Crowd Perceptions of Bias in Online News

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ABSTRACT

People are increasingly relying on social media for news content. Accordingly, biases in online information sources, such as filter bubble effects are an increasing social concern. This paper examines how online, biased news content affects user and crowd perception of real events. In particular, we examine how textual and visual features, in biased news, can affect a crowd to: (1) perceive bias, (2) change perspective, and (3) promote action. We describe results of an experiment (N=300) to evaluate the impact of five bias channels across three different news topics across these three metrics. Results show that crowds do change their opinion after reading biased news, although their perception of the amount of bias in the article are unchanged. Crowd opinions shift differently, depending on the bias channel used, with framing, visual and source credibility biases generally showing the strongest impact on user perceptions.

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

Author Keywords

News, Bias, User Study, Perception, Social Media

INTRODUCTION

The "filter bubble" effect occurs when users of online social networks curate content for their peers, thereby tailoring the flow of information to support the views of some particular clique [14, 11]. Figure 1 shows an example network when bias occurs through different connectivity patterns. The 2016 "Brexit" vote in the United Kingdom highlighted this effect, with millions of online users expressing shock at the outcome of the national vote. These users were most likely victims of filtering bias that denied them a true understanding of the situation. Bias is also frequently used by traditional media sources as a tool to promote certain beliefs or agendas.

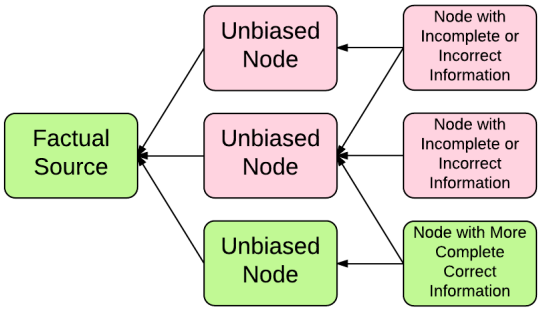


Figure 1: Example network showing friend/follower connections. In this case, pink nodes illustrate a *filter bubble* effect where biases of a user's social connections narrow or mislead their perspective on the facts.

Recent research has attempted to classify political bias using algorithms and crowds [1, 12]. Platforms such as NewsCube [15] have been designed to help mitigate bias. Geovisualizations have being created to automate viewing news in alternative ways [8] . Platforms such as Factful can be used to engage civic communities in public discourse [10]. Tools, such as Odin [9], have applications to find variable opinions in news [9]. Reluctance in awareness of content curation by users [6], and with recent public attention on bias in popular news feed algorithms, such as Facebook NewsFeed [19], it is important to look at how crowds are interpreting these textual and visual features in biased media. In order to study the effects of bias on online information consumers, with respect to their perception of the bias iteslf, perception of the biased subject, and liklihood to take corrective action, we conducted a user experiment in which bias was systematically controlled across a variety of channels and topics.

Research Questions and Hypothesis

De Vreese, et al.'s "model of framing" [21], which describes specific textual and visual channels for bias was used to select channels to evaluate. In particular, we study visual bias, framing bias, credibility bias, source selection, and omission bias [21, 4, 5, 7, 18, 20], with a view to understanding the following three research questions and hypotheses:

1. **RQ1**: What bias channels will be most influential to crowds?

   - **H1**: Framing bias will be most influential. Visual and credibility bias will also be influential.

2. **RQ2**: How does bias influence perception, action-likelihood, and perspective on the biased subject?
    - **H2**: As recognition of bias increases, effect of bias will decrease.
3. **RQ3**: Does influence of different bias vary across news-issue contexts?
    - **H3**: These effects will hold across contexts.

We believe it is important to ask these questions to quantify the effects of news bias in online communities. We also note the limitation that this experiment focuses on perceptions of individual users as opposed to propagation of bias in a network of users. This initial study will inform the design of a larger experiment to assess the latter question. Furthermore, understanding bias perception at the user level is required to alleviate algorithmic exploitation in curated content, deciding what tools are available to users, and for predicting human responses in a particular information context without explicit user input.

EXPERIMENT SETUP

To understand the effects of each bias channel on our three metrics (*recognition of bias in the article, perception of the biased subject and likelihood to take action*) a 5 by 3 mixed design experiment was conducted, controlling for bias channel and topic. Table 1 provides an overview of the 15 resulting conditions. In total, 300 participants completed the study, with 100 in each topic, and 20 participants per channel within each topic. The study was deployed on Amazon's Mechanical Turk platform. Participants ages ranged between 18 and 63 with an average of 24. 47% were female.

