**Investigating disparate results regarding the interactive effect of ideology and conscientiousness on the likelihood of sharing fake news**

The following document investigates the disparate results of Lawson & Kakkar (2021) and Lin, Pennycook, and Rand (2021; working paper) regarding the interactive effect of ideology and conscientiousness on the likelihood of sharing false stories.

**Summary of Pennycook et al. studies**

Participants first indicated would they share stories (No = 0, Maybe / Yes = 1)

Answered Big Five, political partisanship, and other demographics

Measured attentiveness

Studies 1, 2, & 4 used true and false headlines

Study 3 only false headlines

Study 1 – Lucid: 24 headlines, same as our Study 2

Study 2 – Mturk: 24 headlines, same as our Study 2

Study 3 – Mturk: 12 headlines, just the false from our Study 2

Study 4 – Mturk: 24 headlines, related to politics and Covid-19; all partisan, equally balanced

Noteworthy differences between our designs

* Using 6 point measure of partisanship rather than 7 point scale of left-right ideology
  + I would like to see the exact item / coding of this, as it’s a very important distinction.
* Pennycook Studies 1-3 focus on political stories—rather than Covid ones—so only facilitate direct comparison with our Study 2.
* Time period: 21 months between when we ran our Study 2 and the Pennycook studies.
  + I feel this is an important difference as people’s responses to stimuli change over time. For example, a Covid story that would induce a severe reaction in March 2020 when there was a lot of uncertainty about the nature of the virus might not have the same effect anymore. The same goes for political fake news as the political climate change is always changing—with the shift from Trump to Biden being a major event. In my limited experience I’ve found generality across stimuli and time periods to be a challenge in working on misinformation research, and generally try to find fresh polarizing news whenever I start a new project. This is very different to say, decision making under risk, where the stimuli are pretty timeless.
* Pennycook studies didn’t ask accuracy prior to sharing questions.
* Pennycook studies clustered SEs within stories as well as participants.
* Pennycook analyses test interaction specifically within fake stories (rather than also including real).

**Lawson & Kakkar study**

Study 2 from the published manuscript Lawson & Kakkar (2021) was run on the 2nd March 2020. We recruited 502 participants from Mturk via CloudResearch (we later bonused participants later as it took longer than we expected). We restricted HITs approved to 1,000 to 50,000, an approval rate of 94%+, and did not use either CloudResearch approved participants or block low quality participants.

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Almost identical procedure to Pennycook Study 2 used in Lawson & Kakkar—except asked accuracy before sharing questions, and measured political ideology rather than partisanship.

**Analyses**

In the forthcoming analyses I shall focus primarily on the Mturk studies (Study 2-4) as these are more directly aligned with our experiment. Differences between study populations are harder to predict and understand, and thus Study 1’s results are harder to incorporate.

**Pennycook Study 2 vs. Lawson & Kakkar Study 2**

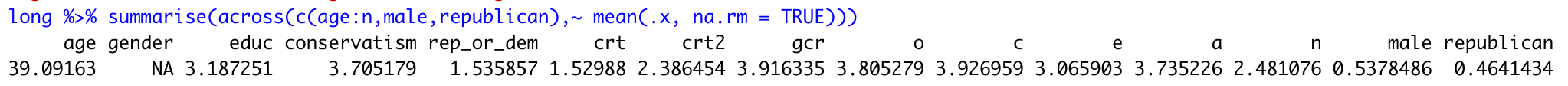
I first looked at the rate at which each story was shared. These are the same 24 stories (they are not lined up here, but that would be possible with a bit more legwork). The average rate at which stories were shared overall, and within real/fake/conservative/liberal were similar. In the Pennycook study, the variance across stories was somewhat higher. I concluded these differences were not material.

The first epiphany came when looking at the correlation between Lawson & Kakkar’s ideology measure and the rate of sharing and the Pennycook partisanship measure and the rate of sharing. The key hypothesis being tested in the following studies is that higher trait level conscientiousness weakens the positive association between more conservative political ideology and the rate of sharing of fake news. The relationship between the ideology measure (partisanship) and sharing being significantly weaker in the Pennycook study means that significantly more power would be needed to detect such an interaction. More on this later.

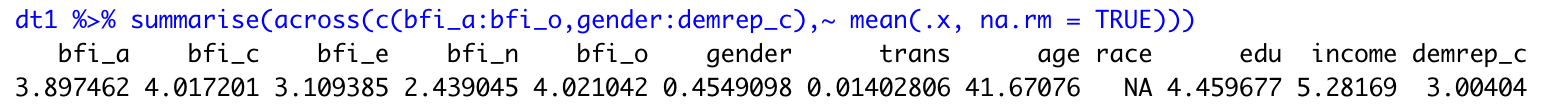
|  |  |
| --- | --- |
| Our Study 2 | Pennycook Study 2 |
| Rate at which stories were shared  Table  Description automatically generated  Average overall: 0.245  Variance = 0.002870181  Average real: 0.287  Average fake: 0.203  Average cons: 0.241  Average lib: 0.249  Correlation between ideology measure (Very liberal to Very conservative 1-7) and “share”  = 0.196 | Table  Description automatically generated with medium confidence  Average overall: 0.252  Variance = 0.005503317  Average real: 0.286  Average fake: 0.218  Average cons: 0.257  Average lib: 0.247  Correlation between partisanship measure (1-6) and “share”  = 0.038 |

I also compared the sample demographics loosely on some different dimensions. Lawson & Kakkar and Pennycook et al. did not include the same full set of demographics so a full comparison was not possible, but at a glance the samples did not look too dissimilar.

