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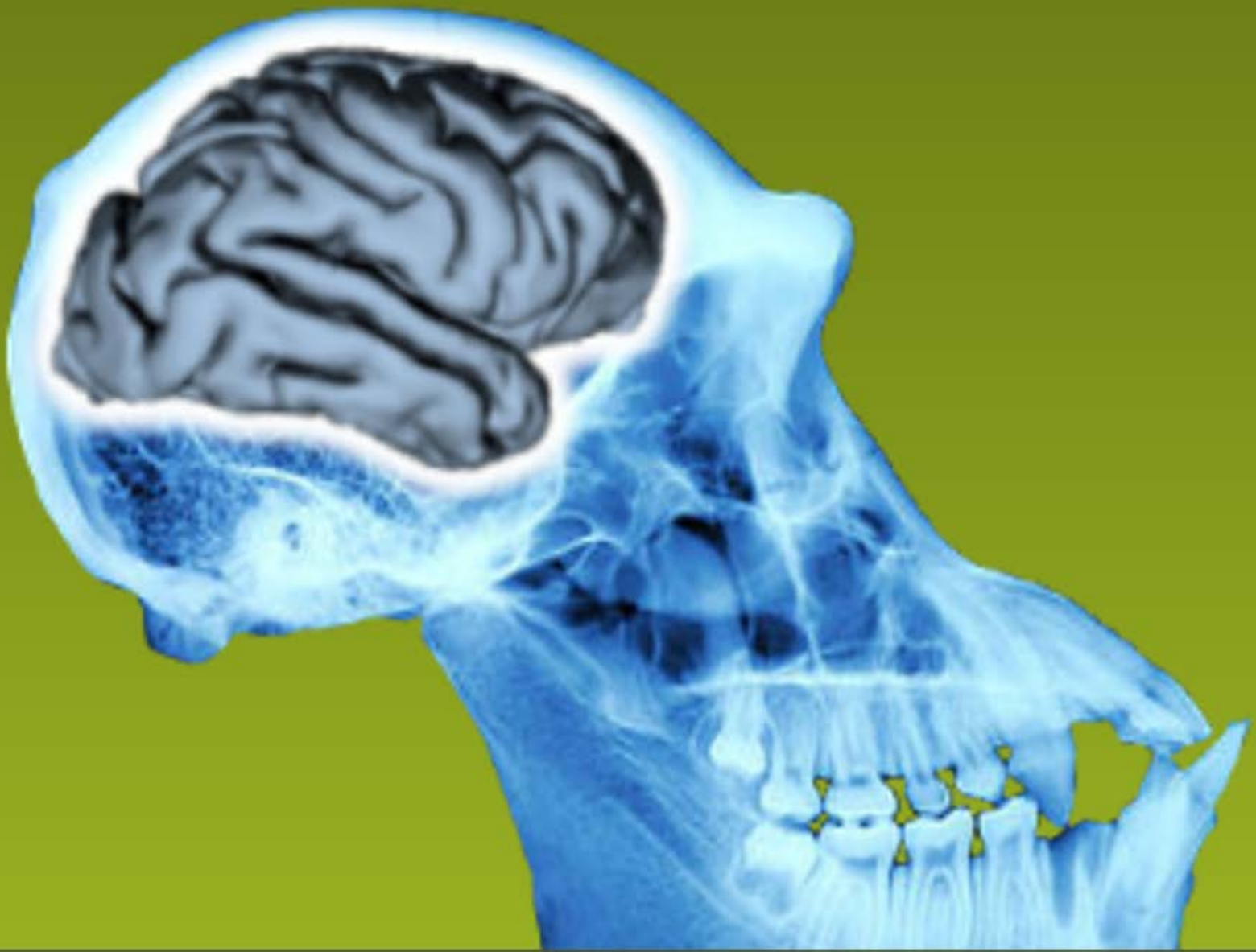


Critical Thinking

From a Psychology Academic

U/MAKATAUI

Critical Thinking (from a Psychology Academic)

Education | Data

Apes, listen up, I'm going to talk to you about something tangentially related to stonks. What is that?

