

Critical Appraisal: what should we be teaching other people?




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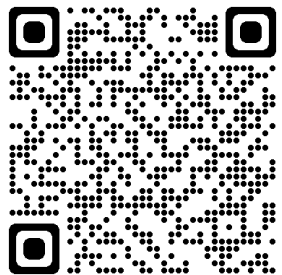
What we're
going to
think about

- **Why** do you want to teach critical appraisal?
 - **What** are you going to teach them?
 - **How** are you going to do it?
- 



Introductions

- Several years working in Medicines Advice / DTG – Leeds Teaching Hospitals, Chesterfield, Sherwood Forest Hospitals
- Many years teaching critical appraisal on the UKMI introductory course with Steve
- "I've got a podcast, you know..."



The Potato Paradox

- You have 100kg of potatoes. They are 99% water
- You dehydrate them overnight so they are now 98% water
- How much do your potatoes weigh now?



A large orange circle is positioned on the left side of the slide, partially cut off by the edge.

Why do you
want to
teach critical
appraisal?

- Why is it important?
- How does it make life better?
- What happens if you don't "do" critical appraisal?



You need to teach
the "why" before
you can teach the
"how"...



Critical Appraisal – what's your sales pitch?

- You've got 10 minutes of your education and training lead's time – what are you going to tell them?



Potential arguments against:



"We only need one Drug and Therapeutics pharmacist"



"It's something you only use during your diploma"



"It's too hard and not that useful – spend that time teaching something else"



"NICE does it all for you now – leave it to the experts!"

Potential arguments for:



Critical appraisal isn't a skill, it's a way of life - if you aren't thinking critically about what we're giving patients, what are you doing?



It's not all CASP tools, primary literature analysis and new medicines – guidelines, guidance and current practice need critically appraising too



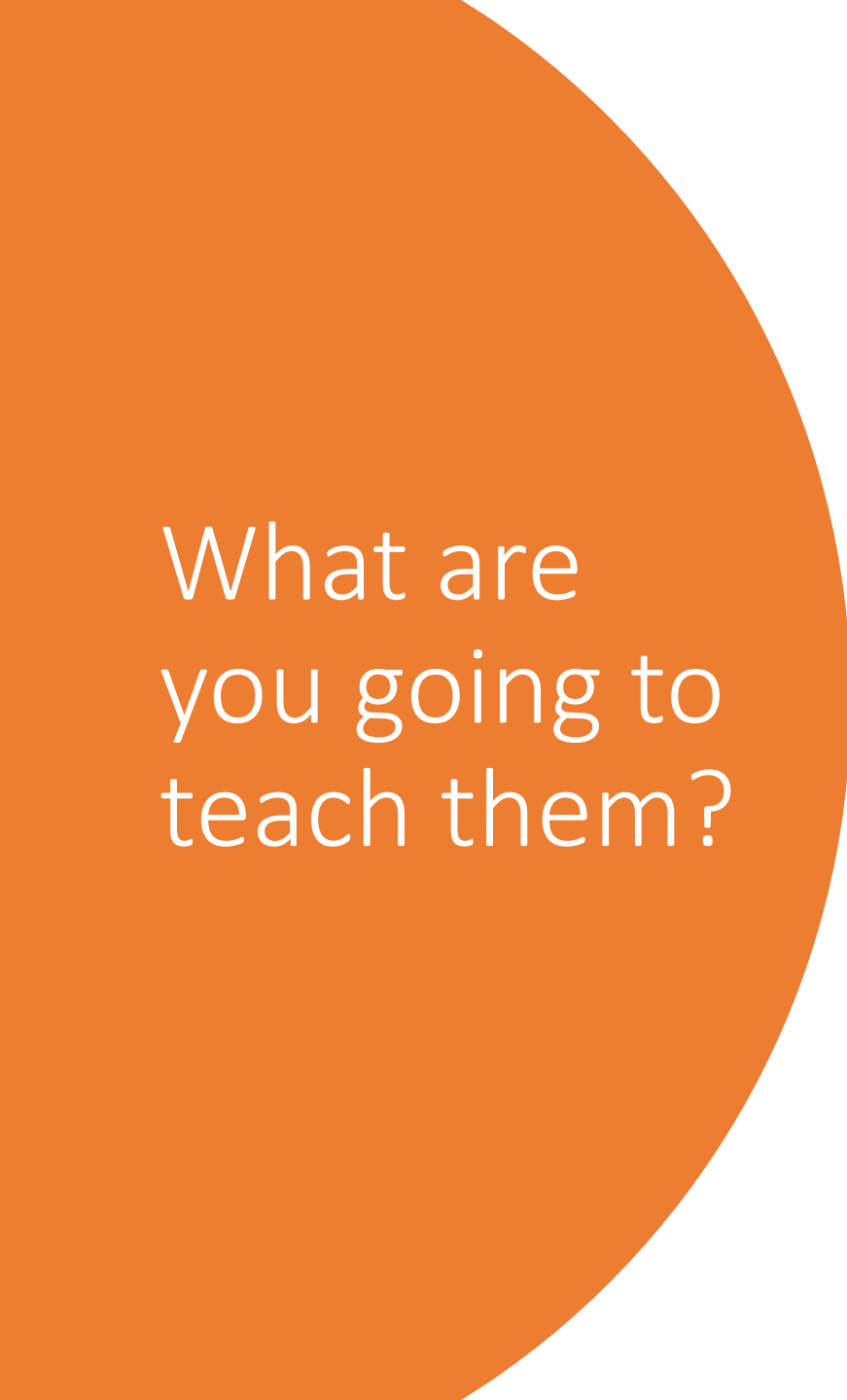
You probably could get through life without critical appraisal, but it would be slower, more painful and less joyful than it needs to be – like getting through life without shoes



