Charta | LESSON NOTES

Paradox questions: make both facts true

Verbal Reasoning

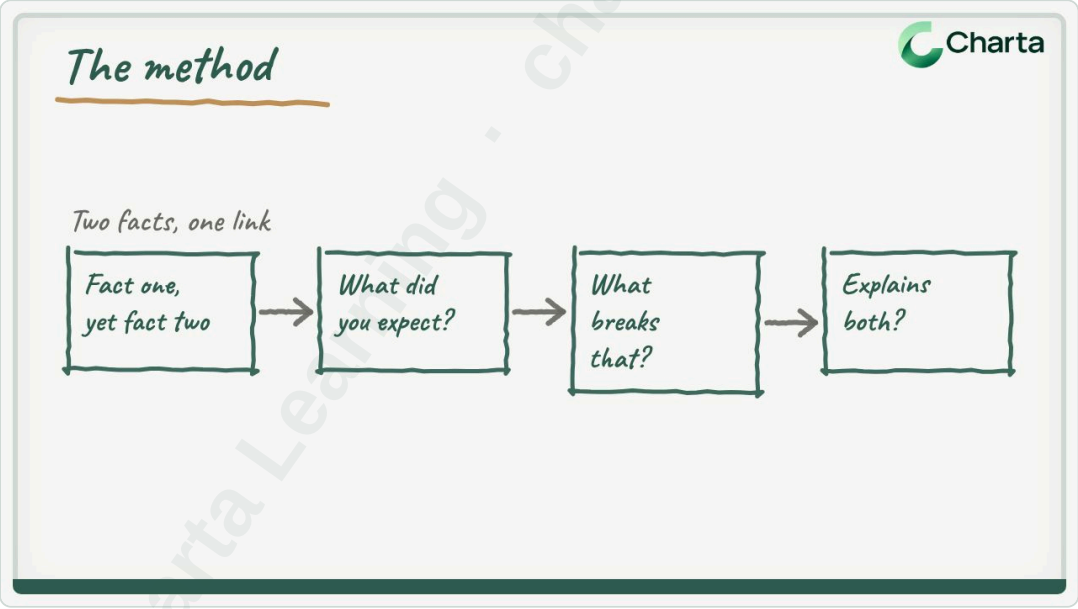
1 What the question asks

- Question line: resolve the discrepancy, or explain
- Two facts that seem to clash
- Both are true: do not doubt either one
- Find a third fact that makes them fit together

IN THE LESSON

- The question line says something like, which of the following, if true, most helps to resolve the apparent discrepancy, or, most helps to explain the situation described above.
- There is no conclusion to attack or defend.
- Instead there are two facts, and something about them seems wrong.
- More hikers, yet less litter.
- Fewer patients, yet longer waits.
- Your job is not to decide which fact is mistaken.
- Both facts are true.
- Your job is to find a third fact that makes the pair make sense together.
- As always, accept every choice as true, and look for the one that explains the surprise, not just one of the two facts.

2 The method



IN THE LESSON

- Here is the method.
- Step one, write the two facts side by side in a few words, joined by the word yet.
- More hikers, yet less litter.
- Step two, say what you would have expected.
- With more hikers, you would expect more litter.
- That expectation is the source of the surprise.
- Step three, ask what hidden change could break the expectation: what would let more hikers leave less litter?
- Step four, test each choice with one question: does it explain both facts together?
- A choice that explains only one of them, or makes the surprise even bigger, is a trap.
- The right answer makes you say, oh, that is why.

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3 The test: does it explain both?

Fewer patients, yet longer waits

Explains both facts	the surprise goes away	**the answer**
Explains one fact	the other is still odd	**half**
Makes it worse	the surprise grows	**deepens**
Ask	less surprised, or more?	**the test**

IN THE LESSON

- Here is the test as a table.
- A choice can do one of three things.
- It can explain both facts together: that is the answer.
- It can explain only one fact.
- For example, if fewer patients come because the town is shrinking, that explains the fewer patients, which we already knew, but not the longer waits.
- Or it can make the surprise bigger.
- For example, if each patient takes the same time to treat as before, then fewer patients should mean shorter waits, so the puzzle gets worse.
- That trap is common, because it is about the right topic.
- Ask of every choice: after reading it, am I less surprised, or more?