Independent Variables

Prior work has examined popular media's methods to bias participants through a dichotomous political spectrum, i.e. "left versus right". To objectively evaluate impact of the different bias channels we chose two current events that were polarizing for their respective communities (Brexit vote and the Zika/Rio Olympics travel debate). These were chosen based on theory from Sociology, of media operating to induce 'Moral Panics'(MP) and people operating under 'Us versus Them' (e.g. ingroups and outgroups) rhetoric from Social Identity Theory [2, 17, 3]. Of course, many people will have predisposition with such real-world political events, and these were assessed and filtered in a pre-study. In addition, a third topic that did not maintain an ideological, political objective was chosen as a benchmark. This choice was based on arguments by Mulligan, et al about the need for bias to be studied in a fictional context [13].

- **Fictional story**: Children's "Red riding hood" story.
- **Brexit**: 2016 Britain vote to leave EU.
- **Rio Olympics**: Travel debate about Zika virus and the the 2016 Rio Olympics

Additionally, these specific, recent topics were chosen to avoid knowledge of a particular event outcome affecting user opinion. Globally important issues were chosen since these are common targets for bias attacks. Clearly defined (binary) sides (e.g. travel or don't travel) allow for quantifiable scaling. Last, issue specific questions are less prone to social desirability bias when measuring political attitude [16].

Bias Channels

The five channels that were used are described as follows. Table 1 also shows the key manipulations in each article and channel. For each of the original articles [**?**, **?**, **?**], bias was added to support pro-boycott (Rio), pro-leave (Brexit) or pro-wolf (fiction story) angles.

- **Visual**: visual imagery used to promote the biased subject.
- **Omission**: important counter statements were removed to support biased subject.
- **Source Selection**: Choose references from sources that agree with biased subject.
- **Credibility**: Establish trust in the article by reputation or knowledge in subject for sources that agree with bias and not others.
- **Framing**: Set the story in a particular background/context to promote the biased agenda.

Dependent Variables

Three dependent variables were

- **Recognition**: Recognition/Perception of bias existing in news article.
- **Action-likelihood**: Likelihood that a user would take action to correct the bias (e.g.: by sourcing another article on the topic).
- **Perspective**: User opinion on the biased topic/subject in the article.

RESULTS

- H1 Correct
    - Framing bias is the most influential across all topics, showing a mean rating shift of 2.25 over the control (mean=3.05), making a relative increase of 73% in user ratings towards the biased argument. This is shown in Figure 5a for Brexit.
- H2 Correct
    - As recognition of bias increased, the influence of bias increased, for the Brexit case. This is shown in Figure 2
- H3 Correct
    - The influence of bias channels holds across the two news articles, however for the fictional scenario, the bias channels had no significant effect. This is shown by the increased rating towards the biased stance in Figure 2 and Figure 3, for Brexit and Rio topics respectively. Significant increases were found for Credibility, Framing and Visual bias channels.

	Bias Channels				
	Visual	*Omission*	*Source Selection*	*Credibility*	*Framing*
Brexit		"...driving license that the 'UK' marker... is surrounded by the stars from the EU flag."	"The chairman of the Commons foreign affairs committee said the rest of the EU..." "The Reigate MP said..." "Mr. Blunt argued that..."	"Brexit will boost our economy... BY: [John Doe] - Professor of Applied Economics of Cardiff Business School"	"BREXIT BOOST: Britain WILL NOT fall into recession after ditching EU, think tank reveals"
Rio		"announced on Monday that he's taking himself out of consideration for the U.S. Olympic team, citing his recent ankle and knee injuries"	"Dr Allen from University Hospital Ayr, said..." "Official advice from the World Health Organization states..."	"Olympic Games Must Not Proceed - Harvard Public Health Review Author: Amir Attaran, DPhil, LLB, MS. Faculty of Medicine and Faculty of Law, University of Ottawa"	"issues surrounding the 2016 Rio Olympics... Zika... Safety... Golfers dropping out... Doping Scandal... Uninhabitable village... Water pollution..."
Fiction		No details of wolf.	"The wolf begins to tell his story..."	"...known to be frequently late to her destinations. She often eats the food that she is delivering."	"...The wolf has not eaten in days."

Table 1: Examples of Bias Channels content features

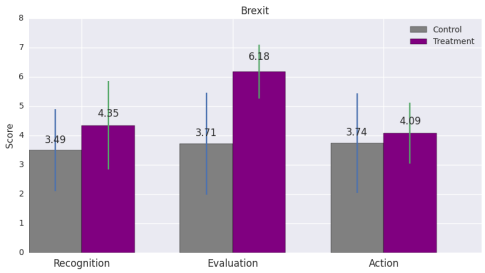


Figure 2: The Pro-Brexit biased news articles shifted crowds to a pro-Brexit stance, while participants' perception of bias remain unchanged.

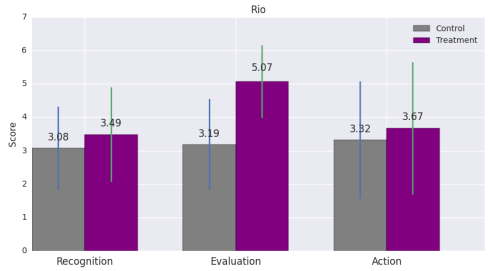


Figure 3: The Rio Olympics biased news articles shifted crowds to an anti-Rio-Olympics stance, while participants' perception of bias remained unchanged.

