

#flattenthecurve: Cognitive models and empirical findings as mainstays in the containment of misinformation and conspiracy theories

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Introduction

What you can observe in social networks



Temporal dynamics

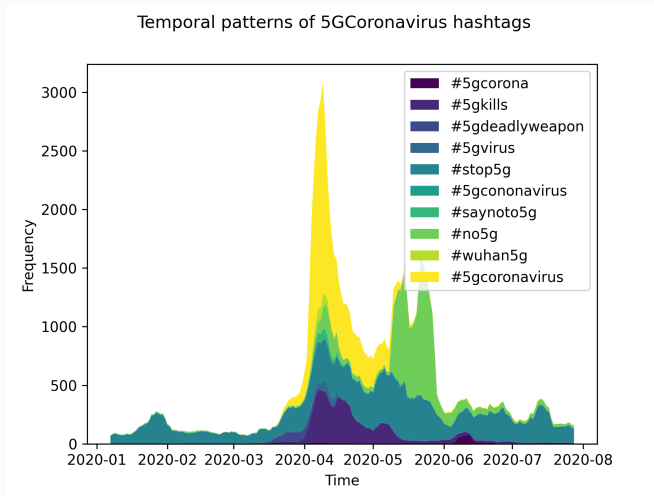


Figure 1: Figure generated with MISS TWEETEPY. Total number of matching tweets $N = 107970$.

Why calling it a 'conspiracy theory'?

Definition

A **conspiracy theory** can be defined as explanatory beliefs that a group of actors meets in secret to attain some evil goal (van Prooijen, 2017).

Key **ingredients** (see e.g., Lewandowsky & Cook, 2020):

- an (evil) group of conspirators (antagonistic outgroup)
- everything that is happening follows a plan
- nothing is happening by accident or coincidence; everything hangs together and nothing is as it seems to be
- 'evidence' that supports the conspiracy theory

Please note that the distinction between conspiracy theories and other kind of problematic information (e.g., misinformation or fake news) can be challenging or even impossible.

Understanding conspiracy theories and misinformation

A general framework

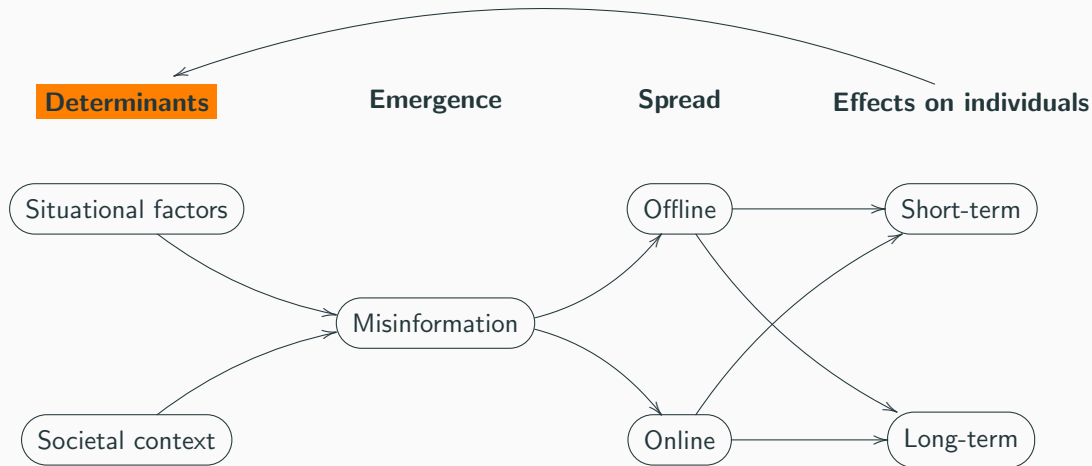


Figure 2: A general framework for understanding the causal chain of misinformation.

Putting the stress on conspiracy theories

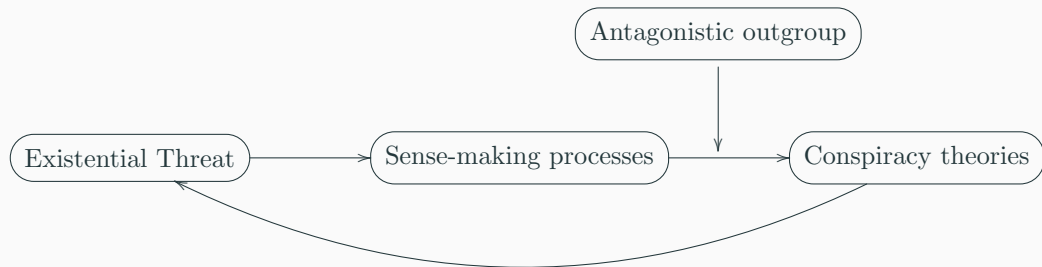


Figure 3: Existential Threat Model explaining why individuals engage in conspiracy theories. Figure adopted from Van Prooijen (2020). See also Swami et al., 2016.

