

# Talking about research on social and broadcast media

Professor Oliver Johnson  
O.Johnson@bristol.ac.uk  
Twitter: BristOliver

School of Mathematics, University of Bristol

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# Introduction



**Oliver Johnson**  
@BristOliver

Two maths-y coronavirus questions:

1. Is anyone plotting UK cases on a log scale, and if so what's the slope?
2. Since 273 out of UK 23513 tests have been positive, we can be confident that a lot less than 1.1% of people currently have it, but how do you estimate the true number?

7:17 AM · Mar 9, 2020 · Twitter Web Client

- I've been on Twitter talking about COVID numbers . . .
- . . . from a maths point of view.
- Has been crazy at times, but mostly good fun.
- Ended up on the *Bristol Post* Cool List (!)
- You're never too old to learn to meme.

# Some unexpected connections

#1 — Nicola Sturgeon  
@NicolaSturgeon • 1 511 505 followers

#2 — Paul Joseph Watson  
@PrisonPlanet • 1 275 022 followers

#3 — Robert Peston  
@Peston • 1 268 473 followers

#4 — Christian Drosten  
@c\_drosten • 1 026 674 followers

#5 — James Oh Brien  
@mrjamesob • 1 025 327 followers

#6 — Susanna Reid  
@susannareid100 • 888 019 followers

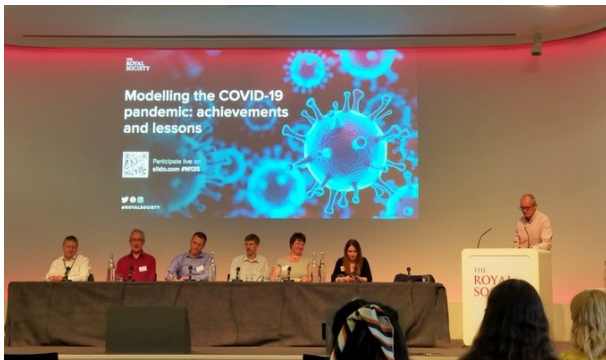
#7 — Hugh Grant  
@HackedOffHugh • 823 636 followers

**@BRISTOLIVER'S ORIGINAL FAMOUS FOLLOWERS  
MADE ON [AFFINITWEET.COM](https://affinitweet.com). GET YOURS NOW!**

## Mentioned in dispatches?

*We found that some of the most informative public communication was by people basically on Twitter, who were doing it alongside their day job, perhaps as a maths professor or something like that.*

– Aaron Bell MP, Parliamentary Science and Technology Select Committee



- Led to various media invitations (Radio 4 *PM* and *More or Less* interviews, *Spectator* and *Guardian* articles, chats with many journalists).
- Informal chats behind scenes with practitioners.
- Spoken at RSS and Royal Society COVID 'lessons learned' events.
- Will talk about the maths, and about the engagement.

## Lateral flow debate (Spring 2021)

- More heat than light?
- Jargon (specificity and sensitivity) doesn't help public?
- Will talk about red light testing ...
- ... positive predictive value intuitive metric?
- e.g. Guardian report of 15th April 2021:

### Rapid Covid testing in England may be scaled back over false positives

Senior government officials have raised “urgent” concerns about the mass expansion of rapid coronavirus testing, estimating that **as few as 2% to 10% of positive results may be accurate** in places with low Covid rates, such as London.

- Probability  $p$  2% to 10% gives **odds**  $p/(1 - p)$  **0.02 to 0.11**.
- NB: “As few as ... may be” are good words to look out for!

# Bayes FTW

- Odds formulation of Bayes

$$\frac{\mathbb{P}(\text{infected} \mid +ve)}{\mathbb{P}(\text{not infected} \mid +ve)} = \frac{\mathbb{P}(\text{infected})}{\mathbb{P}(\text{not infected})} \frac{\mathbb{P}(+ve \mid \text{infected})}{\mathbb{P}(+ve \mid \text{not infected})}$$

- Check: definition of conditional probability means both sides equal

$$\frac{\mathbb{P}(\text{infected}, +ve)}{\mathbb{P}(\text{not infected}, +ve)}$$

- Given a positive test, odds of being infected  
 $\simeq$  prevalence  $\times$  (true positive rate)/(false positive rate).
- e.g. prevalence 0.02%, true positive rate 50%, false positive rate 0.3% gives odds of 0.03.
- Are those numbers realistic though?

# Orkney and Shetland



Oliver Johnson @BristOliver · Apr 18, 2021



Secondly, it's rightly been pointed out that the figures will vary in places where prevalence is really low. And luckily, we have data for that, from Shetland. Only 4 out of 15,383 LFDs there are positive. So we can be generous and assume they are all false positive and do maths.

