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How relevant is information? Some experimental evidence

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Abstract

This paper examines the role of information from expert sources in opinion formation. While fact checking with experts has been widely adopted as a tool to fight fake news, it remains unclear whether people actually use such information to form their opinions, given that opinion formation may be influenced by a variety of factors. To investigate this, we conducted online experiments on three topics (gun violence, global warming, and Covid-19) to measure the impact of information from experts on opinion formation. Participants were randomly assigned to a treatment or control group, with the former receiving objective information from expert sources about the topic and the latter receiving none. Results indicate that objective information had a non-significant impact on opinion formation across all topics, which raises concerns about the effectiveness of using it to counter fake news. Additionally, we find a strong correlation between political position and opinion formation.

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1. Introduction

Fake news has become a major issue in most societies, promoting political polarization (Azzimonti and Fernandes 2023), affecting elections (Allcott and Gentzkow 2017), among other effects. One of the most natural tools to fight it is simply the dissemination of information from trustworthy sources, or experts. Experts are more knowledgeable and able to filter away subjective motivations, and hence may provide more objective information to oppose fake news. This process is usually known as fact checking and is widely adopted (Barrera *et al*. 2020). However, it only works if people actually use expert-backed information to form their opinions.

Opinion formation, however, has many other determinants. It may be related to political identity, to whether it is a long-held opinion, and to affinity to the source of information, among other factors. In the end of the day, it is not clear whether objective information, defined here as information backed by experts, will be relevant.[1] In fact, it may even lead to increased polarization, as reported in *Lord et al*. (1979): participants' behavior was consistent with biased assimilation of new information – that is, they tend to believe in information that confirms prior opinions, and disregard information that goes against it. More recently, Fryer *et al*. (2019) found empirically a similar result, and explained it with a variation of Bayesian updating by subjects. In both cases, the same information was presented to all participants, and led to increased polarization.

In the present paper, we vary the available information randomly among participants to investigate the role of objective information, or trust in experts, in opinion formation. We consider three topics: gun violence, global warming and the Covid-19 pandemic. These are examples of issues frequently discussed and fact-checked in media outlets, but are politically-charged and people often have strong and long-held opinions about them. For all topics, we implement an online experiment that randomly assigns participants to two groups: a treatment group that receives objective information from experts about each topic; and a control group that receives no such information. Both groups answer at the end a series of questions about each topic, which we use to build a measure of a respondent's position concerning these questions. Our experimental design allows us to identify the impact of objective information without bias.

We find that objective information always has a non-significant impact, irrespective of the topic. This calls into question the effectiveness of using objective information, or expert opinion, to counter fake news about well-known and politically charged issues. Moreover, we report that political position is strongly correlated to a respondent's opinion.

[1] More precisely, one might write that information provided or backed by experts is more objective when compared to a layman's opinion – that is, there is no clear separation between objective and non-objective information, but instead it is a matter of degree. We use 'objective information' for simplicity.

2. Experimental Design and Sample

The experiment involved conducting an online survey with two hundred participants from the United States, with no other restrictions, between October 27th and 28th, 2020. The reward for participation was set at US$0.80, and respondents were not permitted to participate more than once. The experiment was conducted through the Qualtrics platform, developed for the implementation and administration of surveys. To obtain the online sample, the Amazon's Mechanical Turk (MTurk) platform was utilized.

Online experiments are cheaper than the physical lab due to easier access by a large population, and hence samples may be much larger (leading to more precise estimates) and more diverse, mitigating external validity concerns. Participants have no contact or communication with each other – in fact, they have no information about other subjects. Our experimental design, presented below, does not demand from participants any type of environment, behavior or tool beyond the computer (or phone, or tablet) used to access the link to the experiment. This is in line with a recent literature on experiments – Horton *et al.* (2011) concluded that conducting online experiments is as valid as any other type of experiment, with the added benefit of reduced cost. Buhrmester *et al.* (2011) showed that MTurk participants are significantly more diverse than typical samples from American colleges (a common source of subjects for experiments in the physical lab).