4 The traps in the wrong choices

- Deepens the puzzle
- Explains only one side
- Partial: smaller change, not the opposite change
- Always true, so it cannot explain a change
- An irrelevant comparison

IN THE LESSON

- Here are the traps by name.
- The first deepens the puzzle: it gives a reason to expect the opposite of what happened, such as rising food prices, which should cut waste.
- The second explains only one side, often the side the passage already explains.
- The third is the partial explanation: it explains why something changed less than expected, but not why it moved the other way.
- You will see that in the coffee question.
- The fourth is a fact that was always true, such as hikers dislike litter.
- Something that did not change cannot explain a change.
- And the fifth is the irrelevant comparison, such as what happened at other parks.

5 Question 1: more hikers, less litter

- Last year the number of hikers using the trails in Oakridge National Park rose by a third. Yet the amount of litter that rangers collected along those trails was lower than in the year before.
- Which of the following, if true, most helps to resolve the apparent discrepancy?

IN THE LESSON

- Question one is an easy one.
- It is short, so read it with me slowly.
- Notice the word yet, which signals the surprise.
- Last year the number of hikers using the trails in Oakridge National Park rose by a third.
- Yet the amount of litter that rangers collected along those trails was lower than in the year before.
- The question: Which of the following, if true, most helps to resolve the apparent discrepancy?
- Put the two facts side by side.

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6 Question 1: what did you expect?

Oakridge: a third more hikers, yet less litter collected

Fact one	hikers up by a third	**more**
Fact two	litter collected fell	**less**
Expected	more hikers, more litter	**surprise**
Prediction	each hiker left less, newly	**the link**

IN THE LESSON

- Fact one: hikers rose by a third.
- Fact two: yet the litter collected along the trails fell.
- What did we expect?
- More hikers should drop more litter.
- So what could break that expectation?
- Something must have changed about how much litter each hiker leaves behind.
- Perhaps hikers were asked to carry their rubbish home, or bins were moved, or a group of volunteers picked litter up before the rangers did.
- Any of these would let more hikers leave less litter for the rangers to collect.
- Predict: a change last year that made each hiker leave less litter on the trails.
- Notice that the change must be new last year, because the litter fell compared with the year before.

7 Question 1: the five choices

- A. The park's budget for trail maintenance and litter collection last year was the same as in the year before.
- B. Most of the additional hikers visited the park during the summer months.
- C. Last year the park began handing hikers free trash bags, and most carried their litter out.
- D. Hikers surveyed at the park said they dislike seeing litter on the trails they use.
- E. Visitor numbers at several state parks near Oakridge rose by a similar amount last year.

IN THE LESSON

- Here are the five choices.
- Choice A.
- The park's budget for trail maintenance and litter collection last year was the same as in the year before.
- Choice B.
- Most of the additional hikers visited the park during the summer months.
- Choice C.
- Last year the park began handing hikers free trash bags, and most carried their litter out.
- Choice D.
- Hikers surveyed at the park said they dislike seeing litter on the trails they use.
- Choice E.
- Visitor numbers at several state parks near Oakridge rose by a similar amount last year.
- Which one explains both facts together?

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8 Question 1: test each choice

Prediction: each hiker newly left less litter behind

A: the budget stayed the same	explains neither fact	**no help**
B: extra hikers came in summer	when, not why less litter	**no help**
C: free bags; litter carried out	more hikers, less left behind	**explains both**
D: hikers dislike litter	always true, no change	**always true**
E: other parks rose too	other parks are irrelevant	**comparison**

IN THE LESSON

- Choice A, an unchanged budget, explains neither fact.
- If anything, the same effort with more hikers should leave more litter.
- Choice B tells us when the extra hikers came, not why the litter went down.
- Choice C matches the prediction.
- Last year the park began handing out free bags, and most hikers carried their litter out.
- That is a new change that makes each hiker leave less behind, so more hikers and less litter now fit together.
- Choice D, hikers dislike litter, is an attitude they presumably always had.
- Something that did not change cannot explain a change between years.
- Choice E, other parks, is an irrelevant comparison.
- The answer is C.

9 Question 2: fewer patients, longer waits

- Since a second, larger emergency department opened in Brenton, the average waiting time at the town's original emergency department has risen. The original department's staffing is unchanged, and it now sees fewer patients than before.
- Which of the following, if true, most helps to explain the situation described above?

