Twitter Thread by Robin Monotti FRSA MA BSc



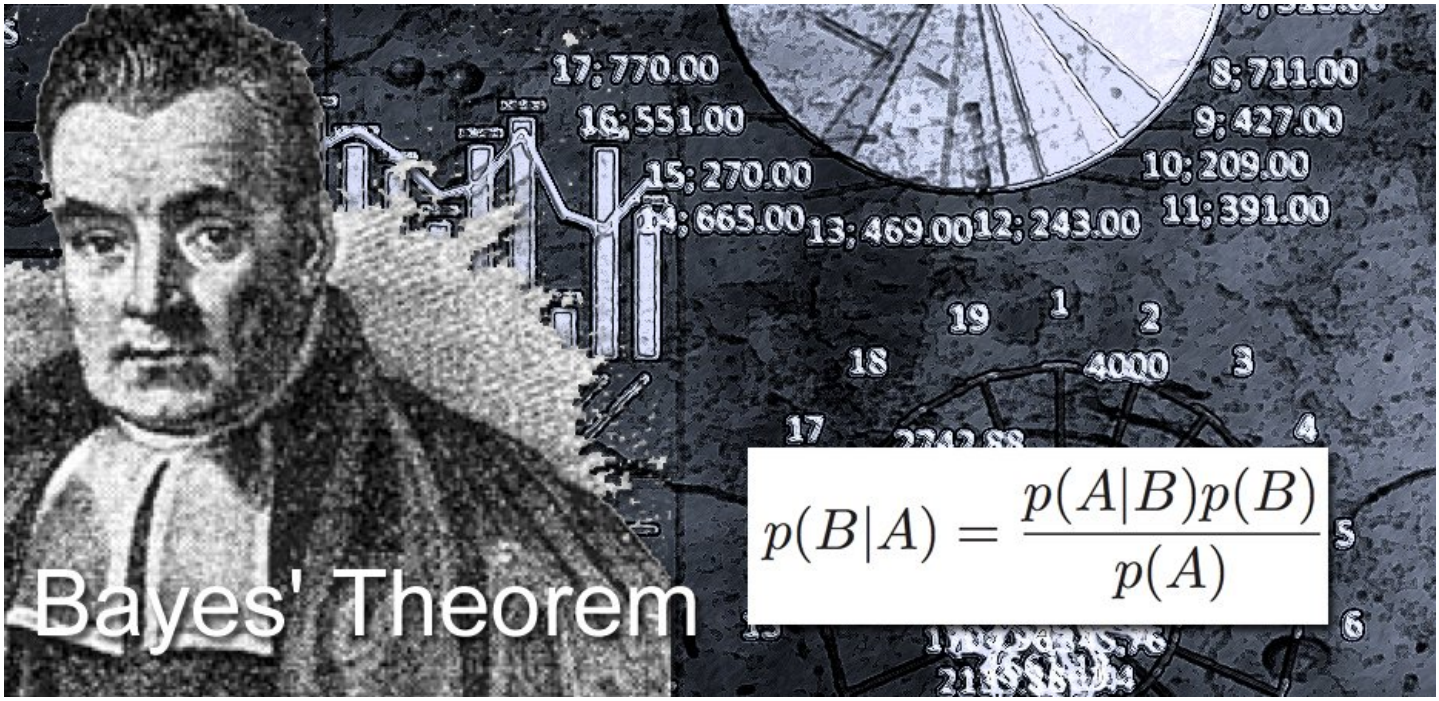
Robin Monotti FRSA MA BSc
@robinmonotti

BAYES' THEOREM: The basic reason we get so many false positives to COVID19. The disease is so rare that the number of false positives greatly outnumbers the people who truly have the disease: THE MATHS: https://t.co/oLHyxYJW9H