Critical appraisal is about explaining how good we think something is, and how confident we are in our opinions – sounds very much like core pharmacy!

Critical appraisal is about being able to explain how good we think a treatment is, and how confident we are in our opinions





What are
you going to
teach them?

- What are you going to put in your curriculum?
- What are you going to leave out?



What are we training people to do?



PASSENGER



DRIVER



ENTHUSIAST



MECHANIC



BUILDER



"Critical appraisal is about being able to explain how good we think a treatment is, and how confident we are in our opinion"



There's no one
target for teaching
– we want to move
everyone along on
their own course



Building a curriculum



How good do
we think a
treatment is?



How confident
are we in our
opinions?



What should
we teach?



What should
we signpost
to?



What
should we
bin?

Thinking about individual papers:

1

Step 1: Are we interested in this paper at all?

- Is reading the paper likely to change the way you treat a patient / approach a problem?

2

Step 2: Is the paper valid?

- Can the paper tell you what it claims to be able to?

3

Step 3: If your paper is valid, are the results meaningful?

- Will your patient care?

Are we interested in the paper in the first place?

- **Population**
 - Who are they treating? Are they similar to who you are wanting to treat?
- **Intervention**
 - What are they doing? Is this the same as what you plan to do?
- **Control**
 - What's it being compared to? Is this fair?
- **Outcome**
 - What's counts as a success? Is this what we care about?

What's the quality of the trial?

If thinking about the PICO things suggests you're interested in the paper, need to start thinking about its quality:

- What sort of trial is it? RCT? Something else?
- What is it attempting to show? Better than alternatives (superior)? As good as alternatives (non-inferior)?
- Where's the bias?



anchoring

The first thing you judge influences your judgment of all that follows.

Human minds are associative in nature, so the order in which we receive information helps determine the course of our judgments and perceptions. Be especially mindful of this bias during negotiations.



confirmation bias

You favor things that confirm your existing beliefs.

We are primed to see and agree with ideas that fit our preconceptions, and to ignore and dismiss information that conflicts with them.

"The first principle is that you must not fool yourself – and you are the easiest person to fool." – Richard Feynman



backfire effect

When your core beliefs are challenged, it can cause you to believe even more strongly.

