



COVID-19 pandemic  
and conspiracy theories

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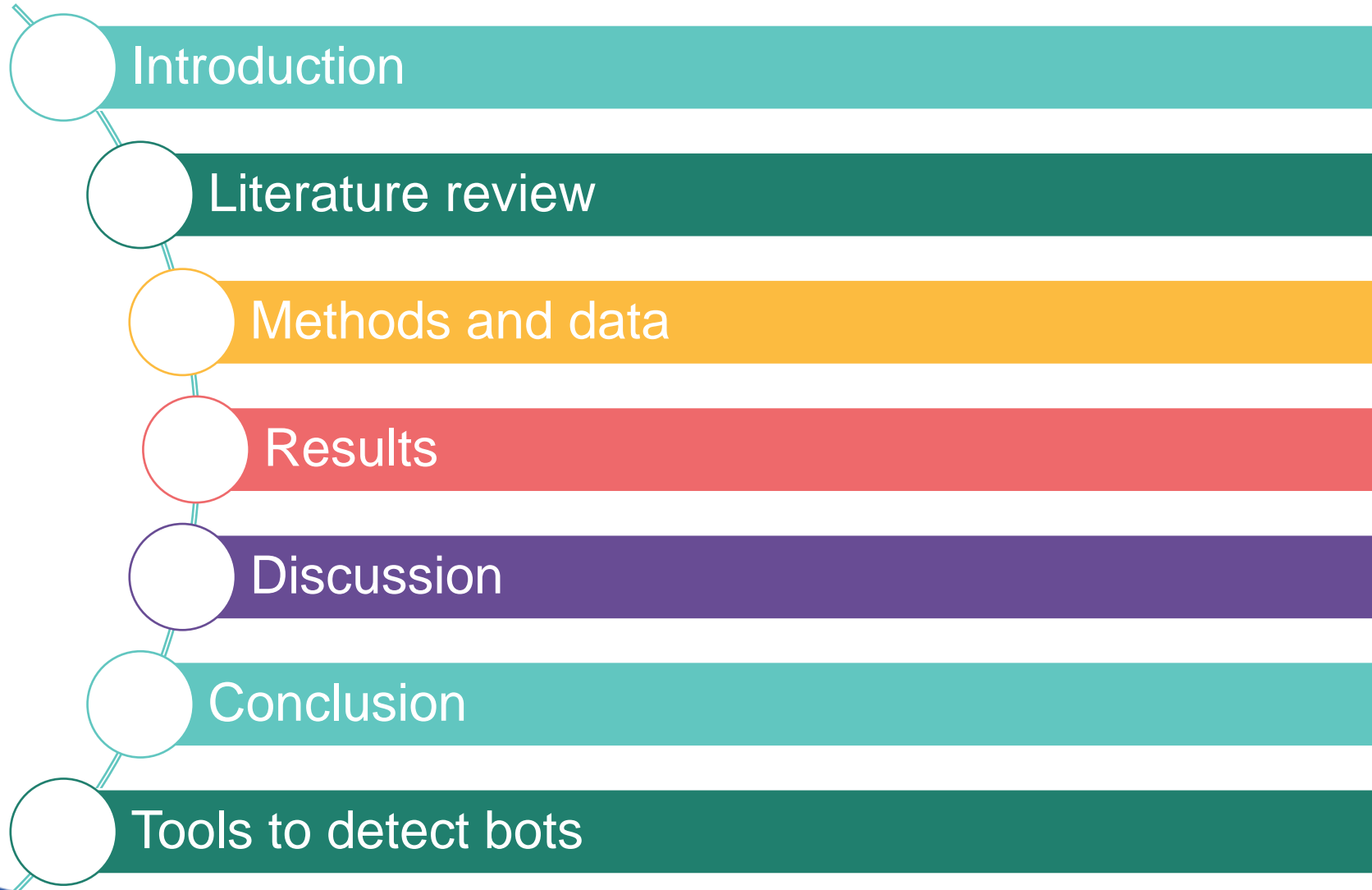
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A vertical list of seven items, each preceded by a white circle with a colored outline. The circles are connected by a thin line. Each circle is positioned to the left of a horizontal bar of the same color, which contains the text of the item. The colors of the bars from top to bottom are: teal, dark green, orange, red, purple, teal, and dark green.

