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## **The Patterns of Influence: LIWC Analysis of Leading News Portals' Impact and Communication Accommodation Theory on Twitter**

**Abstract:** A quantitative analysis was conducted on the tweets of 20 leading Serbian mass media outlets and their followers during the three months from January 1 to March 30, 2021. The analysis, that encompassed more than 1 million tweets, was conducted using (a) Twitter API, (b) the Serbian version of LIWC linguistic dictionary, and (c) additional statistical analyses. Analyses revealed that words related to affective processes (negative emotions), social processes (family and friends), perceptual processes (feel and hear), and personal concerns (work and religion) expressed in tweets of mass media were predictors of the same words in not necessarily related tweets of their followers. The research has shown that spread of psychological and linguistic patterns by media and social networking sites is not limited to negative emotions solely. This research highlights the significance of recommender systems, as they help to determine the content that social media users encounter on a personal level. The findings also indicate how we can address emerging and pressing issues that affect individuals' well-being and democratic capacity, such as echo chambers and polarization. The obtained findings are in line with the communication accommodation theory, emotional contagion theory and negativity bias. Limitations of the present research, future directions, and implications are discussed.

**Key words:** power of mass media, social media impact, communication accommodation theory, recommender algorithms, polarization

### Introduction

At present, social media networks are predominant channels of media consumption that are changing traditional public communication (Kalsens and Larsson 2017). Despite their growing relevance, social media networks are described as a place for spread of 'bad news' (Park 2015). In some ways, social media are extending what traditional media do in their effort to get attention and prolong media use by the public.

Generally, researchers frequently focus on the influence of new media on traditional forms of media (Larsson 2013; Newman 2009; Rogstad 2016). Unfortunately, the influence of the mainstream media on these new forms of media remains insufficiently researched. Still, this research topic has lately sparked some interest among researchers in the field of media, and the results show that the mass media possibly still have a strong influence in setting attention to the entire media sphere. For instance, some researchers such as Harder et al. (2017) have stated that the “news story” approach needs to be introduced, to follow the pathway of information through media sphere and that traditional media sources on Twitter have a “vastly more agenda-setting influence than other actors do” (Harder et al. 2017, 275). In another study that analyzed the agendas during the 2016 U.S. presidential elections, it was found that, although Twitter as a social media platform was quite likely to break from “media gatekeeping”<sup>1</sup>, its agenda would remain under influence of traditional forms of media (Conway-Silva et al. 2017). Similarly, a study done by Vargo et al. (2015) has shown that, even though agenda salience on Twitter is more volatile when compared to mainstream media, due to its openness to real-time occurring events, the priming and new stories are largely set by the traditional media.

However, increasing use of social networking sites for entertainment and news consumption in a novel online environment with more choices and target group fragmentation threatens the traditional agenda-setting power of the mass media (Feezell 2018). The role of editors is overtaken by AI trained algorithms that offer content on an individual basis to social media users with the final aim to extend time of their use. These recommender algorithms are not transparent, which is the same as editorial work in traditional media, but it is possible to fine tune how they work to deliver diverse content. This could be regulated by law (Bojic et al. 2021).

Related to this issue, three corresponding theories are identified: emotional contagion theory (Hatfield et al. 1993), negativity bias (Rozin and Royzman 2001) and the communication accommodation theory (Giles 1973).

Emotional Contagion Theory is a psychological phenomenon where the emotions of one person are transmitted and mimicked by another person (Hatfield et al. 1993). This theory suggests that people can pick up and “catch” the emotions of others through nonverbal cues such as facial expressions, vocal tones, and body language. The theory explains how emotions can spread through a group

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<sup>1</sup> Media gatekeeping is a process by which media outlets decide which stories should be presented to their audiences. It involves journalists and editors making decisions about which stories should be given priority and which should be excluded, based on their own criteria. This process can influence public opinion and shape the narrative of current events.

or a population, and how people can quickly synchronize their emotions and behaviours (Hatfield et al. 1993).

Earlier studies have shown that human emotions and related behaviors can spread quickly through different types of social networking sites affecting physically distant individuals, which is called emotional contagion (Hatfield et al. 1993; Hill et al. 2010; Pugh 2001). Previous research has shown that emotions can also spread in the online context on different social media (Dang-Xuan and Stieglitz 2012; Guillory et al. 2011; Harris and Paradice 2007; Kramer et al. 2014). For instance, it was found that negative emotions users express on social media are spread to other users, even though events expressed in posts are unrelated to the social media users (Coviello et al. 2014). More importantly, modifications of news feeds have shown a different impact of posts to emotions of its online consumers (Ferrara and Yang 2015; Kramer et al. 2014; Tang et al. 2012). Again, this also points towards the power of algorithms that recommend content.

