CHARTA LEARNING · LESSON NOTES

Trading: why, how and how to judge it

Portfolio Management

1 A story: the cake and the sofa

- Orders are parcels: some cakes, some sofas
- The reason for a trade sets its urgency
- Cakes lose value while they wait
- Sofas can wait for a better moment

IN THE LESSON

- Picture a delivery driver with two parcels.
- One is a birthday cake for a party that starts at noon.
- The other is a sofa the customer wants sometime this month.
- Same van, same road, yet nobody would handle them the same way.
- A trading desk is just like that.
- Rafael Oyelaran sends orders to Imogen Strand all week, and the number of shares is only part of the story.
- What matters just as much is why the order exists.
- Some orders are cakes: they lose value every minute they wait.
- Others are sofas: they can wait for the market to come to them.
- So the first question for any order is always the same.
- Why is this trade being made?

2 Four reasons to trade

Why Fenmore trades, and how urgent it is

Reason for the trade	Usual urgency
Profit from an alpha signal	Set by how fast it fades
Cut risk or hedge	Prompt: risk stays open
Cash flow, index change, margin call	Timed or forced
Routine rebalancing	Patient

IN THE LESSON

- Here are the main reasons an investor trades, and the urgency each one brings.
- First, profit.
- Rafael sees a signal that a stock is mispriced, and that expected gain is called alpha.
- Alpha decays, because other investors find the same idea.
- If it fades fast, the trade is urgent.
- If it fades slowly, there is time.
- Second, risk management or hedging, such as cutting market exposure or currency exposure.
- The unwanted risk stays open until the trade is done, so these are usually prompt.
- Third, cash flows and forced trades: a client pays in, an index changes at the close, or a margin call arrives.
- They are tied to a time or a deadline.
- Fourth, routine rebalancing, which can usually be worked patiently.

3 Speed against cost

Chart: Cost of the trade vs Time spent trading (rush to patient)

- Market impact
- Cost of waiting
- Total cost

IN THE LESSON

- Every trade faces one central trade off, so let us draw it.
- The horizontal axis is the time spent trading, from a rush on the left to a slow, patient trade on the right.
- The vertical axis is cost.
- The red curve is market impact, the price you push against yourself by demanding shares in a hurry.
- It is highest on the left and falls as you slow down.
- The gold curve is the cost of waiting.
- It means two things: alpha that fades while you hold back, and the risk the price drifts away from you.
- It is lowest on the left and rises as you slow down.
- Add them and you get the green total, which dips in the middle.
- Where that dip sits depends on the order.

4 The speed trade-off in symbols

Total cost = market impact + cost of waiting
Share of daily volume = order ÷ daily volume

Market impact	Rises with speed
Cost of waiting	Rises with delay
Total cost	Choose the pace that minimises it
Share of daily volume	How big the order is

IN THE LESSON

- Two small formulas hold the whole idea.
- The first says the total cost of a trade is its market impact plus the cost of waiting.
- Market impact rises with speed.
- The cost of waiting, which includes lost alpha and the risk that the price moves against you, rises with delay.
- The best pace is the one where the total is smallest.
- The second formula measures how big an order is.
- Take the shares in the order and divide by the shares that normally trade in a day.
- That is the share of daily volume.
- A tiny share barely moves the price.
- A share of several hundred per cent can move it a great deal, so the order must be spread out.

5 Example 1: the same order at two speeds

One order: impact 40 bp in one day, 20 bp over three

Impact in one day		**40 bp**
Impact over three days	halved	**20 bp**
Alpha lost waiting: fast, slow	two extra days	**60 bp, 10 bp**
Fast alpha: one day or three	40 against 20 + 60	**40 or 80 bp**
Slow alpha: one day or three	40 against 20 + 10	**40 or 30 bp**

IN THE LESSON

- Let us put numbers on it, in basis points.
- A basis point is one hundredth of one per cent.
- Imogen Strand could finish an order in one day, at a market impact of forty basis points.
- Spread over three days, the impact halves to twenty.
- Now the reason for the trade matters.
- In the fast alpha case, the signal fades quickly, and waiting two more days costs sixty basis points of lost gain.
- Three days then costs twenty plus sixty, eighty, against forty for one day.
- Rush it.
- In the slow alpha case, waiting costs only ten.
- Three days costs twenty plus ten, thirty, against forty.
- Be patient.
- Same order, same market, opposite answers.

