SOCIAL SCIENCE

The misinformation machine

Misinformation results from many interacting processes

By **Derek Ruths**

In recent years, there has been an explosion of research trying to understand misinformation: what it is, how it operates, and what impacts it has on the world. On the surface, this roiling field seems to produce as many paradoxes and conflicting results as it does potential insights. For example, some studies suggest that bots (internet robots) play a limited role (*1*), whereas other studies suggest that bots drive the diffusion of misinformation (*2*). It is ironic that the field of research on misinformation has come to resemble the very thing it studies. What is true? What is actually known about misinformation and its impacts on society? A single research paper may interrogate only one aspect of what is a complex misinformation machine, making it tempting to see other papers as providing competing views, when they are, in fact, often entirely complementary windows into a much larger process. On page 374 of this issue, Grinberg *et al.* (*3*) illustrate the necessity of thinking of misinformation as a process.

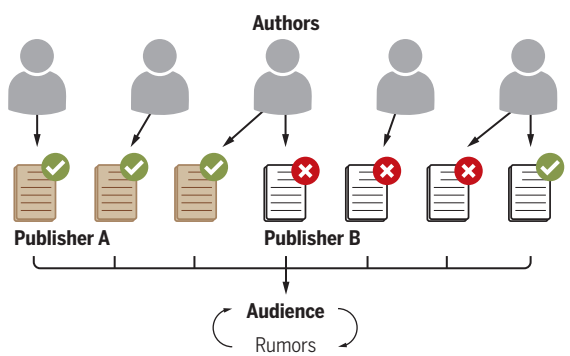
Grinberg *et al.* show that online, mostly political misinformation is shared and seen by only a very small fraction of Twitter users. To do this, they used a clever method to find humans (as opposed to bots) on Twitter: They matched U.S. voter registration records against Twitter accounts. Each Twitter user's political orientation was then estimated using the celebrity and news accounts they followed.

Yet, whereas Grinberg *et al.* found that online misinformation operates within highly concentrated, small online populations, recent work by Vosoughi *et al.* was widely touted as evidence for fast-spreading and persuasive misinformation online (*1*). How can these both be true? To untangle them, we have to begin with how each defines misinformation. Grinberg *et al.* look at misinformation through the lens of fake-news outlets, publishers that do not adhere to established journalistic practices. Vosoughi *et al.* focus instead on false news stories, specific articles that contain factually incorrect claims. These different definitions of misinformation can permit completely different findings: How people engage with news sources may be quite different from the way they treat specific news stories.

For those trying to understand the overarching phenomenon of misinformation, the question is, are these simply different definitions that are unaware of one another—in effect, competing attempts to measure the same thing? If so, then their findings are, indeed, conflicting and troubling. On the other hand, these are actually complementary ways of viewing distinct and interconnected parts of a larger system.

What produces misinformation?

The moment of becoming misinformed may happen because a person interacts with misleading articles (red marks) or rumors. But there is a much larger process implicated that involves authors, publishers, articles, rumors, and the public.



The process of producing misinformation involves five key elements: publishers, authors, articles, audience, and rumors (see the figure). Publishers run distribution platforms, which have codes of conduct, style guides, and journalistic guidelines. Some are more formal and rigorous (for example, well-respected mainstream media publishers) and some are entirely informal (for example, content mills for clickbait). Authors live within this world of publishers. The articles they produce are informed and shaped by the publishers their articles move through. The audience primarily interacts with the media system through articles. It is this article-audience interaction that can produce the crucial moment of misinformation. Of course, the audience can circulate their impressions, interpretations, or reactions to information among themselves. This is the second source of misinformation: rumors.

With this framework in mind, we can better see how the papers of Grinberg *et al.* and Vosoughi *et al.* together point to a much more complete understanding of the misinformation production process. Grinberg *et al.* suggest that there are specific (and small) communities of individuals who engage with "questionable" publishers. To the extent that weaker journalistic standards produce less reliable articles, these publishers will produce false news stories with much higher probability (*4*). When these stories are produced, Vosoughi *et al.* suggest that they will penetrate their audience with greater effect and speed than true stories. What seemed at first contradictory instead strongly suggests that widespread factually wrong beliefs might be traced back, in absolute terms, to small communities that engage with questionable media sources.

Of course, this is still only part of the story. There is a key blind spot in the current research: rumors. Although there has been work on the broad phenomenon of rumoring online and its connection to misinformation (*5*, *6*), there is a serious need for a better understanding of how fake-news stories transform into rumors and to what extent these rumors can amplify beliefs and infiltrate other communities.

Progress here might help explain one of the most curious and unexplained findings of the Grinberg *et al.* paper: that conservatives are significantly more inclined to share and see fake news than liberals. Perhaps this is the whole story: Conservatives have a weakness for fake news. More likely, though, is that liberals embed misinformation in different ways and spread it through means that we, as of now, do not have reliable ways of measuring. When we begin to uncover these mechanisms, it will be important to place them within the context of the much larger misinformation system within which they operate. ■

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