Societal factors contributing to the emergence of misinformation

Lewandowsky et al., 2017, p. 356:

“... the **post-truth problem is not a blemish on the mirror**. The problem is that the mirror is a window into an alternative reality.”

The emergence of misinformation and its consequences may be driven by specific **large-scale societal trends** (Lewandowsky et al., 2017), e.g.,

- declining trust in science
- decline in social capital
- growing inequality
- evolution of the media landscape

A general framework

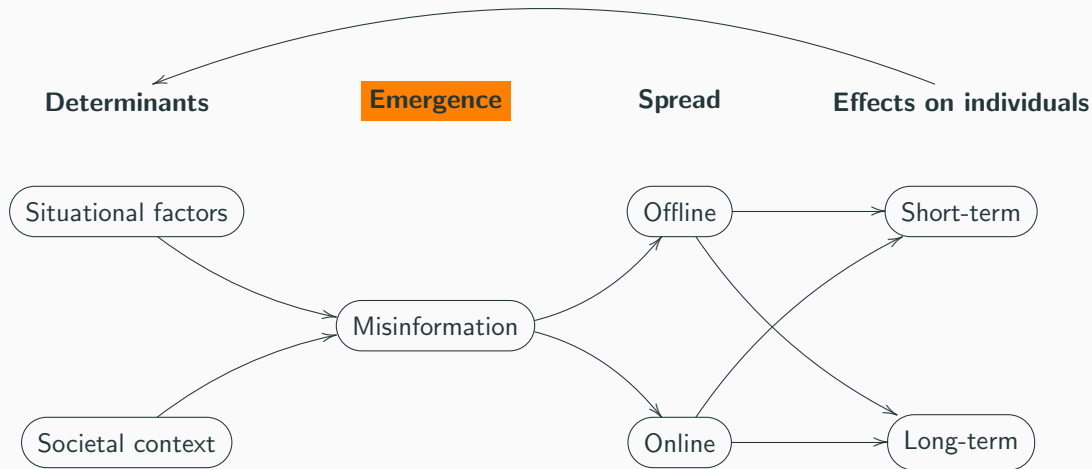


Figure 4: A general framework for understanding the causal chain of misinformation.

Prevalence of misinformation: Still a data gap?

Lazer et al., 2018, p. 1095:

“**How common is fake news**, and what is its impact on individuals? There are **surprisingly few scientific answers** to these basic questions.”

There are a few insights from research:

- more than 5600 misinformation stories concerning COVID-19 in 2020 alone (Siwakoti et al., 2021); > 9000 according to Al-Zaman (2022)
- 1699 (confirmed) false stories on Twitter between October 2008 and late December 2016; predominantly concerning politics and urban legends (Vosoughi et al., 2018)
- US election 2016: up to 25% of the tweets contained misinformation (Bovet & Makse, 2019)
- 'Overall, sharing articles from fake news domains [on Facebook] was a rare activity.' (Guess et al., 2019, p. 1)

Temporal dynamics

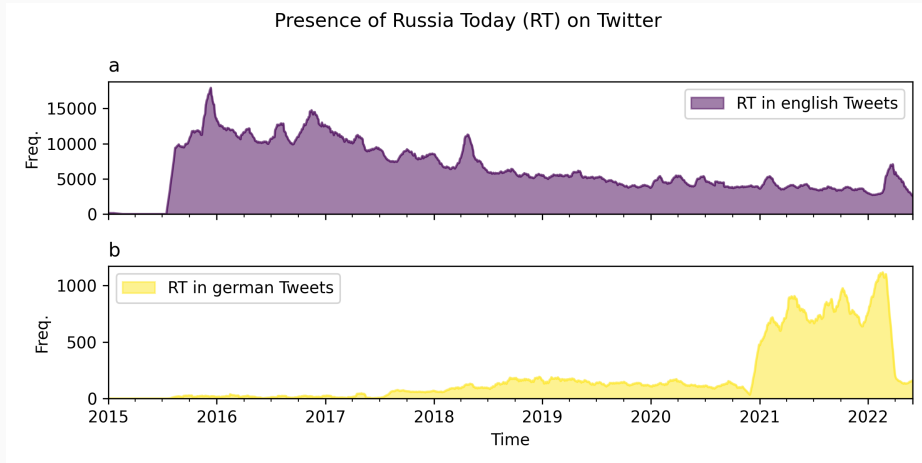


Figure 5: Figure generated with MISS TWEETEPY. Total number of matching tweets $N_{english} = 17273579$ and $N_{german} = 525722$.