6 Same order, opposite answers

Total cost (bp)

Fast, 1 day	**40**
Fast, 3 days	**80**
Slow, 1 day	**40**
Slow, 3 days	**30**

Illustrative figures

IN THE LESSON

- Here are those four totals as bars.
- The vertical axis is total cost in basis points.
- The first pair of bars is the fast alpha order.
- One day costs forty, and three days costs eighty, so the patient route doubles the cost.
- The second pair is the slow alpha order.
- One day costs forty, but three days costs only thirty, so the patient route is cheaper.
- Notice that the one day bars are the same height.
- Trading fast costs the same impact whatever the reason.
- The reason shows up only in what waiting costs.
- The trap here is handling every order the same way, whether it is a cake or a sofa.
- A good desk asks why before it asks how.

7 A story: planning the journey

- Four groups of facts feed the choice
- The order: side and size against daily volume
- The security and today's market conditions
- The manager's risk aversion and alpha decay

IN THE LESSON

- Before booking a journey, you check a few facts.
- How much luggage do you have?
- How busy is the route?
- Is there bad weather on the way?
- And how badly do you need to arrive on time?
- Choosing a trading strategy works the same way.
- Imogen Strand looks at four groups of inputs.
- The order itself: buy or sell, and how large it is compared with normal trading.
- The security: how liquid it is, how wide its spread is, how volatile, how deep its order book is, and where it trades.
- The market conditions today, which can change sharply around news.
- And the manager: how much Rafael Oyelaran dislikes the uncertainty of waiting, and how fast the idea behind the trade goes stale.

8 The four groups of inputs

What goes into the choice

Group	What Imogen checks
Order	Buy or sell; size against volume
Security	Liquidity, spread, volatility, depth
Market conditions	Liquidity and volatility today
Manager	Risk aversion; how fast alpha fades

IN THE LESSON

- This table sets the four groups side by side.
- The order: whether it is a buy or a sell, and its size compared with the average daily volume.
- The security: liquidity, the bid ask spread, volatility, market depth and the place where it trades.
- The market conditions: how liquid and how volatile the market is right now, remembering that both can swing wildly in a stress.
- The manager: risk aversion, together with the urgency that comes from how quickly the alpha decays.
- These inputs do one job.
- They set the balance between market impact, which rises with speed, and execution risk, which rises with delay.
- Every input leans the answer toward either rushing or waiting.

9 Example 2: three Fenmore orders

Share of average daily volume, three orders

Tarn Pharma, buy 40,000	40,000 ÷ 6,000,000	**0.67%**
Quillon Parts, sell 900,000	900,000 ÷ 300,000	**300%**
Marlow Foods, buy 90,000	90,000 ÷ 450,000	**20%**
Tarn: alpha fades	by tonight	**Fast**
Quillon: alpha fades	no hurry	**Slow**

IN THE LESSON

- On Tuesday morning Imogen Strand has three orders.
- Buy forty thousand shares of Tarn Pharma, where average daily volume is six million.
- That is point six seven per cent of a day.
- Sell nine hundred thousand shares of Quillon Parts, where average daily volume is three hundred thousand.
- That is three hundred per cent: three whole days of normal trading.
- Buy ninety thousand shares of Marlow Foods, average daily volume four hundred and fifty thousand.
- That is twenty per cent.
- Size alone says Quillon is the hard one.
- But size is only one input.
- Rafael says the Tarn signal fades by tonight, while the Quillon sale is a tidy up he expects no hurry about.

