Charta | LESSON NOTES

Table analysis: sort, filter and compute

Data Insights

1 What the question gives you

- A table: one row for each item, one column for each fact
- Three statements, each judged on its own
- Each is a find, a count, a comparison or a new figure
- Answer yes or no, or true or false, for each

IN THE LESSON

- Here is what a table analysis question looks like.
- On one side is a table, with a row for each item, such as a store, a hotel or a town, and a column for each fact about it.
- You can sort the table by any column.
- On the other side are three statements, and for each one you choose yes or no, or true or false.
- Every statement is a small question about the data.
- Some ask you to find the biggest or the smallest.
- Some ask you to count the rows that meet a condition.
- Some ask you to compare two items, or to work out a new figure, like a cost for each person.
- Each statement is judged on its own, so one wrong answer never spoils another.

2 The method: statements first

Read the statements before the table

1. Read the statements	which columns matter?	**plan**
2. Name the job	find, count, compare, compute	**job**
3. Do it on the table	sort or work out a figure	**result**
4. Check the exact words	every, exactly, more than half	**wording**
5. Close call? Be exact	do not trust a rough guess	**calculate**

IN THE LESSON

- Here is the method, in order.
- First, read the three statements before you study the table.
- They tell you which columns matter, and which ones you can ignore.
- Second, for each statement, decide what job it asks for: find the top or bottom, count rows, compare two rows, or compute a new figure.
- Third, do the job on the table, by sorting the column in your head, or by writing the few numbers you need on your scratch board.
- Fourth, check the exact words of the statement against what you found.
- Does it say, every, or exactly, or more than half?
- Fifth, if the result is close, calculate carefully instead of trusting a rough guess.
- Always do the statements one at a time.

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3 Words that decide the answer

Circle the small word that sets the rule

Word	What to check
every, never	one exception makes it false
exactly	check the row just outside
more than half	work out half of all rows first
also	the same row wins both columns
per	divide: for each person

IN THE LESSON

- Most mistakes in table analysis come from one small word in the statement, so learn what each word demands.
- The word every, or never, needs the whole table to agree, and one counterexample makes the statement false.
- The word exactly needs the count to be right, so look at the row just outside your group and make sure it really falls outside.
- The phrase more than half means more than half of all the items, so first work out what half is.
- The word also, in a sentence like, the store with the most revenue also has the best rating, means the same row must win in both columns.
- And the word per, as in per person, tells you to divide.
- Circle those words before you touch the table.

4 Sorting and counting on paper

- Find the top: note the winner and the runner up
- Count: tick each row and write the names
- Look at the near miss just outside the group
- One column at a time

IN THE LESSON

- A table on a screen can be sorted with a click, but the principle is the same on paper, so use it.
- To find the highest or lowest, run your eye down one column only, and note the winner and the runner up.
- The runner up matters, because the statement may ask whether the winner is far ahead, or whether another row ties it.
- To count rows that meet a condition, tick them as you go, and write the names, not just the number.
- Names let you check the count later.
- Then look at the very next row outside the group, the near miss.
- Most counting errors are a near miss that was counted by mistake, or a row that was skipped.
- Finally, never mix two columns in one pass.

5 New figures from old columns

- Revenue: count times price
- For each person: total divided by population
- Share: part divided by the whole
- Compare a part with a fraction of the whole

IN THE LESSON

- Many statements need a figure that the table does not show.
- Learn the usual ones.
- Revenue is a count times a price, such as subscribers times the monthly price.
- A figure for each person is a total divided by a population.
- A share is a part divided by the whole, so find the whole first.
- A rate such as debt against budget is one column divided by another.
- Whenever a statement uses a figure that is not a column, write its formula on your scratch board before you do any arithmetic.
- Then compare in the easiest way.
- To see whether a share is more than three quarters, compare the part with three quarters of the whole, which saves a division.
- Always check the units of each column first.