Critical thinking

Why, might you ask, does this baby ape want to share knowledge about this? Because I literally teach this shit at a top 20 UK university in the Russell Group (happy to verify my academic status with mods if needed, could always get cool flair like 'The Psychologist' or 'The Professor'). I am member of British Psychological Society and I lecture on statistics, developmental (child) psychology, and psychology/critical thinking in general – my first degree is in forensic psychology at undergrad level, where we did a lot of understanding of criminology and criminal psyche (probably not surprising how useful that is to assessing these hedgies), interrogation techniques, extremism, deception – I even spent an entire elective module learning specifically about psychopathy and was involved in a research project specifically about looking at psychopaths within business/academia. You might think I was training for the MOASS before I even realised.

As someone who has teach maths and stats to a bunch of people who hate maths and stats, and who need to learn to critically read dense journal articles and critique theories from the last 200 years to spot academic FUD and pop-psychology bullshit, this is literally my bread and butter. I also run SaaS tech startup making cool medical programmes (also happy to verify company with mods if needs be) – so I know a fair bit about programming/working with clients as well and have recently worked on some work on NHS trust' work with a private company so I know a fair bit about healthcare system here – all of this to say, my wrinkles in brain are for things other than stocks and that we have many amazing DD writers here who deal with every minutiae that happens in the markets.

I have to spend my days when not writing software on teaching psychologist-to-be apes in learning how to spot statistical, numerical and research crud that either slipped through peer-review or was just blatantly false and how to think critically (as well as things like how baby-apes learn language, whether development is a continuous process, etc – I also teach fun stats like inferential testing and hypothesis testing). Most days on campus, you'll find me screaming at students 'correlation is not causation!'. I teach across a bunch of undergrad (BA) and masters programme (MA/MSc) and I also teach PhD / doctoral students or assist them with things like developing scales. I also act as a researcher officer, helping develop stuff to make sure it has ecological validity (that it works in real world application as well as lab) and doing things like quantitative analysis/data science stuff (like remote data collection for rural children and ECCD topic reports about integrated programmes and measuring global indicators for child development, where everyone from charities and government wants you to fudge the numbers to make investment into an area look successful). I teach and advocate a lot for Open Science as a way to keep things transparent – and I am fan of pre-registration, where authors will pre-state what their hypotheses are, what they are going to investigate, what they think the main/interaction effects are and what tests they will carry out – which stops them from a process known as statistical significance, or p-value, fishing (where you do stupid shit like make smaller groups to get a statistically significant result, so you get published because there is a positive bias in publication.)

In fact, one piece of research that I currently am working on for submission to a journal with a few co-authors is on co-operation in adults and the reasons why we co-operate, how we identify group members and so on (which we tested empirically using economic games where people played against AI but thought they were playing with other people in the room) - ie what makes us make economic decisions that affect our group, based on whether we co-operate or engage in competition (it has an evolutionary psych slant to it). I've worked on the past as a RA (research assistant) for studies looking at unfairness/punishment - like would you punish another player in another room in an economic game where you both win money? Would you punish if they were in the same room? Etc.

What I am saying to you, dear ape, as an introduction, is that I have to teach people to both spot FUD and have to actively combat it myself to make sure we do honest research that has scientific rigour and follows the empirical method. I want to help bring some of these principles here because I see ape getting excited and I see ape go nuts over every tiny bit of information and I wanted to help you with some tools on how to approach this all critically (without just saying 'FU shills') so you can make evaluated choices based on your own understanding/interpretation – and so you can figure out how to sense check yourself and find out if that gut feeling is in the right direction.

