Fighting misinformation on social media using crowdsourced judgments of news source quality

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Reducing the spread of misinformation, especially on social media, is a major challenge. We investigate one potential approach: having social media platform algorithms preferentially display content from news sources that users rate as trustworthy. To do so, we ask whether crowdsourced trust ratings can effectively differentiate more versus less reliable sources. We ran two preregistered experiments (\(n = 1,010\) from Mechanical Turk and \(n = 970\) from Lucid) where individuals rated familiarity with, and trust in, 60 news sources from three categories: (i) mainstream media outlets, (ii) hyperpartisan websites, and (iii) websites that produce blatantly false content (“fake news”). Despite substantial partisan differences, we find that laypeople across the political spectrum rated mainstream sources as far more trustworthy than either hyperpartisan or fake news sources. Although this difference was larger for Democrats than Republicans—mostly due to distrust of mainstream sources by Republicans—every mainstream source (with one exception) was rated as more trustworthy than every hyperpartisan or fake news source across both studies when equally weighting ratings of Democrats and Republicans. Furthermore, politically balanced layperson ratings were strongly correlated (\(r = 0.90\)) with ratings provided by professional fact-checkers. We also found that, particularly among liberals, individuals higher in cognitive reflection were better able to discern between low- and high-quality sources. Finally, we found that excluding ratings from participants who were not familiar with a given news source dramatically reduced the effectiveness of the crowd. Our findings indicate that having algorithms up-rank content from trusted media outlets may be a promising approach for fighting the spread of misinformation on social media.

Significance

Many people consume news via social media. It is therefore desirable to reduce social media users’ exposure to low-quality news content. One possible intervention is for social media ranking algorithms to show relatively less content from sources that users deem to be untrustworthy. But are laypeople’s judgments reliable indicators of quality, or are they corrupted by either partisan bias or lack of information? Perhaps surprisingly, we find that laypeople—on average—are quite good at distinguishing between lower- and higher-quality sources. These results indicate that incorporating the trust ratings of laypeople into social media ranking algorithms may prove an effective intervention against misinformation, fake news, and news content with heavy political bias.

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Second, news consumption patterns vary markedly across the political spectrum (16) and it has been argued that political partisans are motivated consumers of misinformation (17). By this account, people believe misinformation because it is consistent with their political ideology. As a result, sources that produce the most partisan content (which is likely to be the least reliable) may be judged as the most trustworthy. Rather than the wisdom of crowds, therefore, this approach may fall prey to the collective bias of crowds. Recently, however, this motivated account of misinformation consumption has been challenged by work showing that greater cognitive reflection is associated with better truth discernment regardless of headlines’ ideological alignment—suggesting that falling for misinformation results from lack of reasoning rather than politically motivated reasoning per se (13). Thus, while, politically motivated reasoning will interfere with news source trust judgments is an open empirical question.

Third, other research suggests that liberals and conservatives differ on various traits that might selectively undermine the formation of accurate beliefs about the truthworthiness of news sources. For example, it has been argued that political conservatives show higher cognitive rigidity, are less tolerant of ambiguity, are more sensitive to threat, and have a higher personal need for order/structure/closure (see ref. 18 for a review). Furthermore, conservatives tend to be less reflective and more intuitive than liberals (19). Several results are evident. In study 1, Republicans trusted more than Democrats [post hoc comparison; study 1: 29.8 percentage point difference, F(1,1004) = 243.73, P < 0.0001; study 2: 20.9 percentage points, F(1,965) = 99.75, P < 0.0001]. Hyperpartisan and fake news websites, conversely, did not show clear partisan differences. In study 1, Republicans trusted both types of unreliable media significantly more than Democrats [hyperpartisan sites: 4.0 percentage point difference, F(1,1009) = 14.03, P = 0.0002; fake news sites: 3.1 percentage point difference, F(1,1009) = 7.66, P = 0.006]. In study 2, conserves were significantly less trusting of fake news sites than Democrats [3.0 percentage point difference, F(1,1970) = 4.08, P = 0.041], and Republicans were significantly more trusting of fake news sites than Republicans in trust of hyperpartisan sites [1.0 percentage point difference, F(1,970) = 0.46, P = 0.497], and Republicans were significantly less trusting of fake news sites than Democrats [0.0 percentage point difference, F(1,970) = 0.01, P = 0.985], which Republicans trusted more than Democrats [post hoc comparison; study 1: 29.8 percentage point difference, F(1,1004) = 243.73, P < 0.0001; study 2: 20.9 percentage points, F(1,965) = 99.75, P < 0.0001].