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6 Table 1: the hotel group

Marisford Hotels, last season

Hotel	Town	Rooms	Occupancy (%)	Average nightly rate (USD)	Guest rating (out of 10)
Anchorage	Port Elwin	120	78	145	8.4
Beacon	Port Elwin	85	84	160	8.9
Cliffside	Saltmere	64	91	210	9.2
Driftwood	Saltmere	150	72	118	7.6
Estuary	Haddon Bay	98	82	132	8.1
Foreshore	Haddon Bay	110	69	125	7.9
Gullrock	Penvarra	72	88	175	8.7
Harbourview	Penvarra	135	76	150	8.3

IN THE LESSON

- Our first table is about a hotel group with eight hotels in four seaside towns.
- Each row is a hotel.
- The columns give its town, the number of rooms, its occupancy as a percentage, its average nightly rate in dollars, and the average rating given by guests, out of ten.
- The hotels have between sixty four and one hundred fifty rooms.
- Their occupancy runs from sixty nine percent to ninety one percent.
- Do not try to remember the table.
- We will come back to it for each statement.
- Notice that the three columns we are about to use, rooms, occupancy and rating, are all numbers, which means we can sort them.

7 Table 1: the three statements

- For each of the following statements, select Yes if the statement is true based on the information provided. Otherwise select No.
- 1. The hotel with the most rooms also has the lowest occupancy rate.
- 2. Exactly four hotels have an occupancy rate above 80%.
- 3. The hotel with the highest guest rating also has the highest average nightly rate.

IN THE LESSON

- Now read the three statements.
- For each one, you answer yes or no.
- Statement one: the hotel with the most rooms also has the lowest occupancy rate.
- Statement two: exactly four hotels have an occupancy rate above eighty percent.
- Statement three: the hotel with the highest guest rating also has the highest average nightly rate.
- Before we use the table, let us name the jobs.
- Statement one is a find job in two columns, with the word also.
- Statement two is a count job, with the word exactly, and the word above.
- Statement three is again a find job in two columns, with the word also.
- Two statements use also, so the same hotel must win both columns.

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8 Table 1: work each statement

Hotels: rooms, occupancy, rate, rating

1. most rooms, lowest occupancy	Driftwood 150; Foreshore 69	**No**
2. exactly four above 80%	84, 91, 82, 88; next is 78	**Yes**
3. top rating, top rate	Cliffside wins both	**Yes**
Key	No, Yes, Yes	**NYY**

IN THE LESSON

- Statement one.
- Sort by rooms: the largest is Driftwood, with one hundred fifty rooms.
- Now sort by occupancy: the lowest is not Driftwood at seventy two percent, because Foreshore is lower, at sixty nine.
- The same hotel does not win both columns, so the answer is no.
- Statement two.
- Look for occupancy above eighty percent: Beacon at eighty four, Cliffside at ninety one, Estuary at eighty two and Gullrock at eighty eight.
- That is four.
- The next one down is Anchorage at seventy eight, which is outside.
- So exactly four is correct: yes.
- Statement three.
- The highest guest rating is Cliffside at nine point two, and the highest nightly rate is also Cliffside, at two hundred ten dollars.
- The same hotel wins both: yes.

9 Table 1: what to take from it

- Also: sort both columns, compare the winners
- Exactly: check the row just outside the group
- Some statements are simply true
- Judge each statement alone

IN THE LESSON

- Look back at what made this easy.
- In statement one, the trap was to stop at the biggest hotel.
- A quick glance suggests that a big hotel is half empty, but the table shows a smaller hotel with even fewer guests.
- When a statement says also, always sort both columns and compare the winners.
- In statement two, the trap was an easy miscount.
- We counted four, and then we looked at the next row to prove that Anchorage, at seventy eight, really is outside.
- That step is what the word exactly demands.
- And statement three shows that a statement can simply be true.
- Not every statement is a trap.
- If the table agrees, say yes, and move on to the next one.