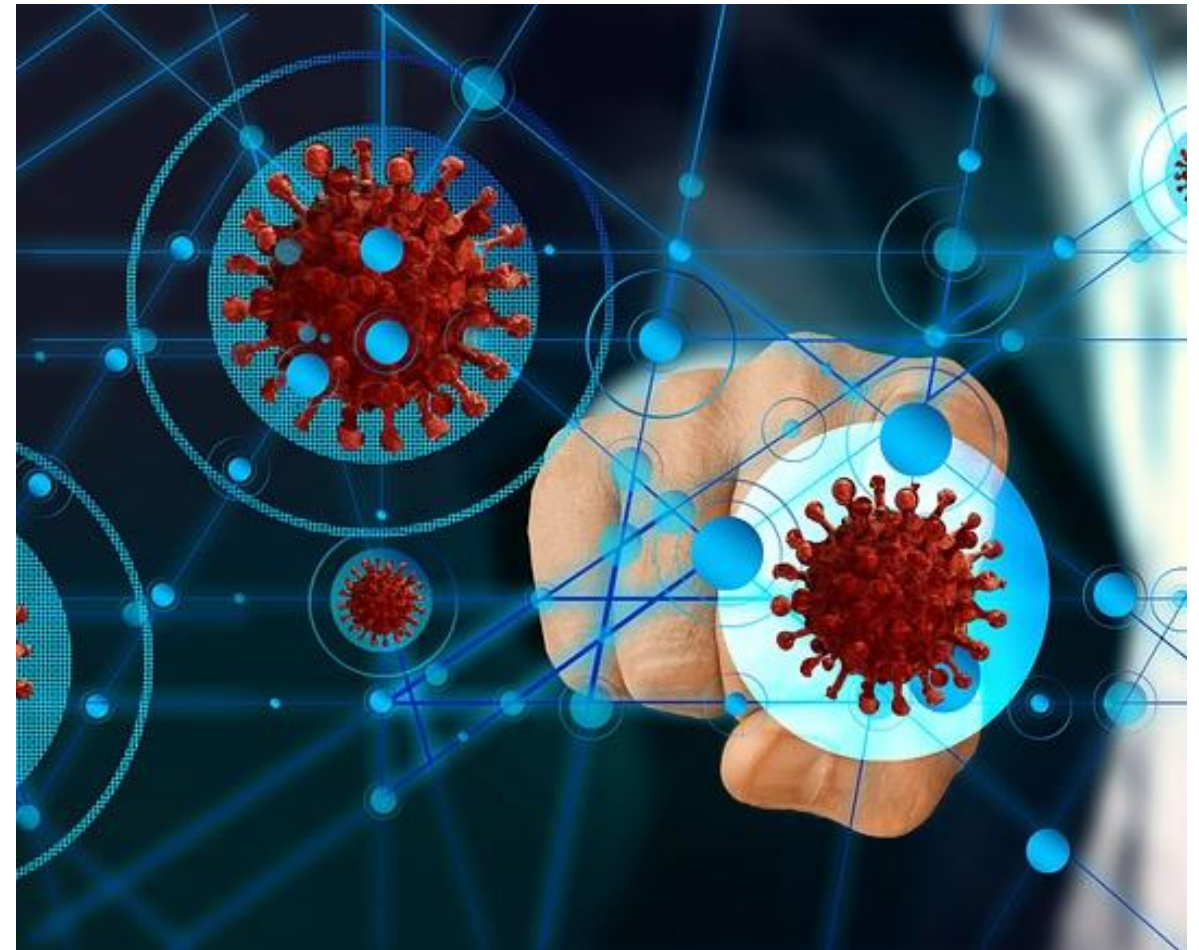
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# Introduction