With that out the way, I wanted to write to you apes about critical thinking, in the context of psychology specifically – so sit back, it's lecture time from *Professor Makataui* (no really, I am ECR – which is early career researcher, but for the purposes of this and every scam email I get inviting me to scam conferences where they just take your money and never hold them, I'll be the Prof for this session. This is also what my international students title me as – despite me repeatedly telling them that I am just a lowly lecturer! For one post, I am going to go on a small power trip).If apes like this, I will essentially share more of what I teach to my students - so let me know if you like it.

So welcome apes, primates and all mammals alike – the *Prof* is in session.

Introduction:

Let's start with why critical thinking is important (I know, we all know).

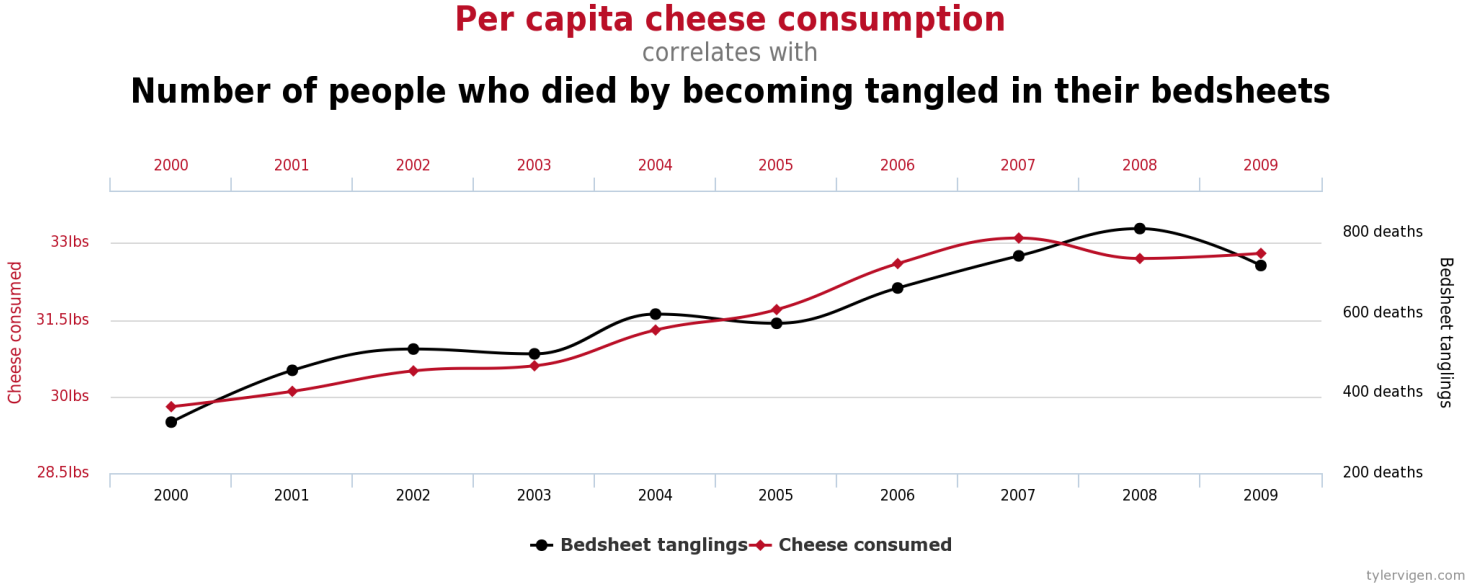
Have you heard of spurious correlations? No?

You remember how I said 'correlation is not causation'? Well, you can get things that have really strong positive or negative correlation, but that are completely **meaningless**.

You need to understand this - you can make relationships appear out of thin air with statistics.

Whaaaaat? People can lie with stats? Yes.

Let's look at something called a spurious correlation - which is, in it's essence, a correlation that has a very strong relationship but has a meaningless relationship. There's even a website and book for these, which is where I will pull some examples from - the examples are **obvious.** The reason the examples are silly is to demonstrate exactly what you can demonstrate with some numbers and vow people with (but ones that are easy FUD so we can train you).Here is a spurious correlation (taken from the great, the one and only: Tyler Vigen - https://www.tylervigen.com/spurious-correlations):



Look at that - an almost perfect positive correlation (probably r=0.9+ or 0.8+) between the per capita cheese consumption and the number of people who died by becoming tangled in their bedsheets.

