Explaining the Spread of Misinformation on Social Media: Evidence from the 2016 U.S. Presidential Election.

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Over the past few years, concerns about the negative societal consequences of the spread of misinformation have become widespread. While false news and propaganda are far from being a new phenomenon, the emergence and popularization of social networking platforms appear to have increased the prevalence of false news stories and the speed at which they become viral. False rumors and news stories that were spread on social media have been mentioned as one of the reasons for the recent rise of populist candidates in the U.S. and Europe and as fuel inciting violence against ethnic minorities in countries such as Sri Lanka and Myanmar (see e.g. Taub and Fisher, 2018). The same new technology tools that allowed the pro-democracy groups during the Arab Spring to coordinate and start a revolution are now seemingly giving a platform to conspiracy theorists and extremist actors seeking to manipulate the political agenda in their own financial or political interest. However, we still know relatively little about the extent to which false news are indeed widespread on social media and the extent to which they have a causal effect on individual attitude change or offline violence. This short note offers an overview of the existing empirical evidence regarding the prevalence of misinformation on social media sites and different individual- and contextual-level factors that may explain its diffusion.

"Fake news" on Twitter during the 2016 U.S. Presidential Election Campaign

Media attention to the extent to which digital technologies may be contributing to the spread of misinformation spiked after the 2016 U.S. Presidential election. Already before the election, journalists such as Craig Silverman at Buzzfeed found that hyperpartisan and "fake news" stories were being widely shared on social media and were reaching large numbers of citizens, propagated at least in part by foreign actors, either for political or financial reasons (Silverman, 2016).

A dataset that I collected over the same period corroborates this finding. Using the Twitter API, I obtained all links shared as part of a tweet that mentioned keywords related to the election (e.g. "hillary", "clinton", "donald", "trump", etc.) between October and November of 2016, representing a total of 24.1 million tweets. Then, I relied on a crowd-sourced list of domains that were producing mostly misinformation during this time – compiled by Zimdars (2016) and also used in other studies of misinformation – as a simple heuristic to classify the individual links shared on Twitter as being misinformation or not. The definition of misinformation used here – news stories that present political facts that are demonstrably false or misleading – is conservative on purpose, which implies the results will likely underestimate the actual prevalence.

Each domain was manually checked to ensure it met this definition.

This analysis showed that links to domains that produced mostly misinformation were shared more often than all 16 most popular media outlets (New York Times, Fox News, NBC News, Washington Post, ...) *combined*. More specifically, 16% of all links shared during this period corresponded to "fake news" domains, while 13% corresponded to 16 established news outlets. The rest of domains adding up to 100% included YouTube, Facebook, the official sites of Hillary Clinton and Donald Trump, and Wikileaks, among others. In other words, even under the most optimistic scenario, this analysis suggests that "fake news" stories were shared at rates comparable to news stories by mainstream media outlets. At least when it comes to Twitter, during the 2016 election there was as much misinformation being shared as actual news.

However, not every user shared misinformation at similar rates. I also found significant heterogeneity in the extent to which users were likely to propagate misinformation. My evidence here comes from merging this dataset with publicly available voter files in ten U.S. states, which include information on users' party of registration, age, and voting history, using the matching method introduced in Barberá et al. (2015). The results demonstrate that age and partisanship were the two most predictive factors. Individuals of ages 65 and higher were nearly five times more likely to share false news stories on Twitter than those ages 18-25. Registered Republicans users were three times as likely to do so as Democrats, although this result could be explained by the higher prevalence of anti-Clinton misinformation during this period. In contrast, differences based on past turnout or predicted income (estimated based on the value of the residential address where the voter is registered) were not as large.