Board of Residence	Number of tests	Number of positive tests	% LFD positive tests
Lothian	415,267	518	0.1
Orkney	10,952	5	0
Shetland	15,383	4	0

- Scotland published weekly report including LFD results.
- **Even assuming all positives in Orkney and Shetland were false,** got false positive rate around 0.03% (not 0.3%)



# Dashboard data release

9 April

## Change to case reporting in England

The way cases are reported has changed. Cases that have been identified through a positive rapid lateral flow test will be removed for people who took Polymerase Chain Reaction (PCR) tests within 3 days that were all negative. Cases of this type that were previously reported were removed from the cumulative total, reducing the total by 8,010. Newly reported numbers of cases for the UK and England were unaffected by the removal of these. Historic published date totals have not been changed.

- 9th April 2021, dashboard reported LFD cancellations.
- Still not sure if they (grown ups) realised significance of this!
- We (nerds) could get (large scale, real world) PPV estimate.

# Plugging into Bayes



**Oliver Johnson** @BristOliver · Apr 9, 2021



I'd like that too. And point taken about prevalence. So, v2.0 is just for March when prevalence has been relatively flat.

[coronavirus.data.gov.uk/details/cases?...](https://coronavirus.data.gov.uk/details/cases?) gives 14,149 verified LFDs, and adding up today's "daily change" figures for March gives 3,191 cases taken off, so 18.4% of +ves false

- About 82% of March 2021 LFD positives were verified.
- Odds of about 4.4 (hundred times bigger than Guardian estimate).
- Bayes with back-of-envelope (ONS March) prevalence 0.3%, true positive rate 50%, (Scottish) false positive rate 0.03% gives odds of 5.

## Covid: 82% of positive rapid tests 'were correct'

By Jim Reed

Health reporter, BBC News

🕒 15 April 2021 | 🗨️ Comments

# Diagnosing testing via PPV

- If true and false positive rates stay constant, odds are proportional to prevalence.
- If PPV falls when prevalence rising, something's wrong.
- Could deduce PPV each week from Table 9 of a Test and Trace spreadsheet.
- In a week, if we went from 92.5% of LFDs passing confirmatory PCR to 87%, there's a problem ...
- ... doesn't sound much, but means odds halving!
- What's the point of all this data if we don't have KPIs for it?

# Immensa – tweets 9th October 2021



Oliver Johnson  
@BristOliver



So here (Table 9 of [assets.publishing.service.gov.uk/government/upl...](https://assets.publishing.service.gov.uk/government/uploads)) are the latest figures from the Test and Trace report for schools retests in the week from 23rd to 29th September. Doesn't look like much, but actually there seems to be something going on.

	A	AC	AD	AE
1	<b>Number of tests for Covid-19, confirmatory PCR tests, by secondary school students [Note 1</b>			
2	England, 4 March 2020 - 29 September 2021			
3	Confirmatory PCR tests, by secondary school students	09/09/21 - 15/09/21	16/09/21 - 22/09/21	23/09/21 - 29/09/21
11	<b>Total number of LFD tests via self-report home test kit</b>	<b>518,227</b>	<b>619,615</b>	<b>579,571</b>
12	<b>Total number of positive LFD tests via self-report home test kit</b>	<b>8,253</b>	<b>16,802</b>	<b>18,746</b>
13	Total number of positive LFD tests not matched to a PCR test	1,651	2,979	2,830
14	<b>Total number of positive LFD tests matched to a PCR test</b>	<b>6,602</b>	<b>13,823</b>	<b>15,916</b>
15	Total matched positive PCR tests	6,113	12,794	13,863
16	Total matched negative PCR tests	471	957	1,966
17	Total matched void PCR tests	18	72	87
18				

# Immensa – problems announced 15th October 2021



**Dave McNally**  
@OliasDave



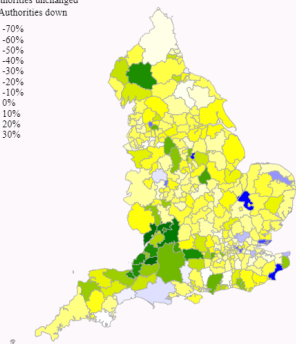
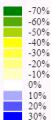
Replying to @vibrazione79 and @chrisdrakeuk

I was wondering about the Tuesday specimen date figures, they seemed surprisingly low. Made a chart of Tuesday figures as a percentage on Monday and it makes it look like a West Country thing. Did they lose a bunch of samples at the Bristol sorting office?