This is a very strong relationship - a very strong positive one - but it doesn't really mean anything. There is not a great explanation or anything plausible here. This is a relationship that is **meaningless.**

This is why we need to learn to think **critically.**

Definition - Critical Thinking

But how do we define what thinking critically means? It isn't just **criticising.** This is something I have to hammer home to even my postgrad students. It does not just mean to look for weaknesses - it is **reflecting, with scepticism and a critical eye, over what we choose to believe and understand and the reasons why we do this.**

Students believe it's just as easy as pointing out the small sample size or to say the methodology or the theory underlying the research question was but there is so much more to this.

How do we start going about 'thinking critically'?

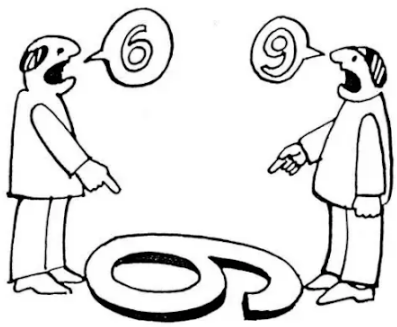
Let's start with a thought experiment - what do you think of when I mention the recent deep ITM calls that people think are related to resetting FTDs? How would you describe this to me if you had to describe it?

Well, I'll give you a framework.

First, we need to describe the behaviour, **without inference.**So when we first describe the behaviour, we look at it - what is happening - someone is buying deep in the money call options that mean they pay a huge premium - but it means they don't have to buy the stock on the open market and drive the price up directly - so they can buy 100 shares from someone, without having to do this in the open market (apes can tell you what effect this may or may not have).Now your mind immediately jumps 'oh my god, this is how they are purchasing sh…' - this is where you need to take a second. Before we look at the **inference** of the behaviour.

This is where we need to take a second - to assess what you know, what you don't know.

We all can see the same observation of the same behaviour - but we can all pick *wildly* different interpretations. We have to recognise that our own biases, our own experience and our own knowledge (and the limits of it), and we have to reflect on this before we look at the 'why' of the behaviour.



What I always teach my students, as we develop critical thinking skills throughout the year, I tell them at the start:

'**You don't know what you don't know'.**

Remember the quote at the beginning of the Big Short? Yeah, that Mark Twain one. It's basically along the same lines.

I can't ask my students to critique an EEG study when they have not even the faintest idea of anatomy, lobes, hemispheres and so on - or understanding words like temporal and spatial resolution (EEG is very good at temporal resolution, ie when something happens, not so great at the where which is spatial resolution - this is why we combine things like EEG with things like fMRI).So, before we all do a cliff dive off the deep end, how do you do something silly like assess what you don't know, if you don't know it?

Building Blocks - or break it down to the simple stuff

What I tell my students is to break down everything, *before attempting the problem as a whole.* **Rather than tackle a huge problem: like how well does EEG relate to neurophysiological processes such as vision, I ask students to break it down to what they know, at each stage of the course as we develop it.**

I ask them to question everything and break everything down to the smallest/simplest block that they know (if anyone is interested, I teach a mean class about **problem solving, executive function and cognitive psychology - which I can share here about decision making).** My research covers emotion and how emotion affects how we learn information, and information overload - ie how do we make sense of the 14 billion data points that we get when we search up information (such as on vaccines) and how do we know who to trust - but this is a story for apes for another time.

So how do we break down what we know - well, let's go back to those deep ITM calls.

What would say your average ape, who has been reading and developed a few wrinkles, know about ITM calls?

Well, for example, when Warden puts them on stream, ape might listen to Warden and listen to Warden to talk about how this is bad. Maybe Ape read DD about deep ITM calls.