Negativity Bias Theory is a psychological concept that suggests people are more sensitive to negative stimuli than positive stimuli (Rozin and Royzman 2001). Negativity bias explains how humans are more likely to focus on and remember negative events, and how this tendency can influence our behaviour and decision making processes (Rozin and Royzman 2001). This theory could be useful tool for understanding how negative experiences can shape people's behaviour, and how to recognize and modify this bias.

Negative emotions have a bigger impact and provoke more intensive behavior than positive or neutral emotions (Baumeister et al. 2001). The impact of negative emotions is examined by the theory of negativity bias (Baumeister et al. 2001; Derks et al. 2008; Rozin and Royzman 2001). Analysis has proven that humans tend to embed anger or sadness in Wikipedia articles about traumatic events (Greving et al. 2017). This points to the fact that humans are emotional beings that cannot resist expressing emotions even in what should be an objective online encyclopedia article. Liebrecht et al. (2019) explore intensification of negative and positive utterances and words to find out that negative emotions still have higher overall effect. The impact of negative emotions is also explored in recent research regarding computer-mediated communication. Social media content with negative emotions provokes more interaction, such as commenting, liking, and sharing, than posts containing positive emotions (Stieglitz and Dang-Huan 2013). The noted inquiries also suggest that politically related social media content with more negative feelings is shared much more than content with less negative emotions. This is confirmed by Kramer (2012) according to results of his Facebook research. In a more recent COVID-19 related research, Wheaton et al. (2021) has found that consumption of news predicted anxiety about the pandemic.

Communication Accommodation Theory (CAT) is an interactional approach to communication which suggests that individuals adjust their communication style in order to be better understood and to build social relationships (Giles 1973). This theory proposes that communication is a dynamic process of accommodation, or the adjustment of one's style to fit the style of the other person, in order to build rapport and understanding (Giles 1973). CAT explains how people adjust their communication style, such as the use of language, gestures, and intonation, in order to fit the context, the relationship, and the situation (Giles 1973).

CAT is a framework to understand the motivations for and ways in which individuals adjust their speech to create, maintain, or decrease social distance in interactions (Soliz and Giles 2014; Dragojevic et al. 2016;). Basic adjustments that happen when people interact are convergence and divergence, depending on whether similarities or differences are emphasized in communication (Giles et al. 1987). Since the 1970s, CAT has been established as a general theory of language and communication applicable in various fields of social life (Giles et al. 1973). For example, researchers analyze how our communication is enacted to maintain relational, personal and familial identity (Giles 2016; Soliz and Colaner 2017). Further, CAT is used to understand the communication dynamics in institutions and organizations (Watson and Soliz 2018), including productive and destructive conflict in culturally heterogeneous workgroups (Ayoko, Härtel and Callan 2002), impact of English to Welsh language through Twitter (Johnson 2013) and brain damage conditions such as aphasia (Simmons-Mackie 2018). Some of the studies focus on communication between patients and medical professionals (Watson and Gallois 1998), classroom interactions (Parcha 2014; Weizheng 2019), science communication (Rice and Giles 2016; Gallois et al. 2016), gendered language (Hancock and Rubin 2014), accent stereotyping (Montgomery and Zhang 2017), human-machine interaction (Linnemann and Jucks 2016; Buzzanell et al. 1996), instant messaging (Riordan et al. 2012), role of power (Muir et al. 2017), miscommunication (Williams 1999) and so on.

Linguistic style plays an important factor in news media reports and headlines (Piotrkowicz et al. 2017). The language used by different types of news media portals will differ depending on their nature and the contents they want to publish (Marchal et al. 2019; Piotrkowicz et al. 2017). For example, news media sources that publish junk news and information use emotionally driven language that incorporates emotive expressions, hyperbole, excessive capitalization, etc. (Marchal et al. 2019).

A question that remains open in research is whether the linguistic style used by mass media influences their followers and their linguistic style. A recent study done by Fong et al. (2021) has shown that psychological and linguistic categories in tweets of conspiracy theory advocates are also reflected in tweets

of their followers on Twitter. Conspiracy influencers and their followers often use language related to negative emotions (e.g., anger, anxiety), power, death, and religion (Fong et al. 2021).

However, the overwhelming issue related to above noted theories is the scope of the influence, such as whether these linguistic categories go beyond negative emotions and if they affect the general communication and mood of social media users. Such a finding would demonstrate effects in all segments of the life of the person who is exposed to media content and could point towards the social impact and responsibility of content creators.

### *Hypotheses*

The hypotheses aimed to be tested were derived from the communication accommodation theory (Giles 1973), emotional contagion theory (Hatfield et al. 1993) and negativity bias (Rozin and Royzman 2001). The gap in the existing knowledge addressed by this inquiry relates to understanding of how social media content created by powerful mass media companies in Serbia (e.g., national TV and radio networks, newspapers, periodicals, etc.), and distributed via social networks, in this particular case Twitter, affect emotions and linguistic styles of their followers.