A general framework

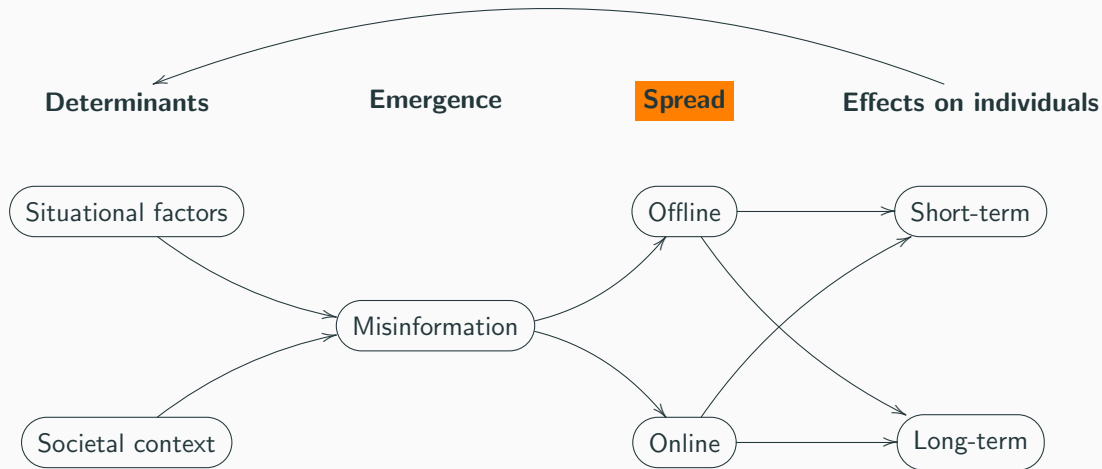


Figure 6: A general framework for understanding the causal chain of misinformation.

The (key) role of social networks in the amplification of misinformation

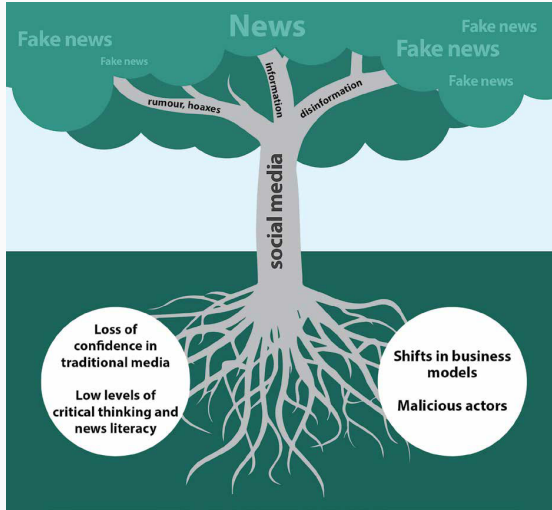
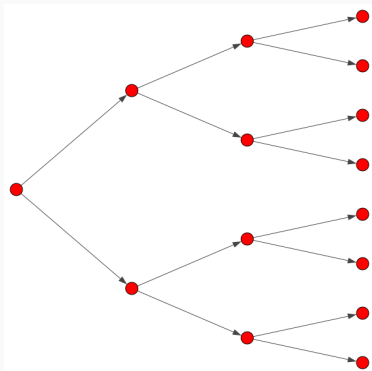


Figure 7: Figure from Stremlau et al. (2018). But see also Allcott and Gentzkow (2017), Allcott et al. (2019), Cinelli et al. (2021), and Lazer et al. (2018).