10 From aggressive to patient

- Tarn: small, fast alpha
- Marlow: moderate
- Quillon: huge, slow alpha

IN THE LESSON

- Let us place those orders on one line.
- The far left is aggressive: trade quickly, accept the market impact, and avoid the risk of waiting.
- The far right is patient: trade slowly, protect the price, and accept that the market may drift.
- Tarn Pharma sits at the left.
- The order is tiny against the volume, so impact is small, and the alpha fades by tonight, so waiting is costly.
- Quillon Parts sits at the right.
- The order is huge against the volume, so rushing would hammer the price, and the alpha is slow, so patience costs little.
- Marlow Foods sits in the middle, because the order is moderate and the alpha is neither fast nor slow.
- In the middle, the manager's risk aversion breaks the tie.
- The trap is setting urgency from size alone.

11 A story: measured from where?

- A runner's time means little alone
- A reference price is the yardstick
- Each yardstick answers a different question
- The wrong yardstick gives a wrong verdict

IN THE LESSON

- A runner finishes a race and checks her time.
- Was that good?
- It depends on what you compare it with.
- Her own best time, the winner's time, or the average of the field would each give a different answer.
- A trade is judged the same way.
- Imogen Strand buys shares at an average price, but is that price good or bad?
- Only a reference price can say.
- Each reference price answers a different question.
- Did trading cost much from the moment the order arrived?
- Did the trader beat the day's average?
- Did the fund get the price it is valued at?
- Pick the wrong reference and the verdict can look very exact while being badly misleading.

12 Reference prices through the day

Before and during the trade

Decision price → Arrival price → VWAP and TWAP

At and after the close

Closing price → A later close

IN THE LESSON

- These boxes follow the order in which each price becomes known.
- In the top row, the decision price is the price when Rafael decided to trade.
- The arrival price comes next: the midpoint of the bid and ask when the order reaches Imogen.
- Both are known before a single share trades, and the trader cannot change them, which is why the arrival price is the honest yardstick for urgent orders.
- The third box holds the two averages for the day, the volume weighted average price and the time weighted average price.
- In the bottom row come the closing price, which suits index funds valued at the close, and a later closing price, a post trade benchmark that shows whether the price bounced back after the trade.

13 VWAP, TWAP and cost in basis points

VWAP = sum of (price × volume) ÷ total volume
TWAP = average of the prices
Cost, buy = (paid − benchmark) ÷ benchmark × 10,000

Price	Price at each point
Volume	Shares traded at that price
VWAP	Busy periods count more
TWAP	Every period counts equally
Cost in basis points	Positive means a cost on a buy

IN THE LESSON

- Three formulas, then.
- The volume weighted average price, VWAP, weights every price by the shares traded at it.
- Multiply each price by its volume, add them up, and divide by the total volume.
- Busy periods count for more.
- The time weighted average price, TWAP, ignores volume.
- It just averages the prices at equal time steps.
- Then the cost of a buy against any benchmark, in basis points.
- Take the average price paid, subtract the benchmark, divide by the benchmark, and multiply by ten thousand.
- A positive number is a cost.
- For a sale, reverse the sign, because selling below the benchmark is the bad outcome.
- Every benchmark uses this same pattern, so the choice of benchmark is what really matters.

14 Example 3: VWAP against TWAP

Prices and volumes through one day

Morning	20.00 × 1,000	**20,000**
Midday	20.10 × 3,000	**60,300**
Afternoon	20.30 × 6,000	**121,800**
VWAP	202,100 ÷ 10,000	**20.21**
TWAP	(20.00 + 20.10 + 20.30) ÷ 3	**20.13**

IN THE LESSON

- Suppose Quillon Parts trades in three stretches of the day.
- In the morning, one thousand shares at twenty dollars.
- Around midday, three thousand at twenty dollars ten cents.
- In the afternoon, six thousand shares at twenty dollars thirty cents.
- The values are twenty thousand, sixty thousand three hundred, and one hundred and twenty one thousand eight hundred.
- They add to two hundred and two thousand one hundred.
- Divide by the ten thousand shares traded, and VWAP is twenty dollars twenty one cents.
- Now TWAP, the plain average of the three prices, is twenty dollars and thirteen cents.
- VWAP is higher, because most of the shares changed hands when the price was high.
- The two benchmarks answer different questions, so they can disagree.