IN THE LESSON

- Question two is a medium one.
- Read it with me.
- Since a second, larger emergency department opened in Brenton, the average waiting time at the town's original emergency department has risen.
- The original department's staffing is unchanged, and it now sees fewer patients than before.
- The question: Which of the following, if true, most helps to explain the situation described above?
- Spot the surprise, then ask what about the patients could have changed.

10 Question 2: what kind of patients?

Brenton: original department, fewer patients, longer waits

Fact one	fewer patients, same staff	**less**
Fact two	the average wait rose	**more**
Expected	fewer patients, shorter waits	**surprise**
Prediction	the stayers take longer	**the mix**

IN THE LESSON

- Fact one: the original department now sees fewer patients, with the same staff.
- Fact two: yet its average waiting time has risen.
- We expected the opposite: fewer patients and the same staff should mean shorter waits.
- What could break that?
- We have been thinking about the number of patients.
- But patients are not all alike.
- If the patients who left were the quick ones, with minor complaints, the ones who stay may each take much longer to treat.
- Then the staff could be busier than before even with fewer patients, and waits would grow.
- Predict: the mix of patients changed, so each patient now takes longer.
- When a count falls but the work rises, look for a change in the mix.

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11 Question 2: the five choices

- A. Patients with minor complaints now mostly go to the new department, so those who remain take longer to treat.
- B. Most patients at the original department say they chose it because it is closer to their homes than the new department.
- C. The average time taken to treat each patient at the original department has not changed since the new one opened.
- D. The average waiting time at the new emergency department is shorter than the original department's was.
- E. The town's population has fallen since the new department opened.

IN THE LESSON

- Here are the five choices.
- Choice A.
- Patients with minor complaints now mostly go to the new department, so those who remain take longer to treat.
- Choice B.
- Most patients at the original department say they chose it because it is closer to their homes than the new department.
- Choice C.
- The average time taken to treat each patient at the original department has not changed since the new one opened.
- Choice D.
- The average waiting time at the new emergency department is shorter than the original department's was.
- Choice E.
- The town's population has fallen since the new department opened.
- Look for a change in the mix of patients.

12 Question 2: test each choice

Prediction: the patients who stayed take longer to treat

A: minor cases go to the new one	those left take longer	**explains both**
B: patients chose it for nearness	why they chose, not the wait	**no help**
C: same treatment time per patient	waits should then shorten	**deepens**
D: the new one has shorter waits	why some left, not the wait	**one side**
E: the town's population fell	fewer patients, known already	**one side**

IN THE LESSON

- Choice A matches the prediction.
- Patients with minor complaints now mostly go to the new department, so those who remain take longer to treat.
- Fewer patients, but more work for each one, so longer waits.
- Both facts fit.
- Choice B, patients chose it because it is closer, says nothing about why those who stay wait longer.
- Choice C is the deepens trap.
- If each patient takes the same time as before, fewer patients with the same staff should mean shorter waits, so the puzzle gets worse.
- Choice D explains why some patients switched, one side only.
- Choice E gives another reason for fewer patients, which we already knew, and fewer patients should shorten waits.
- The answer is A.

13 Question 3: a campaign, then more waste

- A council ran a campaign to persuade the households of Torvale to waste less food. In the year after the campaign, the weight of food waste collected from Torvale's households rose.
- Which of the following, if true, most helps to explain the situation described above?

IN THE LESSON

- Question three is another medium one.
- It is short, so read it with me slowly.
- A campaign to cut waste was followed by more waste.
- How could that be?
- A council ran a campaign to persuade the households of Torvale to waste less food.
- In the year after the campaign, the weight of food waste collected from Torvale's households rose.
- The question: Which of the following, if true, most helps to explain the situation described above?
- Look closely at what was measured.

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14 Question 3: what was measured?

Torvale: a campaign to cut food waste; collected waste rose

Fact one	a campaign to waste less	**less**
Fact two	food waste collected rose	**more**
Look closely	collected and counted	**a record**
Prediction	the counting changed	**the link**

IN THE LESSON

- Fact one: the council ran a campaign to cut food waste.
- Fact two: yet the weight of food waste collected rose.
- We expected less waste after the campaign.
- But look closely at fact two.
- It is not the amount of food households threw away.
- It is the weight of food waste collected and recorded by the council.
- Those can differ.
- If the way waste is collected or counted changed, the recorded figure could rise even if households wasted less.
- You met this pattern in the evaluate lesson: when the evidence is a record, ask whether the record changed.
- Predict: food scraps that used to be counted as something else are now counted as food waste.