To demonstrate that these patterns were not due to differences in the overall propensity of each of these groups to share political news, I estimated a poisson regression of the number of

Figure 1: Individual-level predictors of misinformation diffusion on Twitter (N=31,651)

Estimated effect on number of false news stories shared on Twitter (coefficient from poisson regression)
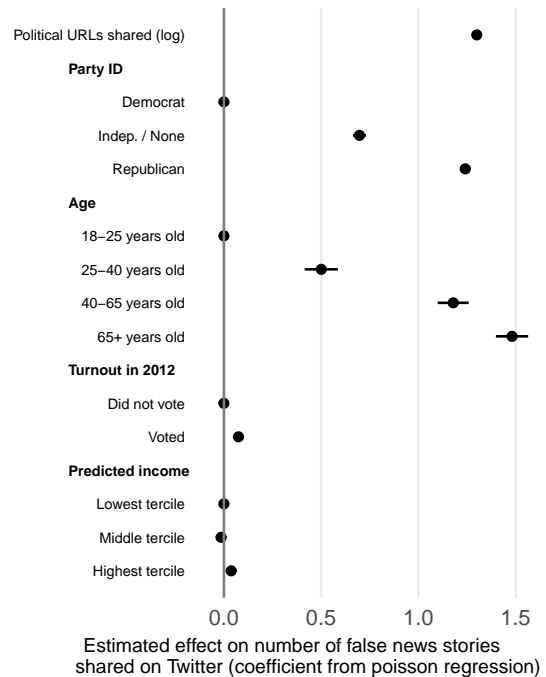
"fake news" links shared on a set of individual-level covariates, including the overall number of political links shared during this period. The results, shown on Figure 1 confirm that these differences across age and party ID groups remain similar in magnitude.

These findings align with other recent work on misinformation. A 2017 report from the Pew Research center found that 32% of U.S. adults say they often see made-up political news online (Bialik and Matsa, 2017). A research article by Allcott and Gentzkow (2017) found that false news stories, particularly those favoring Trump, were also widely shared on Facebook ahead of the 2016 election. A paper published on Science and authored by Vosoughi, Roy and Aral (2018) revealed that political stories that had been fact-checked as false had a broader and faster diffusion that those that were true; and that this result was not due to the automated propagation of rumors through bots. Finally, work by Guess, Nyhan and Reifler (2018), who measured individual-level news consumption during the same period also found that age

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and alignment between an individuals' political leanings and the content being shared were positive predictors of exposure to misinformation.

How Cross-Cutting Interactions May Contribute to the Spread of Misinformation

What explains the spread of misinformation on social media? The individual-level results described above suggest that low digital literacy among older people, as well as partisanship and motivated reasoning, may be two powerful mechanisms that explain the decision to share or click on a story that may be false. Of these, the second has received more attention because of its connection to a broader debate regarding how the internet and social media facilitate the emergence of ideological echo chambers.

The prevailing narrative on this subject, put forward by authors such as Sunstein (2018) or Pariser (2011), is that online misinformation is being amplified in partisan communities of like-minded individuals. In these spaces, fake news goes unchallenged in part thanks to ranking algorithms that filter out any dissenting voice. This narrative has become so popular than even former President Barack Obama alluded to it in a recent interview with David Letterman: "If you are getting all your information off algorithms being sent through your phone and it's just reinforcing whatever biases you have, which is the pattern that develops, at a certain point, you just live in a bubble, and that's part of why our politics is so polarized right now" (Barack Obama, January 2018)

However, despite this apparent consensus, the connection between online echo chambers and misinformation is quite more nuanced. Empirical studies of news consumption in online settings have systematically found that exposure to diverse news is higher on social media than in offline news consumption (Fletcher and Nielsen, 2018; Barnidge, 2017). Cross-

cutting political exchanges in Facebook or Twitter are actually more frequent than commonly assumed (Bakshy, Messing and Adamic, 2015; Barberá, 2015). And the increase in polarization has been smallest in magnitude among those citizens who are more likely to use the internet and social media (Boxell, Gentzkow and Shapiro, 2017). In fact, some of my past research has shown that for most people social media actually has a depolarizing effect, at least when it comes to their overall ideological stances (Barberá, 2015). In other words, compared to other types of news consumption, exposure to political information on social media leads to ideological moderation for most people because it increases the range of views to which they are exposed.

This may have changed after the 2016 election, considered by many as one of the most polarizing elections in recent U.S. history. However, a replication of our analysis of cross-ideological interactions on Twitter (Barberá et al., 2015), shown in Figure 2, reveals remarkable stability from 2012 to 2016. These heatmaps display the structure of information diffusion via retweets of messages mentioning one of the candidates. Here, the x-axis corresponds to who wrote the message and the y-axis indicates who is spreading that message. Users' ideology is estimated based on the political elites they choose to follow. In both cases, we do find that a majority of interactions take place among people of similar political ideology, as indicated by the darker shade of the two poles along the 45-degree line. However, close to 20% of retweets are cross-ideological both in 2012 and 2016, which suggests that even for such a political topic, most messages have the capacity to reach anyone on Twitter. This set of results reveals that the prevalence of ideological echo chambers on social media may have been vastly overstated.