15 Choosing the yardstick

Which yardstick suits which order

Reference price	Suits
Arrival price	Urgent orders; full cost
VWAP or TWAP	Orders worked all day
Closing price	Index funds, valuation
Later close	Shows reversion

IN THE LESSON

- Here is how to match the yardstick to the order.
- The arrival price suits urgent orders.
- It captures the full cost of trading, including the order's own impact, and it separates delay cost from execution cost within implementation shortfall, which is itself measured from the decision price.
- The volume weighted and time weighted averages suit orders deliberately worked through the day.
- They are only known at the end, and they share the day with the order.
- The closing price is the natural yardstick for index funds and for any fund valued at the close, because that is the price the fund is judged on.
- And a later closing price reveals reversion: if the price bounces back, the trade moved it more than the news did.

16 Example 4: a big order flatters VWAP

Buy 5,000 of a 15,000 day; others pay 20.20; arrival 20.00

Our average price paid	5,000 shares	**20.12**
VWAP, our order included	(202,000 + 100,600) ÷ 15,000	**20.17**
Cost against VWAP	(20.12 − 20.173) ÷ 20.173	**−26 bp**
Cost against arrival price	(20.12 − 20.00) ÷ 20.00	**+60 bp**
Our share of the day's volume	5,000 ÷ 15,000	**33%**

IN THE LESSON

- Now the famous trap.
- Imogen Strand buys five thousand shares, which is a third of the day's volume.
- The price at arrival was twenty dollars.
- Other traders buy ten thousand more shares at an average of twenty dollars twenty cents, because her buying pushed the price up.
- She pays an average of twenty dollars twelve cents.
- The day's VWAP, with her own order inside it, is two hundred and two thousand plus one hundred thousand six hundred, over fifteen thousand, which is twenty dollars seventeen cents.
- Against VWAP she looks brilliant, about twenty six basis points better.
- But against the arrival price she paid twelve cents more, sixty basis points of cost.
- Her own order dragged VWAP upward.
- The fair yardstick was the arrival price.

17 Mistakes to avoid so far

- Treating every order the same, whatever its reason
- Setting urgency from size alone, ignoring alpha decay
- Praising a fill below VWAP on a very large order
- Judging an urgent trade against a day average
- Quoting a cost without naming the benchmark

IN THE LESSON

- Let us collect the traps from the first three topics.
- One: handling every order the same way, whatever the reason it was placed.
- Two: setting urgency from order size alone and ignoring how quickly the information behind the trade loses value.
- Three: praising a fill below VWAP when the order itself made up a large part of the day's volume, because the order moves VWAP.
- Four: judging an urgent trade against an average that is only known at the end of the day, instead of the arrival price.
- Five: quoting a cost without saying which benchmark it was measured against, so that nobody can compare it with anything.

18 A story: the doctor's prescription

- Diagnosis: the facts of the order
- Treatment: a strategy matched to the facts
- Check: the benchmark that fits the strategy
- Explain the impact against risk balance

IN THE LESSON

- A good doctor does not just hand over a pill.
- She states the diagnosis, picks the treatment that fits it, explains why, and says how she will check it worked.
- A trading recommendation is an argument built the same way.
- Imogen Strand starts from the facts of the order: its size against daily volume, the liquidity, the volatility, the urgency that comes from alpha decay, and the manager's risk aversion.
- She then matches a strategy to those facts.
- Then she names the benchmark that goes with that strategy, and explains how the strategy balances market impact against execution risk.
- Leave out any one of those links and the answer is incomplete, however sensible the strategy looks.

19 Situation, strategy, benchmark

Urgent

Fast alpha, or a risk to close → Aggressive: accept the impact → Arrival price

Patient

Large order, slow alpha → Scheduled or liquidity-seeking → VWAP or arrival

IN THE LESSON

- Read each row from left to right, because that is the order of the argument.
- The top row is the urgent case.
- The facts: fast alpha, or a risk that must be closed.
- The strategy: trade aggressively and accept the market impact, because waiting is dearer.
- The benchmark: the arrival price, which shows the full cost of that speed.
- The bottom row is the patient case.
- The facts: a large order and slow alpha.
- The strategy: a schedule based method such as VWAP or TWAP, or a liquidity seeking method that searches for hidden volume, possibly over days.
- The benchmark: VWAP, or the arrival price, matched to the method.
- The strategy and the benchmark always go together.