15 Question 3: the five choices

- A. The council gave households separate food-scrap bins, so scraps once collected with general rubbish were now counted as food waste.
- B. The campaign taught households how to compost their food scraps at home.
- C. Food prices in the area rose during the year.
- D. Many households in Torvale told the council they had thrown away less food after the campaign, and said that they now plan their meals.
- E. The weight of food waste collected had been falling in each of the two years before the campaign.

IN THE LESSON

- Here are the five choices.
- Choice A.
- The council gave households separate food-scrap bins, so scraps once collected with general rubbish were now counted as food waste.
- Choice B.
- The campaign taught households how to compost their food scraps at home.
- Choice C.
- Food prices in the area rose during the year.
- Choice D.
- Many households in Torvale told the council they had thrown away less food after the campaign, and said that they now plan their meals.
- Choice E.
- The weight of food waste collected had been falling in each of the two years before the campaign.
- Which one changes what is counted?

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16 Question 3: test each choice

Prediction: scraps once counted as rubbish now count as food waste

A: new bins for food scraps	scraps now counted as food	**explains both**
B: home composting taught	should cut the waste collected	**deepens**
C: food prices rose	dearer food, less waste	**deepens**
D: households report less waste	contrasts, but explains nothing	**no help**
E: waste was falling before	makes the rise more surprising	**deepens**

IN THE LESSON

- Choice A matches the prediction.
- The council gave households separate food scrap bins, so scraps that used to go out with general rubbish are now weighed as food waste.
- Households could waste less food and the recorded weight still rise.
- Both facts fit.
- Choice B, home composting, should cut the waste collected, so it deepens the puzzle.
- Choice C, rising food prices, should make people waste less, so it deepens it too.
- Choice D, households say they waste less, only restates the clash between what they say and what was collected.
- Choice E, waste had already been falling, makes a rise after the campaign more surprising, not less.
- The answer is A.

17 Question 4: cheaper beans, dearer coffee

- Last year the price per tonne of green coffee on international markets fell by a fifth. Over the same year the price of ground coffee in the shops of Elbra, a country that imports all of its coffee, rose by a tenth.
- Which of the following, if true, most helps to explain the situation described above?

IN THE LESSON

- Question four is a hard one, and it has a trap that catches many strong students.
- Read it with me.
- Last year the price per tonne of green coffee on international markets fell by a fifth.
- Over the same year the price of ground coffee in the shops of Elbra, a country that imports all of its coffee, rose by a tenth.
- The question: Which of the following, if true, most helps to explain the situation described above?
- The world price fell.
- The shop price rose.
- Think about money.

18 Question 4: think about the money

World price down a fifth; Elbra's shop price up a tenth

Fact one	world bean price down a fifth	**cheaper**
Fact two	Elbra shop price up a tenth	**dearer**
The key	imports, paid in other money	**currency**
Prediction	currency fell over a fifth	**the link**

IN THE LESSON

- Fact one: the world price of green coffee fell by a fifth.
- Fact two: yet in Elbra, which imports all its coffee, the shop price of ground coffee rose by a tenth.
- We expected cheaper beans to mean cheaper coffee, or at least not dearer coffee.
- The key is the word imports.
- The world price is set in a foreign currency, but Elbra's shops pay in their own money.
- If Elbra's money lost value against that currency, the same beans could cost more in Elbra even after the world price fell.
- How much more?
- A fall of exactly a fifth in Elbra's money would only cancel out the cheaper beans.
- So we need a fall of more than a fifth.
- Predict: Elbra's currency fell by more than a fifth.

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19 Question 4: the five choices

- A. Coffee beans make up only part of the retail price of ground coffee, the rest being roasting, packaging and shop costs.
- B. Green coffee is priced in a foreign currency, and Elbra's currency fell against it by considerably more than a fifth.
- C. The price of green coffee on international markets has fallen in each of the last three years.
- D. Consumption of coffee in Elbra fell over the year.
- E. Elbra's shops buy their green coffee on contracts that fix the price for a year.

IN THE LESSON

- Here are the five choices.
- Choice A.
- Coffee beans make up only part of the retail price of ground coffee, the rest being roasting, packaging and shop costs.
- Choice B.
- Green coffee is priced in a foreign currency, and Elbra's currency fell against it by considerably more than a fifth.
- Choice C.
- The price of green coffee on international markets has fallen in each of the last three years.
- Choice D.
- Consumption of coffee in Elbra fell over the year.
- Choice E.
- Elbra's shops buy their green coffee on contracts that fix the price for a year.
- Which one explains a rise, not just a smaller fall?