Previous studies have been able to establish certain mechanisms of online influence and spread of emotions (Bond 2012; Centola 2010; Kramer et al. 2014), although the methods were limited primarily due to scale limitations and lack of external validity. The goal of the current inquiry is to confirm previous findings in terms of how negative emotions are spread online and to extend the base of knowledge. The novel findings could suggest even more impact of both traditional media and online content, by actually lending support to communication accommodation theory. Also, the findings of previous research studies would be examined in a large sample of tweets. The final aim of this research is examining if emotions and linguistic patterns of social media posts published by mainstream media on their profiles are reflected in posts of their followers.

Research hypotheses are formulated as follows:

1. Analyzed media differ in the language they use, which can be detected through the linguistic categories expressed in their tweets. This can provide important insights into the differences between media outlets, which could be related to the topics discussed and the way in which they are presented.
2. Beyond just negative emotions (e.g., Fong et al. 2021), other linguistic categories expressed in media tweets are reflected in tweets of their followers, as expected by the theory of emotional contagion (Hatfield et al. 1993), which envisions the spread of negative emotions through social media and as expected by the communication accommodation theory (Gasiorek et al. 2021), which envisions adju-

stments in communication's linguistic styles depending on the parties taking part in the interaction. If increases in negative emotions among media followers are not found in relation to increases in negative emotions in media tweets, this would be enough to reject the hypothesis. In the event that changes in the frequency of linguistic categories would not be detected among media followers in the same direction as in media tweets, this would be enough to reject this hypothesis. The analysis would consider linguistic categories from the adequate linguistic dictionary to be used in the analysis.

## Methods

### *Text sample*

This study required (a) data collection from Twitter, (b) applying an appropriate linguistic dictionary on tweets to get word count per day and linguistic categories, and then (c) conducting statistical analyses to test the hypotheses. In the following paragraphs, the key aspects of the research procedures will be described.

In this study, data was acquired from public social media profiles on Twitter, including both the official Twitter accounts of leading mass media portals from Serbia and their followers on that social media.

Twitter is a social networking site, which launched in 2006. Twitter now represents one of the largest social networking sites. It has about 330 million active data users worldwide. Twitter is a social network mostly used for information and discussion (Park 2015; Stieglitz and Dang-Xuan 2013). That is the primary reason why this platform was chosen for the research. Another reason why Twitter would be used as the primary source of data for this research is technical, as well as legal in nature. In contrast to Facebook and other social networks, Twitter provides public data and API access for research applications, without major restrictions.

Data in this study was collected through Twitter API. Every word in the sample of tweets is classified into one or more of the LIWC categories. It was counted how many of these words fall into LIWC categories each day.

### *LIWC*

Once content was collected through Twitter, the primary analysis tool that was deployed was the Linguistic Inquiry Word Count (LIWC), a linguistic tool in development since 1992. Multiple studies show that LIWC dictionaries can be used to identify emotions in large portions of texts (Alpers and Pauli 2006; Kahn et al. 2007; Tausczik and Pennebaker 2009). So far, LIWC dictionaries

exist in nine languages including English (Pennebaker et al. 2015), Spanish (Ramirez-Esparza et al. 2007), German (Wolf et al. 2008), Italian (Alparone et al. 2004), French (Piolat et al. 2011), Russian (Kailer et al. 2011), Portuguese (Balage Filho et al. 2013), Dutch (Boot et al. 2017), and Serbian (Bjekić et al. 2014).

The LIWC categories cover a range of linguistic dimensions, psychological processes, personal concerns, and spoken language (Pennebaker et al. 2015). These categories include functions, pronouns, personal pronouns (e.g. we, you, she, he, they), articles, verbs, auxiliary verbs, adverbs, prepositions, negations, quantity-related expressions, and numbers. They also encompass society issues (e.g. family, friends), affect (positive emotions, negative emotions), cognitive mechanisms (e.g. inhibition, inclusive, exclusive), perception (e.g. seeing, hearing), biological issues (e.g. body, health, sexual functions, ingestion), dynamic categories (motion, space, time), economy topics (work, achievement, leisure, home, money), and religion-related topics (Pennebaker et al. 2015).

### *Procedure*

It was decided to limit analysis to Serbian media, because of the author's extensive knowledge of the local media scene and because of technical limitations. Firstly, a decision was made about the Twitter profiles of Serbian mainstream media that would be taken for analysis. The intention was to analyze major media, both news, and entertainment related. For that purpose, the most relevant listing of media on the Socialbakers platform (Socialbakers 2019) was taken into account. Because of technical limitations it was decided to take the 20 most popular media profiles from Serbia. According the Socialbakers list this meant considering *Tračara*, *Vice*, *RTS*, *Prva*, *Tanjug*, *Pesčanik*, *Svet*, *Novosti*, *NIN*, *NI*, *Noizz*, *Kurir*, *Informer*, *Insajder*, *Hallo*, *Blic*, *Danas*, *B92*, *BIRN* and *BBC*.