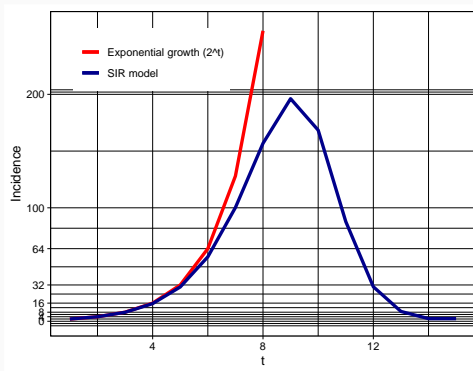
Diffusion patterns

- misinformation on Twitter tends to spread faster, more deeply, farther and more broadly than true news (Vosoughi et al., 2018)
- false (political) rumors may reappear after initial publication, while true rumors show no such pattern (Shin et al., 2018)
- formation of 'echo chambers', which refer to relatively closed systems of individuals who share similar beliefs which are then reinforced while suppressing the exposure to opposing perspectives (see Cinelli et al., 2021)
- (pseudo-)epidemic models may be useful for characterizing the spread of misinformation in social networks (see e.g., Jin et al., 2013; Kauk et al., 2021)

Cherry picking: Pitfalls in climate change denial



(a)



(b)

Figure 8: (a) Each node represents an individual, whereas each individual infects two more individuals ($\mathcal{R}_0 = 2$), as indicated by arrows. Consequently, we would (initially) see an exponential increase in the number of new infections (incidence) over time. (b) Dynamics of an infectious disease outbreak.

Time series data

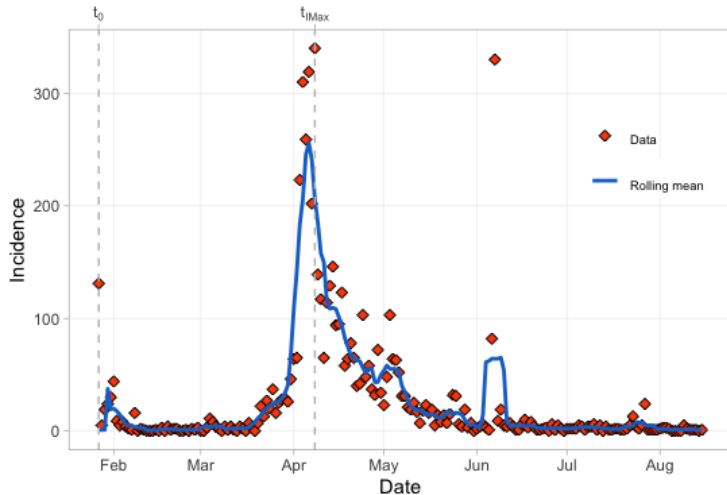


Figure 9: Incidence (total number of tweets containing a specific hashtag) over time. Please note that “Rolling mean” refers to the simple moving average with the rolling window $k = 7$.

(Mis)infodemic?

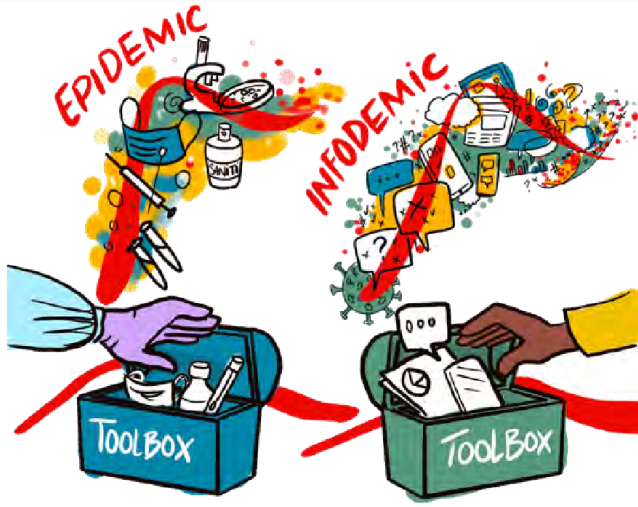


Figure 10: Figure adopted from World Health Organization (2021).

