

Conflicts driven pandemic and war issues in Social Media via multi-layer approach of German Twitter (Working Paper)

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Abstract

Some qualitative studies suggest overlap between COVID-19 and war discourse in Social Media, but there is no research quantifying this statement. Thus, we deploy simple content analysis and a social network approach to analyze tweets related to polarizing issues. We have compared three topics: 1) "impfung" data set consisting of 1 160 941 vaccination related tweets with 171 542 unique selected users from the first half of 2021 2) the biggest coronaseptic protest in Germany #B2908 with 389 217 tweets and 71 612 selected unique users taking place in Berlin in August 2020 3) War related #IstandwithPutin 3 032 tweets with unique users 2 089 in first days of Russian invasion on Ukraine on February/March 2022. By means of community detection algorithm, we have selected potentially proKremlin accounts (199) from war discourse, where 62% of them have been engaged in vaccine and 45% in corona protests discourse. Potentially ProKremlin users are almost 2 folds more likely than their opponents to be engaged in COVID discourse than AntiKremlin and the biggest difference was observed for coronaseptic protest. Moreover, **ProKremlin users are 51 times more likely to be involved in both anti-lockdown and anti-vaccine part of discourse.** [\[\[AND\] Fueling pandemic conflicts? Multi-layer activity of potentially ProKremlin users on German Twitter/ProKremlin users are over 50 times more likely to be involved in anti-lockdown and anti-vaccine discourse on German Twitter\]](#)

1 Introduction

The aim of our analysis is to evaluate the reaction of Twitter users in Germany to the most polarizing topics in the last 2 years. We are going to study opinions polarization phenomena in social media, which changed our lives to a great extent. Moreover, social media is just another communication channel to distribute information as traditional media does. Social media is giving a voice to the user on concerns regarding COVID-19, society, and the political system in an interactive way. We are going to detect and analyze the main common feature COVID-19 (infodemiology [[Eys20](#)]) and discourse at national level by social media listening.

Social movement scholars have increasingly sought to understand the multi-topic dynamics of movements mobilization [[Dia15](#)]. Along with the decline in interest in the topic of coronavirus in the end of so-called 5-th wave in Europe, as well as mandatory vaccination and measures were lifted, part of the Tweeter users changes the subject and begins to comment on conflict between Russia and Ukraine.

1.1 German context

We observe a pattern in the German antivaxx/coronasceptic supporters consist of mainly far right as well as far left politicians being highly interconnected between each-others [[JSB20](#)], which does not need to be the case anywhere else. Thus, both far right and far left side of German political sphere did not supported sanctions issued by European Parliament [[Par22](#)] on 01.03.2022 against Russia after its invasions on Ukraine. Therefore Russian lobby in Germany is very strong (at least according to political experts [[Wes16](#)]). Thus, we want to study epidemiological and political logics of accounts propagating Kremlin propaganda with focus of the mobilization potential of the various lines of conflict (COVID-19 lockdown and vaccination as well as Ukrainian-Russian war).

1.2 Coronasceptic protests

Russia sponsored traditional and social media have been marked by European External Action Service (EU counter disinformation agency) to propagate dis-/mis-information. During spring/summer 2020 in Germany, Kremlin-funded channels have been suggesting “the pandemic never happened” as well coronasceptic protest movement have been amplified [EEA]. Thousands of people across hundreds of Germans towns have gone to the streets against the government’s actions on Covid-19. Demonstration gathered various kind of magical thinking categories of QAnon followers, Querdenkers, believers in alternative medicine, esoteric or folk religion communities [int21], [Sei21]. According to surveys the highest coronasceptic protest potential is mainly among far right AfD (59%) and in some extent far left i.e. die Linke (18%) of electorate [cem]. claiming that Germany was still an “occupied country” and protesters just want to “defend our freedom and our democracy” asking ”Mr. Putin” for help. The protests reached a peak on 29.08.2020 on the streets of Berlin [Neu22]. So, Berlin protests dataset could be a good material to verify our research hypothesis.

