

From darkness to light: Tracing information flow dynamics amid the Russian invasion of Ukraine

Keywords: information flows, cross-domain influence, discursive power, topic modeling

Extended Abstract

The rise of digital media has paved the way for a hybrid media system, which fosters changing (political) opportunity structures that involve not only a higher number, but also different types of information sources, communication spaces, and actors that are able to “introduce, amplify, and maintain topics, frames, and speakers” [3, p. 16] through their “discursive power” [3]. Some of the curators of information within the complex hybrid media system, represent “political outsiders” [4] and “dark platforms” [9] such as the infamous Politically incorrect board of 4chan (4chan/pol/), which enables the spread of malicious, extremist, racist, and conspiratorial narratives [6]. Despite widespread concern and some (anecdotal) evidence that information emerging on dark platforms is problematic and can influence the mainstream media and the public, only a handful of studies have considered the (discursive) power and agenda setting potential of dark platforms when studying information flows in the hybrid media system [e.g., through the spread of news URLs, 7].

Therefore, we developed a novel approach to study information flow dynamics between (1) the dark platform agenda, (2) the social media agenda of politicians, (3) the social media agenda of the public, and the (4) traditional media agenda. Building on the conceptual frameworks of “discursive power” [3] and agenda setting [1], we combined state-of-the-art NLP approaches with advanced over-time analyses to measure how the studied agendas influenced one-another over time by capturing their discursive power through the topics they introduced, amplified or maintained. We applied this method to the first six months of the ongoing Russian invasion of Ukraine. To this end we gathered textual data from news articles (i.e., New York Times, Kyiv Independent), posts from four news-related subreddits, tweets of (G7) politicians, and posts from 4chan/pol via API’s and web scraping ($N_{texts} = 1,545,813$). Then, using the neural topic modeling tool BERTopic, we extracted topics ($N_{topics} = 589$) from our corpus [2]. The majority of the topics passed validation checks ($N_{validtopics} = 548$) performed by 6 human annotators. Using the validated topics we modeled information flow dynamics between the four studied agendas via Hawkes processes [5]. We assumed fully connected Hawkes models where each agenda could also influence itself. Our method made use of Gibbs sampling to determine the model parameters from the data, such as weights, background rates, and the shape of the impulse response functions between the different processes (i.e., agendas) [7].

Selected Results

The bottom left plot of Figure 1 displays the raw influence scores, while the bottom right heat map reflects normalized influence scores of the Hawkes models. Raw scores indicated that the dark platform agenda (i.e., 4chan/pol) was the most influential for topics that appeared on the social media agenda of politicians (i.e., Twitter G7+) and the social media agenda of the public (i.e., Reddit news). More importantly, however, the normalized results showed that the

traditional media agenda was by far the most powerful (130.86%) in influencing all other studied agendas, while the dark platform agenda had the lowest external influence score (11.68%). Albeit, we found a considerable information flow from 4chan/pol to various news related subreddits (see Figure 2). Although content on 4chan/pol is generally considered toxic and extremist, the most influential topics that emerged on this dark platform seemed rather harmless, and comparable to the most influential topics on more mainstream agendas. Some of these topics referred to donating, war crimes, aid packages, and refugees (see top left plot of Figure 1).

Conclusions

Our results confirm that traditional news media outlets remain highly important agenda setters through their discursive power, which aligns well with recent work that highlighted the influence of traditional media when studying agenda setting dynamics across multiple issues and platforms [1]. We did not detect a high degree of information flows from “darkness to light”, and the most influential topics that managed to transcend the boundaries of 4chan/pol and influence the other agendas did not appear harmful at a glance. However, we must continue monitoring the discursive power of dark platforms given the substantial information flows from of 4chan/pol to some mainstream outlets, which was also indicated by previous work [8]. Our study offers a novel methodological framework to trace hybrid discursive information flows from fringe to mainstream. Herewith, the study takes an important step towards gaining a deeper understanding of the complex information flows within the hybrid media system that may play a crucial role in shaping attitudes, beliefs and actions about such important societal and geopolitical issues as the Russian invasion of Ukraine.