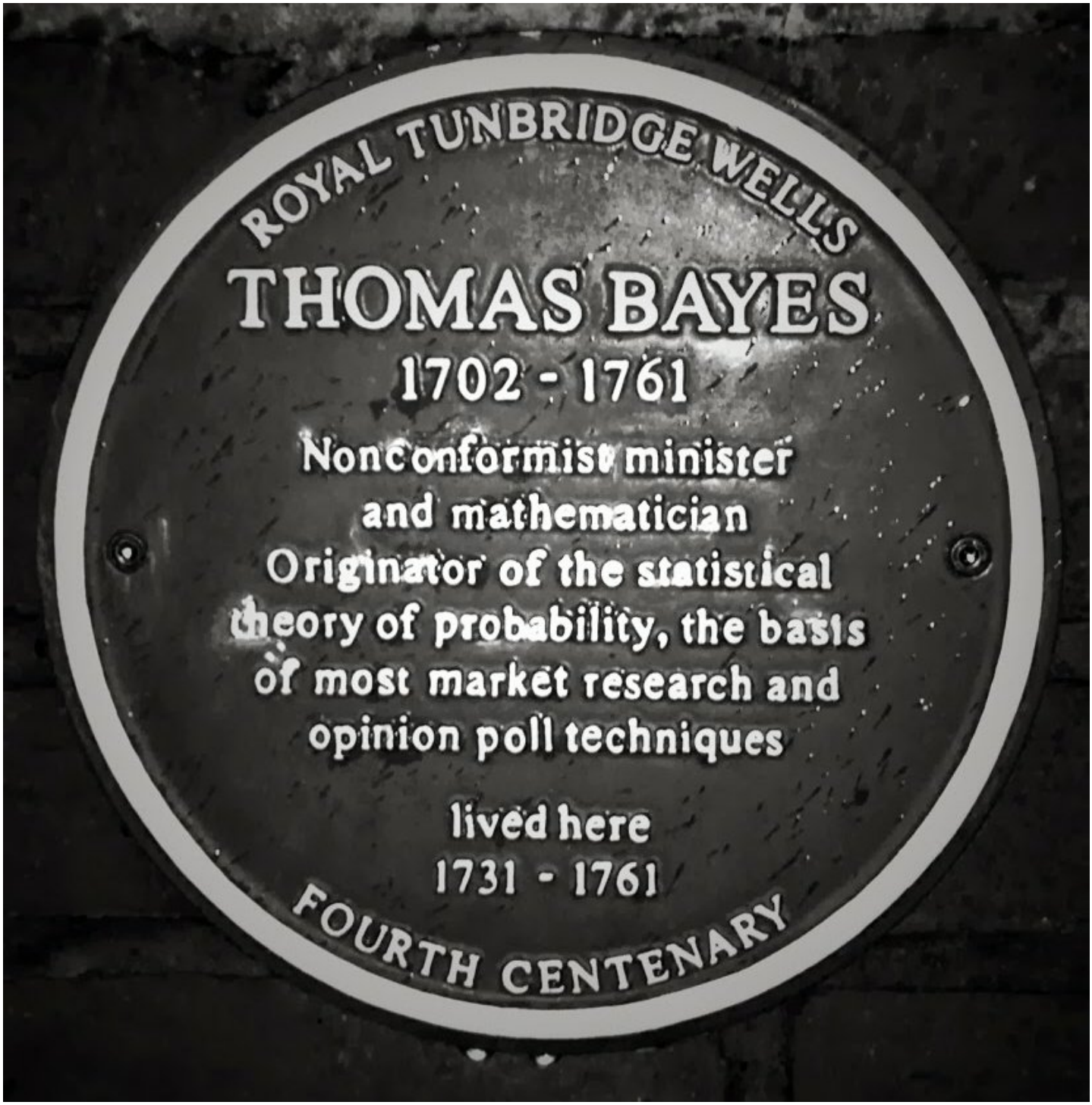


"Suppose that you are worried that you might have a rare disease. You decide to get tested, and suppose that the testing methods for this disease are correct 99 percent of the time"