The next steps in methodology included some filters. After obtaining lists of followers any data not needed for further research were excluded. These were the data which might be considered personal. The process is called anonymization (Zhou et al. 2008). This included locations, descriptions, names and usernames. Further, only unique followers were chosen for analysis. This meant the exclusion criteria was not to follow Twitter profiles of other media that were subject of analysis. The reason behind this decision was to measure the influence of just one media for each social media user. By doing this 20 groups of Twitter users were obtained. The groups were further filtered by the number of tweets they had posted, keeping those that had more than 500 or less than 100,000 tweets. Individuals that post less might be infrequent Twitter users, which may indicate they would not be exposed to tweets of mass media. Also, the individuals that post too much might be machine-based bots or profiles or business profiles. Each profile was tested in terms of language in its posts to

keep only those profiles that posted in Serbian language. Finally, the random choice was made to decide which profiles are taken into analysis so that each group had exactly 1,000 profiles. Applied filters were automatic, based on a script that was made for that purpose.

However, one important limitation of this research was the inability to create a control group that would not include followers of any of the 20 analysed media. This was an impossible task to complete in an automated manner, and manual filtration would have taken an excessive amount of time. As a result, no control group was used, influencing the results and discussion that followed.

The next step in the process included obtaining unique tweets from Twitter API that were published within a range of three months from 1 January to 30 March 2021 by both media and exact profiles in groups of their followers. Additional script-based check was made to see if some retweets are considered by mistake, as only unique Tweets were meant to be subject of further analysis. Tweets of 20 mass media were gathered with tweets of 20 groups of their followers, each group corresponding with one mass media, the total of 1,000,241 tweets.

Each set of tweets from 40 sets (both media and their followers) were analyzed in LIWC software using Serbian dictionary for automatic text analysis (LIWCser; Bjekić et al. 2014). In order to make the results more consistent and comparable, we added an additional layer of optimization. This optimization involved normalizing the results by calculating the number of tweets divided by the number of detected linguistic categories from LIWC. This allowed us to get values in the range of 0 to 1, which could be used to compare the number of tweets per day to the number of detected linguistic categories from LIWC. Due to technical limitations, it was only possible to calculate scores for each LIWC category for dates. This meant that the calculations related to one day of tweets for both the media and their followers. To represent this, it was most appropriate to include these scores (numerical values) in one table per pair for 20 pairs; with the media tweets and follower tweets as columns and dates as rows.

The statistical software was used for further processing (IBM 2020) of each acquired table, to test the hypotheses with linear mixed-effects modelling and canonical discriminant analysis.

Linear mixed-effects modelling (Gelman and Hill 2006) is a tool for analysing data that accounts for both fixed and random effects. Linear mixed-effects models can be used to examine the effects of one or more independent variables on a dependent variable, while accounting for the correlation between repeated measures, or between different levels of nested data. This method is also useful for assessing the strength of the relationship between variables, and for testing hypotheses about the nature of the relationships.



As for the linear mixed-effects modelling applied in this study, the fixed effects were linguistic categories of media, while the random effects were days and the dependent variables were linguistic categories of followers expressed in their posts.

Canonical discriminant analysis (Hair et al. 2010) required the following steps to be conducted. First of all, the test performed was an interclass correlation coefficient, which determined how much the tweets from different media sources were dependent on the daily observations. Following this, a structure was obtained using the method of canonical discriminative analysis that showed how the LIWC categories were structured by media. The analysis found one discriminative function that met the statistical criteria and had a unique value, which is displayed in Table 1. This function encompasses the following 17 LIWC categories: Affect (,873\*), Positive Emotions (,855\*), Relative (,837\*), Space (,828\*), Social (,820\*), Achievement (,801\*), Negative Emotions (,693\*), Work (,667\*), Motion (,649\*), Humans (,627\*), See (,615\*), Senses (,475\*), Money (,429\*), Hear (,422\*), Spirituality (,345\*), Spirituality (,345\*), and Friends (,269\*).

Table 1  
Canonical discriminant functions that were used in the analysis.

