Misinformation in social networks: How one bad apple can spoil the bunch

Just one vulnerable user can spread fake news across entire networks. The good news: raising sophistication levels can stop the rot.



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In network settings, participants typically observe the actions of others and update their own

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beliefs and behaviors based on what they observe. This happens in real physical networks, like an organizational network, or in a social media network like Facebook — any setting where you have individuals communicating with another group of individuals, and not everybody is communicating with each other directly at the same time.

In the wake of the first Trump election and the COVID-19 pandemic, both of which really moved the topic of misinformation to the top of everyone's mind, IESE Prof. Manuel Mueller-Frank decided to explore the extent to which misinformation spreads through networks.

Using mathematical modeling, he distinguished between two types of groups based on the degree of sophistication each had: one group would make very basic inferences, while the other group was "smarter" in that they were better able to process information and understand the broader environment, though neither was perfect in their information-updating abilities. Just like in real-life networks.

What his modeling showed was that if the least sophisticated individual were exposed to enough misinformation, just a single one of those individuals would eventually contaminate the entire group; in other words, everyone's opinion eventually converged around the misinformation.

Importance of educating those most susceptible to misinformation

But it wasn't all bad news. Mueller-Frank's modeling also showed that if only the more sophisticated agents were exposed to misinformation, there were no outsized effects. There may be some effects, but they had a negligible impact on how the rest of the group would understand and view the world.

From this, Mueller-Frank offers two key takeaways: first, you want to protect the most vulnerable member of the network from misinformation to prevent contagion effects; and second, you want to educate the most susceptible members to make them a bit more sophisticated in terms of how they process information.

Besides making sure not too many people are exposed to misinformation, social media networks also need to ensure people are increasingly interacting with others with higher degrees of sophistication. Bearing in mind that nefarious actors are going to target the least sophisticated users with misinformation, it also demands platforms work harder at preventing

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misinformation from ever reaching their intended targets, while educating people on how they process information and raising their levels of sophistication.

However, for platforms to live up to that aspiration, Mueller-Frank issues an important caveat: “Policing misinformation gives tremendous power to the entity that does so. If the entity is not altruistic but has its own agenda, then there is a risk of accurate information being censored, and as a consequence also drastically impacting opinion formation and diffusion.”

With that in mind, he urges, “Individually, we each need to develop healthy skepticism and more critical thinking, and not just rely on what others tell us. And educating yourself means not only finding other sources of information, but actually thinking about how you process the information you observe. And that’s the point of my paper: how you process information is of critical importance, not only to yourself, but to everybody.”

MORE INFO: “As strong as the weakest node: The impact of misinformation in social networks” by Manuel Mueller-Frank is published in the *Journal of Economic Theory* (2024).

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Professor in the Economics Department at IESE Business School. His research lies at the intersection of economic theory and mathematics, including game theory, the economics of information and learning dynamics.

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