# Introduction

- COVID-19 pandemic - a new kind of risk (emergency lasted for a longer period, conditions of uncertainty, missing data).
- Decisive role of social media (lack of scientifically proofed data resulted in a real infodemic).
- The infodemic had a direct impact on risk perceptions of the COVID-19 pandemic and on risk mitigation actions, such as vaccines.
- Resulted in various kinds of behavior in emergency.
- Spread of so-called conspiracy theories (about the source of the COVID-19 virus, the effectiveness of vaccines, and their side effects).



# Literature review

# COVID-19 conspiracies

- **Spread of conspiracies.**

Conspiracy tweets among COVID-19-related tweets (0.6% to 18%).

What specific theories are discussed, to what extent, and how the discussion frequency changes over time?

- **Spread of particular conspiracies.**

5G, FilmYourHospital, plandemic (planned pandemic), “Immuni”.

Aim: to analyze eight different conspiracy theories to estimate the number of conspiracy related tweets, to compare the theories among themselves and to identify patterns in their discussion.

# Risk perceptions

- Studies on risk perceptions. Contribution by analyzing COVID-19 as a dread risk and linking of the conspiracy theories to dread risk biases:
  - heuristic-systematic model, when individuals act heuristically in response to threats, that is, based on their emotions;
  - group epistemological theory, when individuals group together around similar labels;
  - threat and distrust heuristic invoked to deal with industrial power and related fears about the role of big industry;
  - the argument of pure progress to create trust, which can have the opposite effect and turn away half of the audience;
  - the most popular perceptions (e.g., in the nuclear industry, that reactors could potentially fall victim to a runaway reaction), which result in scientists having to reckon with these public narratives, regardless of how scientifically sound they may be.

# Methods and data



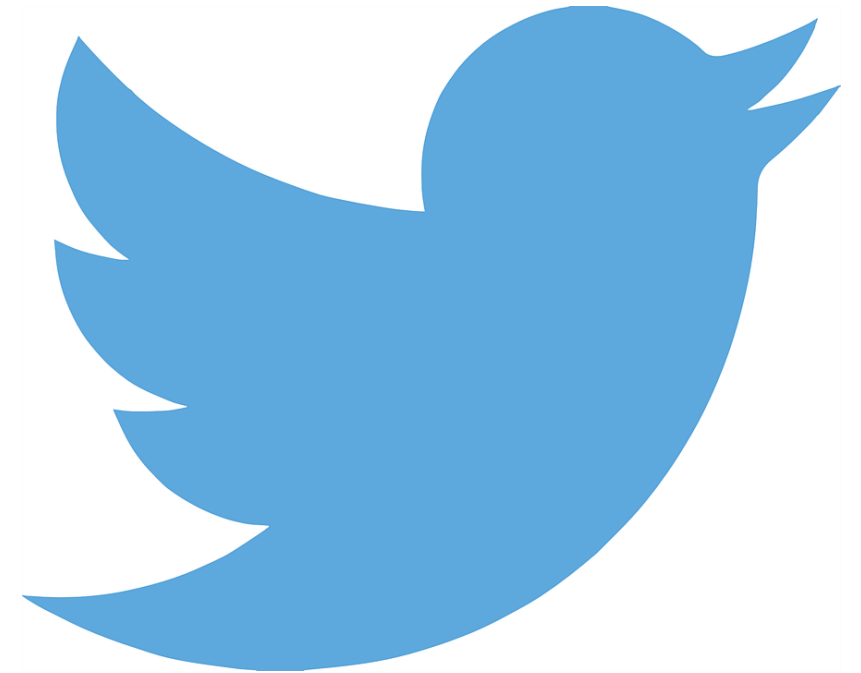
# Conspiracy theories

- Case studies of eight conspiracy theories.
  - 5G.
  - Big Pharma.
  - Bill Gates.
  - Biological weapon.
  - Exaggeration.
  - FilmYourHospital.
  - GMO.
  - Vaccines-related.