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	2,374 <sup>a</sup>	59,4	59,4	,839
2	,700 <sup>a</sup>	17,5	76,9	,642
3	,538 <sup>a</sup>	13,5	90,4	,592
4	,258 <sup>a</sup>	6,5	96,9	,453
5	,045 <sup>a</sup>	1,1	98,0	,207
6	,028 <sup>a</sup>	,7	98,7	,164
7	,018 <sup>a</sup>	,4	99,1	,132

## Results

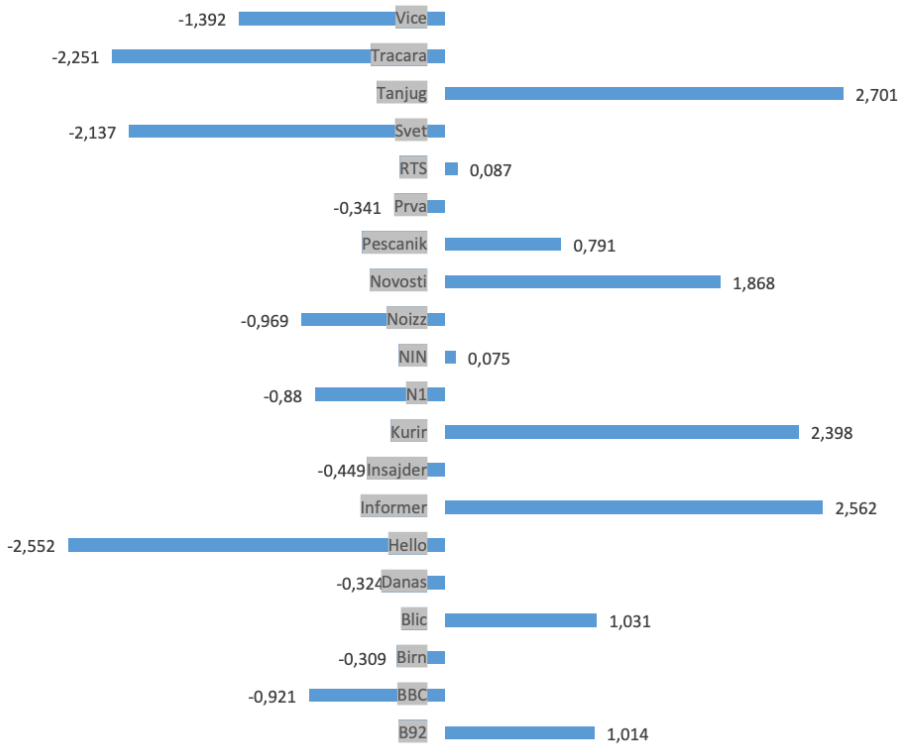
### *Do media differ by the language they use*

Analysis of the language used by the media through the canonical discriminant analysis revealed two distinct groups, presented in Figure 1.

The first group, consisting of news media (Tanjug, RTS, Pescanik, Novosti, Kurir, Informer, Blic, NIN and B92), was characterized by higher levels of affect, positive emotions, relativity, space, social, achievement, negative emotions, work, motion, humans, see, senses, money, hear, spirituality and friends.

The second group, comprising Vice, Svet, Tracara, Prva, Noizz, N1, Insajder, Hello, Danas, Birn, and BBC, was characterized by lower levels of the aforementioned linguistic categories.

Figure 1  
Results of the canonical discriminant analysis.



### *Patterns of influence*

As noted, there were 40 sets of tweets in total, or 20 pairs, each with a group of media tweets and a group of follower tweets. After the primary analysis was done, in which presence of each LIWC category was counted, linear mixed-effects modelling was done for each of the pairs.

The fixed effects were linguistic categories of media, the random effects were days, while the dependent variables were linguistic categories of corresponding followers, which were expressed in their posts.

Results have shown that certain LIWC categories expressed in the tweets of the media predicted tweets of their followers that were not necessarily related to the tweets published by the media. This means that all tweets from media followers were considered. Here is the list of LIWC categories that were detected as significantly related in terms of media and their followers: negative emotions,

hear, friends, work and religion, while the categories of feel and family approached significance. The results showed a direct proportional relationship between media and their followers for the categories of negative emotions, friends, work, religion, and family. Conversely, an inverse proportional relationship between media and their followers was observed in the 'hear' category, which is related to the sense of hearing. This is presented in Table 2.

Table 2  
Mixed Model Fixed Effect Estimates of Linguistic Categories Found in Posts of Media, as Predictor for Linguistic Categories Found in Posts of Their Followers

LIWC category	Fixed effects – linguistic categories of media	Sig.	St. error	95% Interval	
				low	high
Family	1.890	.061	0.1	-2.7	2.3
Feel	7.632	.063	0.5	-5.1	4.3
Hear	-5.307	.029	0.3	-1.8	0.6
Negative emotions	8.588	.033	0.1	-4.7	3.1
Friends	12.687	.004	0.2	-7.1	5.1
Religion	8.621	.0001	0.7	-10.6	8.2
Work	8.168	.026	0.2	-5.4	3.0