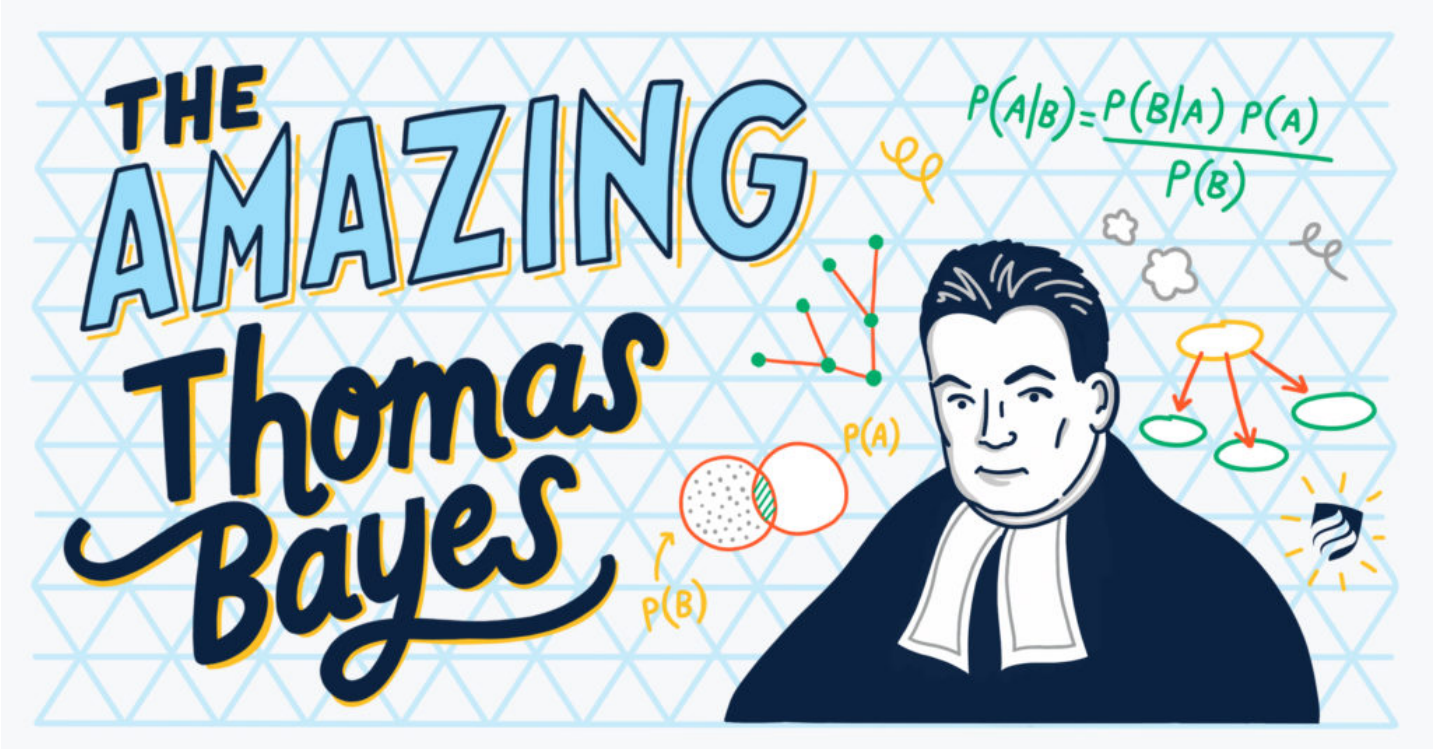
"Suppose this disease is actually quite rare, occurring randomly in the general population in only one of every 10,000 people. If your test results come back POSITIVE, what are your chances that you actually have the disease? LESS THAN 1% chance that you have the disease!"



"The basic reason we get such a surprising result is because the disease is so rare that the number of false positives greatly outnumbers the people who truly have the disease"



Say mass testing of the contagious virus was done to 1 million people. In that million, 100 will really have the disease, 99 will be correctly diagnosed as having it. 999,900 of the million will not have the disease, but of those about 9,999 will be false positives! #BayesTheorem



1 in 2,000 INCLUDING FALSE POSITIVES classifies Covid19 as a rare disease in winter 20-21 https://t.co/29FNwq0Qw2

> "The national statistician has downgraded its estimate of coronavirus in England on October 17 to just 4.89 people per 10,000." or ~ 0.05%. That means that only 1 in 2000 people may be carrying SARS related viral RNA fragments which could be 2 months old. https://t.co/XqpNaY6BzQ
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) December 8, 2020

Stefano Scoglio, Nobel prize candidate 2018, has calculated a real false positive rate of 95% from official Italian Health Service numbers. This is in line with #BayersTheorem. Calculation in links in thread: https://t.co/rthjPRJWeB

> ITALY: CONFIRMED BY ITALIAN HEALTH SERVICE: False positives to Covid19 test as diagnosis are 95%. Legal cases started against testing under charges of fraud to procure public funding, false alarm, ideological false, and manslaughter. pic.twitter.com/C9b7BbzdKa
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) November 25, 2020

If we apply the 95% false positive (Scoglio) back to England positive test % incl. false positive: 0.05% (ONS), we get a real % of positives in England of 0.0025% of the population, or 1 in 40,000 people. This would confirm Covid19 as a rare disease as per #BayersTheorem.