20 More situations, more matches

Situation and the matching strategy

Situation	Strategy; benchmark
Fast alpha, or a risk to close	Aggressive; arrival price
Large order, slow alpha	Scheduled or seeking; VWAP
Index change at the close	Closing auction; close
Cash or multi-asset shift	Futures or portfolio trade

IN THE LESSON

- Two more situations complete the picture.
- Index driven trades, where the fund is valued at the close, are traded at or near the close, often in the closing auction, and judged against the closing price.
- That keeps the fund in line with its index.
- Multi asset rebalancing and cash equitisation, which means putting cash to work in the market quickly, are often done with portfolio trades or futures, which move many exposures at once and cheaply.
- The table lists all four matches.
- Notice that the first three rows each end with a benchmark.
- A recommendation of a strategy with no benchmark is the commonest way to lose marks, because without a benchmark nobody can tell whether the strategy worked.

21 Example 5: the Tarn Pharma buy

Tarn: buy 40,000; alpha fades by tonight; volatility up

Share of daily volume	40,000 ÷ 6,000,000	**0.67%**
Alpha and volatility	fast; up this week	**Waiting is costly**
Strategy	front-loaded, first hour	**Aggressive**
Benchmark	price when order arrives	**Arrival price**
Defence	small impact, dear delay	**Rush**

IN THE LESSON

- Now to defend an actual order.
- Rafael Oyelaran wants forty thousand shares of Tarn Pharma.
- Average daily volume is six million, so the order is point six seven per cent of a day, tiny.
- The stock is liquid, though volatility has risen this week, which makes waiting riskier.
- His signal comes from an earnings revision that the market should absorb by tonight, so alpha decays fast.
- Imogen Strand's proposal: trade aggressively, front loaded in the first hour.
- The benchmark is the arrival price.
- The defence: market impact will be small because the order is small, while every hour of delay gives up gain and adds price risk.
- Rushing is clearly the cheaper choice here.

22 Example 6: the Quillon Parts sale

Quillon: sell 900,000; average daily volume 300,000

Order against a day's volume	900,000 ÷ 300,000	**3 days**
At 10% of volume	900,000 ÷ 30,000	**30 days**
At 20% of volume	900,000 ÷ 60,000	**15 days**
At 30% of volume	900,000 ÷ 90,000	**10 days**
Proposal	schedule at 20% of volume	**15 days**

IN THE LESSON

- The second order is harder.
- Sell nine hundred thousand shares of Quillon Parts.
- Average daily volume is three hundred thousand, so the order is three days of normal trading.
- The manager is trimming a position whose target has been reached, expects little change in value over the coming weeks, and has low aversion to execution risk.
- The pace is the choice.
- Trading at ten per cent of volume takes thirty days, since thirty thousand shares a day goes into nine hundred thousand thirty times.
- At twenty per cent, sixty thousand a day, it takes fifteen days.
- At thirty per cent, ten days.
- A very fast pace would crush the price.
- A very slow pace leaves the order open for weeks.
- Imogen Strand proposes twenty per cent.

23 How the pace changes the finish line

Days to finish the sale

10% of volume	**30 days**
20% of volume	**15 days**
30% of volume	**10 days**

Quillon: 900,000 shares

IN THE LESSON

- Here is the choice as a picture.
- The vertical axis is the days needed to finish the sale, and each bar is a pace measured as a share of normal volume.
- At ten per cent, the sale takes thirty days.
- At twenty per cent, fifteen days.
- At thirty per cent, ten days.
- A faster pace shortens the bar, but it takes a bigger bite out of each day's trading, so the market impact rises.
- A slower pace lowers the impact, but it leaves the order open for longer, so the execution risk, the chance that news moves the price, rises.
- With slow alpha and low risk aversion, the middle bar is a sensible balance.
- A manager who disliked uncertainty more would pick the shortest bar.