References

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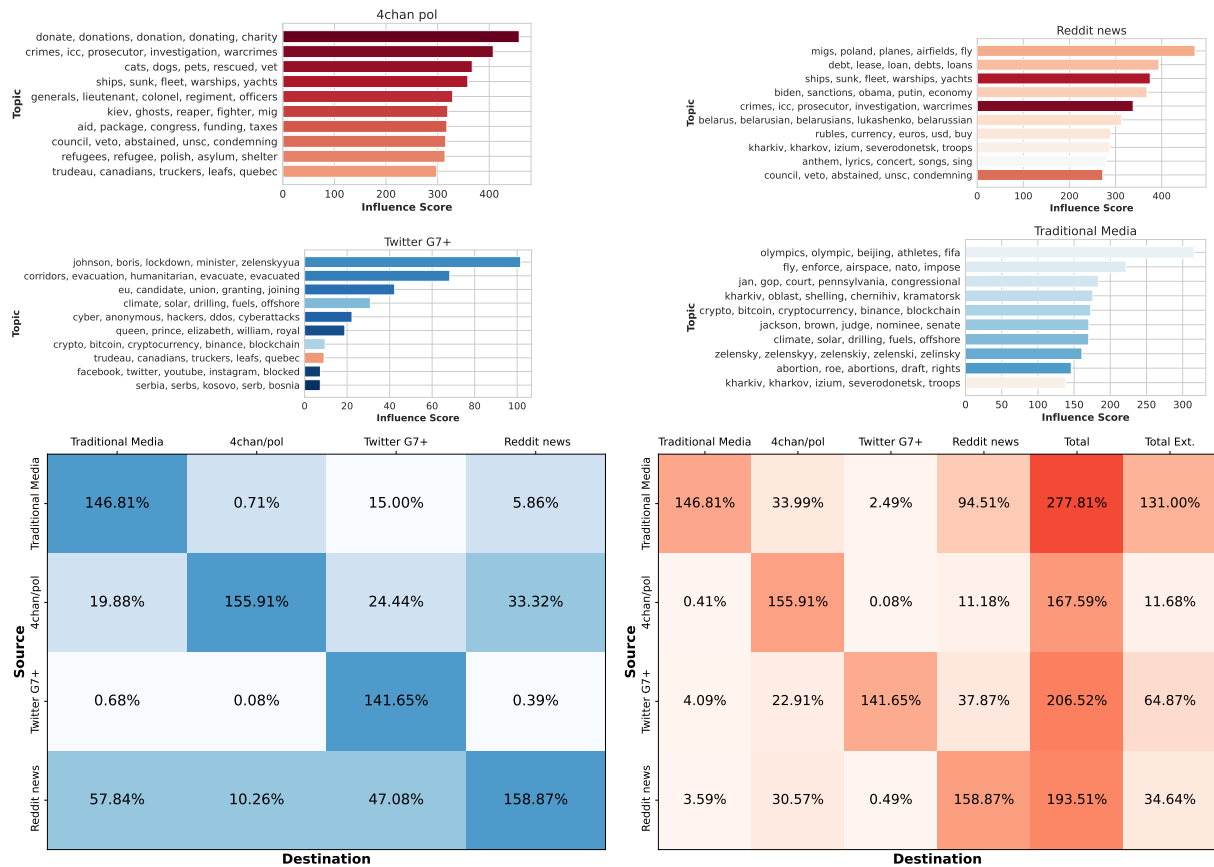


Figure 1: Influence scores are the sum of the normalized influence from a particular source agenda to all the other agendas, and thus can be over 100%. Higher scores on Total Ext. indicate greater discursive power.

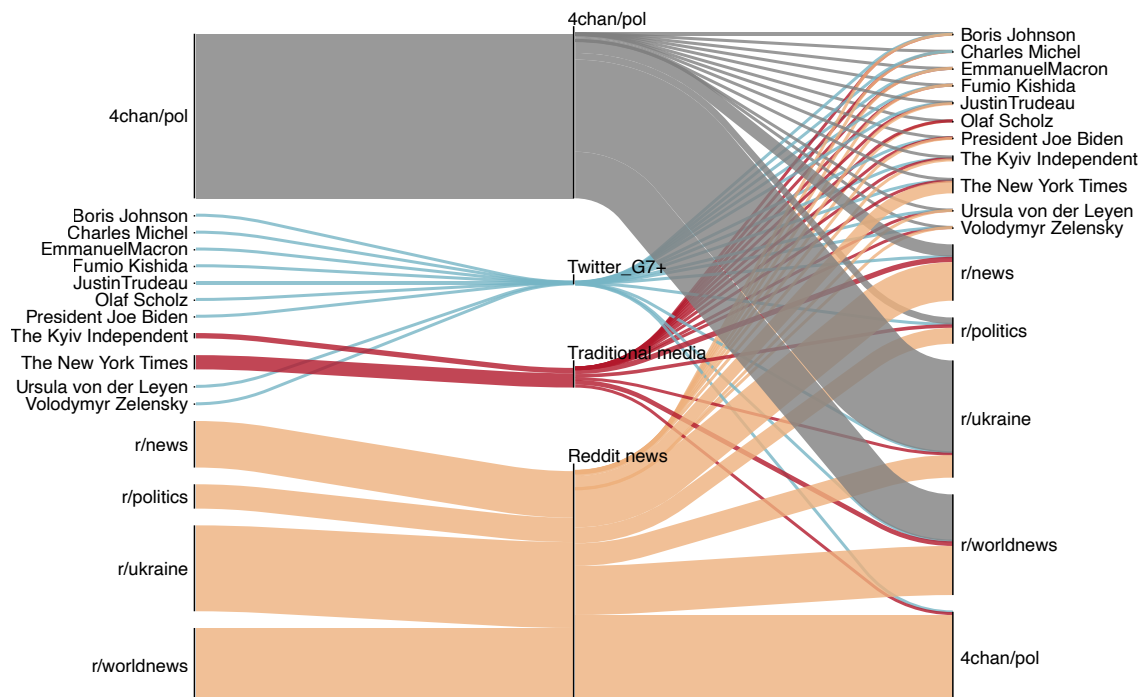


Figure 2: Sankey diagram based on mean influence scores.