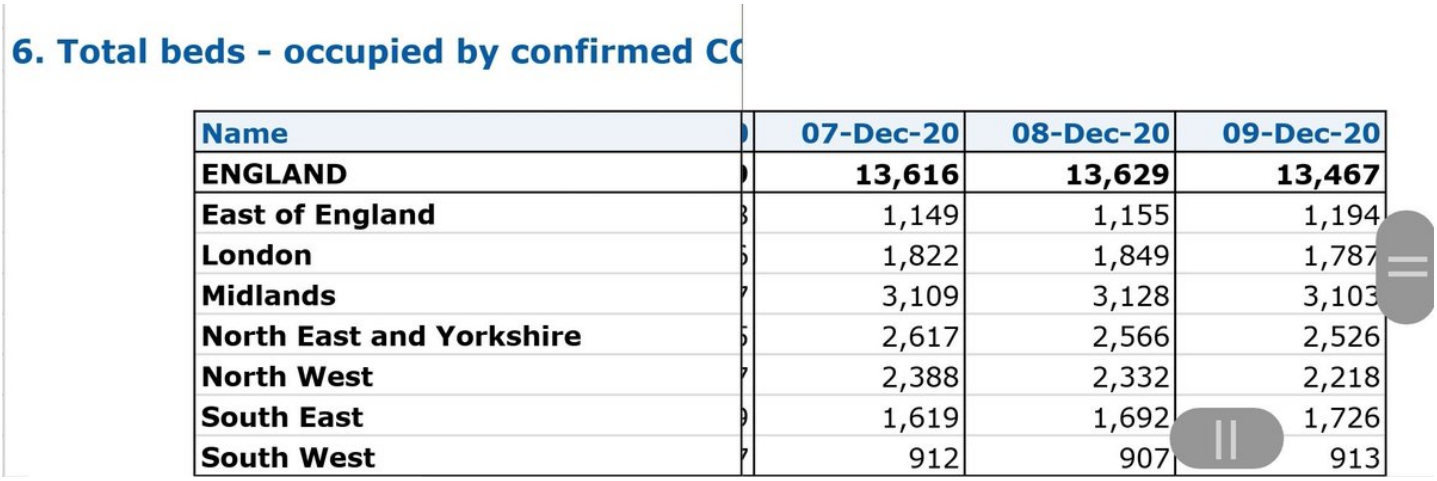
$$\Pr(H|E) = \frac{\Pr(E|H)\,\Pr(H)}{\Pr(E|H)\,\Pr(H) + \Pr(E|\text{not } H)\,\Pr(\text{not } H)}$$

The chance evidence is real (supports a hypothesis)
is the chance of a true positive among
all positives (true or false)

Try this calculator for up to 100 tests. https://t.co/5TKEYpjd80

> #BAYESTHEOREM MEDICAL MASS TESTING CALCULATOR:
> Try it yourself to understand how many false positives you get by changing minor variables:
> \U0001f447https://t.co/7wVMvrpgAW pic.twitter.com/PHbweWK1TK
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) December 9, 2020

Severe Covid19 is a rare disease in England, if tests are 100% accurate, acc. to hospitalization numbers, it's 0.02% or 1 in 5,000 people.
https://t.co/kFnQVoCspb