24 Writing the defence

Defending the Quillon sale in five parts

Facts	900,000 against 300,000 a day	**3 days of volume**
Strategy	scheduled, 20% of volume	**15 days**
Benchmark	VWAP, plus arrival price	**Both reported**
Balance	less impact, more drift risk	**Patient**
What could go wrong	news moves the price	**Reassess**

IN THE LESSON

- A strong written defence has five short parts, and we can use Quillon Parts to show them.
- First the facts: three days of volume, slow alpha, low risk aversion.
- Second the strategy: a scheduled method at twenty per cent of volume, over fifteen days.
- Third the benchmark.
- A scheduled method suits VWAP, but our own order will be a fifth of the volume, so VWAP flatters us, and we also report the cost against the arrival price.
- Fourth the balance: slower trading gives up some price protection in exchange for much lower market impact, which suits a manager who is relaxed about waiting.
- Fifth, what could go wrong, which we turn to next.

25 What could go wrong

- Aggressive: impact can be larger than hoped
- Scheduled: news can move the price mid-plan
- Percentage of volume: finish date is uncertain
- Close targeting: auction imbalances move the price

IN THE LESSON

- A strategy is only as good as the answer to what could go wrong.
- An aggressive trade accepts market impact, and in a thin moment it can be larger than hoped.
- A scheduled trade is exposed to drift: if bad news arrives partway through the schedule, the rest of the sale happens at a worse price, so the plan needs a review point.
- A percentage of volume method has an uncertain finish date, and it can trade more when the price is moving against the order.
- A close targeting trade depends on the closing auction, where a large imbalance can move the price.
- Naming these risks, and what Imogen Strand would do about each, is what turns a recommendation into a defence.

26 Recap: the lesson in five lines

- The reason for the trade sets its urgency
- Impact rises with speed; waiting costs rise with delay
- Inputs: order, security, market, manager
- Match the benchmark: arrival, VWAP or the close
- Defend: facts, strategy, benchmark, balance, risks

IN THE LESSON

- Let us pull it together.
- First, the reason for a trade sets its urgency: profit trades follow alpha decay, hedges are prompt, cash flow trades are timed, and rebalancing is patient.
- Second, the trade off is market impact, which rises with speed, against the cost of waiting, which rises with delay.
- Third, the inputs are the order, the security, the market conditions and the manager's risk aversion with alpha decay.
- Fourth, match the reference price to the order: arrival for urgent, VWAP for scheduled, the close for index funds, and beware VWAP on a big order.
- Fifth, a defence states the facts, the strategy, the benchmark, the balance and the risks.

27 Try three quick questions

1. Buy 50,000; daily volume 5,000,000; alpha fades by close. Share and approach?
   Answer: 1% of a day. Aggressive, benchmark the arrival price.
2. Paid 10.10; arrival 10.00; VWAP 10.15; order 40% of volume. Good?
   Answer: No. Cost against arrival is +100 bp; the big order flatters VWAP.
3. Sell 600,000; daily volume 200,000; trade at 15% of volume. Days?
   Answer: 600,000 ÷ 30,000 = 20 days.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- Fenmore must buy fifty thousand shares of a stock with average daily volume of five million, and the alpha fades by the close.
- What is the share of daily volume, and how should the order be traded?
- Fifty thousand over five million is one per cent, tiny, so impact is small and alpha is fading.
- Trade aggressively against the arrival price.
- Question two.
- A trader paid ten dollars ten cents, the arrival price was ten dollars, VWAP was ten dollars fifteen, and the order was forty per cent of volume.
- Is beating VWAP good evidence?
- No.
- Against arrival the cost is one hundred basis points, and the big order flattered VWAP.
- Question three.
- Sell six hundred thousand shares, average daily volume two hundred thousand, at fifteen per cent of volume.
- How long?
- Thirty thousand a day, so twenty days.
- That is the cost of patience.