# Data collection

- Twitter API's v2 full search for Academic Research.
- The search criteria included all tweets that contain one or more COVID-19 related keywords, and conspiracy-specific keywords.
- Only tweets that are in some way related to the topic were collected. Retweets were excluded from the search.
- Tweets written in English.
- The criteria: all tweets within the scope of the conspiracy theories:
  - supporting,
  - opposing,
  - neutral.
- All tweets published between January 1, 2020, (shortly after the outbreak was first reported in the media), and November 30, 2021.



# Tweet examples

Tweet	Classification
“5G is killing people. Covid was a cover. Now the jab is a cover.”	Supporter
“5G linked scientifically covid death”	Supporter
“#lie: 5G mobile networks DO NOT spread COVID-19. #coronavirus”	Opponent
“I can’t believe there’s people out there that actually think 5G causes covid”	Opponent
"Got second covid vaccine shot 5g booting right"	Neutral

# Methodology

- Ordinary least squares model to estimate the effect of new daily cases on the discussion of each of the conspiracies. To take into account the heteroscedasticity of the residuals, we use robust standard errors.
- Hypothesis: the discussion of the conspiracies should decline with the number of new cases given that more people come into contact with the virus.
- $\ln(y_{i,t}) = \alpha_{i,t} + \beta_{i,t-7} \ln(x_{t-7}) + \varepsilon_{i,t}$ , where  $y_{i,t}$  is the number of tweets related to the conspiracy  $i$  on day  $t$ , and  $x_{t-7}$  is the number of new cases on day  $t-7$ , i.e., a week before.
- We run the regression on a weekly basis because we expect a lag between the number of new cases and behavioral response, which can also be explained by the way the data on new cases is published with a delay.
- We log the data to make our model invariant to the scale of the variables, to have a much less heteroskedastic or skewed distribution of the variables, and to limit the effect of outliers.