We can experience being wrong about some ideas as an attack upon our very selves, or our tribal identity. This can lead to motivated reasoning which causes us to double-down, despite disconfirming evidence.



declinism

You remember the past as better than it was, and expect the future to be worse than it will likely be.

Despite living in the most peaceful and prosperous time in history, many people believe things are getting worse. Use metrics such as life expectancy, levels of crime and violence, and prosperity statistics.



just world hypothesis

Your preference for a just world makes you presume that it exists.

A world in which people don't always get what they deserve is an uncomfortable one that threatens our preferred narrative. Try to remember that we're all fallible, and bad things happen to good people.



sunk cost fallacy

You irrationally cling to things that have already cost you something.

When we've invested our time, money, or emotion into something, it hurts to let it go. Ask yourself: had I not already invested something, would I still do so now?



dunning-kruger effect

The more you know, the less confident you're likely to be.

Because experts know just how much they don't know, they tend to underestimate their ability, but it's easy to be over-confident when you have only a simple idea of how things are.



barnum effect

You see personal specifics in vague statements by filling in the gaps.

Psychics, astrologers and others use this bias to make it seem like they're telling you something relevant. Consider how things might be interpreted to apply to anyone, not just you.



framing effect

You allow yourself to be unduly influenced by context and delivery.

Only when we have the intellectual humility to accept the fact that we can be manipulated, can we hope to limit how much we are. Try to be mindful of how things are being put to you.



in-group bias

You unfairly favor those who belong to your group.

We presume that we're fair and impartial, but the truth is that we automatically favor those who are most like us, or belong to our groups. Try to compensate by imagining strangers to be family.



fundamental attribution error

You judge others on their character, but yourself on the situation.

It's not only kind to view others' situations with charity, it's more objective too. Be mindful to also err on the side of taking personal responsibility rather than justifying and blaming.



placebo effect

If you believe you're taking medicine it can sometimes 'work' even if it's fake.

The placebo effect can work for stuff that our mind influences (such as pain) but not so much for things like viruses or broken bones. Keep a healthy body and bank balance by using evidence-based medicine from a qualified doctor.



halo effect

How much you like someone, or how attractive they are, influences your other judgments of them.

If you notice that you're giving consistently high or low marks across the board, it's worth considering that your judgment may be suffering from the halo effect.



bystander effect

You presume someone else is going to do something in an emergency situation.

When something terrible is happening in a public setting we can experience a kind of shock and mental paralysis. Presume to be the one who will help.



availability heuristic

Your judgments are influenced by what springs most easily to mind.

How recent, emotionally powerful, or unusual your memories are can make them seem more relevant. This, in turn, can cause you to apply them too readily. Try to gain different perspectives and source statistical information.



belief bias

If a conclusion supports your existing beliefs, you'll rationalize anything that supports it.

It's difficult for us to set aside our existing beliefs to consider the true merits of an argument. In practice this means that our ideas become impervious to criticism, and are perpetually reinforced.



groupthink

You let the social dynamics of a group situation override the best outcomes.

Dissent can be uncomfortable and dangerous to one's social standing, and so often the most confident or first voice will determine group decisions.



optimism bias

You overestimate the likelihood of positive outcomes.

There can be benefits to a positive attitude, but it's unwise to allow this to affect our ability to be realistic. If you make rational judgments you'll have a lot more to feel positive about.



reactance

You'd rather do the opposite of what someone is trying to make you do.

When we feel our liberty is being constrained, our inclination is to resist, however in doing so we can over-compensate. Wisdom springs from reflection, folly from reaction.



curse of knowledge

Once you understand something you presume it to be obvious to everyone.

When teaching someone something new, go slow and explain like they're ten years old (without being patronizing). Repeat key points and facilitate active practice to help embed knowledge.



self-serving bias

You believe your failures are due to external factors, yet you're personally responsible for your successes.

Many of us enjoy unearned privileges, luck and advantages that others do not. It's easy to tell ourselves that we deserve these things, whilst blaming circumstance when things don't go our way.



negativity bias

You allow negative things to disproportionately influence your thinking.