For further details on design and analysis approach, see Methods. Our key analyses were preregistered (analyses labeled as “post hoc” were not preregistered).

Results

The average trust ratings for each source among Democrats and Republicans are shown in Fig. 1 (see SI Appendix, section 2 for average trust ratings for each source type and for each individual source). Several results are evident. First, there are clear partisan differences in trust of mainstream news. There was a significant overall interaction between party identity and source type (P < 0.0001 for both studies). Democrats trusted mainstream media outlets significantly more than Republicans [study 1: 11.5 percentage point difference, F(1,1009) = 86.86, P < 0.0001; study 2: 14.7 percentage point difference, F(1,970) = 104.43, P < 0.0001]. The only exception was Fox News, which Republicans trusted more than Democrats [post hoc comparison; study 1: 29.8 percentage point difference, F(1,1004) = 243.73, P < 0.0001; study 2: 20.9 percentage points, F(1,965) = 99.75, P < 0.0001].

Finally, we sought to establish a more objective rating of news sources. For these reasons, in two studies we investigate whether the crowdsourcing approach is effective at distinguishing between low- versus high-quality news outlets. In the first study, we surveyed n = 1,010 Americans recruited from Amazon Mechanical Turk (MTurk; an online recruiting source that is not nationally representative but produces similar results to nationally representative samples in various experiments related to politics; ref. 22). For a set of 60 news websites, participants were asked if they were familiar with each domain, and how much they trusted each domain. We included 20 mainstream media outlet websites (e.g., “cnn.com,” “npr.org,” “foxnews.com”), 22 websites that mostly produce hyperpartisan coverage of actual facts (e.g., “breitbart.com,” “dailykoss.com”), and 18 websites that mostly produce blatantly false content (which we will call “fake news,” e.g., “thefactssiteoffieldgov.org,” “now8news.com”). The set of hyperpartisan and fake news sites was selected from aggregations of lists generated by Buzzfeed News (hyperpartisan list, ref. 8; fake news list, ref. 23), Melissa Zimdaros (9), Politifact (24), and Grinberg et al. (25), as well as websites that generated fake stories (as indicated by snopes.com) used in previous experiments on fake news (7, 13–15, 26).

In the second study, we tested the generalizability of our findings by surveying an additional n = 970 Americans recruited from Lucid, providing a subject pool that is nationally representative and younger in age, and in our sample, considering only men versus women, and across different age ranges (SI Appendix, section 3). We also note that a nationally representative weighting would place slightly more weight on the ratings of Democrats than Republicans and, thus, perform even better than the politically balanced rating we focus on here.
We now turn to the survey of professional fact-checkers, who are media classification experts with extensive experience identifying accurate versus inaccurate content. The ratings provided by our eight professional fact-checkers for each of the 60 sources in study 2 showed extremely high interrater reliability (intraclass correlation = 0.97), indicating strong agreement across fact-checkers about the trustworthiness of the sources.