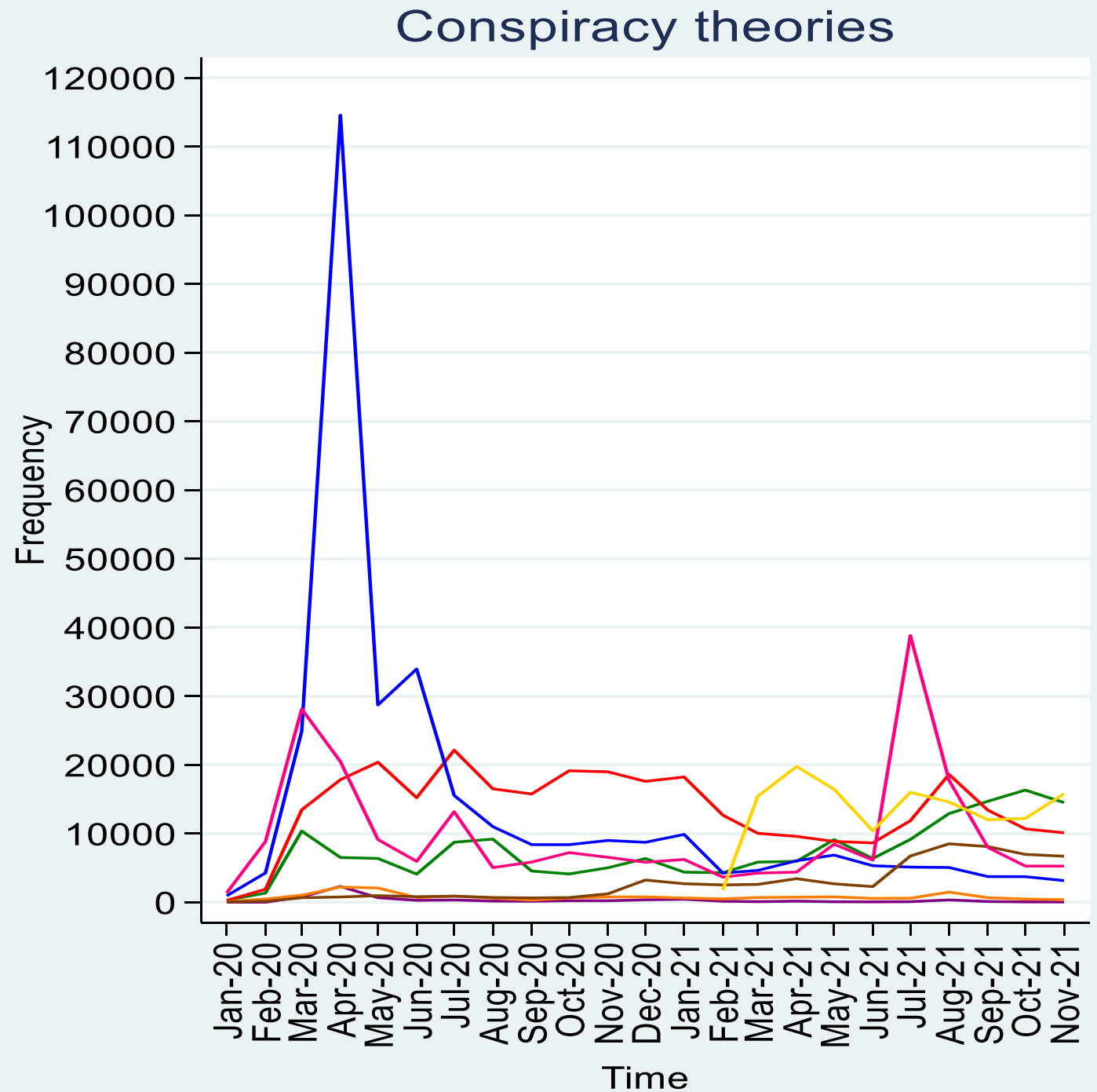
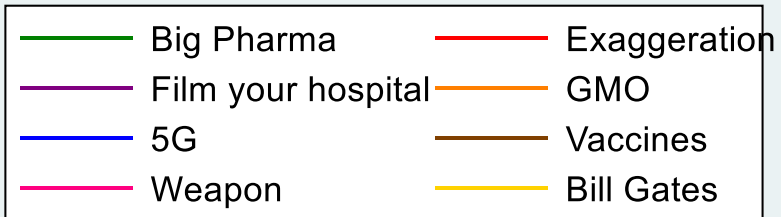
# Results

# Total number of tweets per conspiracy

Conspiracy	Number of tweets
5G	326,035
Exaggeration	314,205
Weapon	226,882
Big Pharma	173,452
Bill Gates	138,061
Vaccines	65,472
GMO	18,090
FilmYourHospital	7,054
<b>Total</b>	<b>1,269,251</b>



# Frequency of tweets on conspiracy theories



# OLS regression results for new weekly COVID-19 cases as an explanatory variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	log_5G	log_BigPharma	log_BillGates	log_Weapon	log_Exaggeration	log_FilmYourHospital	log_GMO	log_Vaccines
log_cases_7	-0.0880**	0.271***	0.769***	-0.100***	0.327***	-0.837***	-0.00791	0.631***
	(-2.60)	(13.15)	(9.19)	(-5.27)	(11.58)	(-9.21)	(-0.49)	(23.56)
_cons	6.676***	1.925***	-4.052***	6.702***	1.906***	12.41***	3.079***	-3.912***
	(15.20)	(7.33)	(-3.68)	(27.92)	(5.26)	(10.53)	(15.02)	(-11.58)
N	671	671	273	671	671	598	671	671
R <sup>2</sup>	0.021	0.294	0.225	0.045	0.405	0.221	0.000	0.524
adj. R <sup>2</sup>	0.020	0.293	0.222	0.044	0.404	0.220	-0.001	0.523

# Discussion

# Discussion

## **Peak at the beginning of the pandemic.**

- 5G and FilmYourHospital.
- Both conspiracies related to the dread risk bias, namely that the COVID-19 pandemic was new, and its reasons were unclear.