The pain of loss and hurt are felt more keenly and persistently than the fleeting gratification of pleasant things. We are primed for survival, and our aversion to pain can distort our judgment for a modern world.



pessimism bias

You overestimate the likelihood of negative outcomes.

Pessimism is often a defense mechanism against disappointment. Perhaps the worst aspect of pessimism is that even if something good happens, you'll probably feel pessimistic about it anyway.



spotlight effect

You overestimate how much people notice how you look and act.

Instead of worrying about how you're being judged, consider how you make others feel. They'll remember this much more, and you'll make the world a better place.



24 cognitive biases stuffing up your thinking

Cognitive biases make our judgments irrational. We have evolved to use shortcuts in our thinking, which are often useful, but a cognitive bias means there's a kind of misfiring going on causing us to lose objectivity. This poster has been designed to help you identify some of the most common biases and how to avoid falling victim to them. Help people become aware of their biases generally by sharing the website yourbias.is or more specifically e.g. yourbias.is/confirmation-bias



This poster is published under a Creative Commons Attribution and Non-commercial license 2018 by The School of Thought, a 501c3 non profit organization. To learn more about biases you should definitely read the books *Thinking, Fast and Slow* and *You Are Not So Smart*.

The illustration above is a reference to Michelangelo's Creation of Adam which many believe depicted the human brain in God's surrounding decoration. The godfathers of research into cognitive biases, Daniel Kahneman and Amos Tversky, are pictured alongside the Christian God above.

Download this poster at www.yourbias.is



strawman

Misrepresenting someone's argument to make it easier to attack.

After Will said that we should be nice to kittens because they're fluffy and cute, Bill says that Will is a mean jerk for wanting to be mean to poor defenseless puppies. Everyone loudly boos Will, drowning out his protests that this isn't what he said at all.



slippery slope

Asserting that if we allow A to happen, then Z will consequently happen too, therefore A should not happen.

Colin Closet asserts that if we allow same-sex couples to marry, then the next thing we know we'll be allowing people to marry their parents, their cars and even monkeys.



special pleading

Moving the goalposts to create exceptions when a claim is shown to be false.

Edward Johns claimed to be psychic, but when his 'abilities' were tested under proper scientific conditions, they magically disappeared. Edward explained this saying that one had to have faith in his abilities for them to work.



the gambler's fallacy

Believing that 'runs' occur to statistically independent phenomena such as roulette wheel spins.

Red had come up six times in a row on the roulette wheel, so Jen knew that it was close to certain that black would be next up. Suffering an economic form of natural selection with this thinking, she soon lost all of her savings.



black-or-white

Where two alternative states are presented as the only possibilities, when in fact more possibilities exist.

Whilst rallying support for his plan to fundamentally undermine citizens' rights, the Supreme Leader told the people they were either on his side, or on the side of the enemy.



false cause

Presuming that a real or perceived relationship between things means that one is the cause of the other.

Pointing to a fancy chart, Roger shows how temperatures have been rising over the past few centuries, whilst at the same time the numbers of pirates have been decreasing; thus pirates cool the world and global warming is a hoax.



ad hominem

Attacking your opponent's character or personal traits in an attempt to undermine their argument.

After Sally presents an eloquent and compelling case for a more equitable taxation system, Sam asks the audience whether we should believe anything from a woman who isn't married, was once arrested, and smells a bit weird.



loaded question

Asking a question that has an assumption built into it so that it can't be answered without appearing guilty.

Steve and Tim were both romantically interested in Stefanie. One day, with Stefanie sitting within earshot, Steve asked in an inquisitive tone whether Tim was having any problems with a fungal infection.



bandwagon

Appealing to popularity or the fact that many people do something as an attempted form of validation.

Shamus pointed a finger at Sean and asked him to explain how so many people could believe in leprechauns if they're only a silly old superstition. Sean wondered how so many people could believe in things based on popularity.



begging the question

A circular argument in which the conclusion is included in the premise.