## Discussion

Significance of the question examined by this inquiry relates to how mass media affect our societies. Also, at the same time, this research deals with the effects of social media. Both contents published by regular users, brands, influencers, various content creators and mass media affect everyone that is exposed. Previous inquiries dealt with negative emotions, while ignoring other psychological and linguistic categories. That is why the purpose of this research is to confirm previous findings but also to check if other LIWC categories present in posts of mass media can also be understood as predictors of unrelated posts of their followers, which would then have repercussions for communication accommodation theory (Giles et al. 1987), on top of emotional contagion theory (Hatfield et al. 1993). However, when looked from the bottom point, this multi-layered inquiry addresses the basic question relating to social psychology and mass media – should journalists care about consequences of their reporting, emotions and other linguistic patterns that are conveyed through the content they create. The same goes for creators of social media content and most importantly for AI recommender systems that decide what social media users are exposed to in real time and on an individual level.

*Do media differ by the language they use*

Canonical discriminant analysis of the language used by the media revealed one discriminative function consisting of the following LIWC categories: affect, positive emotions, relativity, space, social, achievement, negative emotions, work, motion, humans, see, senses, money, hear, spirituality and friends.

Two groups of media differentiated by the strength of the above noted LIWC categories. This confirms Hypothesis 1 of this inquiry.

The first group of media, high in the noted LIWC categories, consists mainly of those that base their programs on news and information. These are Tanjug, RTS, Pescanik, Novosti, Kurir, Informer, Blic, NIN and B92. It could be argued that seven of these promote are pro-government media, and three of these are considered tabloid media.

The second group (Vice, Svet, Tracara, Prva, Noizz, N1, Insajder, Hello, Danas, Birn, and BBC), low in the noted LIWC categories, could be divided into two sub-groups: one consisting of analytical, documentary-based, and opposition narrative media, and the other of entertainment media. However, Prva could not be characterized as opposition-oriented, although it was found to be analytical and low in sensationalistic reporting.

*Patterns of influence*

Psychological processes found in tweets of social media users that were found in mass media include LIWC categories from the domain of affective processes (negative emotions), social processes (family and friends), perceptual processes (feel and hear) and personal concerns (work and religion). This confirms Hypothesis 2 of this inquiry.

First of all, although causality is not firmly established, the noted results indicate that mass media could be very influential on their Twitter followers in Serbia. This inquiry looks at the issue from the perspective of social psychology and therefore surpasses topics and concepts that are being transferred from media to the public. Contrary to this, the issue was examined from a granular level, in terms of patterns. Nevertheless, it is possible to detect a certain magnitude of influence, as seven of the 55 linguistic categories were found to be correlated between two groups: the Serbian mass media and their followers. The possible influence could be present in other countries as well, as this result may not be limited to Serbia. However, the question arises if the same linguistic patterns of influence would be found if the same analysis was conducted in other countries.

The Result that mass media possibly affect the increase of negative emotions in posts of social media users points towards previous research inquiries, such as that of Fong et al. (2021). As noted before, negative emotions are transferred

easily through different types of communication not exclusively related to mass media and social networking sites. This result once again points out that the professions of journalists and content creators are highly responsible. Societies have never faced the issue of negative news, especially when decisions about what to publish and how to portray it were in the hands of editors, owners of media and governments. Now the situation is different with more control given to tech companies, recommender algorithms and individual content creators.

However, the major contribution of this inquiry relates to the finding that mass media possibly impact much more than solely negative emotions of their followers on Twitter. The fact that mass media impact the lives of their users on multiple levels may indicate “media diet” must be considered when thinking about the well-being of citizens (Andersen et al. 2016). The choice of what to consume, how to use social media, mainstream media and smartphones as devices might be much more important than people think. This issue is under researched and neglected by both scientists and decision makers.

Results go in line with the communication accommodation theory (Giles et al. 1987), as it was discovered that the language of those on the receiving end of communication is similar to the language of the media, which doesn't imply causality. Despite the fact that communication is not directed back to the media, the language of Twitter followers is possibly changed under the influence of mass media they were exposed to. The other possible explanation would be that people belonging to some group adjust their language so that it becomes similar. At this point, without further inquiries, it is not possible to claim who affects whom in the group of similar people that consume similar media. However, it could be concluded that the results of this inquiry go in favor of the Communication Accommodation Theory, as outlined in the introduction. It may be useful to execute a separate inquiry that would consider analysis of news stories and direct comments on them. It is possible to envision the results would show even more influence of mass media with the people that were inspired to respond in the comments section. However, having analysis focused on how mass media impact unrelated posts of their followers, such as in this inquiry, may be much more valuable, as it indicates the magnitude of impact to the psychology and language of ordinary media consumers in their everyday lives.

