"Fake News" In Singapore:

An Empirical Analysis of Sources Shared in Local Facebook Advocacy Groups

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1. Introduction

The propagation of misinformation and disinformation ("Fake News") via online channels is an issue of widespread international concern. The Green Paper on Deliberate Online Falsehoods prepared by the Singapore Ministry of Communications and Information and the Ministry of Law has outlined the nature of the threat posed by "fake news" and documented its deleterious effects on civic discourse and democratic institutions in many countries around the world. However, in framing the issue of "fake news" as one that presently exists outside of Singapore, the Green Paper overlooks the possibility that "fake news" is already being mobilised for the purposes of influencing civic discourse and public policymaking in Singapore.

To address this shortcoming, we adopted a data-driven approach to conduct a preliminary study of the sources of information prevalent amongst a sampling of advocacy groups in Singapore. As shapers of public policy as well as drivers of the national conversation on a myriad array of issues, advocacy and civil society groups are especially vulnerable to the propagation and dissemination of online "fake news". It is therefore necessary to examine the information sources that shape and reinforce the beliefs of advocacy group members and to analyse the potential impact this may have on Singapore's society.

In addition, analysing the specific ways in which "fake news" is trafficked online amongst advocacy groups in Singapore will also provide a more nuanced understanding of the environmental factors that facilitate the uptake and transmission of "fake news", which is essential to crafting an effective response to the problem of misinformation and disinformation. To that end, we used quantitative and qualitative metrics such as partisanship scores and diversity indices to compare the information environments of the different advocacy groups in Singapore.

2.   Advocacy Group Selection

For the purposes of this study, we chose advocacy groups that:
- Maintain a significant public online presence on Facebook;
- Pursue an overt agenda both with regard to public policy and wider Singaporean society;
- Share information from a variety of online sources (as opposed to only sharing links from their own websites); and
- Have large membership numbers such that their reach is sufficiently impactful.

Our choice of public-facing Facebook groups (as opposed to those whose posts are viewable only by members) was primarily guided by logistical considerations, as the Facebook API can only be used to scrape data off of "public" groups and pages. In addition, identifying groups with a Facebook presence allowed us to compare like with like, providing consistency across datasets. We also considered the content in these public groups to be fair game for analysis given their open availability.

In summary, we focused our data collection efforts on six advocacy groups whose work centres around environment/heritage and social/cultural issues, and whose members are active in pushing their respective groups' agendas through actions such as letter-writing, canvassing for petition signatures, and engaging with government and other stakeholders. These groups and their agendas are summarised in Table 1 below.

Table 1: Advocacy groups analysed in this study.

Group Name	Category	Agenda
Nature Society (Singapore)	Environment/Heritage	Nature Conservation
Heritage Singapore - Bukit Brown Cemetery	Environment/Heritage	Preservation of Bukit Brown Cemetery
We Are Against Pinkdot in Singapore	Social/Cultural	Preservation of Section 377A of the Penal Code
Singaporeans Defending Marriage and Family*	Social/Cultural	Preservation of Section 377A of the Penal Code; Pro-Life activism
Say No to Foreign Intervention in Singapore's Politics	Social/Cultural	Exclusion of foreign funding from Pink Dot
Humanist Society (Singapore)	Social/Cultural	Advocacy of secular issues

The Singaporeans Defending Marriage and Family page has been taken offline by Facebook as of 7 March 2018 due to a harassment complaint.

3.   Methodology

Data Crawling and Cleanup

Using a combination of custom Python scripts and the R[1] package Rfacebook v0.6.15[2], we downloaded all posts and comments from each of the respective advocacy groups' Facebook pages or groups (Table 1). This scraping was performed on 24 February 2018, and thus includes all content from the creation of the group up to that date. In addition to posts and comments, the scraped data also included the usernames of posters and commenters, links referenced in Facebook posts, as well as the numbers of reactions ('likes', 'loves', etc.), comments, and shares. Scraped datasets were subsequently cleaned up by expanding any shortened URLs, as well as mapping any posts from

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[1] R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.
[2] Barbera P, Piccirilli M, Geisler A, van Atteveldt W. (2017). Rfacebook: Access to Facebook API via R. R package version 0.6.15.