As is evident in Fig. 2, post hoc analyses indicated that the professional fact-checkers rated mainstream outlets as significantly more trustworthy than either hyperpartisan sites [55.2 percentage point difference, \( r(38) = 0.91, P < 0.0001 \)] or fake news sites [61.3 percentage point difference, \( r(38) = 0.93, P < 0.0001 \)]. We also found that they rated hyperpartisan sites as significantly more trustworthy than fake news sites [6.1 percentage point difference, \( r(38) = 0.59, P = 0.0001 \)]. This latter difference is consistent with our classification, whereby hyperpartisan sites typically report on events that actually happened—albeit in a biased fashion—and fake news sites typically “report” entirely fabricated events or claims. These observations are consistent with the way that many journalists have classified low-quality sources as hyperpartisan versus fake (e.g., refs. 8 and 23–25).

As with our layperson sample, we also found that fact-checker ratings varied substantially within the mainstream media category. Several mainstream outlets (Huffington Post, AOL news, NY Post, Daily Mail, Fox News, and NY Daily News) even received overall untrustworthy ratings (i.e., ratings below the midpoint of the trustworthiness scale). Thus, to complement our analyses of trust ratings at the category level presented above, we examined the correlation between ratings of fact-checkers and laypeople in study 2 (who rated the same sources) at the level of individual sources (Fig. 3).

Looking across the 60 sources in study 2, we found very high positive correlations between the average trust ratings of fact-checkers and both Democrats, \( r(58) = 0.92, P < 0.0001 \), and Republicans, \( r(58) = 0.73, P < 0.0001 \). As with the category-level analyses, a post hoc analysis shows that the correlation with fact-checker
ratings among Democrats was significantly higher than among Republicans, $z = 3.31$, $P = 0.0009$—that is to say, Democrats were better at discerning the quality of media sources (i.e., were closer to the professional fact-checkers) than Republicans (similar results are obtained using the preregistered analysis of participant-level data rather than source-level; see SI Appendix, section 4).

Nonetheless, the politically balanced layperson ratings that arise from equally weighting Democrats and Republicans correlated very highly with fact-checker ratings, $r(58) = 0.90$, $P < 0.0001$. Thus, we find remarkably high agreement between fact-checkers and laypeople. This agreement is largely driven by both laypeople and fact-checkers giving very low ratings to hyper-partisan and fake news sites: Post hoc analyses show that, when only examining the 20 mainstream media sources, the correlation between the fact-checker ratings and (i) the Democrats’ ratings falls to $r (18) = 0.51$, (ii) the politically balanced ratings falls to $r (18) = 0.32$, and (iii) the Republicans’ ratings falls to essentially zero, $r (18) = -0.05$. These observations provide further evidence that crowdsourcing is a promising approach for identifying highly unreliable news sources, although not necessarily for differentiating between more or less reliable mainstream sources.

Finally, we examine individual-level factors beyond partisanship that influence trust in media sources. First, we consider “analytic cognitive style”—the tendency to stop and engage in analytic thought versus going with one’s intuitive gut responses. To measure cognitive style, participants completed the Cognitive Reflection Test (CRT; ref. 29), a widely used measure of analytic thinking that prior work has found to be associated with an increased capacity to discern true headlines from false headlines (13, 15, 26). To test whether this previous headline-level finding extends to sources, we created a media source discemment score by converting trust ratings for mainstream sources to a z-score and subtracting it from the z-scored mean trustworthiness ratings of hyper-partisan and fake news. In a post hoc analysis, we entered discemment as the dependent variable in a regression with CRT performance, political ideology, and their product as predictors. This revealed that, in both studies, CRT was positively associated with media source discernment, study 1: $\beta = 0.16$, $P < 0.0001$; study 2: $\beta = 0.15$, $P < 0.0001$, whereas conservatism was negatively associated with media source discernment, study 1: $\beta = -0.34$, $P < 0.0001$; study 2: $\beta = -0.31$, $P < 0.0001$. Interestingly, there was also an interaction between CRT and conservatism in both studies, study 1: $\beta = -0.17$, $P = 0.041$; study 2: $\beta = -0.25$, $P = 0.009$, such that the positive association between CRT and discernment was substantially stronger for Democrats, $r(642) = 0.24$, $P < 0.0001$; study 2: $r(524) = 0.23$, $P < 0.0001$, than Republicans, $r(366) = 0.08$, $P = 0.133$; study 2: $r(445) = 0.08$, $P = 0.096$. (Standardized coefficients are shown; results are qualitatively equivalent when controlling for basic demographics including education, see SI Appendix, section 5.) Thus, cognitive reflection appears to support the ability to discern between low- and high-quality sources of news content, but more so for liberals than for conservatives.