**Demographics (Lawson)**

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**Demographics (Pennycook)**

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**Observations**

* Pennycook sample was a bit higher in O, higher in A
* Age 2.6y off (but not likely important)
* Lawson & Kakkar sample 46% Republican; not sure how to interpret the Pennycook measure of party yet but could be different

**Initial test of interaction hypothesis**

Using simple logistic regression to check that any conclusions are not an artefact of clustering structure—which often entails researcher degrees of freedom—I estimated the simplest model using all of the data. It exhibited the predicted interaction pattern. More Republican identifying people shared more, but less so when conscientiousness was higher.

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Testing this interaction using the fake stories only, it was also significant.

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Testing this interaction using the real stories only, it was marginally significant (p = 0.055).

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The Pennycook et al. analyses chose to cluster within participant and story. For now, I’m just clustering within participant as per the Lawson & Kakkar studies. We see that the interaction is no longer significant, but is in the predicted pattern.

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The results when looking at the model with clustered SEs for just the fake stories offers a similar result:

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**Conclusion from comparing Lawson & Kakkar’s Study 2 and Pennycook et al. Study 2**

The striking results in the comparison I conducted between these two studies were that i) the ideology (partisanship) measure used by Pennycook et al. correlated only 0.04 with the rate of sharing stories, whereas Lawson & Kakkar’s ideology measure correlated close to 0.20, and ii) there was an interaction in the predicted pattern in the Pennycook data, both overall and for the fake stories specifically, but it did not attain statistical significance. It is of course impossible to predict what would happen in a larger sample, but my hunch is there may be a significant interaction in the Pennycook design, if sample size were scaled up to reflect the weaker association between the partisanship measure and sharing. That is, of course, conjecture.

My takeaway from the comparison of Study 2s was that the weak correlation between the political ideology measure (partisanship) and sharing was the source of the disparity in results between Pennycook et al. and Lawson & Kakkar. This was a surprising finding given a lot of work on fake news documents the positive association between conservative political ideology and sharing fake news. I probed this possibility in the other studies.

**Looking at partisanship / sharing correlation & subsequent models in Pennycook Study 3**

In Lawson & Kakkar Study 2, the correlation between political ideology and sharing specifically fake stories was 0.224:

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In Pennycook Study 3, which uses the same 12 fake stories, this correlation between partisanship and sharing fake news was 0.026 (9x smaller):

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This disparity appears to be the crucial factor distinguishing between the Lawson & Kakkar and Pennycook et al. studies’ results. There is no hint of an interaction between the Pennycook partisanship measure and conscientiousness here. This is unsurprising given there wasn’t much of a relationship between partisanship and sharing anyway.

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**Can we find a political ideology measure that does display the same behavior as Lawson & Kakkar’s study?**

Pennycook et al. include a wider range of partisanship and ideology measures, so it is possible that there is one with a stronger relationship with sharing fake news that could be used to test the interaction hypothesis with conscientiousness. Below is a correlation table between the ideology measures featured by Pennycook et al. and the rate of sharing fake news in Study 3.

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While significant in this repeated measures design, the main measure of ideology (demrep\_c; partisanship) has a very weak correlation with the rate of sharing these fake stories.

warm\_repub has the strongest association of 0.10 (still much weaker than the political ideology / sharing correlation in Lawson & Kakkar, but stronger). Using this alternative measure of ideology, we do in fact find that conscientiousness weakens the positive association between warm\_repub and sharing of falsehoods.

**Without clustering standard errors, the result is significant:**

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**The significance falls out with clustering, but directionally is there:**

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**Will this result from Study 3 (conscientiousness appears to moderate the effect of warm\_repub on the likelihood of sharing) replicate in Study 2?**

First, I replicated the same correlation table featured above, this time using the data from Pennycook’s Study 2.

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Again, here we see there’s a stronger relationship of “warm\_repub” with sharing than there is “demrep\_c”.

If we use the “warm\_repub” as the ideology measure in Study 2’s data, we see a significant interaction across all the data with clustered SEs. Higher conscientiousness weakens the positive association between warm\_repub and sharing fake news.