1.3 Vaccine hesitancy

Since the beginning of 2021 Kremlin-funded disinformation intensified, targeting in particular Western-developed vaccines [EEA21]. Thus first half of 2021 was crucial for socializing picture of vaccine in the societies. According to Russian media researchers Ilya Kiriya, Kremlin has a separate information strategies for inner and outer communication [Kir21]. Thus as COVID-19 vaccines uptake is promoted in state sponsored media inside Russia, anti-vaccination attitudes are fuel to the international audience. According to research on USA of digital epidemiologists Broniatowski’s group, the so called ”Russian trolls” were found to be 22 times more likely to tweet about vaccines than was the average Twitter user [BQDJ20]. It worth to mention, that semantic comparative analysis on vaccines preventable infectious disease revealed that topics related to freedom of choice/mandatory vaccination are over-represented in German media than European average [WJG+21]. According to Internet researchers led by Dariusz Jemielniak, AstraZeneca Covid-19 vaccine [JK21] was the main target of the larger Kremlin campaign on Twitter aimed at discrediting the Western vaccines. German society reacted the most in the Panic (i.e. compering Google Trends search intensives) among European countries rolling out the same vaccine in the same extent [BJ]. The same time Germany (along with Hungary) called to approve Sputnik V (Russian flagship vaccine of very similar vector - like mechanism as AstraZeneca) roll-out in the EU as soon as possible [Wis21].

1.4 Ukrainian-Russian War contexts

According to Jannis Grimm - German expert on protest movements and conflicts ”many Telegram groups prominent among anti-vaxxer, where members are parroting Kremlin propaganda (..) Due to the easing of Covid19-related restrictions, movements such as ’Querdenken’ have been slowly but steadily losing traction in the past weeks. War in Ukraine has now triggered a shift” ¹.

Pro-Russian/pro-Ukrainian propaganda with #IstandwithPutin in English ² and the Greek ³ Twittersphere have been already attempted by social media researchers. Which is important to notice, most of #IstandwithPutin is coming from Asia, Americas and Africa (even war is happening in Europe). Some researchers have looked at botnets (i.e. accounts with small number of followers and interaction within less than 1 second) ⁴. Thus, this hashtag seems to be an interesting starting point for investigation. However, quantitative analysis of possible link between war and coronavirus discourse is missing.

1.5 Research questions

We want to investigate:

- To what extent proKremlin position during Russian invasion correlates with appearance in vaccine and anti-lockdown protests discourse;

¹<https://twitter.com/jannisgrimm/status/1496750923292499969>

²<https://twitter.com/marcowenjones/status/1499312099041947649>, <https://medium.com/dfrlab/istandwithputin-hashtag-trends-amid-dubious-amplification-efforts-2b8090ac9630>

³<https://twitter.com/gmikros/status/1500489494662893568>

⁴<https://twitter.com/conspirator0/status/1499498721964351491>

- Is there difference between proKremlin and antiKremlin accounts in overlapping with vaccine and anti-lockdown protests discourse?
- pro Kremlin position during Russian invasion correlates with antivaxx/supporting corona protest attitudes;
 Additionally we want to compare vocabulary and sentiment between pro/anti-Kremlin discourse.

2 Data and Methodology

This study we retrospectively processed Twitter data. Authors understanding of Research Integrity and difficult circumstances, suggest that user names of #IstandwithPution cannot be revealed because of possibility of user miss-classification (not 100% specificity). The research does not violate the terms and condition of the platform (no profiling of single account based on produced content was applied). R package rtweet for Twitter application programming interface (API) was used with query with 1) "impfung" (vaccine) keyword from 2021-01-27 to 2021-06-07 2) hashtag #B2908 (anti-lockdown protest) from 2020-08-17 to 2020-09-08, 3) hashtag #IstandwithPutin (Russian invasion) from 2022-02-24 to 2022-03-04, all for language: de (German). Some brief insights onTwitter discussion in German during first year of pandemic has been described by researchers [Jar20], [RvN21], [DRA+21]. In this study, we will mainly incorporate Social Network Analysis (SNA) [JPB19]. The network graphs shows Twitter accounts interacting using igraph package). The nodes represent individual accounts, the lines between them are retweet. We choose retweeting (the Golden Standard for Social Media Engagement with better information propagation prediction liability than following, commenting, replaying etc. [BGL10]) activity as a based of our networks. Thus, the base of determining particular pro/anti position in a given discourse is a subset of users who retweeted or were retweeted. Louvain community detection [BGLL08] (and in case of big networks of COVID issues spinglass [RB06] with fixed number of only two communities was selected) of retweets was applied to shed light on structure and the Fruchterman-Reingold layout algorithm was used for visualization. Different colours are different communities (accounts that tend to interact with one another more than with rest). Thus, our classifiers worked purely on meta-characteristics of the interactions and do not work on the content as in other studies [KWO+21].