Facebook groups to their parent organisations. Our custom scripts are obtainable upon request and will be made publicly available shortly.

Source Classification

To estimate the proportion of posts containing "fake news", we classified the sources of information present within each of the Facebook pages/groups based on two independent source grading databases. These databases are the Media Bias/Fact Check database[3] (MBFC), which assesses sources based on their partisan bias as well as their factuality, as well as the OpenSources.co database of fake news sites[4] curated by Melissa Zimdars of Merrimack College. While these source grading databases are themselves susceptible to possible bias, these databases were selected due to their transparent and consistent methodologies, and the fact that both databases converge on similar ratings despite their independent approaches.

In addition, we cross-referenced the data against Southern Poverty Law Center's (SPLC) Hate Map database of hate groups in the United States of America[5] to track the deployment of hate propaganda in the advocacy groups surveyed in this study.

We used custom Python scripts and Microsoft Excel to classify the information sources shared within the respective Facebook pages/groups of each of the advocacy groups. Due to time and resource limitations, we excluded YouTube and Vimeo video links, as well as photos and statuses posted by individual users, from our analysis.

[3] Van Zandt D. (2015). Media Bias / Fact Check: The Most Comprehensive Media Bias Resource. Retrieved from https://mediabiasfactcheck.com/
[4] Zimdars M. (2017). OpenSources. Retrieved from http://www.opensources.co
[5] Southern Poverty Law Center. (2017). Hate Map. Retrieved from https://www.splcenter.org/hate-map/by-ideology

4. Results

<u>Analysis of source reliability</u>

In the MBFC database, news sources are originally classified as "Very High", "High", "Low", "Mixed", and "Fake News". Sources classified as 'Mixed' are described as "not always [using] sourcing, or sources to other biased sources. They may also report well sourced information as well, hence it is mixed."[6]. We re-classified the results into 'reliable' 'High' and 'Very High') and 'unreliable' ("Low", "Mixed", and "Fake News").
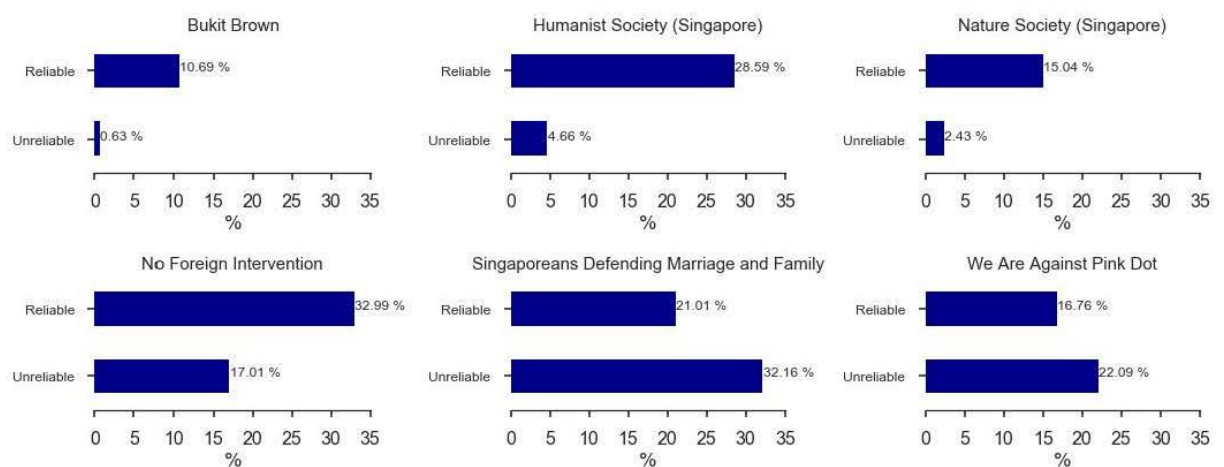

Figure 1: Reliability of Links Shared.