## **Increase throughout the pandemic.**

- Vaccines and the Big Pharma.
- Consistent with the threat and distrust heuristic, which refers to industrial power and related concerns about the role of big industry, as well as argument of pure progress.

## **Persistent theories.**

- Bill Gates and exaggeration.
- This may be due to the introduction of digital certificates and the use of Bill Gates by conspiracy theorists as the embodiment of digital slavery.
- This discourse is again related to the threat and distrust heuristic as well as the use of the pure progress argument.
- The discussion of the exaggeration conspiracy may indicate people's distrust of statistics.

## **Multiple peaks.**

- GMO and biological weapon.
- The first peak was at the beginning of the pandemic, the second peak was at the beginning of the active and massive introduction of vaccines.
- These theories faded as quickly as they emerged after they peaked.
- After reaching the peaks, the theories only played a negligible role.

# Conclusion

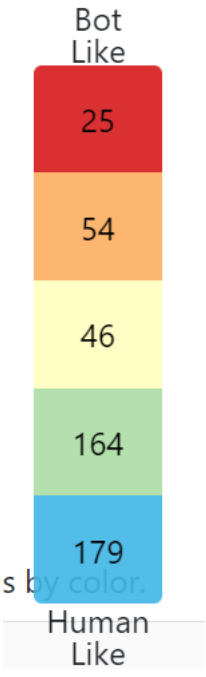
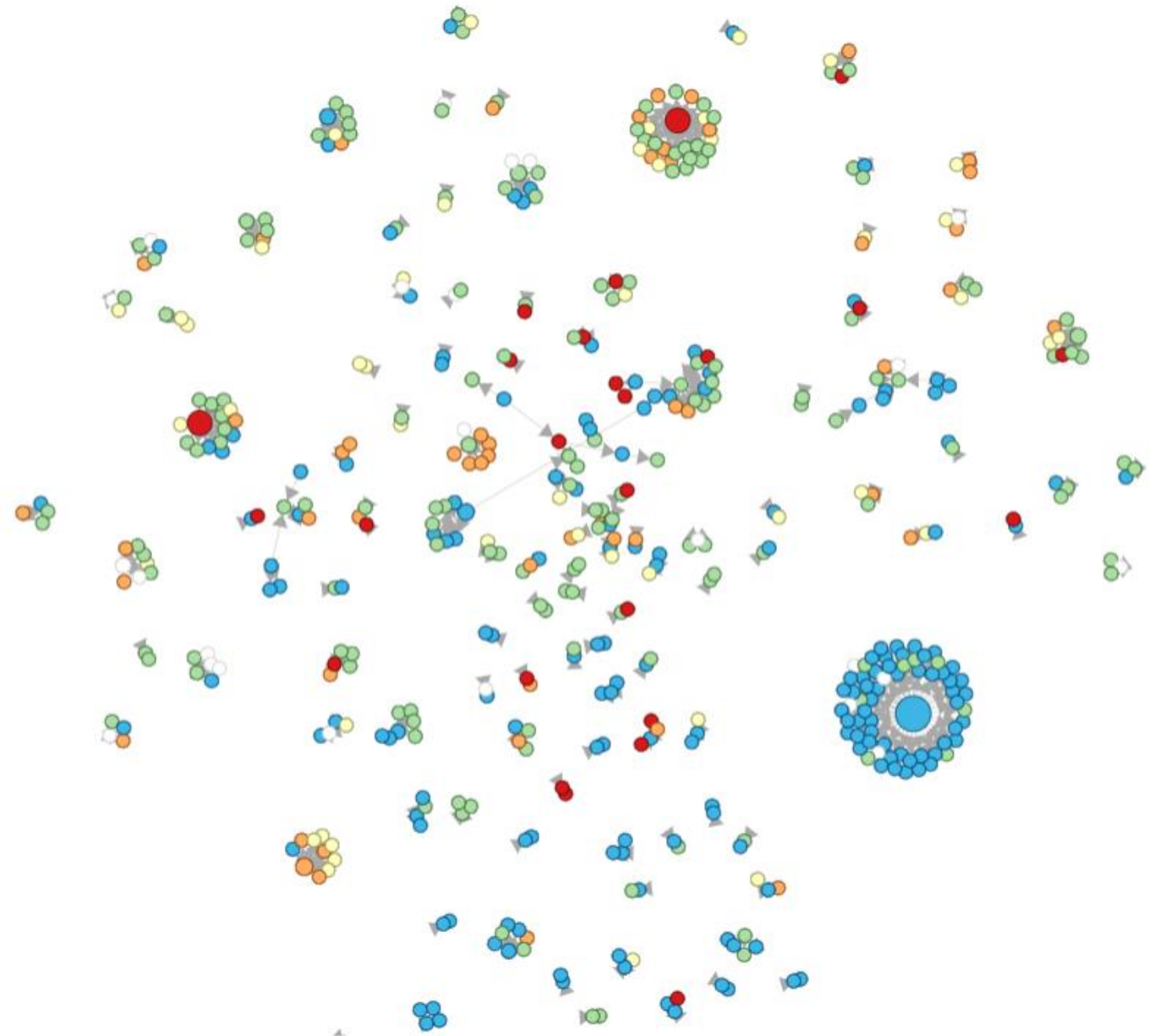