The word of Zorbo the Great is flawless and perfect. We know this because it says so in The Great and Infalible Book of Zorbo's Best and Most Truest Things that are Definitely True and Should Not Ever Be Questioned.



appeal to authority

Using the opinion or position of an authority figure, or institution of authority, in place of an actual argument.

Unable to defend his argument that the Earth is flat, Bob said that his friend Terry was a qualified botanist who also believed the Earth to be flat, and had even seen it from up in a tree.



appeal to nature

Making the argument that because something is 'natural' it is therefore valid, justified, inevitable, good, or ideal.

The medicine man rolled into town on his bandwagon offering various natural remedies, such as very special plain water. He said that it was only natural that people should be wary of 'artificial' medicines such as antibiotics.



composition /division

Assuming that what's true about one part of something has to be applied to all, or other, parts of it.

Daniel was a precocious child and had a liking for logic. He reasoned that atoms are invisible, and that he was made of atoms and therefore invisible too. Unfortunately, despite his thinky skills, he lost the game of hide and go seek.



anecdotal

Using personal experience or an isolated example instead of a valid argument, especially to dismiss statistics.

Phoebe said that that was all cool and everything, but her grandfather smoked, like, 30 cigarettes a day and lived until 97 - so don't believe everything you read about meta analyses of sound studies showing proven causal relationships.



appeal to emotion

Manipulating an emotional response in place of a valid or compelling argument.

Luke didn't want to eat his sheep's brains with chopped liver and brussels sprouts, but his father told him to think about the poor, starving children in a third world country who weren't fortunate enough to have any food at all.



tu quoque

Avoiding having to engage with criticism by turning it back on the accuser - answering criticism with criticism.

The blue candidate accused the red candidate of committing the tu quoque fallacy. The red candidate responded by accusing the blue candidate of the same, after which ensued an hour of back and forth criticism with not much progress.



burden of proof

Saying that the burden of proof lies not with the person making the claim, but with someone else to disprove.

Bertrand declares that a teapot is, at this very moment, in orbit around the Sun between the Earth and Mars, and that because no one can prove him wrong his claim is therefore a valid one.



no true Scotsman

Making what could be called an appeal to purity as a way to dismiss relevant criticisms or flaws of an argument.

Angus declares that Scotsmen do not put sugar on their porridge, to which Lachlan points out that he is a Scotsman and puts sugar on his porridge. Furious, like a true Scot, Angus yells that no true Scotsman sugars his porridge.



the Texas sharpshooter

Cherry-picking data clusters to suit an argument, or finding a pattern to fit a presumption.

The makers of Sugarette Candy Drinks point to research showing that of the five countries where Sugarette drinks sell the most units, three of them are in the top ten healthiest countries on Earth, therefore Sugarette drinks are healthy.



the fallacy fallacy

Presuming that because a claim has been poorly argued, or a fallacy has been made, that it is necessarily wrong.

Recognising that Amanda had committed a fallacy in arguing that we should eat healthy food because a nutritionist said it was popular, Alyse said we should therefore eat bacon double cheeseburgers every day.



personal incredulity

Saying that because one finds something difficult to understand that it's therefore not true.

Kirk drew a picture of a fish and a human and with effusive disdain asked Richard if he really thought we were stupid enough to believe that a fish somehow turned into a human through just, like, random things happening over time.



ambiguity

Using double meanings or ambiguities of language to mislead or misrepresent the truth.

When the judge asked the defendant why he hadn't paid his parking fines, he said that he shouldn't have to pay them because the sign said 'Fine for parking here' and so he naturally presumed that it would be fine to park there.



genetic

Judging something good or bad on the basis of where it comes from, or from whom it comes.

Accused on the 6 o'clock news of corruption and taking bribes, the senator said that we should all be very wary of the things we hear in the media, because we all know how very unreliable the media can be.



middle ground

Saying that a compromise, or middle point, between two extremes is the truth.