As one of the results indicates perceptual processes are the matter of possible impact, such as senses of feel and hear, this could further open discussion about neurolinguistics and the importance of such findings, as examined by Roberts et al. (2016). However, it should be noted that although “feel” is listed as one of the categories belonging to perceptual processes in the documentation of LIWC (Pennebaker et al. 2015), this category may encompass a wide array of feelings that are not related solely to the corresponding sense of touch. What if using those patterns of communication tied to senses could stick social media

users to their screens even more in the silent war for attention that is currently undergoing (The Social Dilemma 2020)? Tech companies may already apply this knowledge. This is because the nature of the algorithms may be based on machine learning, the situation in which what happens behind the curtains in the black box of recommender algorithms is unknown.

### *Implications*

The major social and scientific inspiration for this research is to see how emotional expressions were spread in terms of patterns, and not related to some particular topic. The essence of the message conveyed by the media might be less important than the tone that is being expressed. Content that media users are exposed to, which to some extent comes from mass media, has a direct effect on their individual lives, but also to societies in which people live. The question is even more important at the times of Covid-19 pandemics when rumors are easily spread online, constituting content that cannot be controlled by governments or editors of media. Fake news items polarize societies, thus making dysfunctional democracies with lack of constructive public debate. As a consequence, populist politicians get grips of power across the world. This is illustrated by the vaccine issue, as societies are divided into two echo chambers<sup>2</sup>, one that strongly supports the vaccination and the other that opposes it. In this kind of chaos, with conflict as the main tool of public discourse, it is not acceptable to have an opinion somewhere in between. The main reason why this might be happening, according to many researchers, is beyond content creators. This blame is mainly put to AI driven recommender algorithms under control of tech companies, such as social media. These algorithms suggest pieces of content to each one of social media users on a daily basis (Helberger et al. 2016). It has been thought that recommender algorithms use patterns of everyone's social media use, otherwise called digital footprints, that individuals leave behind, to calculate which content will prolong their media use (Bojic et al. 2021). This content is subsequently offered to them. Knowing that these recommender algorithms have the most control of what social media users see and hear online and that they function through calculation of patterns, similar to the linguistic and psychological categories that were part of this analysis, it is clear why this research is important. It should focus the attention of researchers on this pretty much neglected issue, that has social psychology in its core.

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<sup>2</sup> Echo chambers can be defined as situations where individuals are exposed only to opinions that are similar to their own (Garimella et al., 2018). There are two components in the phenomenon — the opinion that is shared by a user, and the “chamber” i.e., the social media around the user which allows the opinion to “echo” i.e., to be re-shared by others.

This research was limited by the lack of a control group, which could not be created in an automated manner and would have required an excessive amount of manual filtration to create. This limitation should be taken into consideration when interpreting the results and discussion.

Nevertheless, bearing in mind such a great importance of the theories of communication accommodation and emotional contagion in terms of society, the result that negative emotions from mass media are found in tweets of their followers might suggest how powerful mass media might be and their significance altogether. This is an era of mass media, flooded with negative news reporting, spreading fear without any idea about the effects of this type of content, and lack of responsibility from editors, journalists, media owners, and most importantly legislators in regulating this field.

As stated before, consequences of this research can be observed on different levels. Societies, democratic processes and individuals may all have repercussions based on what they are exposed to online and offline. Even the perceptual processes of social media users are impacted by online content. It's possible to conclude that more media use words related to some senses that would reflect in posts of their followers. Thus, exposure to media content would not only affect audiences and social media users on emotional but also on perceptual level, as their senses are stimulated by this and potentially provoke actions as well. This may be further explored for the benefit of research in the field of psychology.

The rest of the results may be useful for researchers to focus their future inquiries, for example the finding that the more words connected to family and socializing are used, this would provoke more these words among society members. This goes in line with previous research results indicating benefits of close intimate relationships with friends and family members to their individual well-being (Bojić 2018). Additionally, the finding that religious and work-related topics can also be impactful among social media users, might trigger more research into this matter in economy and theology.

At the bottom point it might be the case that different categories are impactful in different societies and that needs to be examined. For example, if religion is impactful and spreads easily in online social networks that might indicate this topic is desired by the public.

Results of the statistical enquiry indicate possible direct connection between emotional patterns expressed in mass media and emotional patterns found in unrelated posts of social media users. The main implication is the importance of responsibility mass media have when reporting about virtually any issue. Role of journalists and content creators is to depict what happens around them in realistic ways, while editors seek to provide a balanced picture of the events in the society, especially in percentage of negative and positive news, reports and other forms of content. Anecdotal evidence indicates social reality measures both positive and negative events. Why is that different in mass media?

Knowing that the impact of social media, in their various forms, will grow further, the real question underlying this inquiry is how impactful and responsible are recommender algorithms. What would happen if these algorithms would recommend more alternative content to social media users and what effects this would have to social polarization, fake news and democracy.