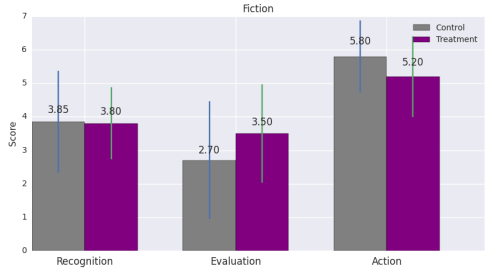
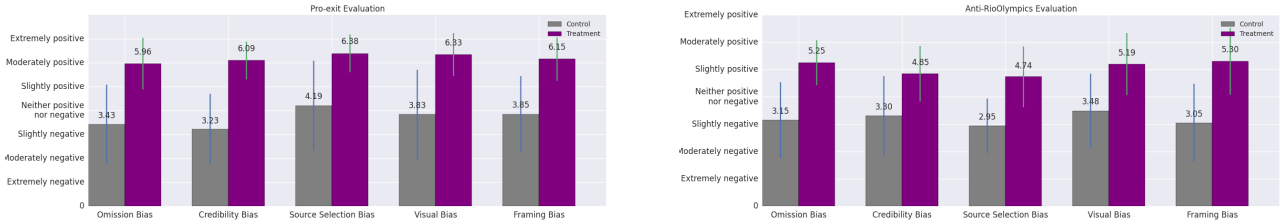


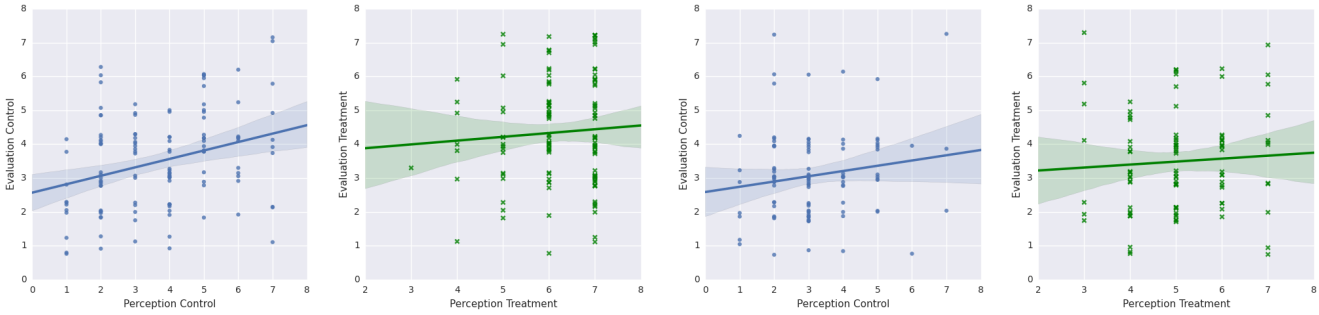
Figure 4: The fictional article did not adjust participants' perception, action-likelihood, or evaluation of article when treated.



(a) Brexit debate

(b) Rio Olympics/Zika debate

Figure 5: Comparison of control and biased treatments over *5 bias channels* for the (a) Rio Olympics/Zika and (b) Brexit debate. Bars show standard error.



(a) Brexit debate

(b) Rio Olympics/Zika debate

Figure 6: Linear regression plots showing the relation between Perception and influence of Bias in the *Brexit* and *Rio* topics. Control case is on the left (blue) and biased treatment is on the right (green).

Limitations and Future Work

As discussed earlier, this experiment focuses on bias perception at the user level. The next logical step in understanding impact of self-imposed bias in online networks is to extend this work to include a network context with filter bubble bias. Results from this study will be used to guide the design of this experiment. Additionally, future work includes a more granular analysis of the amount of bias and resulting effects on perception. This will include varying the amount of bias in each channel, and over multiple channels, and multiple heterogeneous information sources.

CONCLUSIONS

In this paper, we presented the results of a user experiment (N=300) to study the effects of targeted bias in news articles over 5 channels and 3 different topics. The real-world topics were chosen based on their current nature and their polarizing effects and binary choice decision context. A fictional story was also evaluated. Bias was artificially added to original articles to promote one side of the argument and participants were asked to report on three metrics: recognition of bias, liklihood to take corrective action and perception of the biased subject in the article. Key results are summarized as follows

- Bias works, but decision makers may not be aware. Both of the biased news articles that we tested (pro-Brexit and anti-Rio Olympics) successfully shifted our participants' reported evaluations to the article's stance while user perceptions of bias remained unchanged.
- Framing bias was found to be the most influential bias channel, followed by credibility and visual channels.
- The bias channel effects held only across the two biased news articles, and not the fictional scenario.

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