A general framework

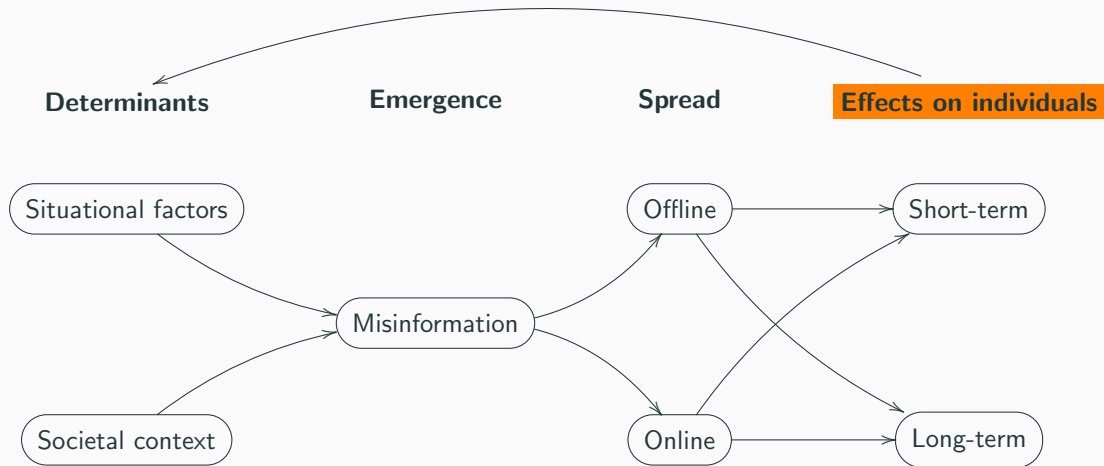


Figure 11: A general framework for understanding the causal chain of misinformation.

Greenspan and Loftus, 2021, p. 4:

“... research have shown that misinformation, particularly health-related misinformation, can affect people’s lives in a myriad of consequential ways. **Misinformation can impact beliefs about a disease’s impact, effective preventive behaviors one can take ...**”

Relevant effects:

- continued influence effect (see e.g., Lewandowsky & Cook, 2020; Susmann & Wegener, 2022)
- confirmation bias
- misinformation may induce fear and anxiety (Rocha et al., 2021)
- the intention to get vaccinated and the adherence to public health measures might be reduced (see e.g., Simonov et al., 2020; Tasnim et al., 2020; Teovanović et al., 2021)

Continued influence effect



Figure 12: Figure from <https://medium.com/@cathxli/bias-design-understanding-the-continued-influence-effect-633283e30a4a>.

[//medium.com/@cathxli/bias-design-understanding-the-continued-influence-effect-633283e30a4a](https://medium.com/@cathxli/bias-design-understanding-the-continued-influence-effect-633283e30a4a).

Watts et al., 2021, p. 5:

“The debate around misinformation and its potentially damaging effects on public opinion, understanding, and democratic decision making is **complex and multifaceted**. **There is not, to our knowledge, any general consensus on what “the problem” is**, and even less agreement on what the solution or solutions ought to be.”

Potential effects:

- reduced trust in political leaders (Karić & Međedović, 2021), institutions (Pummerer et al., 2021) and media? (Swift, 2016)
- undermining social cohesion?
- strengthening of far-left/right parties?
- affecting outcomes of democratic elections? (for the US election 2016 see Allcott & Gentzkow, 2017)

How to intervene?

A general framework

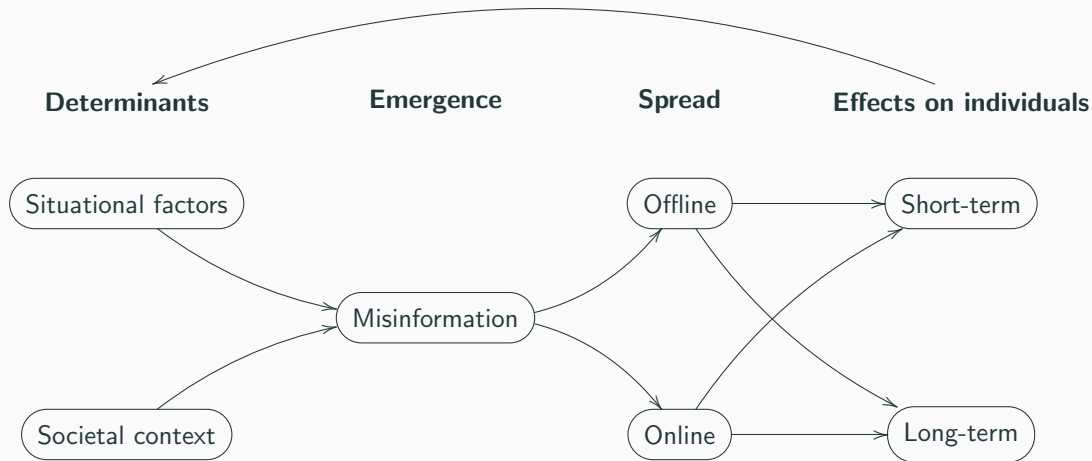







Figure 13: A general framework for understanding the causal chain of misinformation.






Papers discussed in this section:





1. Swami et al., 2016
2. Douglas and Sutton, 2011
3. Imhoff et al., 2022
4. Goreis and Voracek, 2019
5. Grimes, 2016a, 2016b
6. Lewandowsky et al., 2020
7. Kauk et al., 2021

Thank you for listening!

Are there any questions?

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