It would be useful to analyze media and their followers in more countries, as this inquiry was limited to Serbia only. Confirming the results of this inquiry and getting additional insights into how results in various countries differ would be goals of such endeavor.

Additionally, the focus on “echo chambers” may as well produce some important results for the sake of social science. As mentioned before, it may be important to highlight that polarization had been a consequence of mass media reporting in the past (Ognjenović 1995), while the main role is overtaken by recommender algorithms in current times, which calls for an urgent attention of the scientific community.

Overall effects of this research could provoke more inquiries in the same direction. There are some streams that come out from this research: confirming the results that relate to communication accommodation theory (Giles et al. 1987) on even larger sample and in longer time span, with an adequate control group, creating an index to monitor emotions and their spread online through patterns analysis, which would provide a clear picture of how every issue in the public sphere ultimately affects society on emotional level. This inquiry can inspire research in terms of emotional patterns and capability of AI to predict them.

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*Obrasci uticaja: LIWC analiza uticaja vodećih portala za vesti i teorija prilagođavanja komunikacije na Tviteru*

Sprovedena je kvantitativna analiza tviteva 20 vodećih portala srpskih mas medija i njihovih pratilaca tokom tri meseca, od 1. januara do 30. marta 2021. godine. Analiza, koja je obuhvatila više od jednog miliona tviteva, sprovedena je uz upotrebu: (a) Tvit API, (b) srpske verzije LIWC lingvističkog rečnika i (c) dodatnih statističkih analiza. Analize su otkrile da su reči koje su se odnosile na afektivne procese (negativne emocije), društvene procese (porodica i prijatelji), opažajne procese (osetiti i čuti) i lične zaokupljenosti (posao i religija), a iskazane u tvitevima mas medija uticale da se koriste iste te reči u tvitevima njihovih pratilaca, mada ne nužno vezanih za mas medije. Istraživanje je pokazalo da širenje psiholoških i lingvističkih obrazaca, koje su koristili mas medijski portali i društvene mreže, nisu ograničene samo na negativne emocije. Istraživanje je osvetlilo značaj sistema preporuka, budući da oni pomažu da se odredi sadržaj s kojim se korisnici društvenih mreža susreću na ličnom planu. Nalazi su takođe ukazali na to kako možemo da se pozabavimo novim i hitnim pitanjima koja utiču na dobrobit i demokratski kapacitet pojedinaca, kao što su eho komore i polarizacija. Dobijeni nalazi su u skladu sa teorijom komunikacijske akomodacije, teorijom emocionalne zaraze i pristrasnošću negativnosti. Razmatraju se ograničenja sadašnjeg istraživanja, budući pravci i implikacije.

*Ključne reči:* moć masovnih medija, uticaj društvenih medija, teorija prilagođavanja komunikacije, algoritmi preporuke, polarizacija

*Modèles d'influence: analyse LIWC de l'impact des principaux portails d'information et la théorie de l'adaptation à la communication sur Twitter*

Une analyse quantitative des tweets de 20 portails médiatiques serbes les plus importants et de leurs suiveurs a été menée au cours de trois mois, du 1er janvier au 30 mars 2021. L'analyse, qui a englobé plus d'un million de tweets, a été menée par l'utilisation de (a) Twitter API, (b) la version serbe du dictionnaire linguistique LIWC et (c) des analyses statistiques supplémentaires. Les analyses ont révélé que les mots liés à des processus affectifs (les émotions négatives), les processus sociaux (la famille et les amis), les processus perceptifs (sentir et entendre) et les soucis personnels (le travail et la religion) exprimés

dans les tweets des portails médiatiques étaient des prédicteurs des mêmes mots dans des tweets de leurs suiveurs non nécessairement reliés entre eux. La recherche a montré que l'expansion des modèles psychologiques et linguistiques par le biais des médias et des réseaux sociaux ne se réduit pas uniquement à des émotions négatives. Cette recherche met en relief l'importance du système des recommandations, étant donné qu'elles aident à définir les contenus que les utilisateurs des réseaux sociaux rencontrent au niveau personnel. Les résultats obtenus rendent compte également des façons de résoudre les problèmes actuels qui influent sur le bien-être des individus et leurs capacités démocratiques, comme par exemple la « chambre d'écho » et la polarisation. Les résultats obtenus sont en accord avec la théorie de l'adaptation à la communication, la théorie de la contagiosité émotionnelle et la théorie de la partialité négative. Les limites de cette recherche, les futures orientations de la recherche et ses répercussions sont ici discutées.

*Mots clés:* pouvoir des médias de masse, influence des médias sociaux, théorie de l'adaptation à la communication, algorithmes des recommandations, polarisation

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