Cross-cutting interactions are generally considered to be normatively desirable (Mutz, 2006). However, when it comes to the spread of misinformation, they may be having an unintended consequence. Precisely because social media increases unfiltered exposure to political opinions

Figure 2: Information Diffusion Across Ideological Groups on Twitter
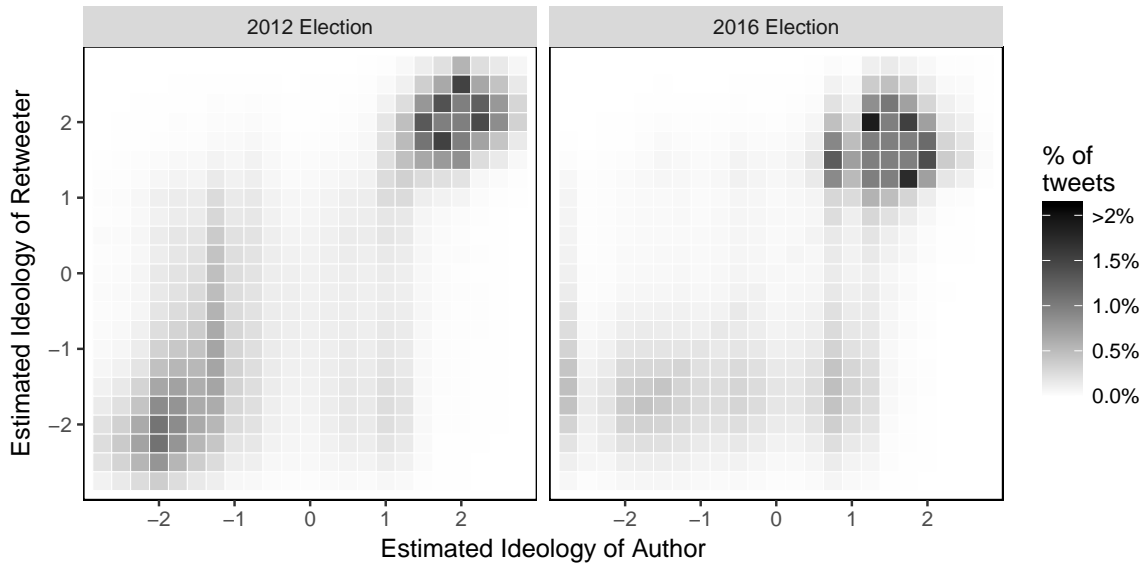
across the aisle, citizens are now increasingly exposed to all types of ideas – and that includes conspiracy theories, hyper-partisan stories, and illiberal political opinions. In other words, the mechanism that could be determinant in the spread of "fake news" on social media may not be the existence of echo chambers, but rather the opposite.

To make sense of this apparent paradox, it is important to understand how social media transforms the patterns of interpersonal communication. Sites like Twitter or Facebook facilitate maintaining a connection with both strong and weak ties. As defined by Granovetter (1977) in his classic study of social networks, strong ties are our closest friends and family; whereas weak ties are acquaintances, distant relatives, co-workers, etc. The importance of weak ties is that because they're distant from us, they can connect us to new ideas and novel information. This is where social media represents a profound shift in our news consumption: they increase our exposure to information shared by weak ties. And because they are more ideologically diverse than strong ties, that will also increase the range of views to which we are exposed, including false news stories.

This argument highlights the trade-offs that platforms face when potentially identifying solutions to limits the diffusion of misinformation. Because false news stories are often engaging and attract the attention of audiences that may not be as interested in politics otherwise, finding a way to reduce their spread may also reduce exposure to political news overall, leading to lower levels of political interest and civic engagement. In contrast, finding a way to increase exposure "to other side" on social media, as many scholars advice as a solution for political polarization, may have the unintended consequence of fueling the spread of misinformation.

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