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The p-value for this interaction term slips to p = 0.0523 for the false stories only data, but that could just be a sample size problem:

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**Investigating the results of Study 4**

I’ll comment more on this in my concluding comments, but one thought that jumped out at me when hearing these results was that the stories used in Study 1-3 might just be too old. If I remember correctly, they contain references to Trump being president and are firmly set in the context of the 2019/2020 period, which is quite a different political landscape to December 2021. Study 4 removed that concern by testing a new set of stories recently pre-tested by Pennycook and colleagues. I tested whether the interaction hypothesis was supported when using a different measure of ideology—warm\_repub. First, I tested the association between demrep\_c and sharing, which was low as in Studies 2-3.

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**I then reproduced the correlation table as per Studies 2-3 above**

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Again, warm\_repub had a stronger relationship with sharing than anything else (risk has also had some strong-ish relationships with sharing, but I don’t know what that measures). When estimating the logistic regression model, the interaction was not significant, but was in the predicted direction.

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**Testing effects in Study 1—Lucid—different sample population**

I had initially avoided looking at this sample because the population of Lucid seems very different to MTurk, which would then make comparison with the results of Lawson & Kakkar’s study difficult. However, after having observed the same pattern of results across Studies 2-4, I was interested in whether these would also emerge in Study 1.

Let me note that personally I am not sure about the quality of data from Lucid. If you cross-tabulate demographic variables that participants report in your study versus those stored in their Lucid profiles, there are often disparities. Moreover, they seem to behave atypically and score low in attentiveness. In a fake news study I ran on Lucid a while ago I found political ideology did not predict sharing political stories, which just seemed surprising. All else equal it’s better a result replicates across more sample populations, but I don’t really know what to make of Lucid. It seems significantly worse than other representative samples I’ve used (e.g., ROI Rocket). That’s just my 2 cents though—maybe I’ve been unlucky.

The association between demrep\_c was in fact negative in this sample. I found that a little surprising given that Republicans sharing more fake news is one of the more robust results I know of in the literature.

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**Are there ideology measures that are positively associated with sharing fake news?**

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In what may not come as a surprise—warm\_repub had a much stronger association with sharing fake news than did demrep\_c, and it was in the direction that is generally found in the literature. As per the other studies, I used this as an alternative operationalization of ideology.

**Basic logistic regression model: very significant interaction in the predicted direction.**

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**The same model using SEs clustered within participant. Significance drops out (p = 0.067) but the pattern is the same.**

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**Testing the same interaction with SEs clustered in participant using just the fake observations. Not significant but in the predicted direction.**

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**Concluding comments**

In this document I investigated possible roots of the different results observed in Lawson & Kakkar’s (2021) Study 2 and a series of studies conducted by Pennycook and colleagues. In my opinion the difference comes from a different choice of ideology measure and the different relationship that measure displays with sharing behavior, but I’m sure there are other possibilities.

Lawson & Kakkar (2021) used:

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Pennycook et al. used a measure called demrep\_c (which I think is strength of identification from Strong Democrat to Strong Republican or something similar).

Whereas, Lawson & Kakkar’s measure correlated around 0.20 with the rate of sharing, demrep\_c correlated:

* Study 1 = -0.053
* Study 2 = 0.038
* Study 3 = 0.026
* Study 4 = 0.040

I think that this weaker association between the ideology measure and the rate of sharing meant that the sample size was insufficient to detect an interaction effect between political ideology and conscientiousness in the sharing of fake news. Given that the Bayesian method used to evaluate sample size was based on an effect that was determined by this weak association between partisanship & sharing, I think it would have found support for the null and stopped data collection before gathering sufficient sample size to test properly for effects with other ideology measures (e.g., warm\_repub).

In re-analyzing the four Pennycook studies, I used a different measure of political ideology (warm\_repub). I estimated the following logistic regression model with SEs clustered within participant for each of the four studies:

Share ~ warm\_repub + bfi\_c + warm\_repub\*bfi\_c

Study 1: expected pattern, interaction p-value = 0.0665

Study 2: expected pattern, interaction p-value = 0.0420

Study 3: expected pattern, interaction p-value = 0.2311

Study 4: expected pattern, interaction p-value = 0.6132

Using this measure of ideology, I found some evidence that higher conscientiousness moderated the positive effect of more right-wing political ideology on the likelihood of sharing fake news. Notably, the association between this measure (warm\_repub) and sharing was still weaker than the relationship between Lawson & Kakkar’s measure (conservatism) and sharing, which could mean that these studies were underpowered to detect this size of interaction.

**Why is the association between demrep\_c and sharing weak?**

This is a question I don’t have an answer for. My gut says it could be a difference in the political / cultural context—I think the political stories from Studies 1-3 (if they are the ones I think they are) might just be less relevant in today’s political climate. They are quite old. It could also be a difference between partisanship and ideology. Our studies all used left-right ideology rather than strength of Dem-Rep identification. I am surprised that the relationship between demrep\_c and sharing is so weak, but I’d need to look at the materials to be able to further comment.