe before accepting it?

I do not explain the Clever Hans effect at this point. The purpose is to make students articulate what evidence they think the claim requires.

2 Replace “Is Hans clever?” with testable alternatives.

Students usually begin with a broad intelligence question. I ask them to make the explanations more specific.

POSSIBLE EXPLANATION	WHAT WOULD IT PREDICT?
Hans independently solves the question and uses tapping to communicate the answer.	Performance should not depend on whether the human questioner already knows the answer.
Hans responds to features of the testing situation rather than solving the question.	Performance may change when those features are altered.
Hans uses information provided by the questioner.	Removing access to that information should reduce accuracy.

Ask: What observation would make each explanation more plausible? What observation would make it less plausible?

3 Have students predict the result of each manipulation.

The historical tests varied who asked the question, whether the questioner knew the answer, the questioner’s distance from Hans, and Hans’s visual access to the questioner.

MANIPULATION	REASON FOR THE TEST
Different questioners	Tests whether performance depends specifically on von Osten.
Questioner knows / does not know the answer	Removes information the questioner could transmit, intentionally or unintentionally.
Questioner stands at different distances	Changes access to subtle visual information.
Hans is blinkered	Restricts visual information directly.

Before revealing the results: What should happen in each condition if Hans is solving the problem independently?

Students use the pattern of results to choose among explanations.

RESULTS REVEALED TO THE CLASS

RESULT	INTERPRETIVE QUESTION
Hans needed visual contact with the questioner. Accuracy declined as the questioner moved farther away, and blinkering reduced performance further.	Why should visual access matter if the task is independent arithmetic?
Hans answered correctly when the questioner knew the answer, but not when the questioner did not know it.	Which explanation predicts this result?

SYNTHESIS

The results support the explanation that Hans was responding to visual cues from the questioner rather than independently calculating the answers. The cues could be involuntary changes in posture, facial expression, or tension as Hans approached the correct number of taps.

Inference check: The experiment does not show that Hans was unintelligent. It addresses the narrower question of what information explained his correct responses in this task.

This provides a concrete transition to experimenter effects and blinding: if an experimenter knows the expected outcome, information can be transmitted unintentionally. Students then identify other situations in which expectations could affect a subject, measurement, or interpretation.

QUESTIONS I USE FOR DISCUSSION OR WRITTEN FOLLOW-UP

1. Rewrite “Hans is clever” as a testable hypothesis.
2. Give two alternative explanations for Hans’s performance.
3. Choose one manipulation from the case. What did you predict before seeing the result, and why?
4. Which result most changed your interpretation?
5. Write the narrowest conclusion that is justified by the evidence.
6. Design one additional test that would separate the remaining explanations.

OPTIONAL STUDENT RESPONSE SPACE

What evidence would convince you that Hans was solving the questions independently?

What is the strongest conclusion supported by the historical tests?