Comparing the proportion of reliable links versus unreliable links shared in each respective group (Fig. 1), we find that members/admins of both the environment/heritage groups share a high proportion of links from reliable sources relative to unreliable sources. This trend is similarly observed in the Humanist Society (Singapore) page as well as the No Foreign Intervention page, although the ratio of reliable to unreliable sources is far greater for the Humanist Society (Singapore) page. In contrast, in both the Singaporeans Defending Marriage and Family and the We Are Against Pink Dot groups, there is a proportionally higher amount of links from unreliable sources.

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[6] Van Zandt D. (2015). Media Bias / Fact Check: The Most Comprehensive Media Bias Resource. Retrieved from https://mediabiasfactcheck.com/methodology/

Breaking down the reliability results into the original MBFC categories (Fig. 2) reveals that a large proportion of the unreliable information trafficked in all groups stems not from sources that fabricate stories, but rather from sources that generate information of indeterminate ('Mixed') reliability. Across the groups surveyed, for instance, we consistently observe a five to thirteen-fold greater proportion of links from sources of 'Mixed' reliability relative to links from sources labeled as 'Fake'.
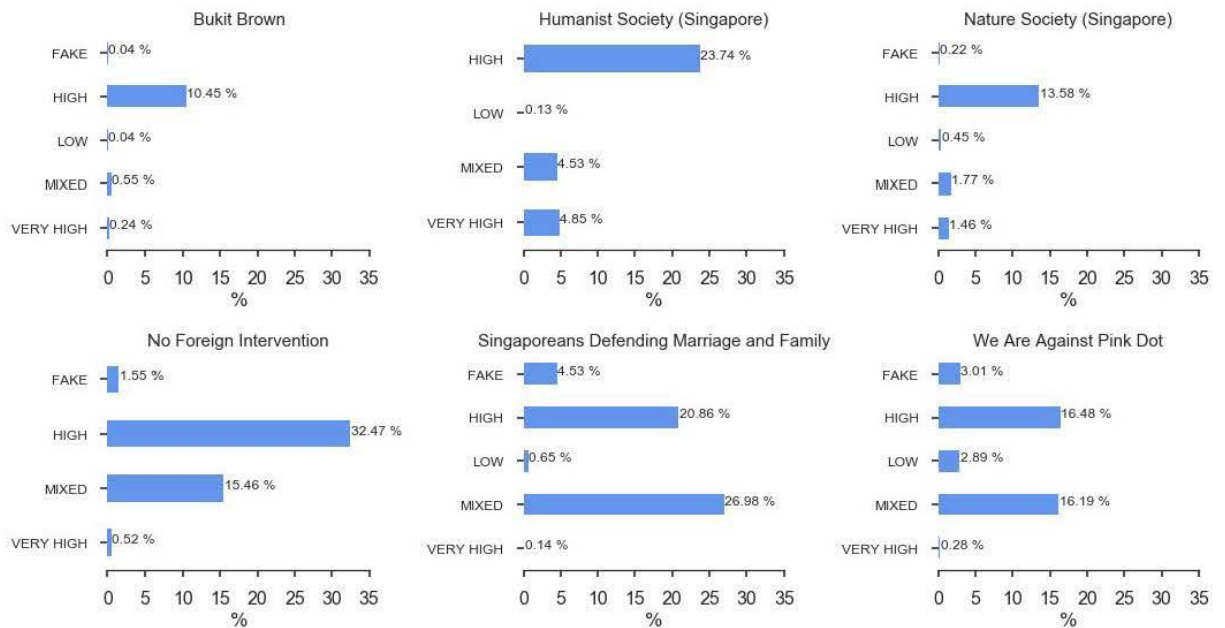

Figure 2: Breakdown of reliability scores

Our reliability analyses suggest that while certain advocacy groups may traffic in higher proportions of unreliable news content, it is important to note that only a small proportion of this content stems from sources that are discernibly "fake", and that a large proportion of misleading information disseminated and trafficked in such online groups originate from sources that publish content for which the reliability may be much more difficult to discern.