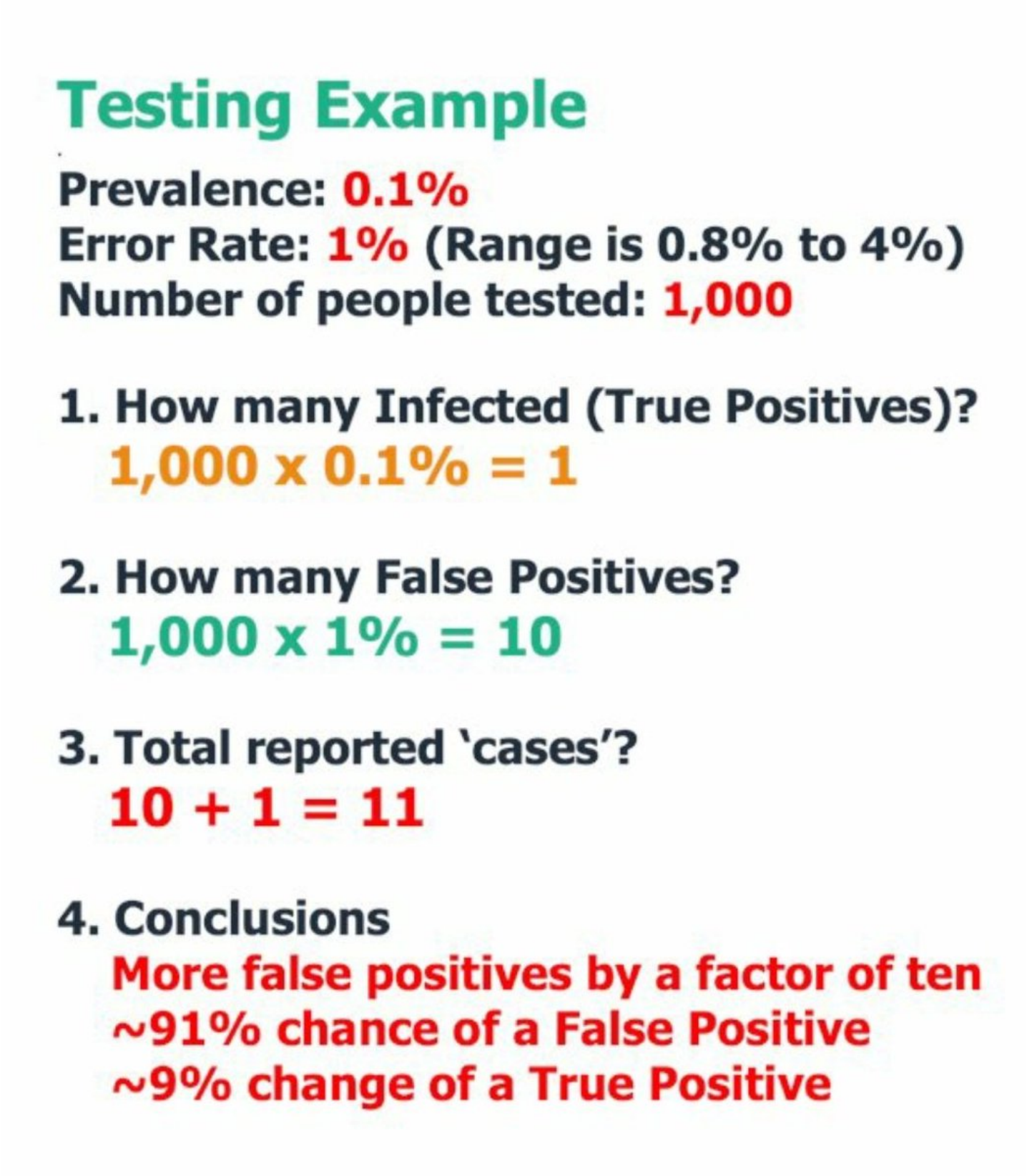
6. Total beds - occupied by confirmed C

Name	07-Dec-20	08-Dec-20	09-Dec-20
ENGLAND	**13,616**	**13,629**	**13,467**
East of England	1,149	1,155	1,194
London	1,822	1,849	1,787
Midlands	3,109	3,128	3,103
North East and Yorkshire	2,617	2,566	2,526
North West	2,388	2,332	2,218
South East	1,619	1,692	1,726
South West	912	907	913

#BayesTheorem applied to LF tests: https://t.co/3OrdS7ZFUJ

> LATERAL FLOW: False positive rate of "0.4% with a sensitivity of 58% and specificity of 99.6%, would mean that 100\u2009000 people being tested would find 630 positives\u2014of which only 230 would actually have covid-19, while 400 would be false positives.
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) November 17, 2020

A simple example of #BayesTheorem with a prevalence of 0.1% (much higher than Covid19) an error range of 1% (RT-PCR Charité range est. 0.8-4%) and only 1,000 people tested: 91% false positives.