The following text was presented in the questionnaire announcement on Mturk:

"This survey takes about 3 to 4 minutes. We will ask questions on three general subjects. Please read them carefully. The survey is completely anonymous, and no personal data will be collected. The results will be used only for academic research."

Participants were directed to a link to answer a questionnaire, beginning with a series of socio-demographic questions. They were then randomly assigned to one of two groups: the control group ("Questionnaire A"), which received no objective information, and the treatment group ("Questionnaire B"), which received such information about a variety of topics, clearly stating the expert sources that provided it. At the end of the questionnaire, both groups answered the same questions.

More specifically, each questionnaire had three blocks of questions for different topics (beyond the socio-demographic part), beginning with an introduction to the topic. Subsequently, respondents are asked to provide their opinion on statements relevant to each theme. Respondents must rate their opinion on an integer scale ranging from 0 (strongly disagree) to 10 (strongly agree). After completing one block, the next block is displayed. Both questionnaires have the same structure, but questionnaire B includes additionally a fact informed by an expert between the introduction and opinion questioning, to verify if this additional information has any degree of influence on respondents' opinions. In short, participants gave their opinions about the following statements:

1- Lockdowns and social distancing are relevant measures to limit the spread of the coronavirus.

2- Wearing masks is a relevant measure to limit the spread of the coronavirus.
3- There are well-established and effective treatments against Covid-19 (for example, hydroxychloroquine).[2]
4- Homicide rates are higher when people are allowed to carry firearms.
5- Human activity is a major cause of climate change.

The appendix presents the complete questionnaires. We should stress that the five statements above are politically charged, and people usually have defined opinions about them, or at least are familiar with them – we aim precisely at evaluating whether in such a context, the type of information frequently presented in media outlets, based on expert opinions, is able to change people's opinions.

As a result of the random assignment, the type of questionnaire assigned to participants does not have any correlation with other factors that might influence participant responses to each question. This allows to identify any effect of objective information, that is, the effect of the expert opinion.

Of the 200 respondents, 13 were excluded due to a wrong response in a verification question, resulting in a valid sample of 187 subjects. The ages were divided as follows: 33% aged 29 years or younger, 38% between 30 and 39 years, 18% between 40 and 49 years, and 11% aged 50 or older. Regarding gender, all participants declared themselves as male or female, with 54% male and 46% female. The average score on the political spectrum, which ranges from 0 (Very left wing) to 10 (Very right wing), was 6.9, and the distribution is negatively skewed. These figures are similar in the control and treatment groups. Finally, of the 187 valid subjects, 98 were from questionnaire A and 89 were from questionnaire B.

3. Results and Discussion

We consider initially an aggregate variable, Y_i^a, equal to the sum of the points individual i obtained in each of the five statements presented in the previous section. We run the following OLS (Ordinary Least Squares) regression:[3]

$$Y_i^a = \beta_0 + \beta_1 \times Info_i + \beta_2 \times Pol\_Score_i + \beta_3 \times Gender_i + \beta_4 \times Age_i + u_i$$

Y_i^a: Aggregate score of each individual.
$Info_i$: Dummy variable for questionnaire response, equal to 1 for questionnaire B (with objective, expert-backed information) and equal to 0 for questionnaire A.
Pol_Score_i: Score on the political spectrum question.
$Gender_i$: Dummy variable for gender, equal to 1 for male and 0 for female.
Age_i: Variable related to age group, equal to 1 for up to 29 years old, equal to 2 for ages 30-39, equal to 3 for ages 40-49, and equal to 4 for ages over 50.

[2] The experiment was implemented before COVID vaccines were first approved. (While vaccines are not technically treatments, as the question asks, the wording might confuse participants if they were available.)
[3] More precisely, this is our main specification, with all controls but no interactions. It corresponds to column (2) in Table 1.

Since participants are randomly assigned to get the treatment, we may identify β_1, our parameter of interest, without bias. Table 1 below shows the results of the estimation.