Second, we consider prior familiarity with media sources. Familiarity rates were low among our participants, particularly for hyper-partisan and fake news outlets (study 1: mainstream = 81.6%, hyper-partisan = 15.5%, fake news = 9.4%; study 2: mainstream = 59.5%, hyper-partisan = 14.5%, fake news = 9.9%). However, we did not find that lack of experience was problematic for media source discernment. On the contrary, the crowdsourced ratings were much worse at differentiating mainstream outlets from hyper-partisan or fake news outlets when excluding trust ratings for which the participant indicated being unfamiliar with the website being rated. This is because participants overwhelmingly distrusted sources they were unfamiliar with (fraction of unfamiliar sources with ratings below the midpoint of the trust scale: study 1, 87.0%; study 2, 75.9%)—and, as mentioned, most participants were unfamiliar with most unreliable sources. Further analyses of the data suggest that people are initially skeptical of news sources and may come to trust an outlet only after becoming familiar with (and approving of) the coverage that outlet produces; that is, familiarity is necessary but not sufficient for trust. As a result, unfamiliarity is an important cue of untrustworthiness. See SI Appendix, section 6 for details.

Discussion
For a problem as important and complex as the spread of misinformation on social media, effective solutions will almost certainly require a combination of a wide range of approaches. Our results indicate that using crowdsourced trust ratings to gain information about media outlet reliability—information that can help inform ranking algorithms—shows promise as one such approach. Despite substantial partisan differences and lack of familiarity with many outlets, our participants’ trust ratings were, in the aggregate, quite successful at differentiating mainstream media outlets from hyper-partisan and fake news websites. Furthermore, the ratings given by our participants were very strongly correlated with ratings provided by professional fact-checkers. Thus, incorporating the trust ratings of laypeople into social media ranking algorithms.
may effectively identify low-quality news outlets and could well reduce the amount of misinformation circulating online.

As anticipated based on past work in political cognition (18, 19), we did observe meaningful differences in trust ratings based on participants’ political partisanship. In particular, we found consistent evidence that Democrat individuals were better at assessing the trustworthiness of media outlets than Republican individuals—Democrats showed bigger differences between mainstream and hyperpartisan or fake outlets and, consequently, their ratings were more strongly correlated with those of professional fact-checkers. Importantly, these differences are due to more than just alignment between participants’ partisanship and sources’ political slant (e.g., the perception that mainstream sources are left-leaning)—as shown in SI Appendix, section 9, we see the same pattern regardless of whether (or both). Differences between these possibilities is an important direction for future research.

Our results are also relevant for recent debates about the role of motivated reasoning in political cognition. Specifically, motivated reasoning accounts (17, 30, 31) argue that humans reason akin to lawyers (as opposed to philosophers): We engage analytic thought as a means to justify our prior beliefs and thus facilitate argumentation. However, other work has shown that human reasoning is meaningfully directed toward the formation of accurate, rather than merely identity-confirming, beliefs (15, 32).