#BayesTheorem in simple terms: when medical mass testing includes asymptomatics & the disease affects a minority of the population, a very small margin of error in the testing process will mathematically result in the false positives being many times more than the real positives.



"Covid19"[■] mass testing graph from The Economist. Y axis being % of test results either true or false. As share of population with active infection (X axis) is well under 1%, most positive tests are false, & most negative results are true. This is called #BAYESTHEOREM.



Latest England estimates:
https://t.co/8hsZ1hNjD7

> Official estimates from mass testing in England (including asymptomatic) puts Covid19 "infections" at 0.9%
> https://t.co/2ljzi9YfKN
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) December 11, 2020

How to increase the prevalence of a rare disease from 0.01% to 1%? Test the asymptomatics. What prevalence do we estimate Covid19 at including asymptomatic tested? Less than 1%. What could the true prevalence be if we exclude asymptomatic testing? 0.01%. It's called #BayesTheorem

Proof that Matt Hancock is aware of #BayesTheorem, he mentions Bayesian mathematics: https://t.co/hpZYDzD5Pe

> @lucyfrazermp 20/11:
>
> 2. Apparently @MattHancock tells HoC 17/09 how ONS \u201cadjusts for False Positives\u201d. Looked it up.@DesmondSwayne asks;@MattHancock doesn\u2019t answer.
> Obfuscates with \u201crigorous Bayesian mathematics\u201d
> \u201cOne of his academics" will \u201ctake him through it\u201d
>
> (thread) pic.twitter.com/42YO9vaioy
>
> — Edmund Fordham (@EdmundFordham) November 28, 2020

As Matt Hancock is clearly aware of #BayesTheorem, if he wanted to avoid the false positives being many more than the true positives, he would not say ONS is applying rigorous Bayesian mathematics, he would instead not implement testing of any asymptomatics not linked to a case.

Matt Hancock is pre-empting the #BayesTheorem false positive trap by mentioning Bayesian mathematics himself in reply. A Freudian slip, a lapsus which reveals what he is really thinking: how do I increase false positives to make Covid19 prevalence appear worse than it really is?

Sir Desmond Swayne >
(New Forest West) (Con)

Share

Some 1.4% of those 275,000 people who travelled and queued were positive. Will not even a modest number of false positives mislead us? Is the Office for National Statistics survey any less prone to false positives?

Matt Hancock >

Share

My right hon. Friend raises an important point about the mathematics and the science of testing. I am sure he would enjoy reading the annexes to the ONS report that comes out each Friday, which address directly the question how the ONS adjusts for potential false positives, due to the high but not perfect specificity of the polymerase chain reaction test. I am very happy for one of my academics to take him through the rigorous Bayesian mathematics, which I am sure will help to elucidate the debate on this matter still further.

So how does he do it? He implements mass testing of asymptomatics in Universities, then schools. He uses the hierarchical power structures in these institutions to convince healthy students they need to be tested. The schools get closed on false positives, false fear is created.

#BAYESTHEOREM @ Cambridge University. 0.4% of 262 students came back as positive after the first "test". All came back as negative after the second. Government only tests once. ONS would say there is 0.4% prevalence instead it's 0%.

Result	Number	%
Positive	1	0.4%
Negative	262	99.6%
Total	263	100%

#BAYESTHEOREM @ Cambridge University. 0.5% of 1,937 students came back as positive after the first "test". All came back as negative after the second. Government only tests once. ONS would say there is 0.5% prevalence instead it's 0%.

Result	Number	%
Positive	10	0.5%
Negative	1,927	99.5%
Total	1,937	100%

Sorry this should say 0.4% of 263 students https://t.co/eSNnhyOI4n

> #BAYESTHEOREM @ Cambridge University. 0.4% of 262 students came back as positive after the first "test". All came back as negative after the second. Government only tests once. ONS would say there is 0.4% prevalence instead it's 0%. pic.twitter.com/zeAQAAOeRN
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) December 13, 2020

See what happens in #BayesTheorem? Number of asymptomatic testing increases & the estimated prevalence of the disease increases!! This can be addressed by requiring confirmatory tests of those who test positive when numbers are small, otherwise DON'T test asymptomatics.

Cambridge Pooled Testing Report #BayesTheorem
https://t.co/BYIzoTl64c

09:43 Wed 9 Dec 82%
Cambs pooled_testing_...