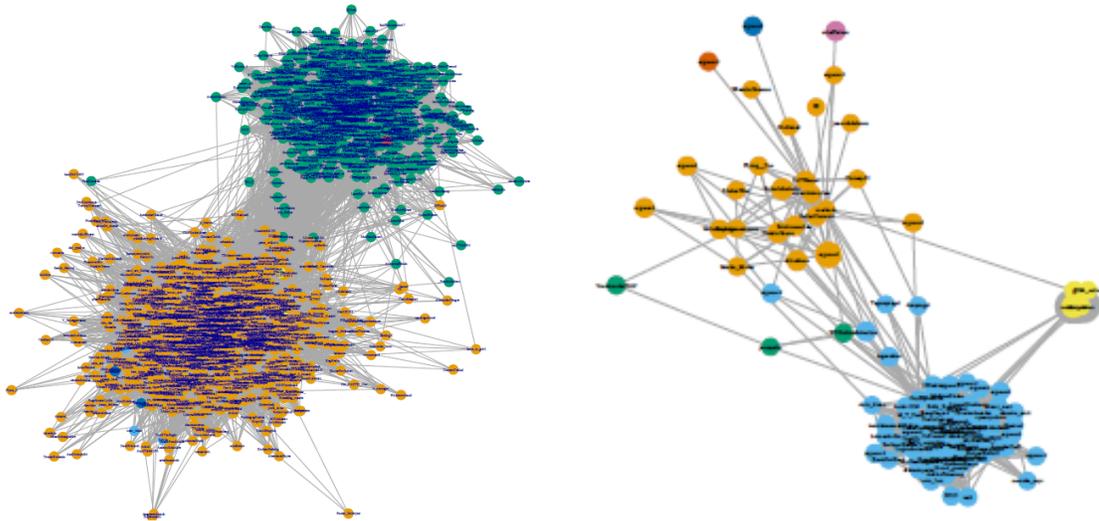


Figure 1: (Left) Bimodal pro/anti- corona sceptic protest of 29.08.2020 and (Right) Bimodal pro/anti-vaccine discourse in the first half of 2021 [[AND] both nets plotted after filtering. To be updated]

Simple NLP (natural language processing) procedures were applied after words stemming (using unnest_tokens function) and removing stop words. Sentiment with use of words positive/negative/neutral load [RQH10] was calculated. Simple conceptual fields analysis in terms of most frequent keywords was also initiated.

To assess overlapping sets we have selected accounts created before 15.07.2020. First of all to exclude accounts created for a short time only (i.e. bots or quickly blocked extremists) and include only accounts with a history.

3 Results

Provided analysis is a signaling rapid response only and deep investigation will be needed to explore research problems further.

3.1 Polarizing discourse and hashtag hijacking

To distinguish automatically potentially pro and anti protest as well pro and anti vaccine discourse spinglass algorithm was chosen (after removing users who do not belong to the giant component, thus small amount of accounts, but). We obtain 42 314 users who were classified as protests supporters and 25 803 who were against protests, as well as we obtained 72 669 users who were classified as pro vaccine and 26 792 who were anti vaccine. Note that, no cleaning afterward was performed. In both coronascepticism and vaccine Twitter discussion we can observe clear visual polarization of two filter bubbles of similar size [Fig. 1]. Most of social movements are accompanied with opposite movement [Pla20] (phenomenon of Hashtag hijacking [Rod20] where opponents are discussing under hashtag of the enemy). However, border between pro/anti-vaccination and corona protester/anti-corona protesters are blurred.