Table 1: Regression Analysis Results

	Dependent variable:					
	Total_Score					
	(1)	(2)	(3)	(4)	(5)	(6)
Info	1.697	1.480	2.016	1.508	2.742	3.166
	(1.390)	(1.281)	(3.023)	(1.903)	(3.602)	(2.036)
Age		−0.584	−0.458	−0.585	−0.572	−0.407
		(0.662)	(0.925)	(0.664)	(0.665)	(0.692)
Gender		−0.524	−0.532	−0.500	−0.490	−0.310
		(1.293)	(1.297)	(1.787)	(1.300)	(1.347)
Pol_score		−1.414***	−1.411***	−1.414***	−1.308***	
		(0.240)	(0.242)	(0.242)	(0.372)	
Info*Age			−0.258			
			(1.318)			
Info*Gender				−0.051		
				(2.584)		
Info*Pol_score				−0.183		
				(0.489)		
Pol_left						6.434***
						(2.182)
Pol_right						0.847
						(2.276)
Info*Pol_left						−0.893
						(3.160)
Info*Pol_right						−4.677
						(3.282)
Constant	37.449***	48.766***	48.490***	48.751***	47.983***	36.386***
	(0.959)	(2.308)	(2.709)	(2.432)	(3.116)	(2.113)
Observations	187	187	187	187	187	187
Adjusted R^2	0.003	0.156	0.151	0.151	0.152	0.098

Note: OLS standard errors in parentheses. Results are unchanged with robust standard errors. P-values: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

We see that the estimated value of β_1 is not statistically different from zero in all specifications: objective information had no impact on the opinions of respondents. That is, an expert opinion was not enough to change minds.

From a theoretical point of view, the impact of information provision is ambiguous. Basic Bayesian updating suggests that the presentation of the same information to subjects should either decrease polarization (if they incorporate this common information to some extent), or have no effect (if they discard it). On the other hand, memory-based approaches highlight that bringing up a topic might call into memory a mix of considerations, ideas and information about this topic, and the net result is not obvious. Other approaches model opinions as reasoning driven largely by unconscious processes, based on affective tallies stored in the memory.[4] One may observe a backlash with increased polarization, as in Lord *et al.* (1979) and Fryer *et al.* (2019). Our results indicate that when expert-backed information about politically charged issues is presented in a simple style typical of media outlets, the net effect is null. Subjects neither change their minds in line with the provided information nor exhibit any backlash.

We ran similar regressions for each statement separately: instead of the sum Y_i^a, we use the score only for individual statements 1 to 5, and find that objective information had no impact on opinion about any particular topic.

Political positioning is the only significant explanatory variable in the aggregate exercise, and point estimates are stable across specifications. It is also significant in most individual exercises, with the exception of statement 4. Other controls (age and gender) are non-significant in the aggregate exercise and in most individual regressions (except gender, which is significant in statement 3). Moreover, the interaction of political positioning and objective information is also non-significant, meaning that there is no political heterogeneity in the use of information provided by experts – both right-wing and left-wing participants use this information in the same way, which is insufficient to change their positions about issues as presented in our experiment.[5]

Results are similar if we use dummies to indicate whether a subject is to the left of the distribution of political positions (*Pol_left* in the regression above) or to the right (*Pol_right*).[6] In this specification one may see that only being to the left is significant – that is, participants in the center and on the right had similar opinions.

All in all, we interpret that political positioning is a relevant factor to predict people's answers to the questions we pose. We cannot give a causal interpretation to this result – political position is not randomly assigned, and may be jointly determined with personal positions regarding the questions we ask, for example, so that the exogeneity assumption fails.

Yet, our results indicate that while an expert opinion is not relevant to opinion formation about guns, global warming and Covid-19, political positioning seems to play a relevant role. This is in

[4] See Bordalo *et al*. (2023) for a model of memory retrieval.
[5] Interactions of objective information with other socio-economic controls are also non-significant.
[6] These are not exactly the first and fourth .25 quantiles because the distribution is not continuous, but concentrated in some points. We used cutoffs 30% to the left and 27% to the right.

line with Bullock *et al*. (2015), who showed that political position (being Republican or Democrat) leads to different views about objective facts – hence it is expected that such difference will be even greater when it comes to interpreting causal relations among variables, as we study in this paper. Allcott *et al*. (2020) showed that Republicans and Democrats have different views about the severity of Covid-19, and behave accordingly – e.g., Republicans engage in less social distancing.