UoC Asymptomatic COVID-19 Screening Programme: Week 9 (30th November – 6th December 2020)

Report author – Dr Ben Warne, Clinical Lead. Report prepared – 6th December 2020

Participation

All 31 Colleges of the University of Cambridge, and 6 Houses of the Cambridge Theological Federation, participated in the programme. A summary of participation across the University is shown in this table:

Decision	Number	%
Consented	12,544	81.9%
Declined	539	3.5%
Undecided	2,227	14.5%
Total Eligible	15,310	100%

Students screened

This week, **all** consenting students from each testing pool, who did not meet exclusion criteria for the programme (such as those who have recently testing positive or are not in residence in their College accommodation) were requested to contribute swabs. Based on data from electronic student returns, the mean number of students who actually contributed swabs was **4.8** per testing pool.

From a total of **2,256** testing pools across College accommodation, **1,953** (**86.6%**) samples were received and processed at the testing facility. Of these, **16** were reported as "void" (for a variety of reasons, including inappropriate packaging and leaking samples).

Combined with the student returns data, we estimate that **9,453** students contributed swabs, including **9,376** students with valid results.

Results

The final pool results were:

Result	Number	%
Positive	10	0.5%
Negative	1,927	99.5%
Total	1,937	100%

Members of all **10** positive pools were invited for individual confirmatory tests. As of Sunday 6th December, all students have been re-tested. Of the positive pools:

- **0** pools were true positives (i.e. included at least 1 student confirmed to be positive on individual testing).
- **10** pools were false positives (i.e. all individual confirmatory tests were negative, following pooled screening test results which were positive at the limit of detection)
- **0** pools have outstanding results

Based on these data, we did not detect any new cases of asymptomatic COVID-19 amongst 9,376 students living in College accommodation screened this week.

The false positive rate for all pooled screening tests to date has been **1 in 373** (**0.3%**).

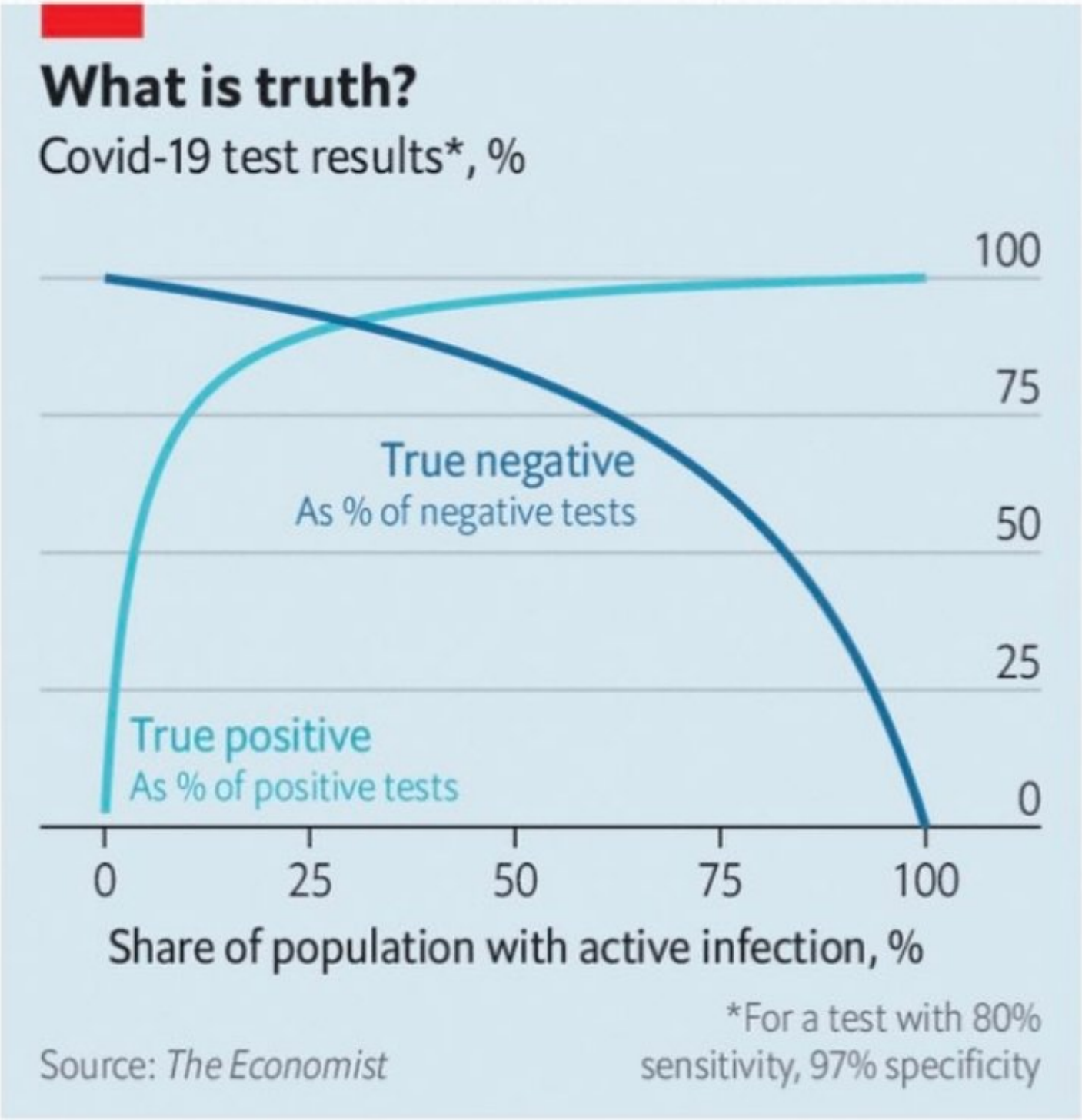
Summary for students living in College accommodation