3.2 Selecting pro/anti- Kremlin clusters

Classification of users to classes (pro/anti-Kremlin) is a difficult task. Some researchers proposed classification of tweets based on Fake/not fake [Gol20]. Instead of deep content analysis we proposed collective classification depending of belonging to a given community based on retweeting behaviour. Through manual overview the giant component [Fig. 2] is pro Ukrainian (Hashtag #IstandwithPutin was hijacked by German Twitter community).

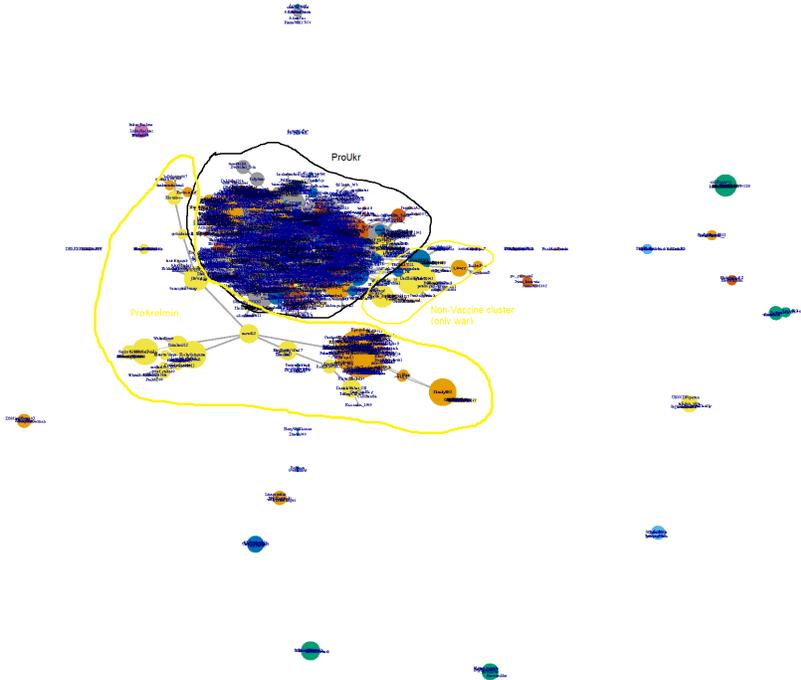


Figure 2: Division of war discourse into most of the giant component (proUkrainian) and rest of the net (proKremlin) [[AND] To be updated]

Sentiment	neg	neu	pos
ProKremlin	3.5%	92.6%	3.9%
AntiKremlin	3.8%	89.7%	6.5%

Table 1: Sentiment of content (by words) for both clusters

Small disconnected graphs were classified as proKremlin. Moreover, peripheral part of the Giant component does not provide antiKremlin narration (yellow) as the rest of pro-Ukrainian cluster so the whole community (mainly Arabic and Serbs minorities or supporters) was classified as proKremlin [Fig. 2]. Another indicator of suspicious behavior was a large number of disconnected dyads and small nets (mainly proKremlin).

Thus 1890 accounts were classified as anti-Kremlin and 199 as pro-Kremlin. Note, that additional cleaning were not performed.

3.3 Comparative analysis pro/anti- Kremlin content

The level of aggression (negative load) is more-less the same among both clusters. ProKremlin is less optimistic than AntiKremlin, which suggest that ProKremlin discourse is less emotional and more calculated [Tab. 1]).

We can see that main discussion is concentrating on Americans (i.e. building relativism stating that USA have been invading other countries) or Energy (i.e. Germany needs Russian oil, gas and carbon) [Fig. 3].