20 Question 4: test each choice

Prediction: Elbra's money fell by more than a fifth

A: beans only part of the price	a smaller fall, not a rise	**partial**
B: currency fell over a fifth	beans cost more in Elbra	**explains both**
C: the world price fell for years	more falls, more surprise	**deepens**
D: coffee drinking fell in Elbra	less demand, lower prices	**deepens**
E: prices fixed for a year	no fall, but still no rise	**partial**

IN THE LESSON

- Choice A is the trap that catches strong students.
- If beans are only part of the shop price, then a fall in the bean price should cause a smaller fall in the shop price.
- But the shop price rose.
- A explains a smaller fall, not a rise, so it is partial.
- Choice B matches the prediction.
- Elbra's currency fell against the foreign currency by much more than a fifth, so the beans cost more in Elbra's money, and the shop price can rise.
- Choice C, earlier falls in the world price, makes the puzzle worse.
- Choice D, falling demand, should push prices down, so it deepens it too.
- Choice E, fixed contracts, could explain why prices did not fall, but again not why they rose.
- The answer is B.

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21 Accurate and quick

- Write: fact one, yet fact two
- Say what you expected
- Check what was measured
- Less surprised, or more?
- A smaller change is not the opposite change

IN THE LESSON

- Some habits that keep you accurate and quick.
- First, read the question line first.
- If it says discrepancy, or explain the situation, write the two facts joined by yet.
- Second, say out loud what you expected, because the answer always breaks that expectation.
- Third, look closely at what was measured: a record, an average, a price in which money.
- Many paradoxes hide there.
- Fourth, test each choice with the single question: am I less surprised, or more?
- Cross out anything that deepens the puzzle or explains one side only.
- Fifth, when a choice explains a smaller change, ask whether the passage needs a smaller change, or a change in the other direction.

22 What the four questions taught

- A new behaviour: hikers carry litter out
- A different mix: only the slow cases stay
- A different count: scraps become food waste
- A different currency: the money lost value

IN THE LESSON

- Look back at the four answers.
- In question one, a new habit, carrying litter out, broke the link between more hikers and more litter.
- In question two, the mix of patients changed: the quick cases left, so fewer patients meant more work.
- In question three, the measurement changed: scraps that were counted as rubbish became food waste.
- In question four, the money changed: a falling currency turned cheaper beans into dearer coffee.
- Four kinds of hidden change: a new behaviour, a different mix, a different way of counting, and a different currency.
- When you meet a new paradox, run through these four, and you will often predict the answer before reading the choices.

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23 Quick check

1. A choice makes you more surprised. Can it be the answer?
   Answer: No: it deepens the puzzle.
2. A choice describes something always true. Can it explain a change?
   Answer: No: no change cannot explain a change.
3. Sales fell, yet profit rose. One hidden change?
   Answer: A new mix of dearer items, or lower costs.

IN THE LESSON

- A quick check.
- Pause after each question.
- Question one.
- A choice makes you more surprised by the two facts than before.
- Can it be the answer?
- The answer is no.
- It deepens the puzzle.
- The right answer makes you less surprised.
- Question two.
- A choice describes something that has always been true, such as shoppers prefer low prices.
- Can it explain a change from one year to the next?
- The answer is no.
- Something that did not change cannot explain a change.
- Question three.
- Sales fell, but profit rose.
- Name one kind of hidden change that could explain it.
- The answer: a different mix, for example the shop now sells fewer but more profitable items, or its costs fell.

24 Recap: the paradox method

- Fact one, yet fact two; what did you expect?
- Four hidden changes to look for
- Does it explain both? Less surprised?
- Name each trap

IN THE LESSON

- Let us recap.
- Write the two facts joined by yet, and say what you expected.
- Accept both facts as true.
- Ask what hidden change would break your expectation: a new behaviour, a different mix, a different way of counting, or a different currency.
- Then test each choice with one question: does it explain both facts together, so that I am less surprised?
- Name the trap in every wrong choice: deepens the puzzle, explains one side, partial, always true, or an irrelevant comparison.
- The right answer makes you say, oh, that is why.
- Practise this on every paradox question.

Summary notes for the Charta whiteboard lesson. Figures are from the lesson's made-up examples.

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