Two aspects of our results support the latter account. First, although there were ideological differences, both Democrats and Republicans were reasonably proficient at distinguishing between low- and high-quality sources across the ideological spectrum. Second, as with previous results at the level of individual headlines (13, 15, 26), people who were more reflective were better (not worse) at discerning between mainstream and fake/hyperpartisan sources. Interestingly, recent work has shown that removing the sources from news headlines does not influence perceptions of headline accuracy at all (15). Thus, the finding that Republicans are less trusting of mainstream sources does not explain why they were not particularly discerning between real (more accurate) and fake (more accurate) news. Instead, the parallel findings that Republicans are worse at both discerning between fake and real news headlines and fake and real news sources are complementary, and together paint a clear picture of a partisan asymmetry in media truth discernment.

Our results on laypeople’s attitudes toward media outlets also have implications for professional fact-checking programs. First, rather than being out of step with the American public, our results suggest that the attitudes of professional fact-checkers are quite aligned with those of laypeople. This may help to address concerns about ideological bias on the part of professional fact-checkers: Laypeople across the political spectrum agreed with professional fact-checkers that hyperpartisan and fake news sites should not be trusted. At the same time, our results also help to demonstrate the importance of the expertise that professionals bring since fact-checkers were much more discerning than laypeople (i.e., although fact-checkers and laypeople produced similar rankings, the absolute difference between the high- and low-quality sources was much greater for the fact-checkers).

Relatively, our data show that the trust ratings of laypeople were not particularly effective at differentiating quality within the mainstream media category, as reflected by substantially lower correlations with fact-checker ratings. As a result, it may be most effective to have ranking algorithms treat users’ trust ratings in a nonlinear concave fashion, whereby outlets with very low trust ratings are down-ranked substantially, while trust ratings have little impact on rankings once they are sufficiently high. We also found that crowdsourced trust ratings are much less effective when excluding ratings from participants who are unfamiliar with the source they are rating, which suggests that requiring raters to be familiar with each outlet would be problematic.

Although our analyses suggest that using crowdsourcing to estimate the reliability of news outlets shows promise in mitigating the amount of misinformation that is present on social media, there are various limitations (both of this approach in general and with our study specifically). One issue arises from the observation that familiarity appears to be necessary (although not sufficient) for trust, which leads unfamiliar sites to be distrusted. As a result, highly rigorous news sources that are less well-known (or that are new) are likely to receive low trust ratings—and thus to have difficulty gaining prominence on social media if trust ratings are used to inform ranking algorithms. This issue could potentially be dealt with by showing users a set of recent stories from outlets with which they are unfamiliar before assessing trust. User ratings of trustworthiness also have the potential to be “gamed,” for example by purveyors of misinformation using domain names that sound credible. Finally, which users are selected to be surveyed will influence the resulting ratings. Such issues must be kept in mind when implementing crowdsourcing approaches.

It is also important to be clear about the limitations of the present studies. First, our MTurk sample (study 1) was not representative of the American population, and our Lucid sample (study 2) was only representative on certain demographic dimensions. Nonetheless, our key results were consistent across studies, and robust across a variety of subgroups within our data, which suggests that the results are reasonably likely to generalize. Second, our studies only included Americans. Thus, if this intervention is to be applied globally, further cross-cultural work is needed to assess its expected effectiveness. Third, in our studies, all sources were presented together in one set. As a result, it is possible that features of the specific set of sources used may have influenced levels of trust for individual items (e.g., twice as many low-quality outlets as high-quality outlets), although we do show that the results generalize across two different sets of sources. In sum, we have shed light on a potential approach for fighting misinformation on social media. In two studies with nearly 2,000 participants, we found that laypeople across the political spectrum place much more trust in mainstream media outlets (which tend to have relatively stronger editorial norms about accuracy) than either hyperpartisan or fake news sources (which tend to have relatively weaker or nonexistent editorial norms about accuracy). This indicates that algorithmically disfavoring news sources with low crowdsourced trustworthiness ratings may—if implemented correctly—be effective in decreasing the amount of misinformation circulating on social media.