Figure 3: Words clouds (100 most frequent stems) of left ProKremlin and right AntiKremlin discourse [[AND] To be updated]

On the other hand antiKremlin words cluster use vulgar names for Vladimir Putin (but not proper German, words as "Hitl", "fckptn" which will not be detected by sentiment analysis [Tab. 1]) and words suggesting that in proKremlin cluster there are so-called "Russian troll farms". Moreover, AntiKremlin cluster accused coronasceptic movement (i.e. so called "covidioten") to be manipulated by proKremlin narration.

3.4 Accounts Overlapping

The highest absolute overlap is between vaccine and war's proKremlin accounts, however the highest relative overlap is between coronasceptic protest and proKremlin war's accounts [Tab. 2].

Prokremlin users were over 13 folds more likely than AntiKremlin users to propagate coronosceptic content during Berlin protests and 25 time more to be engaged in antivaxx community.

Overlap	ProKremlin (199)	AntiKremlin (1890)	OR (p-Value)
Coronasceptic Protest	90 (45%)	591 (31%)	1.81 (<0.001)
Coronasceptic Protest (Pro)	70 (35%)	86 (5%)	13.2 (<0.001)
Vaccine	125 (62%)	928 (49%)	1.71 (<0.001)
Vaccine (Anti)	102 (51%)	75 (4%)	25.3 (<0.001)
Vaccine AND Protests	84 (42%)	526 (28%)	1.89 (<0.001)
Vaccine (Anti) AND Protests (Pro)	66 (33%)	18 (1%)	51.3 (<0.001)
Vaccine OR Protests	131 (67%)	993 (52%)	1.74 (<0.001)
Vaccine (Anti) OR Protests (Pro)	113 (57%)	143 (8%)	16 (<0.001)

Table 2: Descriptive statistics of users sets overlaps (number of accounts co-occurring in given sets of users). Fisher two sample test was applied with OR (odds ratio) for statistical significance verification.

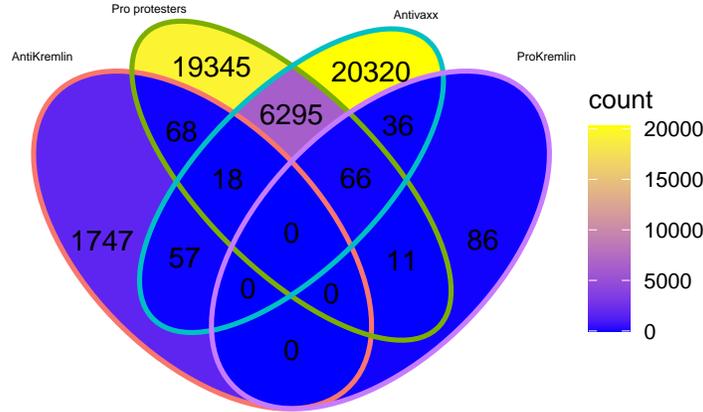


Figure 4: Venn diagram of the users engaged in multiple activities with overlapping sets showing how many accounts belongs to each subsets.

The biggest difference between proKremlin and antiKremlin overlapping characteristic is observed for Vaccine AND Protest (intersection of both sets [Tab. 2, Fig. 4]), so it suggests that proKremlin users are especially likely to get involved in all kind of polarizing activity. **Thus, 51 folds higher activity of ProKremlin users in both antivaxx and antilockdown communities suggest strong cohesion and mobilisation of these accounts [Tab. 2].**

4 Conclusions

The listening of social media makes it possible to trace COVID-19 perception and allows to early detect possible behavioral changes associated with the epidemic, however the impact of narrative driven by foreign intelligence was surprisly not considered enough by Western epidemiology, while most infodemiological efforts concentrates on bots [HWGD+21] or fake news[RdMD+21].