Caleb said that vaccinations caused autism in children, but his scientifically well-read friend Holly said that this claim had been debunked and proven false. Their friend Alice offered a compromise that vaccinations cause some autism.



thou shalt not commit logical fallacies

A logical fallacy is a flaw in reasoning. Strong arguments are void of logical fallacies, whilst arguments that are weak tend to use logical fallacies to appear stronger than they are. They're like tricks or illusions of thought, and they're often very sneakily used by politicians, the media, and others to fool people. Don't be fooled! This poster has been designed to help you identify some of the more common fallacies. If you see someone committing a logical fallacy online, link them to the relevant fallacy to school them in thinkiness e.g. yourfallacyis.com/strawman



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Download this poster at yourfallacyis.com

<https://www.researchsquare.com/article/rs-100328/v1>

In a prospective users survey, 243 members of a Jewish ultra-orthodox synagogue community in Bney Brak that participated in the two days holidays prayers (7 hours spent daily in the synagogue) were followed up for the following 14 days to measure the effect of Taffix in this potentially “super spread” (post mass gathering) event . 83 collected and used Taffix throughout Rosh Hashana prayers and for the following two weeks (intention to treat group, ITT) . 81 of them used it regularly as instructed (per protocol, PP) while two used it rarely if at all. The remaining 160 did not use Taffix .

At the end of the two weeks follow up - in the ITT population, 2/83 (2.4%) of the Taffix users and 16/160 (10%) of the Taffix non users were infected. The odds ratio for SARS-CoV-2 infection in Taffix users were 0.22 (0.05-0.99, Mid P exact =0.028), a reduction of 78% (95%CI 1%-95%) in odds of infection. No side effects were reported.

We suggest that Taffix can be an additional powerful tool against COVID19 spread. To our knowledge this is the first time that any measure to prevent infection in SARS-CoV-2 virus, beyond the use of masks. was proven effective.

Self test with a real trial - Taffix

Step 1: Are we interested in the trial at all – what’s it trying to tell us?

Step 2: Do we believe the trial – is it well enough designed?

A summary of the summary statistics

Statistic	Range	"does nothing" value	Over-simplified description
Absolute Risk Reduction	-100% to +100%	0	"What percentage of everyone treated will have a different outcome?"
Relative Risk Reduction	-infinity% to +100%	0	"What percentage of the people who would have been harmed will have a different outcome?"
Number Needed to Treat	-1 (kind of) to +1	Infinity	"How many people do I need to treat for 1 to have a different outcome?"
Odds Ratio (or anything that's a ratio)	0 to infinity	1	No-one knows. Only used by statisticians and perverts

Absolute risks



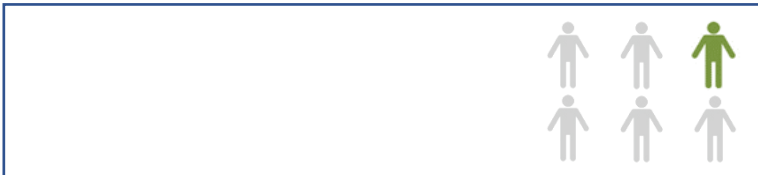
“30% of people without treatment had an event, compared to 25% of people with treatment”

Absolute risk reduction



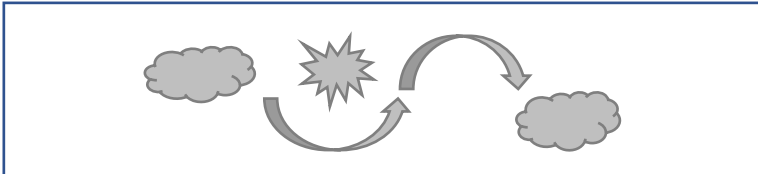
“5% of people you treat will have a different outcome compared to if you didn’t treat them”