But this is **not** where ape should start with example.

Ape should break it down to simple terms: **ok, ape mentioned deep ITM calls. What do I understand from the term, before I think about the why?**

Ape first needs to think about definition: does ape know what **deep** (you dirty apes, I mean in the context of options!) means? Does ape know what in the money means? Does ape know what a call is?

Ape will need to check knowledge of all three terms (unless you know them off by heart as you are an options expert - but use your own thought experiment to follow along for a term you don't know). Ape will first want to find information - ape could pose question or search Reddit/sub, this is true. But better ape learns how to *find and assess* information.

That's what I tell my students:

I could tell you the answer - you could use my answer to learn and you could use that answer to use as a template. But if I don't teach you the skill of how to find and assess the information on your own, as soon as you are presented with something outside your comfort zone, you will crumble back into the corner.

(I do it dramatically, with a booming voice, for effect).What's more important than rushing to understand Shitadel's latest tactic and what's more important than trying to absorb ENTIRE DD in one or a few readings - is learning how to find information to support yourself.

And you MUST. PUT. IN. THE. WORK.

You cannot skip it.TL:DR is fun, ELIA is also great - but the problem is, most people skip entire posts to just read the short bit at the bottom or the top, and ape no put in work to understand. Learning **how** to understand will make you **better** at understanding stuff.

Just kidding - it's an old problem. With a *very old solution.* ***(https://medium.com/the-mission/elon-musks-3-step-first-principles-thinking-how-to-think-and-solve-difficult-problems-like-a-ba1e73a9f6c0***).

Above is a link to how Musk apparently approaches problems - but he uses an old technique known as 'first principles', which I won't go into too much detail here, but the framework which I follow for critical thinking and problem solving, and I teach my students the same.

The first step: **identify and define your current assumptions** (which means you have to identify what you know and what you think you know).

You first need to start with the definitions of terms - maybe make yourself an ape glossary or ape library of terms (maybe our DD writers could make one for sub?). You need to identify which terms you: understand, think-you-understand or don't-understand-at-all. Then you need to read up and check that you understand - use credible and reputable sources (Investopedia, as one example, rather than some random dude on the internet). Then you need to identify the crux of what is being presented to you.

Again, let's go back to our deep ITM calls.

Author X, let's call him Smith, is suggesting that the deep ITM calls are used to reset FTDs.

Ok, well let's approach that - and I won't give you the answers here, as you need to think about this yourself (this is a thought experiment, not a lesson in stonks).What do deep ITM calls mean?

Well, they are call options that are so deep in the money that regardless of expiration, it is **incredibly unlikely** that their strike price won't be in the money. What does that mean for us? Well, it means that anyone purchasing these can get the stock for a much cheaper strike price than the current price. Cool, why doesn't everyone do this to get stock cheaper than market rates? Well, because call options come with a premium - stuff that you pay extra, in addition to that price - which means, it would probably be cheaper to buy them on the market, if you just wanted shares.

Ok, cool, so why does Smith tell us that these are not being bought on the market directly, if these actors just want shares of our beloved GME?

Well, the reason that Smith gives us is (and again, it's a thought experiment):

'That these deep ITM calls are used to purchase shares, avoiding the open market so as not to raise the price of the underlying asset by doing huge buys of shares, therefore, driving up the price. These are used to reset then used to reset their FTDs, when these are exercised.'

Ok, now we can look at the why, once we know the words in the sentence. *Why* would someone want to buy shares, at a relative cost that's higher than the current market price and to avoid the open market? Well, there are a number of reasons - and your mind will **immediately** jump to the 'bad Shitadel' reasons because of everything you've read.