11:06 AM · Sep 10, 2021 · Twitter Web App

Cases by specimen date compared with a day earlier.  
Comparing 07/09/2021 with 06/09/2021

24 Authorities up  
4 Authorities unchanged  
287 Authorities down



Data retrieved from <https://coronavirus.data.gov.uk/> on 09/09/2021

- In fact problems visible in public data at least a month before.

# Thoughts on engagement

- Part of the job of an academic.
- Important to justify and sell our subject.
- Good to practice explaining things in different 'voices'.
- Will help in thesis, viva, job and conference talks, job interviews, grant applications etc.
- Vital skill to sell yourself to non-specialists.
- Doesn't just have to be schools . . .
- . . . though lots of opportunities there!
- Do it, but not too much . . .
- . . . and don't expect lots of credit for it!

# Public engagement lessons

- Shouldn't be afraid to communicate via maths
  - ▶ if understand odds and log scales ...
  - ▶ ... can understand (logistic) growth of variants.
- Keep explaining, no harm in repeating.
- Don't have to go into complete detail – what to leave out?
- Can (try to!) make it funny, do show your personality.
- Gimmicks stand out: log scales, bunny

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# Twitter

- Have fun!
- Lots of separate and overlapping conversations.
- Met some great people there, some excellent chats by DM.
- Don't be afraid to approach your heroes.
- Most people are nice – engage with them, answer questions etc.
- Some people are nasty – block them.
- There are more subtle forms of bad behaviour – sealioning, JAQing.
- Don't have to answer everyone, can filter replies etc.



# What works well?

- Tell stories.
- Visual representations are good.
- Animations even better?
- Having 280 characters can make you write better.
- Can write threads – but need a teaser to draw people in.
- People like puzzles, figuring things out (with help).
- People like to learn something new.
- Good to relate to names they know: Turing, Hawking, Bayes ...
- ...but also to introduce new (diverse?) names.


# Media

- I get a certain number of requests, by DM, email or phone.
- Should come via Press Office in theory, not in practice.
- Fine to say no: if too busy, out of scope, just don't fancy it.
- Fine to ask if on or off the record.
- If doing an interview fine to
  - ▶ negotiate format (recommend pre-record)
  - ▶ ask for angle
  - ▶ ask for another go if you fluff an answer
  - ▶ refuse to answer out of scope
- You aren't a hostile witness, they just want explanations.

# Writing a research highlight

- WHAT: snappy (1 sentence) summary of what you did
- WHO: good to mention collaborators - particularly international or interdisciplinary
- WHY: what's important or novel, what does this allow people to do, why does it matter, why should other people <sup>1</sup> care?
- WHEN: is this an ongoing collaboration, or something new?
- HOW: what tools or methods were involved?
- WHERE: how can someone see more? - link to paper or preprint

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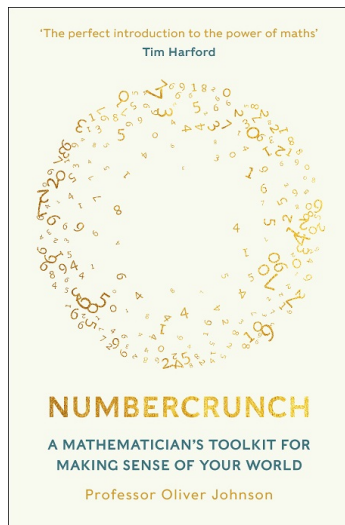
<sup>1</sup>Think: non-experts, academics in other disciplines, people in industry, the public 

## Writing a research highlight (cont.)

Also:

- any caveats or limitations that you might want to mention
- any funders or industrial partners to acknowledge
- any images from the paper that help tell the story?
- descriptive headline of results will encourage people to click through

Recommend you try it . . . either for your stuff, or someone else's.



- Out 2nd March 2023, with Bonnier Books.

## (Trade) book process

- Need an idea, really need a USP.
- Get an agent:
  - ▶ they help shape the manuscript
  - ▶ they can approach publishers
  - ▶ ...including overseas
  - ▶ and handle contracts, paperwork etc
- Normally write proposal first (~30 pages, pitch, bio, sample chapters).
- I didn't do that.
- Typical non-fiction book 70-90k words.
- Wrote 40k words in Lockdown 2 (November 2020), pitched to agents, redrafted for agent (May 2021) 60k words, redrafted for publisher (summer 2022) 75k words ...
- Then line edit, copy edit, proofs out to endorsers ...
- ... finally typesetting, adding illustrations, start and end matter etc
- Now promotion, plugging generally.

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| THANK |

| YOU |

| FOR |

| LISTENING! |

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