While it is tempting to jump to conclusions about the advocacy groups that may be susceptible to the transmission of unreliable information, our sample size presently remains too small for any rigorous conclusions to be drawn in this respect.

Analysing Magnitude of Partisanship

In addition to the reliability of sources, we also assessed the distribution of partisan content shared within each of the sampled groups. Our interest was not in the political leanings of the groups, but in the strength of their bias - that is to say, *how* partisan they are, regardless of which direction they lean in.
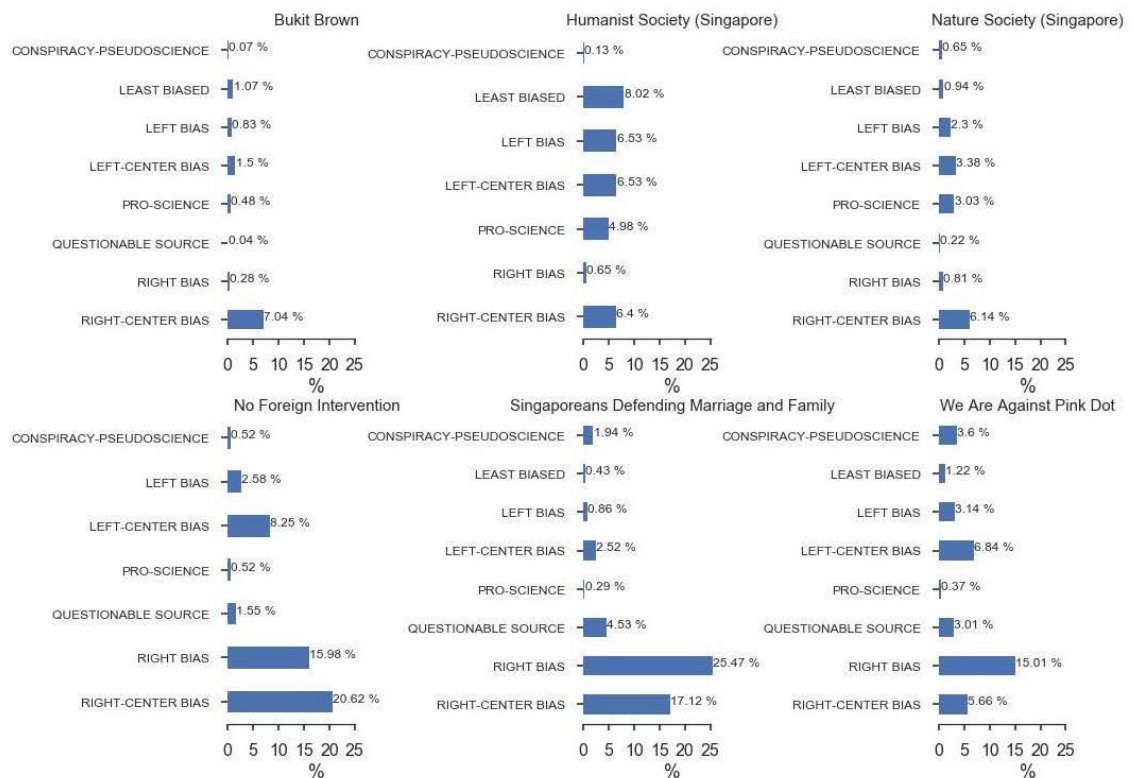
Figure 3: Classification of Bias of Links Shared.

We measured this as hyper-partisan content appeals to the 'echo chamber' nature of these groups - and, in fact, Facebook usage in general. Advocacy groups are by nature echo chambers, as they are explicitly created to bring together people of like-minded opinions. However, hyper-partisan sources tend to rely on techniques other than fact to attract readers and strong reactions - this can include emotive language and other methods of misdirection. This can reinforce the sense that the group's stance is correct and entrench groupthink. Hyper-partisanship thus engages in the next level of narrative shaping.