But let's just take a second (again, I am going to **stress,** this is a thought experiment to explore all avenues):Who would fit into the group of people who might want shares, would have large amounts of capital, would find this a cost-effective exercise, but would want to not drive the price of shares up (and potentially reduce the floating shares by taking stock from the pool).Yes, Citadel is suspect number one (or replace Citadel with anyone who holds a short position).But ask yourself, who else fits this category **theoretically**? Well, for example, an institution that might need to delta hedge but is wary about driving the price up and affecting the underlying security. They might want to buy shares to hedge against call options that are being bought for later that week, they might not want to drive the price up because it would immediately then make more of the calls they have just written in-the-money, needing more shares to be bought to be delta hedged and creating an endless loop.

Again, this is just a thought experiment and there is plenty of data and DD about how these deep ITM calls are being utilised - but we must always force ourselves to ask - what is the **alternative hypothesis here. What is the thing that I suspect, why do I suspect it and what is the alternative.** This will make you better consumers (and writers) of DD.

If you consider the counter argument or the alternative argument to your explanation or where your gut tells you to go, you can focus on ruling out and testing which hypothesis is true.

In science, we always take the default approach that the null hypothesis is true - that there is no relationship or significant difference between our variables, theories, etc. We test **against a no relationship**, and we only say something is **significant,** when the null hypothesis has to be rejected. So even if you can't find an alternative hypothesis or alternative explanation to what you are reading or thinking about, try and imagine that there is no reason for what you are seeing. If you can't find any counter to your argument - well, I don't believe you.

There is **always a counter - but that counter is not always equally likely.**

This is why you have to think it through - and what I always tell my students to do, is to try it on the easy stuff first.

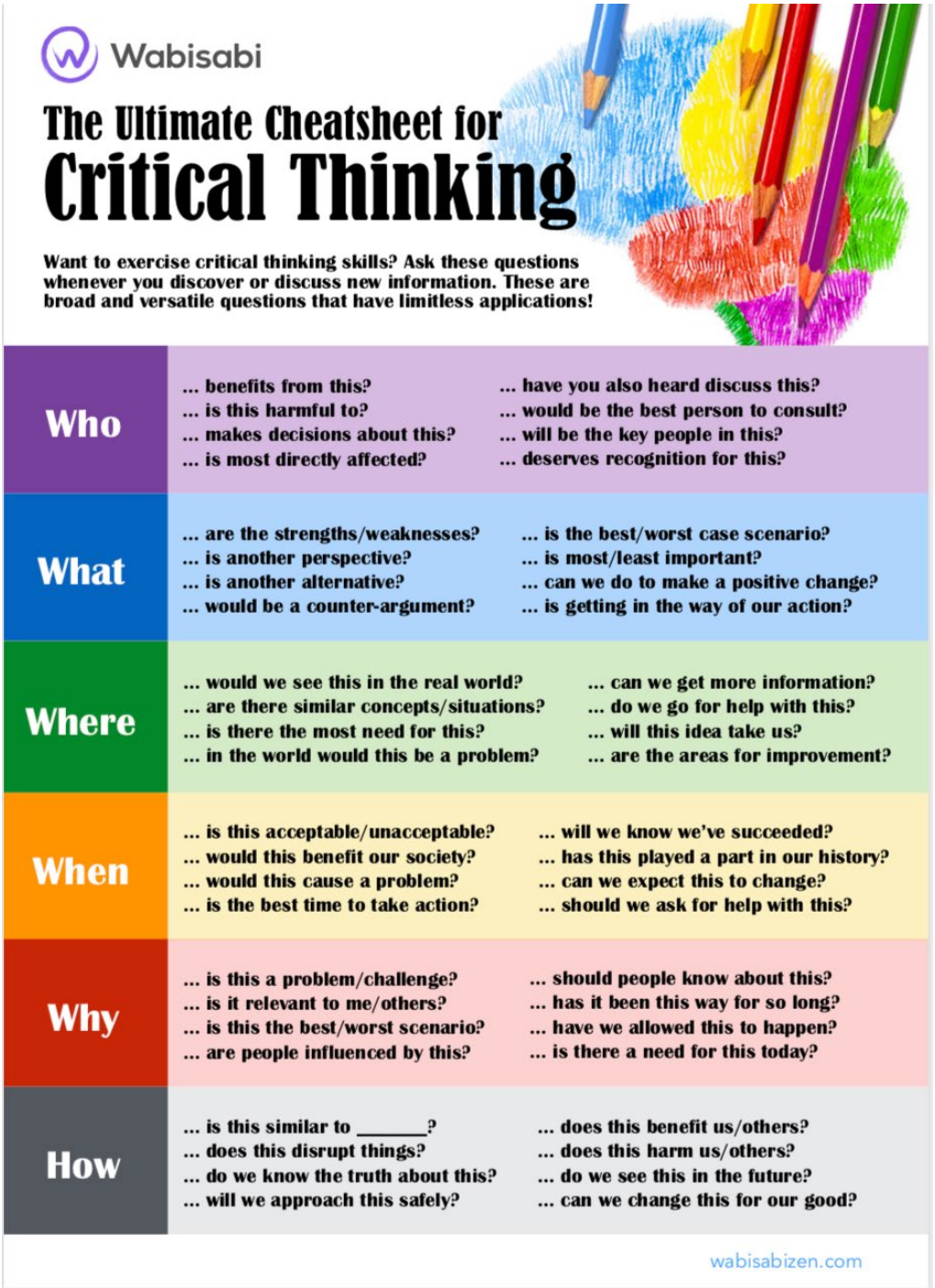
For example, when you wake up at 6am, the sun seems to just be peaking and coming up wherever you live when you open your curtains. Is the sun coming up because you open your curtains, or do you open your curtains because the sun is coming up? What is the relationship there? Of course, if you think about it statistically, there is a big correlation there probably - but why does that relationship exist. I know it's silly, but you have to start with the small stuff.