Week	No. students screened	No. confirmed positive cases	Prevalence*
5th – 11th October	3,463	12	0.3%
12th – 18th October	3,675	34	0.9%
19th – 25th October	4,660	39	0.8%
26th Oct – 1st Nov	5,494	38	0.7%
2nd – 8th Nov	4,583	23	0.5%
9th – 15th Nov	5,339	80	1.5%
16th – 22nd Nov	4,138	27	0.7%
23rd – 28th Nov	9,329	3	0.03%
29th Nov – 6th Dec	**9,376**	**0**	-

*asymptomatic SARS-CoV-2 infection among screened students

1/2

To have the same number of false negatives as false positives you need a disease that is present in 30% of the population. Covid19 affects less than 1%. This means the false positives VASTLY outnumber both the real positives & the false negatives. It's called #BayesTheorem.



Matt Hancock claim: "the ONS report..address directly the question how the ONS adjusts for potential false positives, due to the high but not perfect specificity of the PCR test. I am very happy for one of my academics to take him through the rigorous Bayesian mathematics"

"I am very happy for one of my academics to take him through the rigorous Bayesian mathematics, which I am sure will help to elucidate the debate on this matter still further." @MattHancock to @DesmondSwayne https://t.co/pZcFlMBKEZ

I am waiting for one of @MattHancock's academics to take us through this as I have seen no evidence of @ONS adjusting for false positives according to #BayesTheorem https://t.co/ykB67TJORe

> "I am very happy for one of my academics to take him through the rigorous Bayesian mathematics, which I am sure will help to elucidate the debate on this matter still further." @MattHancock to @DesmondSwaynehttps://t.co/pZcFlMBKEZ
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) December 15, 2020

Professor Emeritus in Public Health, University of Arizona:
https://t.co/aidVGWOVqH

> Numerical details aside, the use of Bayes's theorem and the principle described are valid. Taught in epidemiology courses.
>
> Extreme example. If disease prevalence is zero, predictive value of positive test is zero. Every positive is false positive.
>
> A similar graph in the thread pic.twitter.com/ddvBe36OmU
>
> — \u05e4\u05e8\u05d5\u05e4' \u05d0\u05d9\u05d9\u05dc \u05e9\u05d7\u05e8 (@prof_shahar) December 16, 2020

WHO wakes up to #BayesTheorem https://t.co/nDKklwMhQe

> \u26a0\ufe0fWHO WARNING ON BAYES THEOREM & TESTING \u26a0\ufe0f
> "Healthcare providers are encouraged to take into consideration testing results along with clinical signs and symptoms, confirmed status of any contacts"https://t.co/GkRJzdn70b pic.twitter.com/jXPQDqqnVE
>
> — Robin Monotti FRSA MA BSc (@robinmonotti) December 16, 2020