Furthermore, Facebook's algorithms are designed to show you more of what you've already seen and liked. As such, widespread hyper-partisan content lowers the barriers to entry for other sources of misinformation. There thus could be a network effect with the spread and entrenchment of views based on fake news.

Using the same methodology, we compared the sources against the partisanship values in the MBFC database to get a sense of the strength of bias of each group; that is, we could identify the extremeness of the views propagated. For our interests, we considered 'left bias' and 'right bias' as equally polarised viewpoints, while 'left-center bias' and 'right-center bias' are more moderate viewpoints and thus considered more balanced. For example, we can see from the data that more than a quarter of links shared in 'Singaporeans Defending Marriage and Family' are from extremely biased and partisan sources.

We can also consider posts made from sources classified as 'Conspiracy-Pseudoscience' and 'Questionable Source' as outright fake news. However, context is needed to make sense of the numbers in this case, as the links could equally be offered with commentary supporting or disputing the fake news. Other group members can also comment to support or dispute the article. We propose that given enough time and resources, a semantic analysis of such posts in the groups be done to have a sense of the groups' attitudes toward conspiracy, pseudo-scientific, and otherwise questionable sources - in short, whether the communities indulge and entertain fake news, or are able to identify and isolate it as a whole.

Analysis of Hate Propaganda

Another dimension of the "fake news" debate that needs to be quantified is the deployment of "hate propaganda", which draws heavily on cherry-picked information aimed at vilifying groups or sections of society[7]. While our study does not delve into the contextual contents of individual posts within each group, the dependence of hate propaganda on 'grand narratives' provides a useful avenue for approaching this question in a data-driven manner.

Although limited to the continental United States of America, the SPLC's list of "hate groups" allows for the preliminary identification of sources that traffic in overt forms of hate propaganda and hate speech. Per the SPLC, a "hate group" is defined as an "organization that – based on its official statements or principles, the statements of its leaders, or its activities – has beliefs or practices that attack or malign an entire class of people, typically for their immutable characteristics"[8]. Analysing advocacy groups for traces of content originating from "hate groups" provides a useful metric for understanding the extent to which advocacy groups scaffold their group content within an overarching narrative of hate propaganda.

Table 2: Number of posts originating from SPLC-listed "hate groups"

SPLC Rating	We Are Against Pink Dot	Singaporeans Defending Marriage and Family	No Foreign Intervention	Humanist Society (Singapore)	Nature Society (Singapore)	Bukit Brown
Anti-LGBT	248	49	0	0	0	0
Anti-Muslim	4	0	0	0	0	0
Male Supremacy	2	0	0	0	1	0
White Nationalist	1	0	0	0	0	0

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[7] George C. (2018). Meeting the Challenge of Hate Propaganda. Written Representation to the Select Committee on Deliberate Online Falsehoods. Retrieved from http://www.hatespin.net/wp-content/uploads/2018/02/George-SelectCommittee2018-public.pdf
[8] Southern Poverty Law Center. (2017). Hate Map. Retrieved from https://www.splcenter.org/hate-map/by-ideology

Consistent patterns of anti-LGBT hate propaganda can be observed within the We Are Against Pink Dot" as well as the Singaporeans Defending Marriage and Family groups, with more than 2.5% of each group's total posts comprised of content from anti-LGBT hate groups (Table 2). The high absolute number of posts originating from anti-LGBT hate groups diminishes the likelihood that such content could have been shared in ignorance of the intentions of the source.

In addition, we also observe a small but nonetheless worrying presence of content from anti-Muslim hate groups shared among the members of the We Are Against Pink Dot group, which is of especial concern owing to the multi-racial nature of Singapore's populace. Whether the sharing of content from anti-Muslim groups was inadvertent or otherwise will require more detailed contextual analyses that fall outside the scope of this study.

Our hate propaganda analysis, although preliminary and restricted to content originating from the United States of America, indicate that hate propaganda is nonetheless present amongst some advocacy groups in Singapore. The deployment of hate propaganda adds an additional dimension to the "fake news" issue since such incitements often rely on largely truthful but cherry-picked information, and the observation of high levels of partisan information bias (Fig. 3) and low information reliability (Fig. 1) amongst the groups known to disseminate hate propaganda elevates the risk of such groups deploying false and misleading information for the purposes of sowing divisions in Singaporean society.