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10 Table 2: the software products

Corvel Systems subscription products

Product	Segment	Subscribers (thousands)	Monthly price (USD)	Annual churn (%)
Ledgerly	Small business	42	29	18
Tallymate	Small business	65	19	24
Quorix	Enterprise	8.5	240	7
Stackwise	Enterprise	12	180	9
Notewell	Consumer	150	6	31
Planbird	Consumer	96	9	27
Fieldcast	Enterprise	5.2	410	5
Rotaline	Small business	30	45	15

IN THE LESSON

- Our second table is about a software company with eight subscription products, in three customer segments.
- Each row is a product.
- The columns give its segment, its subscribers in thousands, its monthly price in dollars for each subscriber, and its annual churn, which is the percent of subscribers who cancel in a year.
- Notice the units.
- Subscribers are in thousands, and the price is for one month.
- Ledgerly has forty two thousand subscribers at twenty nine dollars.
- Fieldcast has just five point two thousand subscribers, but at four hundred ten dollars each.
- Keep an eye on those two products, because the statements will turn out to compare them.

11 Table 2: the three statements

- For each of the following statements, select Yes if the statement is true based on the information provided. Otherwise select No.
- 1. Fieldcast generates more monthly subscription revenue (subscribers multiplied by monthly price) than any other product.
- 2. The product with the lowest annual churn also has the highest monthly price.
- 3. Consumer segment products account for more than half of all subscribers.

IN THE LESSON

- Now the three statements.
- Statement one: Fieldcast generates more monthly subscription revenue, which is subscribers multiplied by monthly price, than any other product.
- The statement even gives us the formula.
- Statement two: the product with the lowest annual churn also has the highest monthly price.
- Statement three: consumer segment products account for more than half of all subscribers.
- The jobs: statement one is a compute job, a new figure for every product, and a compare.
- Statement two is a find job with also.
- Statement three is a count and share job, which needs the total number of subscribers first.
- Only statement one needs real arithmetic, so be careful with it.

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12 Table 2: statement one, a close call

Monthly revenue = subscribers times monthly price

Fieldcast	5.2 x 410 = 2,132	**thousand $**
Stackwise	12 x 180 = 2,160	**thousand $**
Quorix	8.5 x 240 = 2,040	**thousand $**
Verdict	Stackwise is higher	**No**

IN THE LESSON

- Statement one needs a new figure for each product: subscribers times price.
- Fieldcast is five point two thousand times four hundred ten dollars.
- Five times four hundred ten is two thousand fifty, and point two times four hundred ten is eighty two.
- In thousands of dollars a month, that is two thousand one hundred thirty two.
- That looks like the biggest, because the price is so high.
- But do not stop at one product.
- Stackwise has twelve thousand subscribers at one hundred eighty dollars.
- Twelve times one hundred eighty is two thousand one hundred sixty, again in thousands.
- That is more than Fieldcast.
- The gap is small, about one percent, so a rough guess could have fooled us.
- Fieldcast is not the top earner, and the answer is no.

13 Table 2: statements two and three

Churn, price and consumer share

2. lowest churn, top price	Fieldcast: 5% and 410	**Yes**
Consumer subscribers	150 + 96 = 246 thousand	**246**
All subscribers	sum of the eight: 408.7	**408.7**
3. over half?	246 is about 60% of 408.7	**Yes**
Key	No, Yes, Yes	**NYY**

IN THE LESSON

- Statement two.
- Sort by churn: the lowest is Fieldcast at five percent.
- Sort by price: the highest is also Fieldcast, at four hundred ten dollars.
- The same product wins both columns, so the answer is yes.
- Statement three.
- Consumer products are Notewell, with one hundred fifty thousand subscribers, and Planbird, with ninety six thousand, which is two hundred forty six thousand in all.
- Now the total of all eight products.
- Forty two, plus sixty five, plus eight point five, plus twelve, plus one hundred fifty, plus ninety six, plus five point two, plus thirty, is four hundred eight point seven thousand.
- Half of that is about two hundred four.
- Two hundred forty six is well above half, about sixty percent.
- The answer is yes.

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14 Table 2: what to take from it

- Use the formula on the rivals, not just one
- Close figures need exact arithmetic
- Share of a total: find the total first
- Compare to the line; no exact percent needed

IN THE LESSON

- Two lessons from this table.
- First, when a statement hands you a formula, such as subscribers multiplied by price, apply it to the contenders and not only to the one in the statement.
- Fieldcast looked like the winner, and it was the winner in price, and in loyalty.
- But the winner in revenue was Stackwise, by a whisker.
- When the figures are close, a rough guess is not enough, so calculate carefully.
- Second, for a share of a total, work out the total first, and then compare the share to the line.
- Here the line was half, and the share was clearly above it.
- Notice that we did not need an exact percentage.
- Sixty percent against fifty is enough to decide.