4. Concluding Remarks

Our study finds that objective information, defined as information provided or backed by experts, has no significant impact on people's opinions regarding gun violence, global warming, and the Covid-19 pandemic, which are examples of politically charged issues frequently discussed in the media. This suggests that simply providing information from experts may not be an effective way to combat the spread of fake news. Our findings highlight the need for further research to understand how people form their opinions and what factors contribute to opinion change.

5. References

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6. Appendix: Questionnaire

Both questionnaires begin with two blocks of questions for sample categorization:

Block 1: "What's your age?" With four response options: "Age: 29 or less," "Age:30-39," "Age:40-49," "Age:50+". "What's your gender?" With three response options: "Male," "Female," "Other/Prefer not to say".

Block 2: "How do you classify yourself on the political spectrum?" With an integer scale ranging from 0 to 10, with titles on the numbers: 0 – "Very left-wing," 5 – "Center," 10 – "Very right-wing."

Then three blocks with descriptive texts on Covid-19, firearms, and climate change are presented. Below the descriptive text, statements related to the theme are displayed, and respondents are asked to rate their agreement with the statements on an integer scale ranging from 0 to 10, where 0 represents total disagreement, 5 represents neutrality, and 10 represents total agreement.

In Block 4, a verification statement was introduced, asking respondents to select number 5 on the NPS scale to filter and invalidate respondents who demonstrate a lack of attention to the written content.

Both questionnaires have the same structure, but questionnaire B adds some objective information. We highlight this added information in bold below, but there was no such highlighting participants could see. Moreover, we included a source with a reference in hyperlink format that redirected to the source page upon clicking.

Block 3:

"The Covid-19 pandemic has affected the lives of people all over the world. **Research indicates that there is no effective cure among available treatments, but masks and social distancing are effective measures to limit the dissemination of the virus that causes the disease (Reference: World Health Organization)**. Please choose the option that best describes your opinion about Covid-19 for each statement below."

"A- Lockdowns and social distancing are relevant measures to limit the spread of the coronavirus."

"B- Wearing masks is a relevant measure to limit the spread of the coronavirus."

"C- There are well-established and effective treatments against Covid-19 (for example, hydroxychloroquine)."

Block 4:

"The culture of a country has an important role in determining attitudes towards gun control legislation. **Studies show that strict gun control laws decrease homicide rates (References: NBER and Journal of General Internal Medicine)**. Please choose for each statement below the option that best describes your opinion about firearms."

"A- Being able to have a firearm is an important principle of freedom."

"B- Homicide rates are higher when people are allowed to carry firearms."

"C- This is just a verification statement, please select the number five."

Statement A is a matter of opinion, unrelated to the objective information we present, and we do not use it in our analysis. Statement C is just for verification purposes: we exclude respondents who did not respond correctly, and otherwise did not use the response.

Link for NBER (accessed on November 4th, 2020): www.nber.org/papers/w23510/
Link for the Journal General Internal Medicine (accessed on November 4th, 2020): link.springer.com/article/10.1007/s11606-019-04922-x/

Block 5:

"Planet earth has gone through several temperatures cycles, going from very cold to very hot temperatures. There is currently an intense debate about the impacts of mankind on climate. **Most climate scientists agree that human actions have a relevant impact on climate change (References: Nasa and CSSR)**. Please choose for each statement below the option that best describes your opinion about climate change."

"A- Most of the news on the subject is exaggerated."

"B- Human activity is a major cause of climate change."

Link for NASA (accessed on November 4th, 2020): climate.nasa.gov/scientific-consensus/
Link for CSSR (accessed on November 4th, 2020): science2017.globalchange.gov/

Statement A is a matter of opinion, unrelated to the objective information we present, and we do not use it in our analysis.