Methods

Data and preregistrations are available online (https://osf.io/6bptd/). We preregistered our hypotheses, primary analyses, and sample size (non-preregistered analyses are indicated as being post hoc). Participants provided informed consent, and our studies were approved by the Yale Human Subject Committee, Institutional Review Board Protocol no. 1307012383.

Participants. In study 1, we had a preregistered target sample size of 1,000 US residents recruited via Amazon MTurk. In total, 1,068 participants began the survey; however, 57 did not complete the survey. Following our preregistration, we retained all individuals who completed the study (n = 1,011;Mage = 36; 64.1% women), although 1 of these individuals did not complete our key political preference item (described below) and, thus, is not included in our main analyses. In study 2, we preregistered a target sample size of 1,000 US residents recruited via Lucid. In total, 1,150 participants began the survey; however, 115 did not complete the survey. Following our preregistration, we retained all individuals who completed the study (n = 1,035; Mage = 44; 52.2% women). However, 64 individuals did not complete our key political preference item and, thus, are not included in our main analyses.
Materials. Participants provided familiarity and trust ratings for 60 websites, as described above in the Introduction (see SI Appendix, section 1 for full list of websites). In each study, participants were given the CRT (29), which consists of “trick” problems intended to measure the disposition to think analytically. Participants also answered a number of demographic and political questions (SI Appendix, sections 10 and 11).

Procedure. In both studies, participants first indicated their familiarity with each of the 60 sources (in a randomized order for each participant) using the procedure outlined in the following subsections: (No/Yes). Then they indicated their trust in the 60 websites (randomized order) using the prompt “How much do you trust each of these domains?” (Not at all/ Barely/ Some what/A lot/Entirely). For maximum ecological validity, this is the same language used by Facebook (12). After the primary task, participants completed the CRT and demographics questionnaire. In study 2, we were more explicit in the meaning of “trust” by adding this clarifying language to the introductory text: “That’s it, in your opinion, does the source produce truthful news content that is relatively unbiased/balanced.”

Expert’s Survey. We recruited professional fact-checkers using an email distributed to the Poynter International Fact-Check Network. The email invited members of the network to participate in an academic study about how much they trust different news outlets. Those who responded were directed to a survey with the same materials as participants in study 1, except they were not asked political ideology questions. We also asked whether they were “based in the United States” (6 indicated yes, 8 indicated no) and whether their present position was as a fact-checker (n = 7), journalist (n = 4), or other (3). Those that selected “other” used a text box to indicate their position, and responded as follows: Editor, freelance journalist, and fact-checker/GCM, Thotoka J (2017) Misinformation and its correction: Continued influence and successful debiasing. Psycho Social Public Interest 13:106–131.

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Analysis Strategy. As per our preregistered analysis plans, our participant-level analyses used linear regressions predicting trust, with the rating as the unit of observation (60 observations per participant) and robust SEs clustered on participant (to account for the nonindependence of repeated observations from the same participant). To calculate significance for any given comparison, Wald tests were performed on the relevant net coefficient (SI Appendix, section 7). For ease of exposition, we rescaled trust ratings from the interval [0,1] to the interval [0,1], i.e., subtracted 1 and divided by 4, allowing us to refer to differences in trust in terms of percentage points of the maximum level of trust. For study 1, we classify people as Democratic or Republican based on their response to the forced-choice question “If you absolutely had to choose between only the Democratic and Republican party, which would you prefer?” In study 2, we dichotomized participants based on the following continuous measure: “Which of the following best describes your political preference?” (options included: Strongly Democratic, Strongly Republican, Independent, Strongly Independent). The results were not qualitatively different if Democratic/Republican party affiliation (instead of the forced-choice) was used, despite the exclusion of independents. Furthermore, post hoc analyses using a continuous measure of liberal versus conservative ideology instead of a binary Democrat versus Republican partisanship measure produced extremely similar results in both studies (SI Appendix, section 8). Finally, SI Appendix, section 8 also shows that we find the same interactions with ideology when considering both Democrats and Republicans separately.

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