15 Table 3: town budgets and debt

Town budgets, current fiscal year

Town	Population (thousands)	Budget (USD millions)	Education share of budget (%)	Debt (USD millions)
Ashcombe	48	96	38	54
Brindle	120	276	34	190
Cottersby	35	63	42	22
Dornhill	82	172.2	36	131
Elverton	64	140.8	31	88
Foxley	27	59.4	45	18
Gilsworth	150	330	33	260
Hartmere	71	134.9	40	75

IN THE LESSON

- The third table is the hard one.
- It compares eight towns in one province.
- Each row is a town.
- The columns give its population in thousands, its budget in millions of dollars, the share of the budget spent on education, as a percent, and its outstanding debt in millions of dollars.
- Look at the units carefully.
- Population is in thousands, and the budget is in millions.
- That mismatch will matter.
- A budget of ninety six million for forty eight thousand people means two thousand dollars for each person.
- Nothing in the table is given for each person, so the statements will ask us to divide, and a table you must divide is where most mistakes are made.

16 Table 3: the three statements

- For each of the following statements, select True if the statement is accurate according to the information in the table. Otherwise select False.
- 1. Foxley spends more on education per resident than any other town.
- 2. Fewer than half of the towns have a budget of at least 2,100 USD per resident.
- 3. Debt exceeds 75% of the annual budget in exactly two towns.

IN THE LESSON

- Here are the three statements, and for each one you choose true or false.
- Statement one: Foxley spends more on education for each resident than any other town.
- Statement two: fewer than half of the towns have a budget of at least twenty one hundred dollars for each resident.
- Statement three: debt is more than seventy five percent of the annual budget in exactly two towns.
- All three need a new figure, so plan before you divide.
- Statement one needs education spending for each resident: the budget, times the education share, divided by the population.
- Statement two needs the budget for each resident.
- Statement three needs debt divided by budget.

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17 Table 3: statement one

Education per resident = budget x share / population

Foxley	45% of 59.4 = 26.73 M	**26.73 M**
Foxley per resident	26.73 M / 27 thousand	**$990**
Brindle per resident	93.84 M / 120 thousand	**$782**
Verdict	Foxley leads	**True**

IN THE LESSON

- Statement one.
- Education spending for each resident is the budget, times the education share, divided by the population.
- Start with Foxley, which has the highest education share, forty five percent.
- Its budget is fifty nine point four million, and forty five percent of that is twenty six point seven three million dollars.
- Divide by twenty seven thousand residents: about nine hundred ninety dollars each.
- Now check the rivals, not just the share.
- Brindle spends thirty four percent of two hundred seventy six million, which is ninety three point eight four million, over one hundred twenty thousand residents.
- That is about seven hundred eighty two dollars.
- So Foxley leads clearly, and the statement is true.

18 Table 3: statement two

Budget per resident = budget / population

Under 2,100	Ashcombe 2,000; Cottersby 1,800	**Hartmere 1,900**
2,100 or more	Brindle 2,300; Dornhill 2,100	**Elverton 2,200**
Also 2,100 or more	Foxley 2,200; Gilsworth 2,200	**five towns**
Fewer than half?	five is not fewer than four	**False**

IN THE LESSON

- Statement two.
- The budget for each resident is the budget divided by the population, so scale the units.
- Ashcombe is ninety six million over forty eight thousand, which is two thousand dollars.
- Brindle is two thousand three hundred.
- Cottersby is eighteen hundred.
- Dornhill is two thousand one hundred.
- Elverton is two thousand two hundred, and so are Foxley and Gilsworth.
- Hartmere is nineteen hundred.
- Now count the towns at twenty one hundred dollars or more: Brindle, Dornhill, Elverton, Foxley and Gilsworth.
- That is five of eight.
- Half of eight is four, and five is not fewer than four.
- So the statement is false.
- Notice that Dornhill sits exactly on the line, and at least includes it.