4.1 Infodemiology: profiling discourse

This analysis focuses on the supply of disinformation on Twitter by examining what proportion of proKremlin accounts active during first days of invasion on Ukraine were engaged in COVID related discuses on Twitter. Infodemiology can be useful in understanding reasons of popularity of antivaxx and coronasceptic movements if some external political propaganda is active. Analysis of keywords and topics structure can be premising in understanding which topic are valuable for fueling by foreign intelligence. Thus, we can suggest that Kremlin propaganda is profiled to each country individually, as in Germany fossils are main frame of concern [Fig. 3]), in English speaking world anti-Western attitudes are present ⁵, when in Poland Ukrainian genocide on Polish population during WWII is played on ther other hand ⁶. Multi-layer SNA analysis of overlapping accounts may help to identify which users may

⁵<https://twitter.com/marcowenjones/status/1499312099041947649>

⁶<http://ibims.pl/komunikat-ws-szerzenia-dezinformacji-ws-sytuacji-na-ukrainie-w-polskiej-przestrzeni-internetowej/>

be the most susceptible for propaganda. Internet content is currently intensively analyzed for the English speaking societies in the context of perception non-pharmaceutical interventions or vaccines and foreign intelligence trolls ⁷, which are not directly transferable to further European countries. Moreover, studies for languages as German are extremely underrepresented also in terms understanding role of Kremlin propaganda in contrast to Eastern European languages [MS22].

4.2 Infodemiology: quantifying engagement of ProKremlin users

Users engaged in Prokremlin war propaganda are almost 2-folds likely to be previously engaged in COVID related discourse than users who supported Ukraine [Tab. 2]. Based on the analysis of protest material of the anti-lockdown Berlin demonstrations in 2020 and COVID-19 vaccine, overlaps between accounts of proKremlin attitudes can be identified and significantly different from anti-Kremlin users. However, conclusions need to be carefully assessed if they are interpreted correctly according to statistical reasoning. By a simplified spin-glass cauterisation method we suggest that proKremlin user was 13 times more likely to tweet in cluster of coronasceptic accounts during Berlin Protests and 25 more in cluster of antivaxxers than was the average antiKremlin user. This is in line with previous research in USA than Russian trolls could more than 20 folds more likely engage in vaccine (preCOVID) discourse Twitter user [BJQ⁺18]. However, huge intersection of both COVID anti-scientific cluster and proKremlin war accounts suggest (over 51 folds) that proKremlin users are extremely coherent and consistent in engaging in multiple polarizing discourse and this should turn on the red light for public health authorities. To conclude, there is a strong evidence of association between the Prokremlin attitude and the Corona discourse, which need further investigation to understand internal/external motivations of users. We can only confirm, that majority of proKremlin classified accounts were engaged in COVID discourse. However, we cannot say how many of coronasceptic and antivax accounts are proKremlin. We can only speculate that only minority of anti-corona discourse is proKremlin [Fig. 4], so still there is a hope and possible place for public health interventions.

More comparative content analysis is needed, because the same so-called "conspiracies theories" as role of "Big Pharma" or "bio-weapon laboratories" were identified in all datasets, however quantification of this phenomenon is still required.

4.3 Limitation

We confirm that majority of proKremlin accounts using #IstandwithPutin were involved in COVID discourse, however our research cannot be extrapolated to whole war discourse on Twitter. There is high uncertainty in this classification, because there is also pro Ukrainian content produced by proKremlin accounts. There are plenty of possible arguments explaining this phenomenon. Mark Owen Jones and David Broniatowski [BQDJ20] are suggesting that one of the tactic of proKremlin agents of influence is mixing opposing content (presenting views of both sides) to get higher reach. Another possible explanation is mis-classification (false positive, so when account is classified as proKremlin by mistake). Moreover, the ground truth for is also not know and we there no consensus how to properly label messages [HBBR⁺18]. On the other hand, fact-checking and fakes classifications in proKremlin messages is much easier to obtain with very good performance (for instance by agreement between human judges [GAC⁺20]). Additionally, the classes (pro/anti-Kremlin) are imbalanced, thus involvement of ML/AI algorithms would still have a problem with classification. It's important to notice, that Twitter is actively moderating, which bias the results. For instance significant amount of account engaged in coronasceptic protests have been closed or suspended. The results of this study cannot be extrapolated for other countries due to uniqueness of German political Tweetsphere.

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