5. The environment that contributes to the trafficking of fake news

Although our preliminary analyses indicate that "fake news" is already present and being trafficked among local advocacy groups in Singapore, our results additionally indicate that the problem is more complicated than the Green Paper suggests.

In particular, our results indicate that "fake news" is not a binary distinction. Rather, a significant proportion of the misinformation already being shared online comes in varying degrees of reliability. "Fake news" legislation based on a strict definition of "fake news" may do little to curb the spread of misinformation online since only a small proportion of unreliable information consists of overtly fabricated stories (Fig. 1). On the other hand, a more robust definition of what constitutes "fake news" will then fall into the problem of defining where the threshold cutoff lies.

Our results also indicate that factors extraneous to the absence or presence of "fake news" may influence the uptake and dissemination of misleading information. The distribution of partisan information across the sampled advocacy groups suggests that polarisation, a factor independent of the "fakeness" of news, may also play a role in influencing the receptiveness of activists to the introduction of misinformation and disinformation. The presence of a scaffold of hate propaganda narratives, which has also been shown to be present in some advocacy groups, will only serve to enhance the effect of polarisation and increase the receptiveness of Singaporeans to the influence of unreliable information.

On the issue of "fake news", our data therefore suggests that the spread of unreliable information is more likely to be the symptom of a larger societal problem rather than the cause. Any efforts aimed at curbing the spread of "fake news" that merely focuses on dissemination channels are therefore run the risk of driving "fake news" dissemination to ever more encrypted channels rather than curbing the spread of misinformation altogether. Understanding and addressing the environmental factors at play are likely to be far more effective at tackling the problem.

6. Limitations

Owing to the fact that our study focuses only on source classification and not on information contexts, our results remain strictly preliminary at this stage and much more work remains to be done.

In particular, a better understanding of the environmental issues that influence the susceptibility of groups to "fake news" will allow for better metrics to be deployed to better understand the information landscape of Singapore. One metric that might be of use would be analysing the diversity of information sources and commenters within advocacy groups. A time-calibrated Shannon-Weaver Index could conceivably be deployed as a quantitative tool for understanding the diversity of voices and information sources within groups and how this may affect their resilience in the face of misinformation.

In addition, semantic analyses may prove to be a useful tool in arriving at a deeper understanding of the ways in which people traffic and interact with misinformation. Although the use of computational tools to algorithmically study the information content of online groups is largely a nascent field, deploying such tools may allow for the spread of misinformation to be tracked at a higher resolution.

At the macro level, understanding how misinformation spreads across networks is also a key issue that this study is presently unable to address. As has been seen in recent years, malicious actors often rely on sock-puppet groups to amplify hate propaganda and misinformation in order to influence large groups of people and give the impression of broad support for certain controversial ideas. Although we do not quantify this in our study, we observed that many of the advocacy groups studied tend to cross-post their own content between tightly-linked networks of groups with similar, if not identical agendas. Quantifying the existence and relationships between sock-puppet groups in Singapore may add an additional dimension to the "fake news" discussion that "fake news" legislation may not be able to directly address.

7. Conclusions and Future Directions

7.1. Some of the largest Facebook groups concerned with advocacy in Singapore traffic in fake news / questionable sources.

7.2. There is also room for further study into how this correlates with other factors such as the strength of partisanship and the presence of hate propaganda in the groups.

7.3. Given the scale of activity online, we propose a data-driven approach to identify pockets of open forums where fake news is trafficked.

7.4. We are doubtful of censorship and use of other similar legal/constitutional tools to shape civic discourse. Such tools, we feel, are unable to respond What we are confident of is the use of at-scale data analytics to profile public discourse.

7.5. This will allow individuals and policy-makers to make an informed judgement about the bias and reliability of discourse in pockets of Singapore society.