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19 Table 3: statement three

Debt above 75% of budget?

Gilsworth	debt 260; 75% of budget 247.5	**above**
Dornhill	debt 131; 75% of budget 129.2	**just above**
Brindle	debt 190; 75% of budget 207	**below**
Verdict	exactly two towns	**True**

IN THE LESSON

- Statement three.
- Debt over seventy five percent of the budget means debt divided by budget above three quarters.
- Rather than divide every town, compare debt with three quarters of the budget.
- Gilsworth: three quarters of three hundred thirty million is two hundred forty seven and a half, and its debt is two hundred sixty, which is more.
- Dornhill: three quarters of one hundred seventy two point two is about one hundred twenty nine, and its debt is one hundred thirty one, which is also more, by a small margin.
- Brindle: three quarters of two hundred seventy six is two hundred seven, and its debt is one hundred ninety, which is less.
- The others are well below.
- So exactly two towns, and the statement is true.

20 Table 3: what to take from it

- Plan the formula before touching numbers
- Watch the units: thousands against millions
- Check the rivals, not just the first candidate
- Close to the line: calculate it exactly

IN THE LESSON

- The hard question was hard only because of the arithmetic, and the habits that solved it are the same ones we used before.
- We planned the formula for each statement before touching the numbers.
- We watched the units, and divided thousands into millions carefully, which is the same as multiplying by a thousand.
- We checked the rivals and not just the first candidate, in statement one.
- We counted around the line, with at least meaning equal counts, in statement two.
- And for close calls, we compared with three quarters of the budget instead of working out every percentage.
- Notice that Dornhill was only just above the line, so we calculated it exactly.
- When a figure is close to the line, give it a careful look.

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21 Accurate and quick

- Statements first, then the table
- Write only the figures you need
- Estimate first; be exact only when close
- Circle every, exactly, also, per
- About two minutes, then decide

IN THE LESSON

- Now habits that save time without losing accuracy.
- First, read the statements before the table, so you know which columns matter.
- Second, do not copy the table.
- Write down only the few figures you need, next to the name of the row.
- Third, estimate first, and calculate only when the estimate is close.
- If two products differ by a factor of two, you do not need three decimal places.
- Fourth, circle the key word in each statement, such as every, exactly, also or per.
- Fifth, keep statements separate.
- If one statement is slow, mark it, answer the others, and come back.
- A steady pace of about two minutes for each question beats a perfect answer on one.

22 Quick check

1. 'Highest revenue also has the highest rating': how to check?
   Answer: Sort both; the same row must top both.
2. 'Exactly three stores are 4 or more': what else to check?
   Answer: That the next store down is below 4.
3. Budget in millions, population in thousands: per person?
   Answer: Divide, and scale: million over thousand is a thousand.

IN THE LESSON

- Now a quick check.
- Pause after each question and answer it yourself.
- Question one.
- A statement says, the store with the highest revenue also has the highest rating.
- How do you check it?
- The answer: sort revenue and find the top store, then sort rating and find the top store, and the statement is true only if it is the same store.
- Question two.
- A statement says, exactly three stores have a rating of four or more.
- What must you check besides your three?
- The answer: check that the next store down is below four, so the count is exactly three.
- Question three.
- A table gives budget in millions and population in thousands.
- How do you find the budget for each person?
- Divide, and remember the units: a million over a thousand is a thousand dollars.

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23 Recap: the table analysis method

- Statements first; name each job
- Circle every, exactly, also, per, half
- Sort, count, or compute the new figure
- Watch units; be exact only on close calls
- Judge each statement alone

IN THE LESSON

- Let us recap the technique.
- Read the three statements first, and name each job: find, count, compare or compute.
- Circle the small word that sets the rule, such as every, exactly, also, per, or more than half.
- Then do the job on the table, writing down only the figures you need.
- Sort in your head for finds and counts.
- Use the formula on the rivals, and not only on the first item.
- Watch the units, and estimate first, calculating exactly only when the result is close to the line.
- Judge each statement on its own, and say yes when the table agrees.
- Done in order, a table of forty cells becomes three small questions, each of which you can answer.

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

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