If your first attempt at critical thinking is trying to digest an 18k word DD that has a boatload of terms you don't understand - good luck, you'll never get that. That's like me throwing down a 40 page vision publication in front of my first years and saying 'tell me, critically, what you think of this'. You can't start **big.** You need to start small - and you need to practice it with the little things. When someone quotes a number or a statistic at you, in a thread for example, even if you agree with it or think you understand it - go and check it. Force yourself to practice. Do the maths yourself. Check their sources.

Critical Thinking Cheatsheet:

A while back (and several times since) there was a crit cheat sheet that was posted here. While this may be the topic of the next post, what I wanted to point out was that it was a really good sheet (even if you think you know what you are doing and you can think critically).The sheet is included below and I actually use it with my students when we assess popular psychology claims and news media about conditions such as autism and ADHD, and whether the medical

model, behavioural therapies and so on, are an appropriate response and are appropriately well understood. But remember apes, the questions below **don't just apply to Citadel, bad actors, etc - apply them to everything you consume when you start thinking about when reading DD.** Why did the author write this way? What are they saying? What are they leaving out? What are they including? Why? Who stands to gain from the production of this DD? What are the strengths and weaknesses? How much of this DD do I understand? How much is speculation? Has the author identified clearly where they are speculating and drawing inferences - if no, why not? Was is the best or worst case scenario from what the author has written, etc.



What I can do, if apes would like, is write more posts like this, breaking down critical thinking further - with practical, methodological and theoretical examples - and I can also write/reference about decision making, emotionality, impact of stress (and especially the impact of Covid on decision making as I just supervised about 8 masters students over the

past year doing projects like this) and go further into each topic.

I don’t know how much appetite there is for posts like this, but I thought I would give it a go - it probably will fade into nothing but I thought I’d give an introduction, similar to what I give on the first day to my students, to how we approach a topic as big as critical thinking, where everyone already feels like they are doing it anyway (and hardly anybody does it well by nature - it takes practice).

For now, *Prof Makataui* out.

Peace - and no, I won’t give you a TL:DR - you got to exercise those smooth brains and put them to work. You come to my class, you have to put in the work.

EDIT: Formatting got *really screwed* when I posted - reformatted.