Relative risk reduction



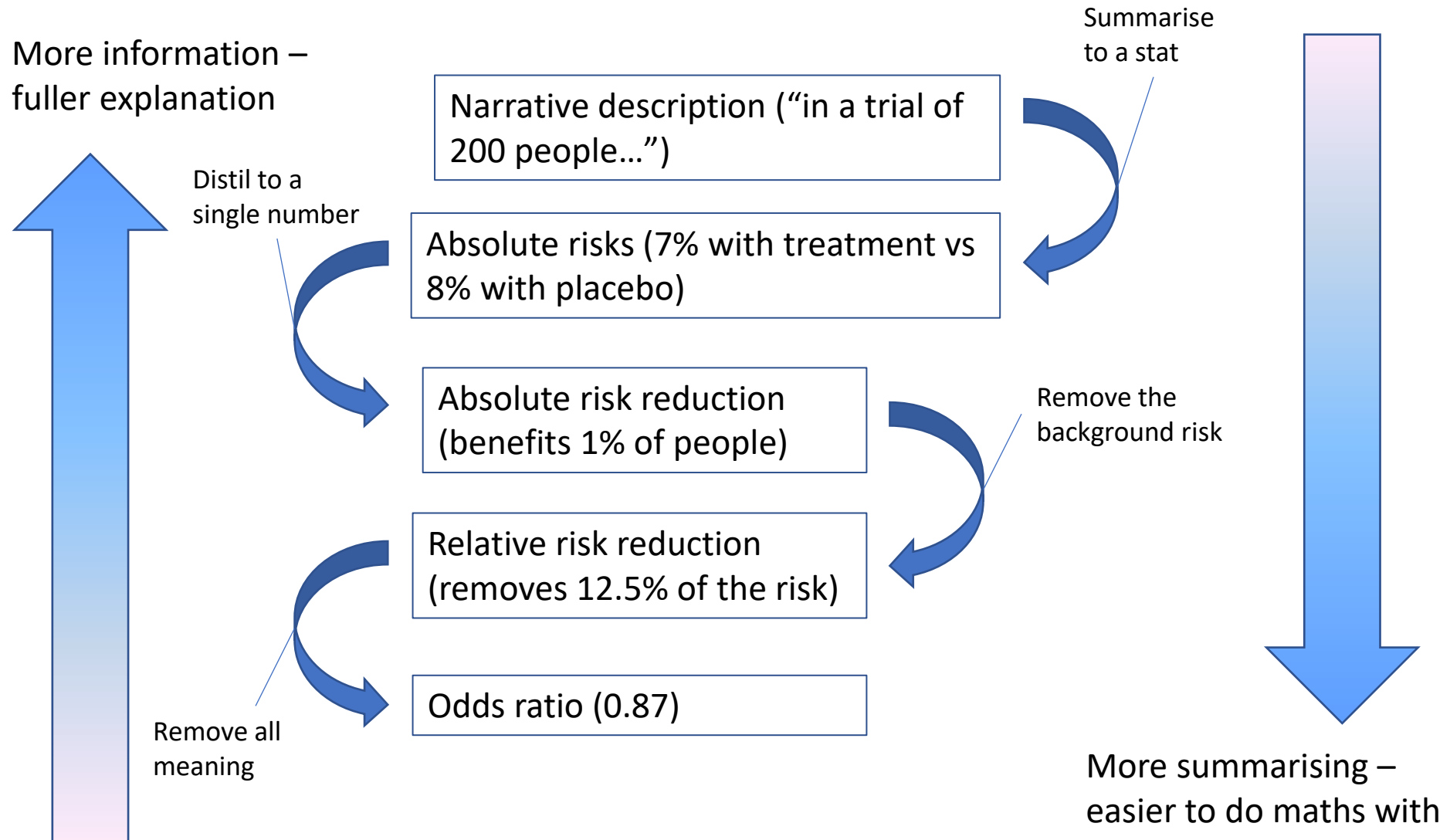
“17% of of the events that would have happened if you didn’t treat anyone, won’t happen if you do”