# Conclusion



- 1.269 million extracted tweets using keywords related to the most common COVID-19 conspiracy theories.
- Categorization into four groups.
- 5G and FilmYourHospital played a major role at the beginning of the pandemic and then almost completely disappeared.
- Vaccines and Big Pharma began to play a major role later as vaccines began to be actively introduced.
- Exaggeration and the role of Bill Gates remained relatively high over a long period of time with some fluctuations.
- GMO and biological weapon had two peaks and were driven by two events – the emergence of the pandemic and the active start of the vaccination campaign.
- Many people react to new, unexpected, and incomprehensible risks by resorting to conspiracy narratives. People refer to the heuristic-systematic model.
- When the picture becomes clearer and more reliable and clear information emerges, most narratives fade away. But there are some that remain quite persistent.
- This may indicate a lack of outreach and be a recommendation to decision makers who can use the data to draw conclusions about the effectiveness of combating different conspiracy theories, to identify theories that remain persistent despite two years of pandemic development and anti-conspiracy news campaigns, and to develop measures aimed specifically at combating the remaining conspiracies.

# Tools to detect bots

# Hoaxy “5G” and “Covid”



# Botometer

✓ 
4.7 / 5 
✕

Bot type scores <span style="float: right;">?</span>	Bot score based on <span style="float: right;">?</span>	
Echo-chamber 0.1	All features: 4.6	<div style="border: 1px solid #ccc; padding: 5px; display: flex; justify-content: space-around; margin-bottom: 10px;"> <span>Profile</span> <span>Tweet</span> <span>Details</span> <span>Feedback</span> </div>
Fake follower 1.4	Language-independent: 4.7	
Financial 0.1	10% of accounts with a bot score above 4.7 are labeled as humans.	
Self declared 4.7	Majority tweet language: es	
Spammer 1.0		
Other 4.2		

# Bot Sentintel

BotSentinel.com



**Rating: Normal**

This report was created for [REDACTED]

Report created: 6-6-2022 21:23:15



■ Normal: 0% - 24%

■ Satisfactory: 25% - 49%

■ Disruptive: 50% - 74%

■ Problematic: 75% - 100%

Our analysis has concluded [REDACTED] exhibits normal tweet activity.

Thank you!



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