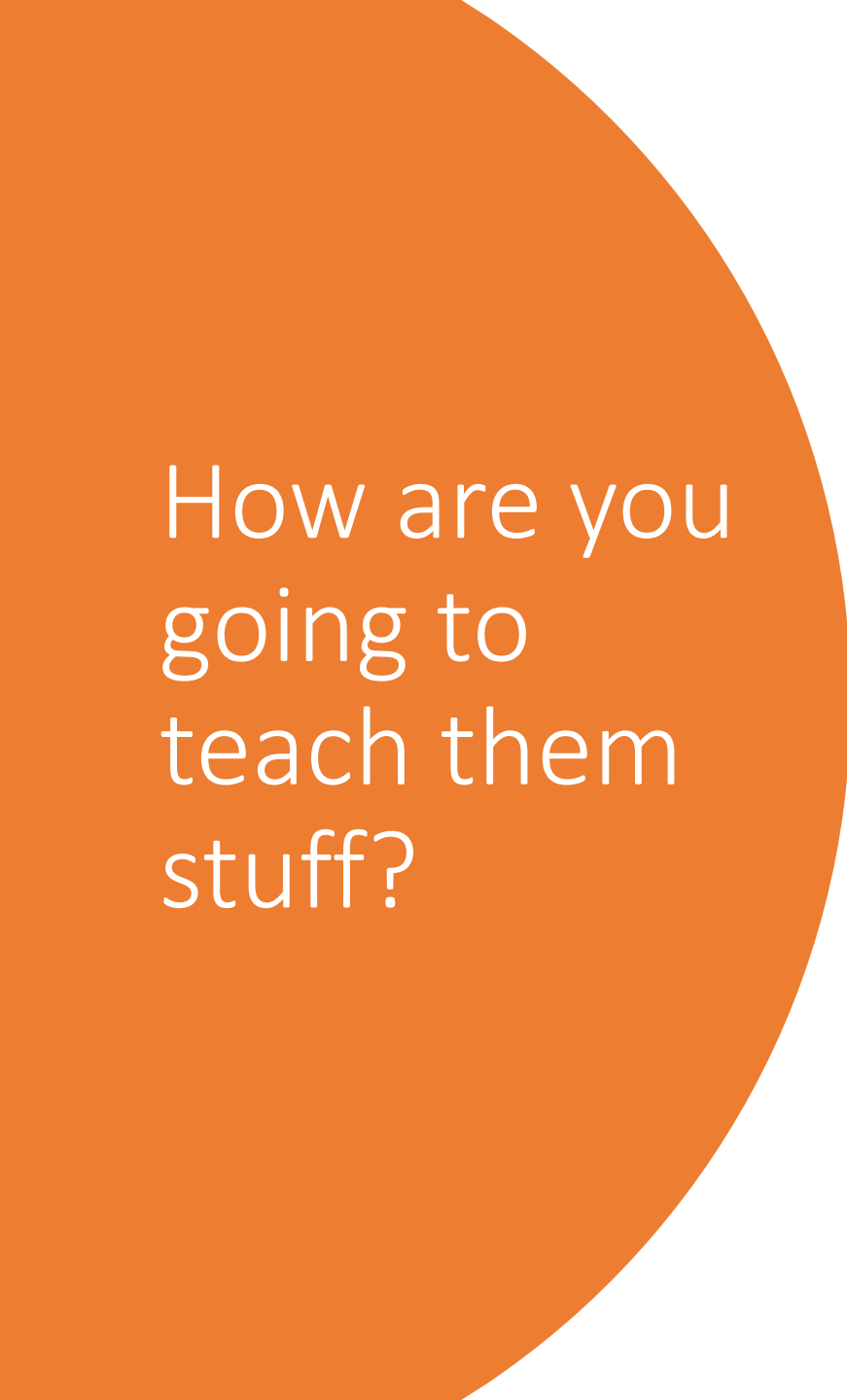
Odds ratio



“0.78”

The Goldilocks Zone





How are you
going to
teach them
stuff?

- What's the "best way" to teach critical appraisal?
- How can you make it "sticky"?
- How do you make it not boring?



Be interested
yourself – that then
makes it interesting
for others



Don't worry about
them forgetting the
"how" - that's what
Google is for. Focus
on the "why"



Make it relevant –
look for opportunities
to use the skills
yourself



Close – have
we done
what we said
we would?

- **Why** do you want to teach critical appraisal?
- **What** are you going to teach them?
- **How** are you going to do it?

